The FIELD ARTILLERY Journal

JULY, 1944

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A NEW "PONY" EDITION of your JOURNAL makes its bow with this issue. Especially designed for our overseas members as a result of requests from them, it will regularly be sent to all members and subscribers with foreign, Fleet Post Office, or overseas A.P.O. addresses. Nothing has been cut from it—it is a complete JOURNAL with only the size reduced, photographically. We hope its portability will at least counterbalance the inevitable reduction in legibility which results from the smaller page size, and that its lighter weight will speed up its delivery through the mails.

We don't expect this initial issue to be perfect. Inevitably there will be some "bugs" that must be removed. One thing is certain—all our efforts are devoted to publishing as useful a JOURNAL as possible, with first priority always going to our members on duty abroad.

THIS MONTH'S COVER is straight from the Burma front. It shows Chinese artillerymen, American - trained, -equipped, and -led, firing on retreating Japs.

MANY MEMBERS still do not appreciate the necessity for our having their *complete address*, if their JOURNALS are to reach them. *Permanent* A.P.O. numbers must replace temporary ones at the earliest possible moment. *Unit designations* are essential. *Serial numbers* are a great help. If your friends aren't getting their JOURNALS, the chances are their stencils are in our "incomplete address" file. Send in your *complete* address — help us to *keep 'em rolling*.

The Field Artillery Journal

"Today's Field Artillery Journal is tomorrow's Training Regulations."

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Anzio beachhead, showing terrain problems our troops faced there.

FO Comments from the Beachhead

By Lt. Dale Van Hyning, FA

FO Team

FO methods are used almost entirely by the light artillery units in this theater. Large- and small-T are "out," except in rare cases.[1]

Every artillery FO should be able to conduct infantry mortar fire. He should study and practice it, and become familiar with the 60-mm, 81-mm, and 4.2″ mortars. On more than one occasion artillery FOs have been called upon to adjust the fire of these weapons in addition to 105-mm fire.[2]

Each FO team should consist of one officer and three EM. All should be trained in wire laying and splicing, plus radio. Knowledge of the service of both wire and radio by each member of the team is of the utmost importance. The team chief should be trained to shoot as well as the FO. The officer should have a detailed knowledge of the organization within the infantry regiment. All should be trained as infantrymen with infantry weapons (small arms). They should be equipped with infantry packs and carbines, and any special weather-resisting clothes which are an issue to the infantry.

There should be 3, but never less than 2, complete FO teams in each firing battery: BC, RO, and Asst Ex should each have his own team. For FO work the 610 radio is a bit heavy and comes in too many pieces; the 300-series used by the infantry is much handier. W-130 wire should never be used when you can get W-110: a shell landing 10 to 15 yards away is sufficient to knock out your 130 wire. A sound-powered telephone is very useful as a connection between your radio and observer—they seldom can be together in the same spot.

All infantry company commanders, their executive officers, and their rifle platoon leaders should be invited to your classes on the conduct of fire by FO methods. In battle they will conduct about 50% of your fire,[3] so you can easily see why they should be well trained.

The Firing Battery

Practice with 3-man gun crews. Teach your men in the kitchen how to work on the guns.

The flat top net is seldom used. Learn to use the drape—it's better many places.

Practice digging in the guns. Learn the use of sandbags; distribute them freely; let the men use them in constructing their holes.[4] Dig in the executive's pit to the flank of the guns, connect the pit to the guns by 'phone. Two men in each section should be trained telephone operators. Have two sections per gun complete, trained to function individually.

Much ammunition comes to you dented. Causing frequent jams, it is a major problem for the firing battery executive officer. Each section should have the tools and knowledge to deal with this problem.

Liaison

The artillery battalion commander, his executive officer, or some other selected officer should be with the infantry regimental commander at all times. The battalion liaison should be trained, by teams, in the same way and in the same subjects as the FO teams. It is not necessary to relieve them as often as you should the FO team, however. Their casualty rate is not high enough to necessitate more than one team per infantry battalion.

Fire Direction Center

Two men should be trained on each job in fire direction, plus two radio operators to work with your observation plane. You need three officers trained in fire direction work; the Asst S-2 could do the job.[5]

Survey and unobserved fire have been greatly overplayed. The only survey we use to any extent is a simple short traverse to tie the batteries into the map. (The idea that maps are always scarce is wrong—there have always been enough available to us at all times.) This simple survey can be put in the hands of a responsible non-com.

The primary reason for this suggestion is that in any action you can have 3 batteries being fired at 3 separate targets by 3 different observers. It takes 3 officers to handle this situation.

A great deal of emphasis should be put on operating under the confusion caused by several fire missions' coming into fire direction at the same time. This training will also help the computers especially, since they are the ones who have to pick out of the tirade of figures the ones which apply to them.

Adjusting Fire

Smoke shell is invaluable when registering on difficult terrain—and the terrain is always difficult. Change to HE, however, when bursts are out where you can see them, because (1) if you register your defensive fires with smoke Jerry will know where they are as well as you, (2) the variance between HE and smoke is anywhere from 50 to 200 yds., and (3) if there is no wind blowing you stand the chance of blinding yourself. Be careful when using smoke in a fight, or you'll obscure the target for yourself and for the other people who are firing in the area.

Nearly everyone uses smoke at one time or another during his adjustment. And when several people start adjusting in and around your target, which is often the case, a distinctively colored smoke will aid you in picking up your round.

Use time fire whenever possible; the results are excellent. Ricochet fire is not practical in this mountainous or boggy terrain. Practice adjusting time fire by FO methods a lot. The third factor, site, which you were teaching the FO to send back with the rest of his sensing, doesn't work well. Let fire direction

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[1] This statement is doubtless true of the situation described, but combat has shown that successful destruction, without which advance is impossible, can be achieved only by precision methods, sometimes with direct laying.—Ed.

[2] This usage makes heavy demands on communications; either additional artillery lines or use of a complicated net through both artillery and infantry switchboards.—Ed.

[3] A general situation of this sort suggests a rather alarming lack of knowledge as to infantry needs on the part of our forward observers, unless very special terrain conditions utterly pin down the FOs and prevent their observing more than a tiny area in their immediate vicinity.—Ed.

[4] Parapets? or as revetment?—Ed.

Editor's note: Lt. Hyning has been "through the mill" as a forward observer. His latest assignments have been on the Anzio-Nettuno beachhead, where he was wounded. His definite conclusions bear the stamp of true authority—battle experience.

[5] But only in the special case where little survey is required, due to the availability of accurate maps.—Ed.

pick up the site from map data. It works better that way.[6]

The new M48A1 fuze makes the round a bit difficult to sense. Make your adjustment with SQ fuze, then switch to delay for effect.[7]

When shooting at tanks or armored vehicles wait whenever possible until they stop, then open fire. The only alternative is to wait until they near a registered concentration, and by judging their speed and the time of flight of your projectile get the two to come together. It is extremely difficult to accomplish this feat. You cannot hope to hit the tanks except for a lucky round, but they will button up and on many occasions leave. They don't like artillery fire.

Register on all roads and draws leading into your area, using time on the draws and both time and percussion on the roads. WP is effective in driving the enemy from their holes at the extreme ranges where time will not reach. Zone fire works very well against infantry advancing in the open. It speeds operations a lot and you do need speed. Use WP for adjusting counterbattery at night, then switch to zone for your effect. You'll get results.

[6]But only when maps are excellent and targets are accurately reported by coordinates.—Ed.

[7]For ricochet fire, must test for it during adjustment, and use delay fuze for effect only if ricochets feasible. If ricochet not useful here, why use delay at all, especially for effect?—Ed.

INFANTRY—ARTILLERY ON THE ANZIO BEACHHEAD

By Lt. J. W. Ault, Inf.

Our objective was the RJ 2,200 yards southwest of Cisterna. We took it without a great deal of difficulty. Then we tried to go farther east and got into a small area where we were pinned down by fire and could not move. When we stopped there we had two artillery barrages prepared by our direct support battalion—one across the road and the other in a small creek bed. The Germans were very close. We could see them light cigarettes, hear them talking and digging, and hear their trucks coming in and the sound of guns being unlimbered and getting into position, but they were just out of effective rifle range.

We were pushed off our OPLR and back to our MLR. When the Germans made a strong push we would call for the normal barrage, and I am sure these intermittent barrages were all that enabled us to hold.

Later we advanced up the road through Isola Bella toward Cisterna. We never would have gotten very far without our artillery fire in front of us.

Our battalion commander went into a house just west of Isola Bella in the dark and occupied it as a CP. Fortunately he got up early, because when he went into another room in the house he found three Germans sleeping there. They had dug in through a hole under the floor. They had machine pistols. Probably they were in there when he entered the house, but were asleep.

Two days later we used as a CP another house near a cross roads, occupying the ground floor. Finally we went up to the second floor to see how the visibility was and found a German OP party there!

The Germans are deadly accurate with their mortars; we even had a mortar in a pit knocked out.

BEACHHEAD BRIEFS

EXTRACTED FROM A LETTER FROM S-3 OF AN ARMD FA BN

"This Italian war is nothing like the old North African campaign as there is plenty of defilade, although you have to stake out a land claim to get a gun position. Sometimes things move very slowly so that one position will last a long time. One always gets shot at every so often, but we have been lucky and haven't had too many people hurt, considering everything.

"'Jerry' drops personnel bombs 3 or 4 times a week (always at night) similar to the old butterfly bomb. Everyone is well dug in with cover overhead. It is a good thing it is easy digging here.

"I have a double CP tent for S-3 office now. The top is even with the ground, but I've refused overhead cover in order to have daylight during the day. Our 'tracks are dug in at least to the top of the tracks, with the motors usually lower than that. It is all hard to believe, but it is the truth.

"Ground OPs are scarce here. Visibility is greatly limited and the Cub comes into its own. Of course, Jerry has all the high ground and we are in the center of a big bowl—but that is life."

SIMPLE METHODS ARE BEST

In the early days of artillery, the artilleryman's technique was a professional secret. An aura of mystery surrounded it. None but a chosen few were initiated, and they jealously guarded both their esoteric knowledge and the prerogatives which it brought.

In recent years, however, artillerymen have completely reversed that attitude. Even in a time when over-organization and compounded and confusing duplication of effort mark many fields, artillery technique has been steadily simplified. It has now reached the point where even an infantry private can receive his first lessons in the heat of battle and successfully destroy an enemy position.

"Somewhere in Italy" Pfc. William C. Kelly was manning an OP for his infantry regiment, part of the 36th Division of the Fifth Army. Sighting some German mortar and machine gun emplacements, he reported them to his CP by phone and further stated that there was no artilleryman at his OP to bring fire upon them. The artillery liaison officer at the CP

gave him hasty instructions in forward observation methods, and told him to stand by. A round of 105 HE was fired, which Kelly sensed by reporting deviations from the target in yardage and compass directions. His third round landed on an emplacement, and fire for effect immediately smothered the German positions.

Incidents of this sort clearly show the strides made by our artillery in rendering the utmost support to our infantry.

AN LnO IN THE RAPIDO CROSSING

By Lt. Paul F. Richmond, FA

I was LnO with an infantry battalion which participated in the second crossing. Our battalion was the left of the two battalions which crossed south of San Angelo. I was with the battalion commander, who at first stayed east of the river behind the hill line helping direct the men along and generally supervising.

Our party crossed the river in rubber boats about 1830, accompanied by an observer from another division. 50 yards west of the river we halted to await the infantry battalion executive. We stayed there about half an hour, during which time the rest of my section joined us. Although the executive did not show up we then started forward, following a wire line laid to where the CP was supposed to be located. After we had gone some 500 yards a mortar barrage came down and we got into a little irrigation ditch; each mortar barrage consisted of 50 or 60 rounds at a time. The ditch quickly filled pretty well with men from rifle companies and some medical corpsmen. There was quite a lot of confusion—men were calling to each other to find out if their particular pals were there. Every time there was any noise at all fire from machine guns and rifles would come in, so I crawled along the ditch to try to get the men to quiet down. I then tried to get back to the battalion commander but could not find him; he had given me no indication that he was going to leave and it was so dark you couldn't see your hand before your face. There was no moon and lots of fog and smoke decreased the visibility. Deciding that I would not be able to find the battalion commander, I rounded up my three men and we again started following the wire forward. It seemed that the wire ran more to the left and to the south. We kept on along with some medical men and some others who had been in the ditch, all moving in small groups. I can't estimate how far along the wire was, maybe 200 or 500 yards, but finally we found the Hq Co commander who was laying the wire. I joined him and his small group with his wire reel, and we kept laying wire toward where the CP was supposed to be. About the time we decided our compasses were not working right and were not sure which way we were going, the wire ran out.

The Hq Co captain and I decided that under these circumstances we would split up and follow the wire back to the river to contact the battalion commander and find out what was going on. During this time we heard no mine explosions and hit no barbed wire; I think we had been moving parallel through wire.

I got the three men of my detail and we started back, following the line. We fell into irrigation ditches and my compass got wet so the needle stuck. About halfway to the river we found the wire had been cut by a large shell, perhaps a 155, and then had the problem of finding the other end of the wire. We searched all around, keeping hold of the end we had. Although we covered an area probably 100 yards square we could not find the other end at all.

I am not sure what time it was—probably about 2100. All the time that we had been following the wire the slightest noise, even a cough, would bring small arms fire. We were just hopelessly lost—did not know which way to go. From that time we wandered all night long except for an hour or two; a few times we had to drop into a ditch to get out of a barrage. The men were getting tired carrying the 610 radio and the telephone. We stepped into a ditch and listened to the artillery fire, trying to get some kind of orientation. I let the men rest an hour and a half or two hours, then decided we had better get off the flat country. We came out of the ditch to hunt either the river or the front line companies; I assumed the battalion commander was near the river.

As we started there was one of those lulls in the firing and I heard what I was pretty sure was a 2½-ton truck on our side of the river, which at last gave us some indication as to direction. Moving toward that sound we came to the river within two or three hundred yards. First we went in one direction and then in the other to find a point of crossing, as we had met several wounded men who told us of having crossed on a footbridge; we assumed that bridge was still in. It was now starting to get light but still quite foggy and smoky. We hunted for 45 minutes to an hour but just couldn't find that bridge, so we dug us some holes along the river bank as Jerry had started throwing mortar barrages right up and down the

155-mm guns give forth considerable concussion. Different reactions to it—and attempts to minimize it—clearly appear here. No. 1's shoes are only half tied; perhaps he was suddenly aroused for this fire mission?

river. He certainly covered it thoroughly, and one round falling in the river threw water up over the bank and into our holes.

All this time men were drifting up and down the river bank, looking for the bridge—but none seemed to find it. We just stayed in our holes and dug deeper all the time until they were down about 3 feet. By then we were completely exhausted and rested until about 1000. About that time my corporal took it on himself to scout around for the bridge—I did not tell him to go, he just beat it. He came back about 1045 or 1100 having found the bridge 800 or 900 yards upstream from where we were. It was only about 300 yards in a straight line but the river was very twisting and winding. It seemed that the corporal had seen a rubber boat drifting downstream and that had given him a clue where the bridge might be. In other words, he had used his bean.

We loaded up our radio and equipment and started for the bridge as hard as we could go. Only two rounds fell near us—it happened to be one of those lucky times when there was a lull in the firing. A small footbridge (which had been built on rubber boats) was in pretty sad shape: a number of the boats had been shot away and what was left of the bridge was tilted sidewise so we had to crawl across on our hands and knees. Again we were lucky, as the Germans did not fire while we were crossing.

It was 75 or 100 yards to the hill line. We went up a little trail and found the battalion commander—this was my first contact with him since we were separated the night before. We sat there with him in the ditch and pretty soon along came the two FOs from my battalion who had been with the infantry battalion on the right. The LnO who had been with that battalion had been wounded, although these men did not know it at that time. They had no radio; it had been destroyed and the man carrying it wounded. Then the commander of the right battalion joined us. The sergeant of his artillery liaison detail had his radio set up and one FO was there; he and I, with the commander of that right infantry battalion, fired several missions on points across the river—defensive fires requested by the battalion commander.

It was decided to set up a defensive line along the hills, about the same position we had occupied before the attack. I took one radio and moved forward a bit to where the men were digging in. The commander of my infantry battalion decided to set up in the same CP he had used before we started across. I contacted my battalion to get some FOs to work with us.

We had had two FOs, one with "K" Co and one with "I." While the one with "K" was crossing his rubber boat turned over and his radio was lost in the river; he had returned to the recent infantry battalion CP to request another radio by phone and while waiting for it had been wounded. What happened to the FO with "I" company we do not know as yet. We think and hope he was captured, as he was not found during the truce which later followed to clear off the battle ground. He had gone forward with "I" Co, set up his radio, and tried to get artillery fire. Men of "I" Co think he was captured.

When the two new FOs arrived they were placed out in OPs for a defensive situation.

SELECTING POSITIONS AMONG MOUNTAINS

The first consideration in choosing artillery positions has proved to be *flash defilade*. There are other considerations, of course, which must be borne in mind: range, accessibility to routes, feasibility of occupation, cover, etc. Because of the mountainous character of the Apennine terrain, the limited road net, and the comparatively large amount of artillery employed in operations, almost invariably there are rather close restrictions as to areas for selections of positions. Within these restrictions, however, the primary consideration remains defilade when and if it can possibly be obtained.

Battalion commanders start seeking positions near the front, and then work back until they find a suitably defiladed spot. Of course, they cannot always have all the space they want. Sometimes the assigned areas are pretty tight. In fact, sometimes batteries fire over each other and are practically interlaced.

In any event, defiladed battery positions come first and the other installations do the best they can, in what space is left.

While overhead cover to prevent air observation is desirable, positions under large trees are to be avoided because they convert percussion fire into air bursts which will reach personnel in trenches. [Our own alert observers can often turn this trick against the enemy, be he German or Jap.] One battalion had one battery in the open and two back under trees; although the one in the open received a lot of shelling it suffered no casualties, whereas those back in the trees took a number of casualties from relatively light shelling. Of course these remarks refer to tall, large trees, not to the small, light olive trees which are so plentiful in Italy and which afford excellent cover with no significant fragmentation risk.

It is imperative that guns be dug in completely, or partially dug in and partly reveted. When sand bags are scarce, wooden cartridge boxes filled with sand and covered with soil make excellent substitutes. Any other expendable containers will work just as well.

The men dig right in when the situation gets hot. If bombardment seems likely the men need no urging to dig. Excavations are frequently made on the reverse side of banks or terraces.

After choosing battery positions the search begins for CP and FDC sites. The first considerations are the same for both—that is, cover and a central location from which the battalion can be controlled. *Facility of contact* with the batteries is the first aim, then contiguity to the CP of the supported unit. This latter is desirable but not always possible. As one officer puts it, "the infantry regimental CP moves forward by short bounds (a mile to a mile and a half at a time) but the artillery battalion displaces in 6,000- to 8,000-yard jumps. Battalion CPs must be within controlling distance of their batteries because of the difficulty of maintaining communication. For these reasons it is standard practice everywhere for the direct support battalion to keep a liaison officer at the infantry regimental CP."

In Italy it is SOP to keep the FDC at some distance from the battalion CP—anywhere between 150 yards and ½ mile, depending upon the cover. Incidentally, there is no SOP solution to locating CPs and FDCs. Locations must fit the terrain; cover and concealment must be sought.

Italy's abrupt slopes show plainly in this panoramic view of the Fifth Army's sector between Gaeta and Cairo, taken from a point overlooking the Garigliano River and apparently from near Canale or S.M. a Vologno, about a mile south of S. Carlo. Right edge of the photo faces nearly due north, the left one points practically due west. At the left is Minturno, with part of the coastline at Formia and Gaeta beyond. Then, on the river, is Castelforte. Further to the right appears a smoke screen over the Pateley Bridge sector (south of S.M. di Mortola); the black smoke rising from behind the hill just to the right of and beyond the smoke screen is from an Allied bombing raid on S. Andrea. In the right foreground are the villages of Conche and San Carlo, with Mt. Cairo, Montecassino, and Cassino in the distance.

Many outfits keep a duplicate firing chart at the CP, where they have a "snoop phone"; a recorder listens in on all missions and keeps the chart posted. With the CP (S-2) and FDC (S-3) always separated, the whole thing can't be blown up at once.

Sometimes both CP and FDC are in front of the battery position. For example, when the gun positions are fairly close up behind a slope, as frequently occurs in mountainous terrain, very good shelter can be had on up the hillside. The best CPs have been in those rare cases when a good dry cave was available not too far away. Other good locations are in a quarry or behind a steep terrace or bank. Solidly built stone houses of the Italians are helpful in cold weather, but under no circumstances should an isolated building be chosen nor should the availability of a good CP influence the choice of battery positions.

If no such protection as that outlined above is available, if the soil permits the FDC must be dug in four or five feet and the site reveted several feet more by sand bags filled with the spoil. Only when a protecting bank or terrace is sufficiently steep and high should a truck be used for the FDC.

Similar consideration applies to a divisional artillery CP. It must be located primarily for ready control of the battalions, and only secondarily for accessibility to the division CP. If the two are some distance apart the division artillery commander maintains a representative in the division CP.

OBSERVATION IN ITALY

FORWARD OBSERVERS

In rainy weather the percentage of observed fires of course diminishes, and there is extra need for full cooperation among all observers. Every effort is made to obtain observation, and observers readily assist each other. For example, one FO recently completed his adjustment but just as he was ready to fire for effect the target was obscured by a cloud; another observer on an adjacent hill advised that he could see the target and that the effect was coming in fine. Every opportunity is taken to check calls or scheduled map data fires, either by FOs or by air observers. Such map data fires are frequently corrected due to such observation.

All commanders stress that *flexibility* is constantly sought in the use of observation. When an FO reports a target the battalion which offers the best possibility of fire is usually selected, so a FO can expect to fire his own battalion less than half the time. Since division artillery FOs frequently adjust corps artillery battalions (and vice versa), targets are almost invariably designated by map coordinates. *Forward observers must know how to use maps*.

One battalion in effect conducts service practice on the battlefield. To keep seasoned officers on their toes and to instill confidence in inexperienced officers, a BC is sent out to work with a forward observer who is known to be "green." Under this tutelage the latter does some service practice on points where there is reason to believe there may be some Germans.

One medium battalion finds it more important to search for standard OPs than for forward OPs as such. It then helps out the lights by furnishing FOs for them, especially when forward OPs are to be leap frogged. Wire always goes to OPs of any type, except in those rare cases where radio relay must be used.

In one division it is the policy to keep out three FOs per direct support battalion, and at times three for the general support battalions also. Its FOs have adjusted corps battalions and theirs have adjusted divisional battalions. The latter have been adjusted by infantry FOs as often as 14 missions in a single day, some of them observed and adjusted by infantry corporals.

One mission was started by a private in an infantry regiment out on the division's left flank. Communication was thoroughly complex—from him to his company switchboard by voice, then relayed to the infantry battalion and thence to the infantry regiment; as the direct support battalion was out of range, the mission went to the division artillery switchboard and then by radio to the corps fire control center which passed it on to a corps 155 gun battalion. The mission took 1¼ hours but it got results.

The artillery of this division has a school for infantry battalions, in which infantry officers get practice in forward observation methods. It has prepared a little directive for general circulation among the infantry to encourage men to observe on fire missions; all they have to do is send compass sensings.

All battalions in this division run a pool of FOs. Such detail lasts about 5 days as the new FO goes out at night and reaches the OP at dawn, when the old FO points to him the base point, check point, and terrain features. The old FO must remain at the OP throughout that day and wait until night to get out and go back.

A great many of the most remunerative targets are seen at early dawn and toward dusk.

LIAISON OFFICERS

Closely related to the work of FOs is that of the LnOs. The LnO and FOs with an infantry battalion are regarded as a team whose members are coordinated by the LnO. Some artillery battalions place the FOs directly under the LnO, others only require that an FO notify his LnO when he is going to move and get his OK. The object, of course, is not to have all FOs displacing at the same time.

FOs must get where they can see, and not become so tied to forward infantry elements that they become involved in the fire fight. Particularly in light battalions the LnO frequently acts as an FO and conducts fire—not that he goes chasing off on his own, but because he accompanies the infantry battalion commander.

All battalion commanders in one division are agreed on the following: "We put our best people on the job as liaison officers. We need all three because the reserve battalion seldom stays out very long. It is a terrific, wearing job. You can change your FOs and give them some relief, but it is hard to do it with the LnOs because an infantry battalion commander wants to keep his own LnO, whom he knows, with him. The LnO does just about the same job as the FO—there is really very little difference. He accompanies the infantry battalion commander, who wants to get out where he can see and direct his battalion and then turn to his LnO and tell him to place fire on a certain place. When the LnO is worn out and just has to be relieved, we call up a battery and ask for a relief."

EXTREMES IN OBSERVATION

By McKenzie Hill

It is an American trait to go from one extreme to another. In our army the current extreme fashion or mode in observation is forward (or sometimes called close support) observation. The current thought in some quarters is that all fire must be conducted and adjusted by forward observer methods or by air observation.

An overwatching or surveillance observation post is now either looked upon with disfavor or relegated to the role of a general information gatherer. Overemphasis on close support and forward observation may in many cases preclude our seeing the woods for the trees. Overemphasis on overwatching or surveillance observation will certainly preclude our seeing the trees for the woods. Both types are essential to successful combat.

Current regulations emphasize coordination of observation. Little is said on the subject of maneuver of observation. Emphasis is often placed on the maneuver of the guns. How much more important is the maneuver of observation! It will above all facilitate maneuver of fire. In order to maneuver fire, skillful maneuver and coordination of observation is necessary.

Commanders must view their observation facilities as maneuverable tactical units which are maneuvered, coordinated, and allocated in order to see not only the woods but also the trees. Battles have been lost through overemphasis on close observation, and from a lack of overwatching observation which would have discovered and neutralized flank attack by fire or movement of enemy troops or weapons.

A LETTER TO OBSERVERS

By Capt. Ray C. Brewer, FA

Observation and the adjustment of fire may at some time be the duty of all artillery personnel, from the chief of a gun section to the battalion commander. We have reached the maximum use of our artillery when this function of observation is extended to officers of all other arms, limited only by restrictions of communication.

Individual exploits of artillery observers have become so commonplace that they must wait for detailed accounting at some future meetings of veterans' organizations. These include the chief of a self-propelled gun who, by choice or necessity, engages the enemy at close quarters from a hidden position; and who, by indirect methods, adjusts his fire from a point of vantage within voice call. Included also is the officer of a reconnaissance patrol who climbs a hill and sees enemy men and materiel at his feet. He yells "Enemy batteries about 3,000 yards east of ——. I want some artillery fire, quick." Through three voice relays his message goes on the air over the vehicular radio shown below. His unit command base set receives and, by previous arrangement, transmits directly to the division artillery. By wire from here it goes down to one of the artillery battalions, and the fire begins to come out.

They are, one and all, unbound by routine methods, and possess the scope of imagination to adjust themselves to the circumstances as they exist. In this discussion all the above will be referred to under the general term of "observer."

ABOUT THE AUTHOR

Capt Brewer speaks with full authority. His extensive experience and exploits as an observer in Tunisia and Sicily have earned him the Silver Star with an Oak Leaf Cluster. He is now with an armored unit in Italy.

LIAISON WITH THE INFANTRY

In a rapid advance of the infantry (5-10 miles a day) continuous observation can be obtained only by two teams leapfrogging one another. The infantry dispositions will frequently allow the LnO to hold the pivot while he sends a message to the FO, pointing out an advantageous OP in their line of advance. A common channel might be used, but it is

desirable for these two to lay wire between them. An early and constant exchange of information is facilitated and the malfunction of either radio will not break contact with fire direction. It will be found that aggressive observer parties soon pick up such miscellaneous equipment as extra phones and light wire, remote control units, 536 radio sets, infantry power phones, etc. Observers can function under favorable conditions with only glasses, a dog-eared map, and a single means of communication. But with all or part of the above-named equipment, it is difficult to conceive of a situation where communication is not possible, besides giving the observer flexibility of action commensurate with his ingenuity.

As long as physical condition permits, there should be no change among observers with the supported units in a particular operation. Personal acquaintance and the confidence thus bred must be zealously guarded.

Your conduct with supported troops should be such as to induce them to seek you out with information. Contact every possible source. Cultivate the infantry reconnaissance officer to know where their patrols are going and what they find. Ask the infantry battalion commander for dispositions of his sister units. Question the reconnaissance troops. Check on any force of whatever arms that goes forward on some special operation. Only through a heads-up state of cheerful curiosity can you give your own commander a true picture of the lines at any moment and yourself complete confidence in asking for fire.

When the supported commander requests "all available fire," assure him that it is practically on the way—but tell your commander what is there and then he and the artillery commander can judge.

Be alert to identify friendly fire falling too near our troops. When you've stopped it, make some casual remark.

Don't hesitate to ask the infantry for any needed supplies or help: food and water, extra telephones and wire, use of existing wire, help in laying wire to you, etc. Your interests are theirs. If you wish to reach a hill of doubtful status, ask for a patrol to accompany you. If established on an advanced OP when night falls, request an outpost guard.

Fire Direction

It may happen that dawn, the clearing of mist or smoke, or the occupation of a new position suddenly reveals a large number of targets. Every observer calls for a battery and keeps it so busy that half a day might pass before the battalion can be tied together. The first observer to fire for effect on his target should immediately request one gun from the second battery for quick adjustment, then likewise for the third battery. Such a need for rapid adjustment justifies the use of a reasonable short and over, corrected by a good sensing. Perhaps all the possible errors cancel out, but battalion shifts from such as these are as effective as deliberate firing of one *c* up and down from the center range or going through a zone of depth and width. True, we ignore the "prominent feature—center of sector," but other observers can always have the base point marked with a round of smoke.

Survey does not lose its importance whenever possible of application. In its absence the ever present and dependable 1:50,000 map can and does do wonders. With diligent inspection, data can be applied to give transfers of fire with harassing effect at the least. If sound-and-flash units are not available you still have the basis for a workable flash system. Any two observers with aiming circles can inspect their locations and read the azimuth and site to a target. Adjustment for destruction can then be made by the same two observers, by day or night. Such data, if not then fired, builds up a picture that might influence the artillery commander's decision.

You cannot conduct an intelligent argument from FDC with a man up in the front lines. In one case an observer's urgent call for fire was being held up by such questions as further nature of target, number of men and animals, direction of movement, check with higher command for location of front lines, etc. His reply, delivered personally with never a let up on the push button: "I am with the infantry. I see the enemy running all over the landscape. You sent me out here to support infantry. Will you *please* give me fire?" For the next 20 minutes this officer wielded the fire of his battalion over the enemy-infested landscape much as a small boy uses a hose to wash down the chicken house.

Air Observation

Every effort must be directed toward cutting down on the time of flight. When fields are located some distance to the rear, a little radio trouble develops, and poor map reading is in evidence, the enemy receives a leisurely warning. Good map reading on the ground is only fair in the air.

Training of air observers (and several alternates) should be comprehensive enough to give them close familiarity with the plane and its behavior under all conditions. Know something of manhandling the plane on the ground, starting the motor, picking landing strips from the air, making and caring for fields, navigating cross-country, and doing some rough, purposeful maneuvering to settle the liver. Include a working knowledge of the wing-wiggles that can fire a mission when the radio goes out. Learn a safe altitude for flying under your guns' trajectories. Short of qualifying as a pilot, you become of real assistance to the pilot; and, more important, you can accomplish your mission with dispatch and with a minimum of distraction.

Close reconnaissance flights with probable fire missions will become more frequent as the advance slows down. Nor does lack of ground observation indicate the optimum use of planes. On the contrary, when high ground gives you good observation, more high ground will hide the enemy.

Every landing field out of which observers operate can well maintain an up-to-date situation map of their sector.

Pack Mules

When you take unto yourself a mule, you must meet the essential minimum of fastening on a pack that will stay. Every member of observer parties may well know this. With a mixed load (blanket rolls, case of "C" rations, 5-gallon can of water, telephones and wire, radio, extra batteries, etc.) the Double-Diamond hitch is most dependable. No diagram will serve in all cases. The load at hand must result in a balanced, low-center-of-gravity, securely fastened pack. Remember that the basic pack, excluding the radio, will be removed once or twice a day, while the radio might be unpacked a dozen times. By interconnecting the carrying straps between the two units the complete radio can then be slung across the basic load and lashed down tightly with additional rope.

How the native can pile innumerable bulky objects on a saddle having no sign of a projection for fastening, and then balance himself serenely on top of all, remains an unsolved mystery. For our purpose a minimum of holds consists of one at each lower corner of the saddle. Improvise these by gouging holes and threading through a short loop of rope. Telephone

wire may supplement the rope for fastening, but in no event must anything but the saddle itself touch the animal. Breast strap and breeching, both necessary for rough going, can be made up or repaired with web belt, strips of folded canvas, or doubled rope.

The mule is a wonderful animal. You put one man on either side of the saddle and yourself take the bridle, and with misgivings pray that together you can keep him and the pack upright and quiet in the darkness. Instead, you find your sturdy friend holding you all three to your feet on some of the steepest paths. Your mule, if decently treated, will exhaust you in endurance, but he forcibly resents a shifting pack by the simple expedient of quickly getting out from under it.

Take a look in farm buildings for oats or other grain. Search the fields for grain, beans, and hay. Green grass and leaves soothe but do not sustain. Water at every opportunity, but at least once a day.

Miscellaneous Notes

The enemy plays heads-up shooting. Profit by his dodges and turn the tables on him every chance you get. When he fires time or smoke for adjustment or to mark targets for mortars or bombers, throw some of the same back over his own area. He will get a stealthy adjustment by shots at widely-spaced intervals, accomplishing thereby surprise fire for effect while keeping his position secret up to the last minute. It is suspected that, when we reach certain points, he already has the range for them. Yet he sometimes shoots at suspected targets. He can walk his fire along a road or follow a winding gully with commendable ease.

His use of a high time burst gives harassing effect over a wide area. He does not always fire heavily for effect, even when a fair adjustment has been obtained; rather, he keeps coming back with a few rounds at odd intervals. This constitutes a most efficient use of limited amounts of guns and ammunition, whereas we are prone to put a dense battalion concentration on the target and then report it as destroyed. There is some of our ammunition wasted on flash (dummy) positions. The enemy sometimes makes adjustment extremely difficult for us by emplacing his guns on the top of a ridge, their silhouette blending into a higher ridge beyond. Their radio intercept is in close liaison with their artillery, no doubt about it. Beware lest you respond to his spurious fire commands or orders to assemble at some given point. It is worth his time, on occasions, to send planes out with the mission of neutralizing a particular observer.

It is a subject of much curiosity to see single strands of enemy communication wire, both heavy and light, running for miles about the country.

An overall rule concerning booby-traps: never touch anything doubtful unless absolutely necessary.

As for digging in, remember there is no more unhappy frame of mind than that occasioned by finding yourself top man in a fox hole. Even if you're quicker than the other fellow, you stand to lose his friendship thereby. It is better to acquire for yourself some infantry intrenching tools.

You can aid your commander's reconnaissance of forward areas by sending back data on road craters or blown bridges, and possible by-passes. Ask the engineers how long it will take them to open the road for traffic.

In reporting intelligence, be reluctant to send a "panic" report. To blurt out with "Strong enemy force moving eastward in vicinity of ———" might result in a combat command on the move before you've reconsidered your estimate. Be strictly factual.

Echoes in very rough country blend all reports, friendly and enemy alike, into one great indistinguishable noise.

It is estimated that considerable savings in men, materiel, and time would be effected if the average soldier and officer was trained to tell a friend, simply and clearly, about a particular turn-off at a definite point on a certain road.

Train every man of your section as a radio operator, and every operator in relay procedure. Practice encoding and decoding with your particular system until you can do it with great speed and no error.

Sherman was a master forager. A small demonstration, employing a little American tobacco, will often yield surprising results: good native bread, wine, and cheese that really fortify you.

Conclusions

Control in our artillery is from front to rear; it abuses its function, however, when there is unnecessary delay in granting a request for fire. Absolute confidence in observers is thus a fundamental necessity. Visits of the battalion commander to observer parties steady the younger officers and permit considered judgment during action. Always obtain for them blanket clearance in attacking targets of opportunity, especially when the role is a reinforcing one. In turn, demand that they elaborate on the "nature of target" item of fire command to give fire direction the clearest picture possible.

Encourage each observer to alternate among fuze quick and delay, time, and smoke. Only so can he become proficient in their best application. They are every one disturbing to the enemy in some degree and, when mixed, give him a high regard for our methods in the conduct of the war.

The psychological effect of our fire, plainly visible to supported troops, must be recognized. To see our fire falling in enemy territory reminds the front-line soldiers that we are still-with them, and that the other side is no doubt feeling uncomfortable too. Our harassing and interdiction fire at night is conducive to sweet dreams during the infantryman's short sleeps.

Observers need relief, but weigh against this the problem of orienting a new man. Many important details can be overlooked, and broad knowledge of the situation and the temperaments of supported commanders are not easily conveyed to another. Nor must it be said that an artilleryman is not as good a camper-outer as an infantryman.

Field artillery training needs to recognize abnormal conditions; let us say, rather, that normal conditions are seldom met. This indicates no change in basic teachings, but a need to give the observer a quick look at as many "abnormal" conditions as time permits and a vivid imagination can conceive. Practice placing fire down in a cut, then up on a peak, and then halfway down on a shelf. Repeat, using time. In double time, adjust one each of your guns on each gun of an enemy battery. (You do not report such a target destroyed until you see their wheels fall off.) Pick a target on the ridge top. Bring a battery concentration to bear on a moving vehicle. Adjust from a neck-deep fox hole or buttoned up in a tank. Practice in adjusting the fire of weapons other than your own—from mortars to Long Toms. Success from the best OP at 10-15,000 yards requires both a good eye and high-powered glasses.

Your reward is when the tired infantryman lifts his dirty face and says, "We're givin' 'em hell, ain't we, Lootenant!"

NIGHT WORK IN ITALY

"New positions are selected during the day, and we send forward three men per section to dig gun pits before the battalion arrives. These men must have mine detectors, as the Germans mine and booby-trap the most likely battery positions. Routes into the position must be swept for each individual gun, for the switchboard, and for all other installations including the motor park. You have to teach your men to stick to the swept paths and not go wandering about in the night—if they do they will get blown up. If a man finds a mine do not let him play with it—he must mark it and leave it.

"All occupation of position is at night, although of course a battery occasionally may have to change position in the daytime, if it gets caught by fire. You must complete your camouflage and all other protective measures at night; this includes sinking your guns.

"Occupation of position in training should be in the most difficult terrain obtainable. In one position we occupied we had to let the guns off the road by winching them. You have to teach wire crews how to find a switchboard at night (over beyond that hill in a gully). Stress night service practice and night service of the piece. We have had to occupy positions at night, and fire before morning. The battalion gets its place marks and direction from division artillery. We do high-burst ranging at night; this is as good as a daytime check concentration, if you know how to use it. Learn how to do this while still in the States.

"Insist upon observation all night long. It is at first daylight that you see things. The OP should be manned at this time. Furthermore, I do not want to ask at dawn about the FOs and be told 'they are on their way up.' I run two FOs in each infantry battalion, one from the general support and one from the direct support battalion. They leapfrog each other and keep in communication with the LnO, who tells them where to go and when. The FO does not accompany the infantry company commander—he must stay where he can see."

Mt. Trocchio is lit up like a Christmas tree by Allied shells. Spots in the foreground are muzzle flashes from 105s. This photo is a 20-minute exposure from an OP.

USE OF WHITE PHOSPHORUS AGAINST TANKS

By Maj. Edward A. Raymond, FA

Enough American artillery units have fired WP shell against German tanks in Tunisia, Sicily, and Italy to provide conclusions on its use. "It all depends on the situation."

WP Smoke should be used in conjunction with HE when firing upon an area in which tanks are stationary.

WP Smoke should be used when it can ignite fields through which tanks are moving, as it did when fired by the 1st Inf Div Arty at Gela.

WP Smoke should be used with great discretion in attempting to stop a tank attack. Under favorable circumstances it can blind enemy crews, and if the Panzers push on through the smoke they emerge momentarily disoriented and clearly silhouetted against the white smoke. On the other hand, the Germans themselves often use smoke to screen tank movements; use of smoke may merely protect the tanks by preventing the use of more destructive ammunition. Furthermore, the use of smoke by one unit on a battlefield may interfere with action of another unit. After the Sicilian campaign a number of battalion commanders recommended some form of divisional control over the use of WP for this reason.

The Germans feel that smoke can become an important weapon in combating tanks. They have made tests for the close attack of tanks by infantry armed with smoke grenades. There is no indication that the smoke was WP or other incendiary smoke. When the tank was stationary, with hatches closed and engine running, one smoke hand grenade caused evacuation of the tank after a short period. With the engine not running evacuation would also have been necessary in a few minutes. Grenades were thrown at a moving tank with its hatches closed; they did not lodge on the tank. While the vision of the crew was reduced, there was little penetration of smoke into the tank. Those German tests are cited for their indirect bearing only, as the nature of the grenades used is not known and comparison with artillery shells is not possible.

So we find that WP can be useful against tanks, 'though its use is tricky and demands a high degree of gunnery sense. It is not a sure-fire Panzer panacea.

"SNIPING" WITH A 155-MM HOWITZER

By Lt. Col. Joseph R. Couch, FA

So much emphasis has been placed upon the use and excellent effect of massed artillery fire that some artillerymen may forget that precision fire is still highly important. Often a single gun adjusted skillfully by precision methods will accomplish a mission more effectively than would several battalion concentrations. Obviously, the ammunition expenditure is much less for precision fire.

Our battalion of 155-mm howitzers, Corps Artillery, was in position north of the Volturno River in Italy. The terrain was mountainous, with huge rocky crags providing OPs for both our observers and Jerry's. It was evident that German observation was good, for two small towns and a supply road near the front came under constant, accurate enemy fire.

One of our observers finally spotted a German OP across the valley. It was located on a sharp, knife-edged ridge, well camouflaged in a dugout, with good overhead cover. It was reported to Division Artillery and taken under fire by a battalion of 105s. They obtained a bracket and fired several battalion concentrations, but when the smoke cleared away the OP was seen untouched and still in operation. Later in the day the Division Artillery adjusted on the point with time fire, but again were unsuccessful in putting it out of action.

Our observer was allotted a single gun by the S-3 and was told to see what he could do. A bracket of 25 yards was obtained, then 3 rounds were fired for effect using delay fuze. The second round in fire for effect was a direct hit, and OP and contents were plainly seen to be blown high into the air. With no attempt to suppress his elation our observer reported "End of mission. End of dugout."

8-INCH HOWITZER ACCURACY

The forward observer of a light battalion was at an OP on a hill about 700 yards north of Cassino. Seeing a building in the town which should be destroyed, he phoned its map coordinates. At the FDC of an 8-inch howitzer battalion these were corrected to true trigonometric coordinates. The first round struck the building and the 5 subsequent rounds, all direct hits, destroyed it.

A divisional artillery commander reports, "There was an old feudal castle in a saddle between two hills, up on our front. The Germans held one hill, we occupied the other. At that point the lines were about 400 yards apart with the castle midway between them. We got within 50 yards of it once, but were counterattacked and were driven back. One of our forward observers adjusted an 8-inch howitzer. The first round was effective and 35 rounds demolished the castle.

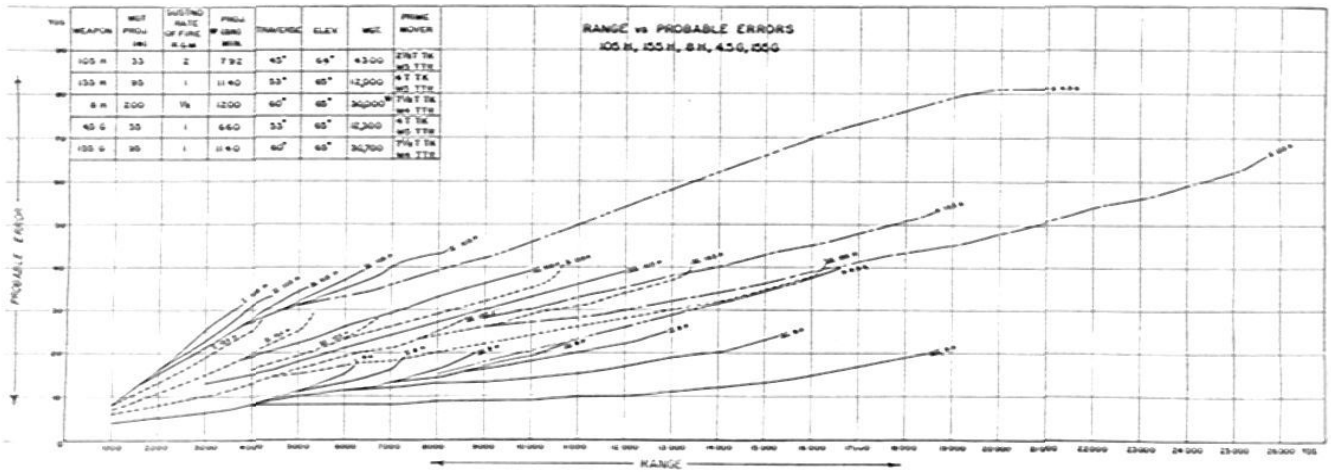
"At the edge of the castle there was a building which we figured was being used as a CP, because we saw rockets from that vicinity. Finally one rocket stuck in the roof and we saw it burning there. I adjusted a 155 howitzer but could get no effect—the shells just bounced off. We asked the 8-inch howitzer to destroy the building and it did so in 8 or 9 rounds."

DIRTY WORK AT THE CROSSROADS

By Capt. Edward G. Seidel, FA

Via Casilina, Italy's Highway 6, was Jerry's main supply route to Cassino. One of our OPs commanded a long stretch of this highway behind the town and the observer was quite irritated one day to see an occasional Jerry truck come boldly along it. But the S-3 said a single truck did not justify the expenditure of much ammunition chasing it down the road.

So the observer mulled over the matter and recalled that a certain crossroad on Highway 6 was a favorite spot for registration. He determined the time of flight to the crossroad. Then he timed a few vehicles and located a landmark. The



vehicles averaged the same time from the landmark to the crossroad as the time of flight to the crossroad. S-3 was more sympathetic when the observer confided his next plan.

Came another dawn, another registration. Instead of "Cease firing" to the registering piece at the completion of the registration, down came the command for the adjusted quadrant and "Suspend firing." Soon a Jerry truck rolled around the curve. The cannoneer on duty at the piece was alerted. The truck passed the landmark, the observer commanded, "Fire!" The result was excellent: one round expended, one truck destroyed.

All told we got fifteen vehicles that way before the fun ceased. Not all were destroyed on the first round. Sometimes that one merely caused the driver to stop his truck and dismount. The stalled truck was a dead pigeon. Average rounds per truck was 3. We considered it a fair enough trade.

NOTE: Some may think this story is far-fetched. Skeptics are referred to 8″ howitzer firing tables with particular attention to the small probable error of this weapon.

240-MM EFFECTIVENESS

A battalion commander states "The other day one of our observers picked up a large maintenance shop over near Pignataro. He saw two tanks go in and another come out. Out of 9 rounds fired we got 6 direct hits, then an ambulance came up and we had to stop the fire."

Southwest of Cassino was a bridge our forces were anxious to have knocked out. It had been attacked several times by air but without success because of flak and air protection. The range was 24,500 yards, so it could not be reached when weather conditions were unfavorable. In the middle of February about 40 rounds were fired. These included one direct hit and several near misses, causing severe and ample damage.

TIPS FROM OVERSEAS

The famous Bismarck is quoted as saying, "Fools learn by experience; I prefer to learn from the experiences of others." We can't learn everything by reading and listening to others, but we certainly can profit greatly from the recent combat experiences of units similar to ours. This material has been taken from a letter from the CO of a battalion of 155-mm howitzers now (and for some time) on the Anzio beachhead, written 7 Apr 1944.

Wear steel helmets and have pistol or carbine ready for use at all times.

Sandbag edges of foxholes, but not higher than two bags, and cover with heavy timber on top of which place a layer or two of sandbags—this for protection from flak, air bursts (HE shell), and personnel bombs.

Have at least 20,000 sandbags for the battalion, if possible.

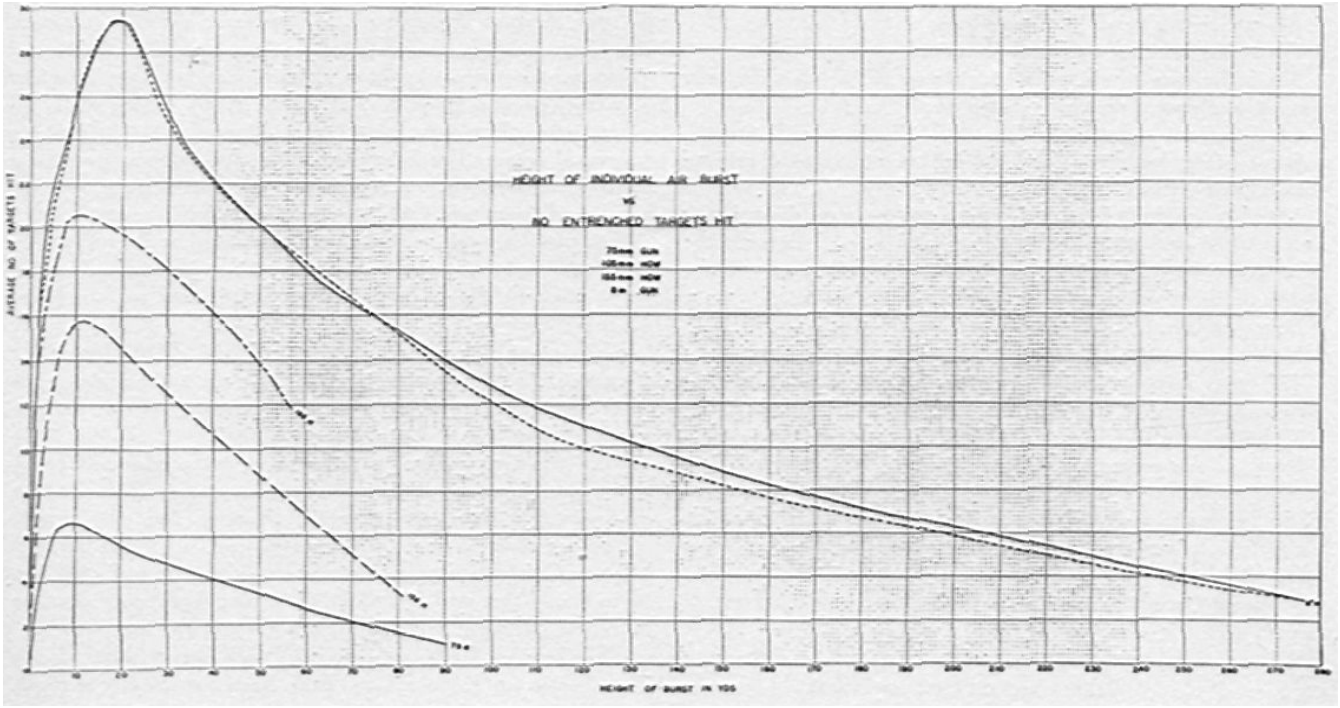
Dig guns in below the level of the tires and sandbag up as high as possible.

Trails and roads to position *must be covered* (meaning obliterated). We even plant the same type of grass or crops over trails and ruts we make.

Do not allow firing at planes unless they actually attack you.

Do not fire when enemy planes are overhead if it can be avoided. Keep men down in foxholes then and whenever not needed elsewhere.

Kitchens usually stay up with the batteries and feeding is



almost a continuous process as *men must never bunch up*.

Personnel section and Serv Btry usually are 10 to 14 miles back as are *all vehicles* not actually needed in the position area.

Keep spread out. Firing batteries should be 300 to 400 yards wide, and staggered. Hq Btry should spread out as much as possible. S-2 and S-3 sections should be together. The CP should be in a separate hole. All not actually needed at FDC should be kept away because there is too much chance of losing too many staff officers and key enlisted men from one lucky direct hit (trained replacements are very hard to get); also unnecessary personnel creates confusion.

Btrys should be 300 to 400 yards apart.

An electric power unit (one to three kilowatt size) is essential for FDC. Be sure to bring globes, sockets, and wire.

Be sure all officers know all about VE and its application. You won't be able to register every few hours, so you get a VE when you do register and use it with subsequent metro messages.

Survey is most important. We do *not* survey the target area. We survey position areas, then pick a grid intersection for a base point. We register on three or four check points or by high burst or center of impact.

Be sure to calibrate your guns and allocate them accordingly. The same gun must not be used all the time for registration, so even after calibration BCs and Execs must shift guns between sections to keep the number of rounds fired equalized.

Be sure to have head-and-chest sets for each gun and the Exec, as he can't yell loud enough to cover a 300- to 400-yard battery front.

Do not fuze rounds until they are to be fired.

Keep powder and shells scattered in piles of about 10, and fuzes by themselves.

Sandbag truck tires and radiators.

Each battery CP should keep an up-to-the-minute copy of all firing charts and maps and the latest VE and corrections.

We run wire between each gun, each battery, and each battery CP.

Be sure to dig in all local wire lines.

Give your Medical Officer a phone.

Tie in by wire to all units within two miles. It's the only way to keep posted on what's going on.

Cultivate the engineers.

Some prefer buildings for CPs; others, holes in the ground—take your choice.

March at night. Keep well apart and be sure the route is *well* marked and route markers *well informed*. Be sure the BCs have plenty of guides at battery positions, as without plenty of them you're sure to have a helluva mess.

Bring can openers and all possible kitchen equipment.

You won't be able to cart around radios and furniture.

Tell your men to pound home to friends and family that they want plenty of letters—they are grand for morale.

Make every effort to get one water trailer per battery.

Bring as many cameras and as much film as possible. Electric razors won't be of any value. Bring at least 200 razor blades per man. Leave bathrobes but bring sweaters, mufflers, a wool knit helmet, fur- or fleece-lined gloves, and a Boy Scout knife per man.

Make and bring plenty of signs with your unit marking on them.

When you select a position, have guards in it. Otherwise you'll find another unit in them when you later try to move in. This is very, very important.

Train 3 men for every job. Train in the worst weather and be prepared to operate 24 hours per day every day. Deliberately cut men out of each section and yet make them function despite being shorthanded. Watch light and camouflage discipline very closely—no lights and no walking around.

Officers and NCOs, particularly, must be on the ball *all the time*. So many "look but don't see."

Don't think it strange if guides don't meet you at docks or other places where you normally expect to find them—it'll just be up to you to find out where you're supposed to go and get there.

If a column stops on the road, have each driver go on foot to the truck ahead to see what caused the stop. Officers and NCOs can't sit waiting in cabs for the column to move. Officers must go forward and take prompt, vigorous action. If a wagon and mule, for instance, are in the way, push 'em off the road or over the cliff. The BnC or a high ranking officer should precede the column by ½-hour to clear traffic, stop oncoming traffic that would create a jam, and generally see personally that the column can and does move.

Stay away from trees. Shells bursting in them have terrific effect. You are much safer well dug in and camouflaged in the open. Remove any lone trees, telephone poles, or towers in your area—they are fine for the enemy to adjust on, them and *you*. Watch out for and obliterate *all* tracks, even footprints, leading to the guns, CP, FDC, etc.

Always be on the alert to improve things. Too many officers and NCOs lack the knack of the "critical eye."

Start digging as soon as you are within bomber range, even though your stay in an area may be for only a short while. The men may gripe and you may come in for a lot of kidding when you make 'em spread out and dig 200 miles behind the front lines, but you and your men will sleep better and boy! how they love you after the enemy has once come over and dumped a load of bombs in or even near the area. Once they've been really plastered with bombs or shell fire you won't have to urge them to dig, but it's silly to learn the hard way and *dead men can't learn new tricks*.

Reconnaissance is far more difficult than you ever imagined—mainly because of mines and booby traps. They really are a headache. The party must be quite large. The BnC locates a general area and each battery must have along a party large enough to sweep its area for mines and booby traps, run surveys, mark positions, and have guards to hold them.

Too much cannot be said about mines and booby traps. You talk, talk, talk, and still some men will go around picking up caps, rifles, field glasses, flags, lights, etc., and *getting blown up every time*.

Then there is the ever-present problem of local security. You must have a *definite* plan for defense against gas, paratroopers, and ground attack. Gas alarms, rifle shots, and horns are the best and simplest alarms.

Rear positions as well as alternate positions should be selected and prepared (cleared of mines, surveyed in, dug in, etc.)—just in case—and all ready to move into. Be sure to tell higher Hq and have them reserved for you. You may not use alternate positions as it's usually necessary and even best to just stay put and "ride out" bombing and being counterbatteried. It's not too bad—*if you're well dug in*.

The Germans have one very neat trick they worked on me. They locate you by sound and flash, flash particularly at night,

and leave their instruments set. During the next night they sneak six or eight guns in very close to you. Then during the day, using other guns, they adjust over you using high burst. Next come 6 or 8 rounds of smoke. Then the guns that had been sneaked in close by cut loose with direct fire for a few fast rounds and move while you're still in the smoke.

Again I say, cultivate engineers. They can help you a lot and save you a lot of blasting and/or digging.

We usually have late breakfast because of fires for hot water, etc. From then on, meals just sort of go on all day long until dark so as to avoid crowding.

Make the men keep canteens filled.

Tell officers and men to bring along a good fountain pen, mechanical pencil, and wrist watch.

Bring all the scotch tape you can get your hands on.

Put up a big howl for time fuzes and shoot all the time fire you can.

Most shooting here is done by forward observers using air-ground methods.

At the least sign of rain, slap on chains. Have your men trained to put them on and take them off with their eyes shut.

Have Btry Execs measure the adjusted compass, the Y-az of the orienting line, and the base angle. This is SOP with my Bn and helps FDC catch lots of errors.

Be sure all personnel know how to bore sight and do so daily.

Everybody *must* know his job forward and backwards.

War "ain't no picnic": it's really hell and mostly "tears, mud, sweat, and blood."

CORRECTOR FOR THE DAY

By Maj. George D. Helms, FA

Lt. Col. E. H. Burba comments concerning this system, "On one occasion in a rapidly moving situation in which I had not had sufficient time to register height of burst nor the survey data required to shoot it, a German infantry battalion advanced in waves by rushes through a 3-battalion concentration of percussion fire I directed on them when they launched a counterattack. If we had had this system in effect at the time it would have been possible to switch to time fire with no loss of time and thus break up the attack. This method is obviously designed for that specific sort of situation in which a change from percussion to time fire is necessary. In view of that experience, I recommend it very highly."

For some time we have been using this time-fire method in combat, after long and gruelling experiments. It gives excellent results 8 out of 10 times, and only small variations or corrections in site the other 2 times. We now shoot "time" very close to the infantry, and whenever impact is safe we never hesitate to finish with time. After getting the "doughs" educated to it they love it and ask for more.

Set up an instrument near the adjusting piece or in a convenient spot, preferably at the same elevation as the adjusting piece else the difference in altitude must be taken into consideration. Fire 3 to 5 rounds in the center of the impact area, using a false angle of site (about 20$\mathfrak{m}$) to assure air bursts.

The instrument operator reports the site reading to each individual burst. Discard any erratic readings and figure the average site of the other bursts. Using the horizontal (or Si 300) as a medium from which to figure, strip out the false site and put the burst on the horizontal by changing the corrector.

For example:

Initial data set on the 105-how. (using charge 6) is Si 320, Range 6,000 (but of course use elevation or quadrant when firing). Average height of bursts as reported by the observer is 318.

False site set on the guns was 20$\mathfrak{m}$. Complementary site at 6,000 yds., Charge 6, is .07. Therefore the true false site is 20—1.4=18.6 or 19$\mathfrak{m}$. Strip out this false site of 19$\mathfrak{m}$ and the burst is 1$\mathfrak{m}$ below the horizontal (318—319= —1$\mathfrak{m}$). So we want to raise the burst 1$\mathfrak{m}$ by use of the corrector.

In column 22 of the range table for charge 6, opposite 6,000 yds. we find that a corrector change of 5 points will change the burst 8.7$\mathfrak{m}$. Therefore we must change the corrector by 5÷8.7×1 or .575 points, or use as corrector for the day Kr 31, which will give a zero height of burst.

Now for any time fire adjust with Shell HE, Fuze Quick. Fire for effect with time shell using the corrector for the day and the same data as for HE fire, but raise the burst 15 yds. by the old site method of 15/R. If the effect has a preponderance of graze or high air bursts the observer senses the effect as a whole (so many yards above or below) and repeats effect.

Since no adjustment of time fire has to be made on a point, this method is quick. Use the range set on the piece instead of the map range. It eliminates the possible error of a ground site to any definite point, requires only one observer (2 are needed for high burst adjustment), and an adjustment is completed with a minimum number of rounds.

LIGHTING FIRE UNITS DURING BLACKOUTS

Experiments to solve the problem of lighting fire heating units in the field during blackout conditions have disclosed that:

a. Normally 5 minutes are required for warming up the gasoline and vapor in the unit so it will burn evenly and with the proper flame. In cold and rainy weather an even longer period of time is required. Throughout such time the flame is reddish yellow and high. Unless thoroughly camouflaged, it will disclose the position.

b. Against horizontal observation safe defilade is provided only by setting up a tarpaulin or tent fly around the unit or by constructing a small shelter in which to conceal it.

c. The principal need for defilade is against aerial observation. This is best provided by placing on top of the water heater the metal shield furnished with the unit, and holding it together by putting a galvanized iron can lid on top of the shield. This conceals the flame perfectly from overhead observation. There is still light on the ground, but this can be camouflaged by stretching a canvas around the side of the fire unit.

d. It is too dangerous to individuals and vehicles to attempt to light a unit in a body of a truck and remove it from there.

PERIMETERS in PARAGRAPHS

(EASED UPON LATEST INFORMATION AVAILABLE AT DATE OF WRITING, AND SUBJECT TO CORRECTION AS MORE COMPLETE REPORTS ARE RECEIVED.)

By Col. Conrad H. Lanza

PRE-INVASION APPEARANCES*

That the Allies intend to conduct an invasion of west Europe has been officially announced. For obvious reasons their preparations can not be discussed, except as to the air phase.

One of the latter's objectives was the destruction of the German Air Force. Official observers with the Allied Air Force in London reported in the first half of March that, granted favorable weather, this objective might be accomplished within 30 to 60 days. The plan was to attack German industries and cities so important that the Luftwaffe would be obliged to rise to defend them; the German planes would then be destroyed by the much superior Allied air forces.

This hasn't worked out. More than 60 days have elapsed and the German Air Force has not been destroyed. There is evidence that it has been weakened. The Germans are using in part old model planes, and they do not appear so often and sometimes not at all. There is no certainty that the reduction in German air activity is due to destruction and not to policy. In any case, however, the Allied Air Forces are able to operate when and where they please.

The bombing of German cities, including industries therein located, has been increased by the sending of larger air fleets which drop correspondingly greater tonnages of bombs. During May the targets have been shifted to a great extent to railroads and airfields in northwest Germany, Belgium, and north France. There has been relatively little Allied air activity against Holland.

The actual results of the air bombing are now largely guesswork. Tremendous damage has been done, and the number of civilians killed and wounded may greatly surpass what is generally believed. But how much the military power of Germany has been affected is mostly unknown.

GERMAN PREPARATIONS AGAINST THE INVASION

The German Commander-in-Chief for West Europe is Field Marshal Karl Rudolf von Runstedt. His normal headquarters is reported to be near Tours, in France. Additional headquarters, completely staffed and with complete communications, have been established at various points from Holland to Bordeaux. According to how the invasion is made, the Marshal expects to transfer himself to whichever one of the several headquarters turns out to be the most appropriately located.

Von Rundstedt has the reputation of being the best general in the German Army. He is now about 68 years old. It was he who re-established the German front before Moscow, after the disastrous defeat during the winter of 1941-1942. Soon after this he was relieved from there and transferred to his present command in West Europe. He has been on his present duty for two years and has had time to study his problem.

The German organization which he has erected appears to be as follows:

a. **Coast Defense Command: estimated as 400,000 men. This means the fortifications lining the shore. A great amount of work has been and is still being done on coast protection. With this help the Germans hope that a minimum number of men will suffice to delay the invasion and materially weaken it, pending the arrival of the field armies.**

b. **Field Armies: four are reported.**

1. The *Netherlands Army* (General Friedrich Christiansen, 64 years old), about 6 divisions, is north of the Rhine, inclusive.

2. The *Flanders Army* (General Baron Alexander von Falkenhausen, 64 years old) occupies Belgium and French Flanders with about 20 divisions.

3. The *West France Army* (commander unknown) occupies north France less Flanders and northwest France. The south boundary of this army has not been identified; may be in the vicinity of Latitude 46º. Has about 16 divisions.

4. The *South France Army* (Field Marshal Johannes Blaskowitz) with about 12 to 15 divisions is charged with the defense of southwest France and the south coast.

c. **Reserve: a Panzer Army (Field Marshal Erwin Rommel) of 9 to 12 Panzer Divisions is posted in central France, in readiness to march in any direction.**

The Field Armies are about 100 miles back from the coast—for example, about half of the West France Army is in the vicinity of Paris.

The plan seems to be to have the Coast Defense Command delay (and if possible, break up) the leading invasion forces. Each Field Army will then advance against any invasion in its sector. Due to their distance back of the coast an opportunity is given to attack the invaders from any of several directions.

There are reports that in addition to the foregoing troops there is an available GHQ Reserve in Germany, reported as having up to 50

In the mountains of Tito's Yugoslavia pack howitzers are extremely useful. This one in action there with the First Partisan Division is a 7.5-cm Skoda mountain howitzer, M. 15. Its 15-caliber tube will depress to —9º, elevate to 50º, and traverse 7º. Separate loading ammunition yields maximum muzzle velocity of 360 m/s (about 1,200 f/s) for a maximum range of 7,500 meters. The particular piece shown may well have been captured from the Italians, who used this as a standard weapon.

*Written in the 4th week of May.—Ed.

divisions. Many divisions in Germany are exhausted divisions from active fronts, sent home for rest and reorganization. The number completely fit for field duty varies: it has been as low as 2 divisions, maximum probably is under 20.

To handle the population of occupied countries a separate force corresponding to our Military Police exists. Last available return (as of Sep 43) shows 60,000 men in this force within France and the Low Countries. Reports as of this April show that Dutch, Belgian, and French Military Police are aiding the Germans. The French force is stated to number nearly 100,000; no other figures are now available.

As soon as the Germans have identified all or most of the Allied divisions and know that they are committed to particular theaters of action, German divisions can be withdrawn from other places and brought to face the invaders.

German reports state that their intelligence service has discovered 60 Allied divisions within the British Isles earmarked for the invasion. Of these 10 are noted as air-borne divisions, expected to be dropped inland—perhaps as far as Berlin. The distribution of German troops in France and in the Low Countries has considerable depth; the Germans seem satisfied that this arrangement will suffice against airborne attacks.

THE WAR AGAINST JAPAN (21 Apr to 20 May 44)

(DATES IN THIS SECTION ARE FOR EAST LONGITUDE)

SOUTHEAST ASIA

There has been considerable activity along the west and north Burma borders, with 3 separate campaigns. Connected with these have been extensive air operations over Burma, principally directed against communication lines and enemy airfields. Naval and naval air activity have been limited to minor submarine raids, and one important raid against Soerabaja on 17 May.

Soerabaja is an important sea and air base in northeast Java. It is also the site of oil plants. A naval force, to which both the British Southeast Asia Command and the American Southwest Pacific command contributed, made a carrier-based air attack. Details are not yet known.

North Burma Campaign

At the beginning of the period a China corps of two divisions (22nd on the west and 38th on the east) was astride the Mogaung valley. Its immediate objective was Kamaing, about 15 miles to the south; the ultimate objective was Mogaung. The enemy main body, estimated as about one weak division, was believed to be in this direction.

The China troops were American-led and equipped. They were protecting engineer working parties following the advance, extending the road from Ledo—the nearest railhead and now over 150 miles in rear. The road was to be built into Bhamo, nearly 100 miles beyond the front; here it was to connect with the Burma road leading to Chungking.

Another China Corps was assembling astride the Burma road, east of the Salween River in Yunnan Province. It was opposed by another Japanese division. This Chinese force was to advance directly toward Bhamo.

The entire theater of operations is rough, with high mountains and much jungle. Roads are few and poor. This was advantageous to the defenders, who strenuously defended the numerous defiles.

The China troops in the Mogaung valley had only mountain artillery. The Japs had complete division artillery, including 150-mm howitzers.

South of Mogaung was an expeditionary British force known as the *Chindits,* air-borne and air-supplied. They were in the enemy's rear areas, to block roads and generally disrupt enemy services. Due to extensive jungle areas the Chindits had been able to avoid engagements with superior forces. Constantly informed by air reconnaissance of enemy movements, they were able to demolish bridges, interrupt railroads, and destroy dumps.

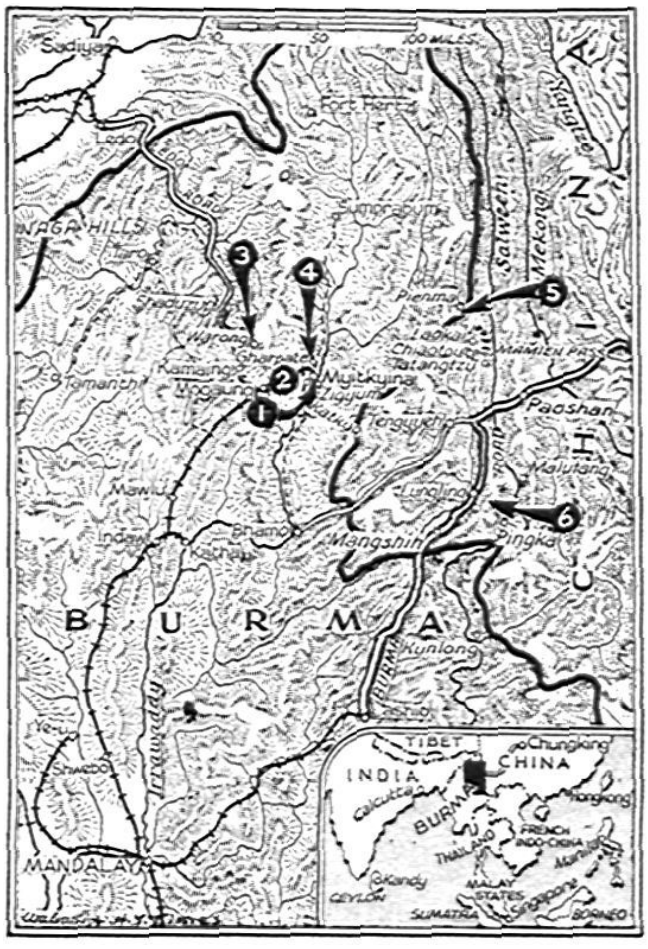
A British force of Gurkha infantry plus levies of native Kachin tribes, based on Fort Hertz, had passed Sumprabum and was in the vicinity of Tiangzup, north of Myitkyina.

Exclusive of the Chindits there were three Allied forces in the field, with axis of advance converging on the area Mogaung—Myitkyina—Bhamo. The Allied superiority in numbers was estimated as at least three to one, but the nature of the country made the Allied advance slow.

As both the China troops in the Mogaung valley and the British column near Tiangzup were finding the advance difficult and the China corps on the Salween was not ready to attack, a new operation was decided upon. An American force (under Brig. Gen. Frank Merrill) was detached at the head of the Mogaung valley. It was directed to move across country, involving the passage of an 8,000-foot mountain range, toward Myitkyina. There were no roads and but few trails. Supply was to be by air. It was hoped that this column might reach its destination without the enemy's perceiving it. Capture of Myitkyina promised to assist materially the advance of all three ground forces.

This column got away about 27 Apr. Liaison between its three columns was not always present, despite the radio and the air force. Trails were very bad; some days only a few miles could be made. Average rate of advance appears to have been about 5 miles a day. No enemy was met until near the end of the march.

Meanwhile the China corps in the Mogaung valley attacked. On 26 Apr its position was reported as 10 miles from Kamaing, an advance



Myitkyina was virtually surrounded as American and Chinese troops took Zigyum and Katkyo (*1*) *and drove 400 yards into the city from the south, other forces maintained a block on the Myitkyina-Kamaing road* (*2*) *against counterattacks, and still another column closed in from Gharpate* (*4*). *The trapped enemy garrison in Warong* (*3*) *also was being attacked. On the Salween front, eighty miles east of Myitkyina, the Chinese captured Pienma* (*5*) *and continued to advance in the Pingka area* (*6*).

of about 5 miles in as many days. On 6 May its position was given as 17 miles away, in contact with a strong enemy force with much superior artillery.

Renewing its attack on 12 May, the China corps was back again 10 miles north from Kamaing. Since that date only small advances have been reported. In reaching that position it was necessary to bypass a Japanese center of resistance at Warong. This town interferes with the line of supplies. As this account closes the Japs are still holding it. The main Allied line is last reported as 4 miles north of Wampin, or 12 miles from Kamaing.

The British column from Fort Hertz seems to have been unable to reduce Tiangzup. A report of 12 May shows this place in enemy possession, blocking lines of communication. The British nevertheless by-passed it, and by 20 May were 8 miles south of Nsopzup.

General Merrill's three columns reestablished liaison shortly before they reached the vicinity of Myitkyina. In the last days of the march enemy patrols had been encountered, so it was certain that the Japs knew of at least the presence of the Americans.

On 17 May Gen. Merrill attacked the Myitkyina airfield. There was little opposition. Soon afterward American engineer troops were dropped in gliders and at once started to improve the airfield. By afternoon, Chinese troops were arriving.

On 18 May an attack was made on Myitkyina. A detachment sent westward took position across the road and railroad from Mogaung to prevent enemy reinforcements from getting in to Myitkyina and the Japs in Myitkyina from getting out.

The attack was continued on the 19th. With the arrival of reinforcements, further progress was made on the 20th. On this date the Americans and Chinese held approximately 1/3 of Myitkyina, including the railroad station, and had the city invested except for the road leading to Bhamo.

The China corps on the Salween was not ready to cross that river until 10 May. It started over that night, and took three nights to cross. There was no opposition. The United States 14th Air Force, based on Chungking, supported this force.

On 15 May the Chinese, by-passing enemy forces of the Japanese 56th Division on the high ground west of the Salween, reached the Shweli valley. The right of the advance was north of Mamien Pass, held by the enemy, and the left at Pingka, about 100 miles to the south. 50 miles still further south a left flank guard advanced down the Namling valley toward Kumlong.

During the night 15/16 May the enemy garrison of Pingka, which had withdrawn during the preceding afternoon, returned and recaptured that place. They held it to the 19th, when they withdrew again.

At the opposite end of the line the Japs held on to Mamien Pass and were resisting strong Chinese attacks against Tatangtzu, just south of the pass. As this account closes the Chinese have reached the Shweli valley, but all roads are blocked by enemy forces.

The general result of the month's operations in North Burma have been

***a*. A very slight advance in the Mogaung valley to a line about 14 miles north of Kamaing.**

***b*. The arrival of a detached American-Chinese force at Myitkyina. This force has no line of communications except by air.**

***c*. Continuous operation of the Chindits in enemy rear areas, south of Mogaung.**

***d*. The arrival of a strong China force on the Shweli River, on the axis Paoshan—Bhamo.**

Manipur Campaign

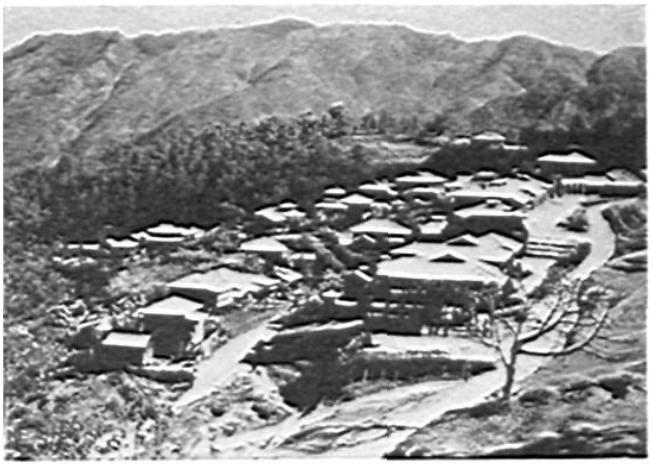
On 21 Apr the general situation was

The British IV Corps, with the 17th and 23rd India Divisions, was holding the Imphal Plain, surrounded by Japanese forces in jungle-covered hills.

The British III Corps, with the 5th India and one other division, was in the general vicinity of Kohima, in close contact with Japanese forces on the north, east, and south. The British line of communication to the railhead at Dimapur was open.

The III Corps had only recently opened the road from Dimapur into Kohima. Only the western part of that town was held, and the route thereto was still threatened by the enemy. The immediate mission was to capture the remainder of Kohima, and thereafter to open the road to Imphal and relieve the IV Corps.

Kohima lies at an elevation of 5,000 feet. The western section is on a ridge, and is the European section, with red-roofed bungalows set in



Tiddim village, much in the news lately, isn't very impressive, but it is typical of settlements in the Chin Hills district.

gardens. The Japs held the native quarters and the bazaar (business section). They were well dug in.

Kohima is an important road junction. A hard surfaced road extending northwest to Dimapur passes through a defile a few miles from Dimapur, with enemy posts only a short distance to the north. Another road extends from Kohima northerly toward Bokajan. For some distance it is nearly parallel to the Dimapur road, and was used by the enemy as a line of departure for attacking the latter. This second road was held by the Japanese for 15 miles as far as Clephema, inclusive.

A prolongation of the Dimapur road extends eastward across the mountains to Tamanthi on the Chindwin. The west end is hard surfaced, the section across the mountains is a trail which has been improved by the Japanese and is now open to truck traffic. This was the enemy's line of supply.

A hard surfaced road extends southward 60 miles to Imphal. The south part of about 25 miles was held by the IV Corps, the balance was in enemy possession.

First operations were to remove the enemy from positions from which he might attack the Bengal & Assam RR through Dimapur. On 25 Apr the British attacked up the Bokajan road and established a position which it was hoped would cut supplies to the enemy at Clephema, which is only 30 miles from the railroad. On the 27th tanks cut across country, following ridge lines (which run north and south) from the Dimapur road to the British positions on the Bokajan road. Only light opposition was met.

Nearly all fighting in this area has been confined to ridge tops. Intervening valleys are dense jungle without roads or trails, which habitually are on high ground. Numerous peaks rise above the general ridge line, where good observation is obtainable over neighboring ridges. The artillery was generally able to follow movements of troops and afford appropriate support. The British had medium and heavy artillery, the Japanese only mountain howitzers. The British also had tanks, while the enemy had none.

On 28 Apr the British gains were completed for the time, in the Clephema direction.

Next operations were to clear the enemy out of Kohima and secure the several road junctions. The enemy was not idle. He attacked on the 28th and passed troops to in rear of some British positions. At this time the front was a maze of pockets, with British encircling some Jap positions and Japs surrounding some British detachments. Both sides had various road blocks on the lines of communication of the other side. These were constantly changing in a jungle warfare. Some British troops reached to places 15 miles in rear of the Japanese front.

On 11 May the British started an operation to clear the enemy out of the south part of Kohima. This was accomplished by 15 May. By the 20th the situation had not materially changed. The Japs still held parts of Kohima, were yet at Clephema. The British had a road block in south of Clephema and another east of Kohima. These road blocks appear to have so interfered with enemy supplies as to cause them to requisition food from native villages. As this hill country doesn't have any too much food, the natives resented this. They have shown no signs of cooperating with the Japanese.

Operations of the IV Corps have been tactically similar to those around Kohima. The British hold Imphal Plain (about 60 miles

from north to south) but have been unable to drive the enemy from the surrounding jungle hills. On his part the enemy has not been able to advance into the Plain. British supplies arrive regularly by air.

The most serious fighting has centered about Bishenpur, on the west side of Lake Logtak, and Palel, east of the lake. From this central position the British separated two Japanese divisions, one attempting to advance northward from Tiddim and the other westward through Palel. A secondary area was north of Imphal along the roads extending north to Kohima and northeast to Ukhrul.

In the secondary area practically no progress was made by either side, and no major engagements occurred. Severe fighting has taken place south of Bishenpur and east of Palel. The Japanese 33d Division at the beginning of the period had its advanced elements at Potsangbam, only 2 miles south of Bishenpur. Strong attacks on 21 and 22 Apr failed to advance the Jap line.

On 8 May the British attacked Potsangbam. This battle continued until the 14th, when the British held most of Potsangbam.

The situation east of Palel failed to change during the month. Enemy attacks on 11, 12, and 17 May were repulsed.

On the 18th, Gurkha troops by-passed the Japanese at Potsangbam on the east and established a road block in rear of the enemy's 33d Division on the main road to Tiddim. Enemy attacks on 20 May failed to move the block.

Japanese efforts to close the road from Bishenpur to the railhead at Silchar have been successful.

The general result of the Manipur campaign during the month has been

a. **The III Corps has improved its position around Kohima, without having been able to clear that town.**

b. **The IV Corps has been unable to drive off the enemy which encircles it, but has slightly improved its own positions.**

c. **No enemy advance has been noted.**

The rainy season has started. While a hindrance, it does not necessarily prevent military operations.

Arakan Campaign

At the beginning of the period the British held the line Maungdaw—Buthedaung, both inclusive. A detached force of West Africa troops was near Kaladan. The enemy was in contact with all forces, and had just arrived at Paletwa in the upper Kaladan valley.

Activity declined in this sector. Due to operations in Manipur, the 5th India Division had been sent north in mid-April. The entire division, including mountain batteries complete with mules, is reported to have been moved by American transport planes within 60 hours.

Only minor actions have occurred. The enemy did not push his advance through Paletwa. The Japs made a minor attack on 6 May, west from Buthedaung. In view of the general situation the British evacuated Buthedaung. No other material change has occurred.

SOUTHWEST PACIFIC

At the commencement of the period the Allied estimate of the enemy land forces in this theater of operations was:

Japanese	**Eighteenth Army**	**in**	**New Guinea**	**60,000 men**
	Seventeenth Army		**New Britain**	**50,000 men, and**
			New Ireland	**10,000 men**
	Sixth Army		**Bougainville**	**22,000 men**
	Entire ? Group of Armies			**142,000 men.**

In the summer of 1942 the strength of this Group of Armies was believed to have been 250,000 men. It was also thought that their mission was the conquest of Australia. The present reduced force is supposed to be the result of casualties of war and the Allied air and sea blockade, which has prevented replacements being forwarded.

As against this estimate the enemy has a large barge traffic in this area. Between 100 and 200 barges have been reported sunk monthly by Allied and naval forces. Still there is an unending stream of barges, for as many are being reported sunk at the end of the period as before. No reports have been noted as to sinking of enemy submarine freight boats, which have been in use for well over a year.

The Allied Southwest Pacific Command, under Gen. Douglas MacArthur, has been engaged in driving the enemy out of New Guinea. No land operations have been directed against the hostile Seventeenth and Sixth Armies, but they have been subjected to an intensive air bombing. With the blockade it has been hoped that the enemy would either voluntarily evacuate New Britain, New Ireland and Bougainville or be starved to death through inability to obtain food. To date no evidence of evacuation has been noted.

On 21 Apr an amphibious expedition was en route with the mission of occupying that part of the north New Guinea coast between Aitape and Tanahmera Bay (both inclusive) believed to be occupied by about 15,000 Japs. This was a front of 160 miles. The Japs' main body was believed to be in the area Madang—Wewak, with their land line of communications extending back along the seashore through Aitape and Hollandia. They were facing a land force of American and Australian divisions, just south of Madang. The interior of New Guinea was believed to be impassable mountains and jungle, completely devoid of food. If its one line of communications was seized, with troops before and behind and the sea blockaded, it was hoped that the Japanese Eighteenth Army would soon be eliminated.

The amphibious expedition consisted of the 41st American Division and was escorted by a powerful American fleet. After having sailed from the Admiralty Islands toward Palau to deceive enemy search planes, the giant fleet and convoy changed course at dark on 21 April and arrived opposite the New Guinea shore at 0500 hours on the 22nd. During the night preceding this arrival cruisers and destroyers had pushed ahead to shell the proposed landing areas. On the day before, naval planes from aircraft carriers had bombed enemy airfields at Hollandia and Wakde. In an air fight 13 enemy planes were reported as downed and 87 as destroyed on the ground, without any loss of American planes.

After daylight 22 April the navy fired an hour's preparation against the three landing places: Tanahmera Bay, Humboldt Bay, and Aitape. At the conclusion the invasion forces pushed for the shore, preceded by rocket boats. From the sea it looked as if the beaches were a mass of billowing black smoke and fire. There was practically no opposition and all forces landed as planned, first waves at 0654 hours.

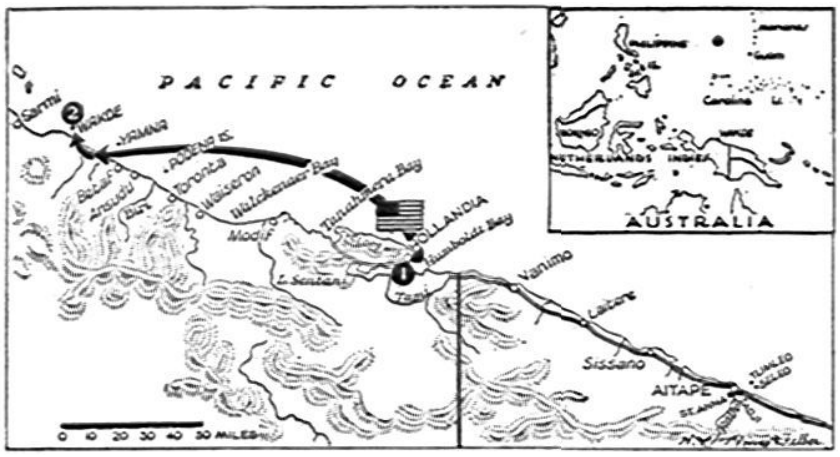
The balance of the day was spent in organizing to envelop the 15,000 hostile troops believed to be caught somewhere between the landings. An enemy force estimated as 2 companies of infantry had been located near Aitape; none had been found at the other landings.

On April 23d the airfields at Hollandia and Aitape were in American possession. Troops were moving eastward from Tanahmera Bay and westward from Hollandia Bay toward each other. This movement was completed on 26 April, when the last airfield in the area was taken. About a company of hostile infantry was destroyed in this operation.

A separate expedition of an Australian division was directed against Madang. An amphibious force swarmed ashore at 1730 hrs. There was no artillery preparation, for a ground patrol had earlier entered the village and reported that there was no enemy. Next day the Australians moved to and occupied Alexishafen, no enemy being found. A hostile post was discovered on Sek Island, just off the coast, however. Using minesweepers and covered by their own artillery, the Australians captured this spot.

Troops at all landing places pushed vigorously outward to discover the whereabouts of the enemy. Small hostile forces were found

This hilly, jungle-covered terrain is typical of much of the country in Burma and southern Asia in general. Detailed observation is very difficult. In this picture, taken 7 miles north of Maungdaw, Jap positions across the valley are being shelled by British 3" mortars and 3.7" howitzers.



In a 125-mile amphibious jump from their base at Hollandia (*1*), *American troops have landed on the coast of Netherland New Guinea and then crossed to the Wakde Islands* (*2*). *The inset shows Wakde's location on the path of the Allies' planned return to the Philippines.*

around Hollandia, resulting in numerous patrol actions. Other small enemy forces were located by the Australians north of Alexishafen.

By 10 May the 41st Div found in the Hollandia and Aitape area a number of Allied personnel held prisoner by the enemy for labor duty. Enemy losses at that time were estimated as having been 977 killed and 259 captured. By the end of the period this number had been increased to about 2,600.

On 17 May another amphibious expedition was debarked 125 miles west from Hollandia in the vicinity of Sarmi. American and Australian cruisers and destroyers fired an artillery preparation, and the landing craft were preceded by rocket boats. As on the earlier expeditions, there was only trifling opposition.

Then the troops re-embarked for an attack on Wakde Island, where the airfield was and which was defended by the enemy. The undefended tiny island of Insumarai, 2½ miles from shore, was first seized. .50-cal. machine guns were established on this island which, with batteries on the mainland, covered a landing on adjacent Wakde. Troops reached the landing field by 1000 hours. They then received heavy machine gun fire. When this acount closes the enemy on Wakde, estimated as about a battalion, have not yet been entirely overcome.

* * *

Operations outside of those mentioned have been limited to air attacks. The area around Wewak and Hansa Bay, supposed to be the location of the main body of the Japanese Eighteenth Army, was bombed on 15 out of 30 days. Maximum tonnage dropped exceeded 180 on three occasions; on all other raids for which figures were given quantities were 100 tons or less.

New Britain Island was bombed 24 days out of 30, mostly in the vicinity of Rabaul, where the enemy's main force is supposed to be. An active naval patrol has been maintained to stop enemy barge traffic.

New Ireland Island was bombed on 21 days, mostly in the vicinity of Kavieng, supposed location of the enemy's main body. An active naval patrol has been maintained about this island.

Bougainville Island contains an American beachhead on the southwest coast about Empress Augusta Bay. Minor patrol and artillery activity with the enemy, who is in the immediate vicinity, has occurred. Air attacks have been delivered against enemy forces in the battle area, his bases near Buka Passage at the north, and Buin at the south end of the island. Minor hostile forces are reported at Kieta on the east coast.

CENTRAL PACIFIC ISLANDS

The Naval Task Force under Rear Admiral Mark A. Mitscher, which had supported the landings at Hollandia and Aitape on 22 Apr, returned to its base through the enemy-held Caroline Islands. On 29 and 30 Apr and 1 May, planes from the aircraft carriers made a major attack against Truk. On his part the enemy, having discovered the Task Force, launched an air attack against the ships on 29 Apr. No vessels were damaged; the ships downed 5 enemy planes.

American planes dropped 800 tons of bombs on Truk and report downing 60 enemy planes and destroying another 60 on the ground. The loss of own planes has not been made public; Jap accounts give 30 as the number. American personnel from planes damaged by enemy fire were landed in the sea and subsequently rescued. The net loss of personnel was 30 killed and wounded. Truk was also bombed on 12 other days.

Numerous other enemy-occupied islands have been bombed. Main attention has been given to Ponape and those Marshall Islands still held by the enemy—each was bombed on 22 days out of 30. Woleai was bombed 7 times, and on 24 Apr 17 out of 30 enemy fighters found there were reported as downed. Nauru Island was bombed 4 times, Puluwat 3 times, and the Hall and Nomoi Islands twice each. Eurapik, Oroluk, and Kusaie were bombed once each.

In the Marianas, Guam was attacked on 7 May and 7 out of 25 enemy fighters were downed without loss. The adjacent islands of Saipan-Tinian were bombed on 18 May, with a reported loss of 1 enemy plane.

Ujelang Island, westernmost of the Marshalls, was occupied by American forces on 24 Apr with only trifling opposition.

NORTH PACIFIC

Operations have been limited to air activities, largely incidental to extended reconnaissances.

The Kurile Islands were bombed 9 times, sometimes by but single search planes. These are now going as far south as Shimushiri, 250 miles beyond Paramushiro.

Wake Island has been attacked 4 times and Minamitori (Marcus) Island once.

CHINA

On 18 Apr the Japanese initiated an operation in Ho-Nan Province. One enemy column crossed the south boundary, following north along the main highway and the parallel railroad from Hankow to Chengchow (Cheng on some maps). A second hostile force marching in the opposite direction and on the same route crossed the north boundary at the same time. The north column, using motorized and armored troops, forced a crossing of the Yellow River and reached Chengchow on the 20th; the strength of this column was 4 infantry divisions and an armored brigade.

After consolidating the river crossing the north column continued on south and arrived at Hsuchang (Hu-Linying on some maps), an important road junction, by 1 May. At this date the hostile south column (reported as 2 infantry and 1 armored divisions) was at Mingkiang, 100 miles from the north column. The two Jap forces joined by 8 May.

They then turned west. By this time reinforcements had arrived, making the total force 6 infantry and 2 armored divisions, plus reinforcing artillery. Opposed to this was a China force, stated by themselves as superior in strength to the enemy. The U. S. 14th Air Force supported the Chinese and were superior in the air to the Japs in this theater. There were no Chinese guerrillas in the area.

On 11 May the Japanese right was at Loyang, which was defended by China forces. The left was at Lushan, 75 miles to the south.

Up to 20 May the Japanese pushed westward, against considerable opposition. By then Loyang was still held by the Chinese, but the front had been pushed back to a north-south line about 50 miles to the west.

This is the first time in three years that there have been any military operations in Ho-Nan. The mission of the Japanese has not been revealed, but has been reputed to be the reopening of the Peiping—Hankow RR, which passes through Chengchow. This is certainly not the immediate mission for the south column did not garrison the railroad as it moved north, and up to the zone of operations extending westward the Chinese have reoccupied the railroad without opposition.

The Japanese are reported to be destroying crops and property. Ho-Nan normally raises a surplus of food. It has been the Japanese policy to secure this food themselves or else destroy it, to keep the unoccupied areas in a condition approaching starvation. This is apparently one objective.

The Japanese expedition in Ho-Nan may be intended to separate the Communist forces on the north side of the Yellow River from the Kuomintang forces who are fighting on the south side of that stream.

The latter's lack of success in holding the enemy is alleged to be due to lack of tanks. The Chinese have very few of these, and none later than 1942 issue. They are also deficient in artillery.

Any further substantial advance of the Japanese would strengthen their position in friendly (to them) Shen-Si, while isolating the Communist forces from the Kuomintang forces. Destruction of supplies is a secondary mission, but may have determined the date of the operation. This is a suitable season in Ho-Nan for that purpose.

COMMENTS

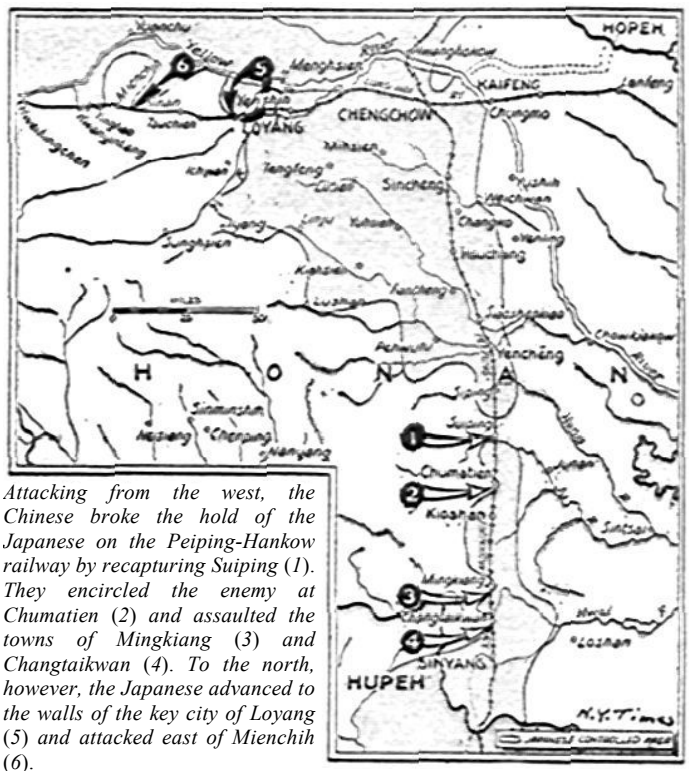
1. Events of the last three months have been noticeable for the lack of Japanese activity in the pacific Islands. There has been resistance, but passive only. The enemy's strength in this area has decreased. Whether this is entirely due to the Allied sea and air blockade is not yet certain.

2. On the Asiatic continent, Japan has been aggressive in Burma and more recently in China.

3. Numerous Japanese broadcasts refer to the prospective bombing of Japanese cities by the Allies. This has been, as far as possible, prepared for, by removing part of the people, taking precautions against conflagrations, and transferring industries to widely scattered locations. Many industries have gone to the Continent.

4. There is no indication that Japan expects to be able to meet the Allied Navies. She is preparing to meet the Allied air fleets, by intensifying the production of airplanes and by training flying personnel.

5. The most intense Japanese efforts appear to be in China. These include increasing production of raw and manufactured materials; increased number of troops in China, part of which are Chinese and Manchu; and increased economic control of unoccupied China.



Attacking from the west, the Chinese broke the hold of the Japanese on the Peiping-Hankow railway by recapturing Suiping (1). They encircled the enemy at Chumatien (2) and assaulted the towns of Mingkiang (3) and Changtaikwan (4). To the north, however, the Japanese advanced to the walls of the key city of Loyang (5) and attacked east of Mienchih (6).

THE WAR IN ITALY (21 Apr to 20 May 44)

At the beginning of the period the main opposing armies faced one another in a continuous line across the Italian peninsula. This was the south front, and had been quiet since the attack of 15 Mar on Cassino. Our beachhead about Anzio and Nettuno had been quiet since February.

SOUTH FRONT

On 21 Apr the line was:

2 miles north from the mouth of the Garigliano River—Minturno (Allies)—Castelforte (German)—San Ambrogio (G)—Cassino (?)—Terelle (G)—Mount S. Croce—Montenero (?)—Castel di Sangro (G)—Villa S. Maria (?)—Torricella (A)—Civitella (G)—Orsogna (G)—point on coast 1½ miles north of Ortona.

On the German side this front was defended by their Tenth Army, with 12 divisions in line. They designated their position by the letter G. Due to telephone conversations stating *G for Gustav* the Allies applied the name Gustav to the line, and it is so referred to in orders and reports.

Facing the Germans was the Allied Central Mediterranean Force under Gen. Sir Harold R. L. G. Alexander.

A line through San Ambrogio (to 8th Army) and Pico (to 5th Army) formed the boundary between the Americans (Lt. Gen. Mark W. Clark) and the British (Lt.-Gen. Sir Oliver W. H. Leese).

The Allied Force had been regrouping ever since the unsuccessful March attack on Cassino. The mission was to initiate a new operation which would force back the enemy's right against the Anzio beachhead. For this purpose both the main front and the beachhead received substantial reinforcements.

The German force in Italy (about 25 divisions) was commanded by Field Marshal Albert von Kesselring. His mission was to detain as many Allied divisions in Italy as possible, and not to allow the Allies to pass the line of mountains across north Tuscany, from the vicinity of La Spezia on the west to near Rimini on the east; that part of Italy south of this line was not essential to the Axis plan of campaign for 1944, from either a military or an economic point of view. In addition to the German troops, authority was given to utilize any Fascist Italian troops which he might be able to raise and equip.

To date the Fascist aid to the Germans has been minor. A naval detachment has appeared and is operating on both Italian coasts. A few Italian planes have been reported as present with the German Air Force. A considerable number of troops suitable only for interior duty has relieved the Germans of much police work. Some Italians are serving within German units. No Italian units other than services have been reported in line.

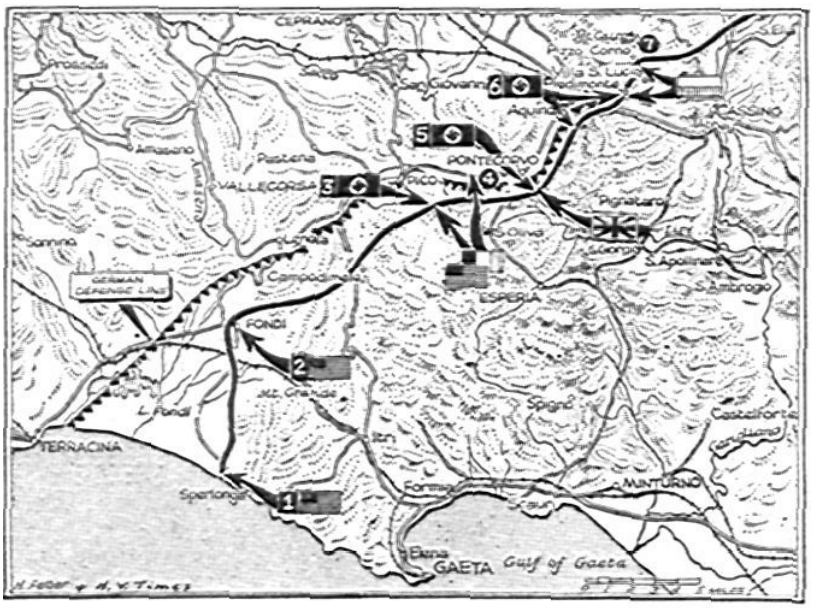
Von Kesselring's divisions have been distributed as follows,

on south front	**12**	**100 miles to cover**
about Anzio beachhead	**5**	**28 miles to cover**
in army reserve	**8**	
total	**25**	

In preparation for the coming offensive the Allied Air Forces on 28 Apr commenced an intensive, continuous, day-and-night attack against enemy lines of communication. The mission was to so destroy these as to make it impossible for the enemy to reinforce his troops below Rome or to change his divisions in line. As these became exhausted it was believed they would disintegrate against the Allied attack, which would be in a position to replace its own exhausted troops with fresh ones.

Attacks of a similar nature, and with the same mission, had been made last January to prevent the enemy from bringing in troops to confront the Anzio landing. That attempt had failed, and the enemy on that occasion had succeeded in assembling sufficient forces to bottle the Allies around Anzio.

Profiting by this experience a more extensive plan was now employed. Railroads were bombed in more places and more frequently. New attacks were made against road traffic, to prevent supplies and troops from being moved by trucks. It was found that the enemy used water transportation from Genoa, and even more distant ports, to supply troops below Rome; ports were therefore regularly and extensively bombed.



The Americans advanced beyond Sperlonga (*1*) *and captured Fondi* (*2*). *Farther inland the Germans counterattacked east of Pico* (*3*), *but the French threw a blockade across the Pico-Pontecorvo road* (*4*). *The enemy said Allied attacks outside Pontecorvo had been checked* (*5*). *The Germans held at Aquino and repulsed the Poles at Piedimonte* (*6*). *The Poles moved toward Pizzo Corno* (*7*), *however*.

This program was reported by the Allied Air Force commander on 6 May as completed, all Italian railroad yards south of Florence having been "knocked out." He added, "When large scale fighting resumes, the enemy's reserves will soon be exhausted." To accomplish this result, planes made 21,800 sorties. Only 63 planes were lost due to enemy action—only .003%

As early as 3 May the Germans noted Allied preparations for attack. The Germans ascertained that new Allied divisions had arrived both in south Italy and at the Anzio beachhead.

The plan of Allied bombing, and the absence in ports of landing craft, indicated that an amphibious expedition was not probable. An attempt to drive the German right in the south back against the Anzio beachhead had been tried in January, and this proposed maneuver publicly explained on 24 Jan by Gen. Sir Henry Maitland Wilson. This general commands the whole Mediterranean area, including the Allied armies in Italy. Information now in German hands indicated that the same maneuver (but with larger forces) would be tried again.

In view of this situation, his mission, and the knowledge that no reinforcements would arrive, the German commander made certain readjustments. He abandoned on his left center, in the Apennine Mountains, a sector between Castel di Sangro and north of Torricella, withdrawing as much as 10 miles to beyond the towns of Palena and Lettopalena. He moved out his supplies within the city of Rome, and flooded the Pontine Marshes by removing or destroying the drainage pumps. Other measures were probably taken.

GARIGLIANO CAMPAIGN

This started at 2300 hours, 11 May, on the left of the main front, from the sea as far inland as Mt. San Angelo. In an air line this is about 20 miles, but between 26 and 27 miles following the curves of the front line. The plan was for a frontal attack.

The American Fifth Army with two corps (one American and one French, latter on the right) attacked south of Ambrogio. The British Eighth Army with two corps (one British and one Polish, latter on the right) attacked north of San Ambrogio.

A General Order announced that the Allied Armies were now about to destroy the German armies in Italy. It was stated that the Allies had overwhelming air forces, and in guns and tanks far outnumbered the enemy.

The winter was over. Weather was warm and dry, the ground dusty. The battle opened with an artillery preparation of great intensity, which lasted until dawn. At this time infantry attacked all along the line, supported by a very large number of tanks. The navy aided the left by shelling enemy positions near the coast. Morning of 24 May turned out to be cloudy, with mists rising as high as 3,000 feet. This interfered with observation from the ground and from the air, and materially reduced the effectiveness of air bombing support.

On this, the opening day of the battle, severe resistance was met on all sectors of the front. Only slight advances were made. Swarms of allied planes dominated the sky; no enemy planes appeared at any time. Due to the weather conditions the ground troops received only a partial benefit from the air service. Many allied planes returned to their bases without dropping their bomb loads, for inability to distinguish the line.

On the left, the right of the Americans and the left of the French captured Castelforte after dark. The Americans furnished the tanks and most of the artillery support, the French furnished the infantry. Castelforte had long been an enemy center of resistance. Normally a town of 8,000, it had been shelled so often that it was a mass of ruins. 83 prisoners were captured at this point.

The British corps forced a crossing of the Rapido River and entered San Angelo in Teodice. The Rapido is 40 to 90 feet wide and 3 to 9 feet deep, with a swift current. It is generally unfordable. Banks average 9′ high. The British started to develop a bridgehead. Engineer troops from Britain and an India Division constructed bridges, despite continuous shelling. A considerable number of men got over. They were unable to clear all of San Angelo, but made progress just to the south. By night they had reached Panaccioni, about a mile from the river.

The Polish attack made only minor gains in the hills north of Cassino in the face of difficult terrain and strong enemy resistance.

On 13 May the battle continued without interruption. American troops on the left pushed forward from Castelforte. After an all day fight they reached the line Ceracoli—Santi Cosmi c Damiano—Ventosa, being an average advance of less than a mile. About 200 prisoners were taken.

The French corps made the major advance of the day. Under direction of Gen. Alphonse-Pierre Juin it pushed its center straight forward, and by hard fighting captured Mount Majo (or Maio), 100 prisoners were taken. A German counterattack by their 71st Division was repulsed.

The British corps completed the occupation of San Angelo in Teodice, and enlarged its bridgehead for a net gain of 1 mile. The Polish corps occupied Mt. Albaneta, 2,000 yards west of the famous Abbey adjacent to Cassino, which was at this time still in enemy possession. Attacks against Cassino by Poles and British failed; so did a French attack against San Ambrogio.

On 14 May the Americans made their major effort against Santa Maria Infante. A surprise attack during the night 11/12 May had failed. During the next two days the village was heavily shelled, reduced to ruins. When the Americans approached there was practically no resistance. Later in the day the American right advanced through Monte Bracchi and Monte Cerri to abreast of Santa Maria Infante, for a maximum net gain of over 3 miles.

The French corps advanced about 2 miles from Mount Majo to the village of Ausonia, on the road joining Cassino to the sea. They also brought up their right. At the end of the day their line was Coreno (exc)—Ausonia (inc)—Mt. Castellone (inc)—Cantelupe Hill (inc) (1½ miles east of Mt. Castellone). San Ambrogio, taken during the day, was within the line.

The British corps slightly enlarged their bridgehead to a depth of about 2,000 yards. Their main effort was directed toward Cassino, from the south. Many tanks were used and many were lost, principally from enemy SP guns. The enemy's 1st Parachute Division, serving as infantry, made strong counterattacks; they lost 121 prisoners without driving the British back. The India Division, on the right, made only minor progress.

On 15 May the Americans advanced into Spigno almost without opposition. An attempted advance westward from Santa Maria Infante met a German counterattack, leaving the line in this area about where it was.

The French corps advanced their right about 2 miles to San Giorgio. There was some evidence of disorder within the German lines in this sector.

The British corps attacked northward from the bridgehead toward Cassino and Route 6 westward from that town. The Germans counterattacked and at first regained some ground, which they were unable to hold.

During these days of battle the Allied artillery and air forces operated incessantly. According to German reports the artillery fire was as heavy as any encountered by them in other theaters. The Air Force operated practically without opposition from the enemy in the air, though they did meet considerable AA fire. German planes were few, and operated primarily for intelligence purposes.

On 16 May the fighting was principally in the sector of the British Eighth Army. The British corps (2 British and 1 India Division) was slowly clearing the territory south of Route 6. To the north the Poles were fighting hard but made only a small advance. This corps was among mountains having very little cover. The ground had little soil, and it was impracticable for infantry to dig in. Due to open country, they were unable to move during daylight: what fighting they did was at night. By day, they remained immobile. Not even wounded could be moved. By night, cold rations were brought forward by pack trains and attacks were organized; they made only slight progress.

In view of the results of the battle to date, the German Army Group determined to fight thereafter on an attrition principle. As this part of Italy was not itself valuable, it was decided not to persist in defending localities unless it appeared probable that the casualties inflicted on the attackers would materially exceed those of the defenders. This was the same policy as for the Russian front for nearly a year. Certain withdrawals were consequently ordered.

On 17 May the Allies realized that the enemy was not resisting in certain locations. It was assumed that he was retiring to the Adolf Hitler Line, supposed to extend from the sea at Formia through Esperia—Pontecorvo—Aquino—Piedimonte (all inc.). According to German accounts this line had not been specially prepared in advance, and was designated as their D Line; the term Adolf Hitler is an Allied one.

Under cover of strong artillery fire the Allies advanced along the entire line. Some fresh divisions were employed. The American corps reached the D Line as far north as Mt. Chiavica (exc). Preliminary attacks failed to dent it except near Formia.

The French corps extended the line beyond Esperia, to include Mt. d'Oro.

Using a Canada Division in lieu of the India Division (withdrawn), the British corps reached Route 6 about 2 miles west of Cassino. The British advance cut the German line of communications to Cassino.

Despite strong attempts the Poles were unable to move south. At date of writing it is not certain how much of the garrison in Cassino withdrew by following trails through the 3-mile gap between the British on the south and the Poles on the north. Not all got away. A detachment remained behind and was overcome on the 18th.

On 18 May the American corps entered Formia and approached Itri.

The French made the greatest advance of the day. Their left pushed through Esperia and advanced through narrow saddles and over high ridges to reach Mt. Faggetto, 6½ miles southwest of Esperia. The right of the Corps failed to get forward, the Germans holding the line Esperia—Pontecorvo.

As yet the German reports are not available. It is known, however, that the Germans had noted preparations in the Anzio beachhead to attack from there. They were also aware that the Allies had at least twice as many divisions about Anzio as the Germans, with much superior artillery, tank, and air forces. It seems that the German High Command decided not later than the night of 17/18 May on a withdrawal from that part of Italy south of the Anzio beachhead. As the beachhead made the use of the coast road impracticable, they commenced by withdrawing their right across the mountains to Route 6.

During the 18th the British corps, using New Zealand armor, faced west to attack along Route 6. They mopped Cassino. The Polish corps mopped the Abbey just outside of Cassino and advanced to abreast of the British on their left. To aid them Polish armored troops entered line.

On 19 May the Americans, meeting relatively light opposition on the south, occupied Gaeta peninsula and after a sharp fight seized the high ground 2 to 4 miles north of Itri.

The French corps made a considerable advance. Its left reached the vicinity of Campodimele, about halfway on the road from Pico to Itri. This part of the front faced west. The line then curved, and the French right (facing northwest and north) passed through San Oliva.

The British advanced toward Pontecorvo from near Pignataro. Tanks pushed down the road by bounds under artillery cover; they were stopped about a mile from Pontecorvo. A German counterattack now stopped the advance. British attacks against Aquino failed. The Polish corps arrived at Villa Santa Lucia, about 1½ miles from Piedimonte, their objective. Attacks on this place could not get forward. The Germans held Mt. Cairo, just to the north. This is a bare topped hill, 5,500′ high—much the highest in this vicinity. It afforded the Germans excellent observation. Some enemy enfilade fire came from this direction.

The British completed mopping of small enemy detachments around and in Cassino and San Angelo in Teodice. Engineer troops set to work to open Route 6 (also known as the Via Casilina) as a main axis of supply.

20 May dawned after a night of light rain. This had been sufficient to create much mud in low ground, which hampered movements of armored vehicles off roads. They got stuck on unimproved roads, too.

In the south a very strong American attack preceded by an artillery and air preparation led to severe fighting. The line was advanced to Sperlonga—Fondi, both inc. The French made their main effort on their right, advancing northwest on the axis Santa Oliva—Pico. This made a breach in the German line, but could not be entirely held. A German counterattack stopped the advance and recovered some ground.

The British violently attacked the Pontecorvo—Aquino sector. Strong artillery fire and numerous tanks failed to secure other than minor gains. The enemy resisted with occasional counterthrusts. The Poles attacked the line Piedimonte—Pizzo Corno, but was unable to capture either place.

As this account closes the line was

Sperlonga (Allies)—Fondi (Allies)—Campodimele (A)—Pico (German) (boundary between American Fifth and British Eighth Armies)—Pontocorvo (G)—Aquino (G)—Piedimonte (G)—Pizzo Corno (G) (right boundary of Allied offensive).

North of this point the line had not changed during the great battle to the south. Nothing unusual happened. This part of the line was:

Santa Elia (A)—Mt. Santa Croce (G)—Alfedena (G)—Castel di Sangro (G)—Palena (A)—Lettopalena (A)—Orsogna (G)—point on coast 1½ miles north of Ortona.

ANZIO BEACHHEAD

During the entire period there were numerous raids by both sides. German artillery regularly shelled the beachhead and the harbor. German and Italian motor torpedo boats made occasional raids against Allied shipping.

As early as the beginning of May the Germans issued warning orders as to action against an impending Allied attack. On 20 May the Allies made extensive raids on a major scale in the Cisterna sector, and somewhat less strong ones southeast of Aprilia. This led the Germans to expect an Allied offensive at an early date.

At this time the line, which had not changed during the month reported herein, was:

point on coast 10 miles northeast of Anzio—due east 5 miles, where there was a German dent 1 mile deep—east from the dent to a point 2 miles southwest of Cisterna—south to the coast, 1 mile east of Astura Creek.

COMMENTS

1. Early reports indicate that the Allies are using more artillery than heretofore. It includes heavier calibers and is firing more ammunition. It has been getting the infantry forward over some very difficult country, almost ideal for defensive positions.

2. Very large numbers of armored vehicles have been used, even though the terrain limits their employment considerably. The Germans use SP guns to a large extent both on the defensive and during counterattacks. These guns take advantage of woods, houses, or other cover to open unexpected fire on appropriate targets, generally by direct fire. After firing only one of a few problems the gun (or guns) rapidly moves elsewhere, before the opposing artillery can locate and neutralize it. The Italian terrain in the area of the battle, less mountain

tops, has numerous orchards interlaced with grape vines, which limit both ground and air observation. It affords good opportunities for use of roving guns.

3. Italian stone houses are excellent for placing guns in cellars, with muzzles just above the ground line. The house above, very solidly constructed, affords good overhead cover unless it catches fire. After the fire is burned out the house may be a better post than before.

4. A small Italian force is serving with the Allies, but was not employed in the main offensive. Considerable numbers of Italians are with the services usefully employed in rear areas. The Italian Government has complained that limiting the employment of their troops to menial services is detrimental to morale.

5. The Italian navy is serving loyally with the Allies within the Mediterranean.

6. There is no evidence that the Germans have had other than minor success in raising Italian troops fit for line duty. It has helped the Germans to have Italians police their rear areas and assist among the services.

7. The Allies have been changing divisions in line at short intervals. With a superiority in strength and a front limited by the terrain, a frequent renewal of troops in line gives improved striking power over a weaker enemy who lacks reserves to similarly relieve his troops.

The changing of front line units after a severe battle was practiced in the first World War. In the Spanish Civil War a system was tried of having several reliefs for infantry units within the same division. This worked in Spain, but has not been found so good in the present war. The complete change of a division has been found preferable.

THE WAR IN RUSSIA (21 Apr to 20 May 44)

For the first time since July 43 the Russian front, with one exception, has been generally quiet. The Russians have vigorously recaptured the Crimean peninsula. Elsewhere there have been no major activities and few minor ones.

According to German reports the Russians have been regrouping their forces with a view to resuming the strategical and tactical offensive. The Germans are now substantially on the last line of defense they can hold without endangering the home country. Further voluntary withdrawals, either under or without pressure, are not to be expected. It would be possible to retire the present German front in south Romania from the Dnestr River to the Galati Gap, which is about 130 miles, without surrendering territory essential to military defense—but this would bring the enemy uncomfortably close to the Romanian oil zone.

Regrouping of Russian forces appears to involve a concentration just south of the Pinsk Marshes. The objective of an offensive in this area would be south Poland. The terrain north of the Carpathian Mountains is generally flat, and suitable for operations of motor vehicles. As it is now past the spring season of thaws, operations could begin at any time.

A second Russian concentration appears to be in the area north of the Pinsk Marshes, as far north as Vitebsk (inc). This front of about 180 miles is substantially equal to the front south of the marshes but is 200 to 300 miles in rear of the south one. If the south force moves forward before the north force is in line with it, it will be exposed to having its right attacked in flank as soon as it clears the Pinsk Marshes.

To provide for this possibility the Germans have gathered a strong force in the general vicinity of Kowel—Luck. In rear of this area and west of the Wista (Vistula) River is the German GHQ Reserve, estimated as 30 divisions. This can be sent to either the north or south of the Pinsk Marshes as future events require. It can also be sent south in rear of the Carpathians, either to the south Romanian front or into the Balkans. First class railroad communications also permit its being sent west against the threatened invasion. Conversely, troops can be sent from west Europe to the Russian area if not needed in the present locations. Reports from returning repatriated personnel are that the German railroad system extending east and west north of Switzerland (and also south of that country) is in excellent shape, and has not been substantially damaged from bombing.

The terrain north of the Pinsk Marshes is ordinarily unsuited for military operations in the late spring by reason of swollen streams and muddy, unimproved roads. The past winter was reported as the mildest on record for Russia and the thaw set in earlier this year. There was less snow to melt off. Russian reports as of mid-April estimated that the country would be dried out by 20 May, or two weeks earlier than usual.

There is some indication that Russia is having personnel difficulties. Reports as to Russian casualties from all causes since she entered the war vary. The minimum estimate is 15,000,000, the maximum 25,000,000. All reports agree that the destruction of the country has been terrific.

To meet this situation the Russians have promptly inducted into their military service all Poles of the proper ages in that part of Poland so far occupied. Russian women are reported being utilized in combat formations.

Russian offers to Finland, Hungary, Romania, and Bulgaria (in the May Day address of Marshal Stalin) to quit the Axis and join the Allies, were reinforced by a second appeal made on 12 May and signed jointly by the United States, Great Britain, and Russia. A separate appeal, partly by unofficial methods, has been made to Poland. To date there has been no visible response to the appeals now repeatedly addressed to Axis satellites.

A definite accord was signed on 8 May with the Czechoslovakian Government in Exile. This sets a precedent for the type of aid to be given by the present Axis occupied small countries. It specifies that Czechoslovak troops will serve under Russian control and under a general approved by Russia. Civil administration will be left to the government of the country.

In the same May Day address Marshal Stalin expressed the opinion that the coming campaign against Germany would be more difficult than preceding ones. He believed that the only chance of success was **"by means of coordinated blows from the east by our troops, and from the west by troops of our Allies. There can be no doubt that only such a combined blow can completely crush Hitlerite Germany."**

* * *

Operations during the period will be considered under the following heads:

Far North	**north of the Gulf of Finland**
North	**between Gulf of Finland and the Pinsk Marshes**
South	**between the Pinsk Marshes and the Black Sea**
Crimea	

FAR NORTH SECTOR

The front has remained stationary, approximately on the line **Liza River (30 miles east of Petsamo)—Notosersk (Russian)—south branch Lake Nuot—Lake Pyavo—Magovoritsk (Axis)—Yuskkozero (?)—Onda River—Lake Vyg—Povyenets (R)—Lake Osero—Svir River—across Lake Ladoga—Metsapirti (?)—Terijoki (?).**

Patrol and raid activity has been increasing. Following the rejection by Finland of Russian offers of an armistice on 19 Apr, Russian planes have increased their attacks on Finnish cities. Several bombings of Kotka have occurred. The Finns have retaliated by bombing Russian bases as far east as south of Lake Onega. None of these bombings have been on a large scale.

Increased Russian air and naval activity has been noted off the north Norway coast, with frequent attacks against German convoys, which discharge at Kirkenes. In spite of these attacks the Germans prefer sea transportation to the road, which is now open to Kirkenes.

In the Far North sector the Germans are reported removing inhabitants, in view of an expected Russian offensive. Due to terrain and weather a major offensive is not likely earlier than the latter part of June. During the summer roads are open from Tromsoe to the German front opposite Kandalaksha. An alternate line of supply exists to the same area from the head of the Gulf of Bothnia. At least half of this line is rail.

NORTH SECTOR

At the beginning of the period the line was:

Narova River (with Russian bridgehead southwest of Narva)—Lake Peipus—Velikaya River (with Axis bridgeheads at Pskov, Ostrov, and Opochka)—Idritsa (Ax)—Chernaya Lusha (Ax)—Vitebsk (Ax)—Krasnoe (R)—Gorki (?)—Chausy (Ax)—Dovsk (R)—Rogachev (R)—Zhlobin (Ax)—Kalinkovichi (R)—Pripyat River—Prypec River—Turja River.

At this time the Germans, using both German troops and some Esthonian units, were reducing the Russian bridgehead across the Narova River. The terrain in this area includes much marsh covered with woods. The German attack of 21 and 22 Apr gained some ground which was held against a counterattack, but the bridgehead was not eliminated.

Local attacks by the Russians against Polotsk on 29 Apr appear to have been for reconnaissance only. A similar Russian operation was made against Vitebsk on 1 May. A German reconnaissance in the same area on 18 May led to three days of fighting.

In preparation for the expected summer campaign, and in order to clear out rear areas, the Germans on 20 Apr commenced a round-up of guerrilla and partisan bands west of Polotsk. This was completed on 11 May by regular troops, military police, and Baltic State troops. The guerrillas were reported as having lost 6,700 prisoners and an estimated 6,000 killed.

Guerrillas are a uniformed part of the Russian army and operate in enemy rear areas. They are supplied with replacements and ammunition (and in part with other supplies) by air. They raid lines of communication, CPs, and dumps, and cause as much disorder as possible. An important duty is to secure identifications and report the same by radio.

Partisans are local inhabitants not enrolled in the military service and not in uniform. Some are women and children. They act as guides and secure information in towns and villages.

As guerrillas can be replaced by air, suppression is temporary only. A new detachment can be dropped readily, but it takes time to reorganize a guerrilla sector after a round-up.

No material change in the front line has occurred during the period.

SOUTH SECTOR

On 21 Apr the line was

Turja River (with Axis bridgehead at Kowel)—Kisielin (?)—Gorokhov (R)—Berestetchko (R)—Brody (Ax)—Zalozce (R)—Strypa River—Buczacz (Ax)—Tlumacz (?)—Ottynia (R)—Zabie (R)—Radauti (Ax)—Suceava (boundary between 1st and 2nd Ukraine Army Groups)—Harlau (R)—Targu Frumos (Ax)—point 8 miles north of Iasi—Koroneshty (Ax)—Orhei (R)—Radauti River (boundary between 2nd and 3d Ukraine Army Groups)—Dnestr River (with German bridgehead east of Miremy and Russian bridgeheads on both sides of Tiraspol).

Operations in Sector of 1st Ukraine Army Group

Prior to this period the Russians had attempted to capture Kowel, after their troops had by-passed this fortified center of resistance on both flanks. This had not succeeded. A German counteroffensive had forced the Russians back.

On 21 Apr the Germans, having previously cleared the west bank of the Turja north of Kowel, were engaged in a similar operation southwest of that town. The Russians had left a cavalry division to delay the enemy while their main body established itself on the east bank. This cavalry division was attacked by greatly superior forces but held on. It took until 27 Apr to overcome this cavalry division completely. The Germans captured the division headquarters, including the commanding general, with about 2,000 prisoners and 17 batteries of artillery. The remainder of the division appears to have died at their posts.

With the aid of at least 1 Hungarian division, attacks were now made against the Russians across the Turja. These failed.

Having reorganized, the Russians started a new offensive on 1 May. The Germans appear to have obtained through their own unsuccessful attack, information as to the coming Russian offensive. This was met by an unusual number of planes. A new feature was special antitank planes which concentrated on enemy armor. The attack failed. It was renewed next day with use of additional troops, but had no better success.

On 4 May new Russian attacks were launched. These were with limited objectives rather than of a general nature, and were supported this time with strong air forces. They failed to secure any material gains. The line in this sector then stabilized.

The next center of activity was the Russian bulge whose center was at Kolomyja, between the Carpathians and the upper Dnestr River. At the beginning of April the Russians had reached the Carpathian divide, practically on the boundary of what had been Czechoslovakia but was now Hungary. An enemy counteroffensive had soon thereafter driven the Russians back to the line indicated at the beginning of this section.

Hungarian troops, with German armor in support, were advancing slowly along the axis Stanislav—Kolomyja. This operation was essentially an Axis attrition one. All attacks were made cautiously, risking little and gaining little. They provoked enemy reaction which resulted in opportunities hoped to produce greater proportionate loss on the Russians than on Axis forces. As these attacks continued nearly every day during the month's period, it is presumed the Axis believed they were accomplishing their mission.

In Russia the Germans have used rocket projectors in multiples of 10 mounted on what appears to be a standard half-track chassis thoroughly protected from the rockets' blast by a good coating of sheet metal or possibly light armor. As proper direction is obtainable by turning the vehicle, the mount can be simplified to provide for elevation changes only.

On 21 Apr the Hungarians captured Ottynia. Thereafter the gain from numerous small engagements did not exceed 5 miles in the month. On 12 May the Axis operations were extended to the area southwest from Kolomyja. A slight advance in this direction followed, with the Russians at the end of the period still holding Kolomyja.

Operations in Sector of 2nd Ukraine Army Group

On 26 Apr the Russians started an offensive on the front Harlau (exc) to the Prut River. It was coordinated with another attack of the 3d Ukraine Army Group. The 2nd Ukraine was to advance southward toward Galeni, the 3d Ukraine westward along the general line Tiraspol—Barlad. According to German intelligence reports the 2nd Ukraine had available 20 infantry divisions plus a variable number of armored brigades.

The initial attack was preceded by a powerful artillery and air preparation. The Russians made their main effort on their left, just north of Iasi. The Axis line was a mixture of German and Romanian troops, under the German general Woehler. He had foreseen the coming attack and decided to counterattack, with main effort on his left.

Both sides sent their armor forward. Northwest of Targu Frumos the Axis attack had mixed results. In one sector a slight advance was made as far as Ruginoasa, resulting in the capture of 18 batteries and 700 prisoners. But in another sector a reinforced regiment was caught under concentrated Russian artillery fire and was driven back with loss of 20 tanks and SP guns. The Russian attack north of Iasi failed to get forward.

On 27 Apr the Russians continued with their attack toward Iasi. They penetrated the Axis line at several places, but not to any considerable depth. Axis resistance was strong. Next day the attack was renewed with fresh troops and a strong supporting detachment of bombers. Initial successes were soon lost to Axis counterattacks.

On 29 April the Axis attacked north of Iasi, making but immaterial gains. Continuing on the 30th, a slight advance was made. Confused fighting continued through 1 May.

On the 2nd a new Russian attack was launched on both sides of the Siret River just south of Harlau. It was really two attacks, each on a narrow front. Each was prepared for by an intense artillery preparation; at its conclusion the Russian armor advanced, covered by a rolling barrage of smoke.

The Axis had discovered this attack in advance and was prepared. AT plane detachments and artillery concentrated against the Russian tanks. At the same time armor, mostly German, counterattacked to intercept the advancing hostile forces, whose route could be fairly well foreseen from the location of the Russian artillery preparation and a consideration of the terrain. According to German accounts

the Russians were driven back with a claimed loss of 160 tanks, of which 65 are credited to the AT planes.

A renewal of the Russian attacks continued daily to include 6 May, but on a reduced scale, resulting in no important changes. On 7 May this battle ended with an Axis counterattack south of Harlau, which gained only a slight advance. The result was to leave the front substantially unchanged.

On 12 May a minor Axis operation near the Siret River drove back a Russian division for a short distance.

Operations in Sector of 3d Ukraine Army Group

On 25 Apr the Russians started an offensive to cross the Dnestr River on the front (Radauti River to south of Tiraspol), a distance of 50 miles. A powerful air and artillery preparation preceded the attack. Main effort was on the north sector, due north of Tighina (Bender on some maps). The initial effort made no gain, but on the next day several penetrations were made into Axis lines. This battle continued through the 29th without the Russians making other than minor gains.

On 11 May an Axis attack was launched against the Russian bridgehead northwest from Tiraspol. According to German accounts the Russians (reported as 9 divisions, including 1 artillery and 1 AAA division) were forced back across the Dnestr after losing 600 guns and 2,600 prisoners. According to Russian accounts the German attacks, stated to have been made by incessant waves of tanks and infantry, were repelled. Best available evidence is that the Axis did eliminate the bridgehead, for Russian accounts next report that Germans on the east side of the river were driven back on 15 May. This Russian counterattack was continued to the west side of the river on the 16th. As this account closes the Russians had regained some of the ground lost, by daily attacks down to 20 May. At this date the line had not substantially changed from its position a month before.

THE CRIMEA

At the beginning of this period a Russian force consisting of the 4th Ukraine Army Group (under General Fedor I. Tolbukhin) had crossed into the Crimea from the north and started to invest an Axis force about Sevastopol. Another Russian force (the Maritime Army) had advanced from Kerch and joined the 4th Ukraine, extending the original left of that army group to the Black Sea. The Maritime Army appears to have been consolidated into the Army Group.

The line was:

High ground south of the Belbek River (Ax)—Cherkez Kerman (?)—Churgoum-Karlovka (R)—Kadikoi (?)—Balaklava (R).

Sevastopol was held by the German Eighteenth Army. At the beginning of April it had about 210,000 men. Its units are not certain, but appear to have been two German corps of 4 divisions each and 1 Romanian corps, also of 4 divisions. There were a considerable number of army units and troops of the services. By 21 Apr, when this account opens, the aggregate Axis strength had been seriously cut, due to losses in battles along the Sivash and near Kerch and in the subsequent retreat from those areas. The Army commander thereupon advised German GHQ that Sevastopol could not be defended. Measures were immediately taken to evacuate the garrison.

The withdrawal from Sevastopol was very slow. The amount of shipping available to the Axis in the Black Sea suitable for troop movements was reported by neutral sources as only 75,000 tons. The Russians claim, however, that they sank 125,000 tons of transports removing troops from the Crimea, exclusive of about 50,000 tons of small vessels. Air transports were also used to remove troops; the Russians have not claimed downing many of these.

German intelligence reports state that the 4th Ukraine had 29 infantry divisions, besides several artillery divisions, the Martime Army, and an unstated number of armored brigades—in all, equivalent to about 35 divisions.

The Russians spent some time organizing for an attack. Sevastopol was defended by a series of reinforced concrete works on hilltops connected by trenches. Wire, mines, antitank ditches, etc., covered the Axis foreground. It was a formidable fortress, and when defended by the Russians in 1942 had sustained continuous attacks for about three weeks. On that occasion the major Axis attack had been made on the north sector and the secondary in the south. It was decided this time to reverse this procedure.

On 5 and 6 May minor attacks were conducted to secure good lines of departure and to neutralize selected enemy targets, with generally good results. The main attack was launched on the 7th.

A violent artillery and air preparation was first delivered, then the infantry moved forward. In the south sector the main effort was against Mt. Sapoum. The infantry moved in small groups, very slowly (apparently at an average rate of 200 yards per hour), hugging the artillery barrage. The advance was divided into 3 phases, based on intermediate objectives. Although the attack was started at dawn, the infantry did not arrive at the final objective before 2400 hours. No definite time table was followed: the infantry moved as the artillery cleared the way.

At the final objective was a permanent fort. Its solid walls were impervious to infantry weapons. Engineer troops came up and placed HE charges against the walls. Soon after the garrison surrendered, and Mt. Sapoum was Russian.

The Russian attack in the north had not been so fortunate: it made only slight gains.

On 8 May the attack was renewed in both sectors, with results the reverse of the previous day's. The north attack's left joined the right of the south attack at Inkerman.

On 9 May the north attack reached the high ground north of Sevastopol overlooking the harbor. Fifteen batteries opened fire on the town and the harbor, which contained transports ready to take off troops. In view of this situation the German commander ordered Sevastopol to be emptied and the garrison withdrawn to a position covering Cape Chersonese pending evacuation. He managed to accomplish this move while the Russians on the south stormed forward against rear guards to reach the line Malakhov—French Cemetery—Cape Fiolente.

The remains of the Axis garrison resisted until late on 12 May, when the survivors surrendered. These are reported to have consisted of Headquarters German V Corps and parts of the German 73d, 111th, and 336th Infantry Divisions.

At date of writing details of the Crimea campaign are unknown. Russian reports claim taking 61,587 prisoners during the entire campaign since 6 Apr. This includes the wounded which fell into their hands. They estimate the Axis killed as 50,000. Assuming these figures are correct, about 100,000 Axis troops are unaccounted for. This may represent the number evacuated during a period of about three weeks. Of these some were lost through bombing of ships, neither side having made any report as what this might be. All Axis materiel was lost.

As it is improbable that the Axis is in any position to attack the Crimea, this Russian victory released over 30 divisions for use elsewhere. Against this the Axis will salvage the equivalent of not over 5 or 6 divisions.

The Crimea is of considerable economic value. It has valuable mineral deposits, and normally raises much semi-tropical fruits, much needed in Russia at this time. Sevastopol as a base is completely ruined. The pre-war population of over a million is now reduced to about 10,000. All buildings and military installations have been destroyed. Moreover, the Russian Black Sea Fleet (which used to be based in part on Sevastopol) has nearly disappeared through nearly three years of war.

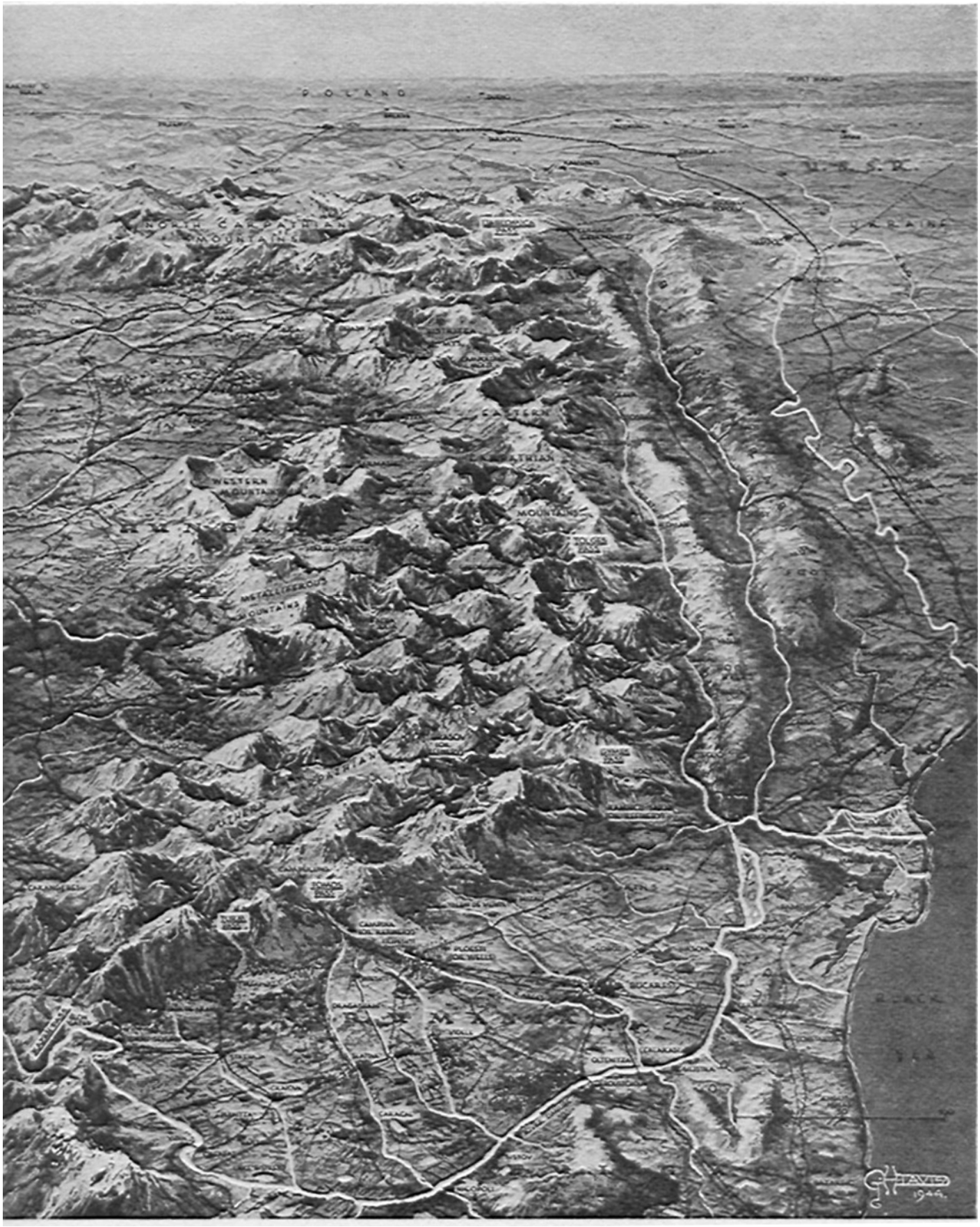
COMMENTS

1. Experience has taught many lessons as to use of armor. It is now the infantry which protects tanks, rather than tanks which protect infantry. The use of armor at considerable distance from supporting troops is declining where strong resistance is met. Armor can not maintain itself alone.

2. The increasing movement of infantry in armored carriers in battle is noted. These have the same mobility as tanks, and can rapidly come to their aid by occupying terrain appropriate to the joint mission. Holding such terrain firmly, artillery forward observers radio the location of enemy AT weapons. Upon these being neutralized the tanks make another advance.

3. The number of artillery divisions appears to be increasing.

4. Use of formations of planes of the fighter-bomber type as special AT units has obtained satisfactory results. The same detachments can be used against other types of targets. The planes habitually attack tanks as they jump off. Tanks not injured are distracted by the necessity of watching overhead for attacks which may come from any direction.



The Eastern Balkans and Carpathian Passes: a map stressing mountain passes, railroads and oilfields.

Know Your Enemies' Weapons

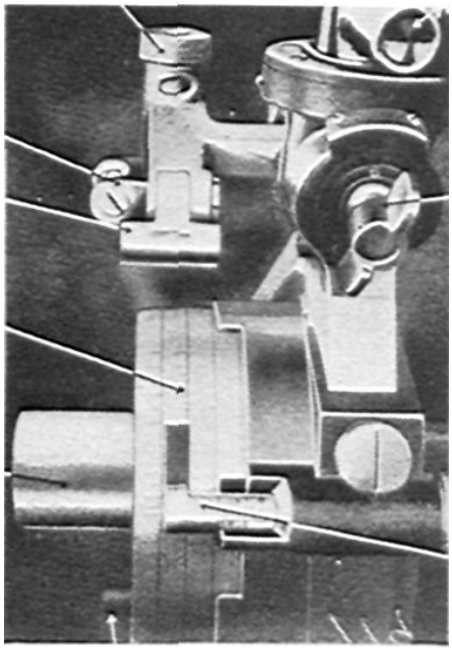
1.F.H. 16

Horse-drawn, like most German artillery, on maneuvers just before the start of World War II

Moving into France in 1940

Before Germany had enough motor equipment and high-speed carriages for the pieces, her tanks were supported by horse-drawn equipment. On maneuvers in '38 a 10.5-cm 1.F.H. 16 is in very direct support of some PzKw I tanks.

Pulling operating lever to the rear opens the block on this model. Note that here, as with practically all their artillery pieces, the Germans paint a skeletonized range table on the shield.

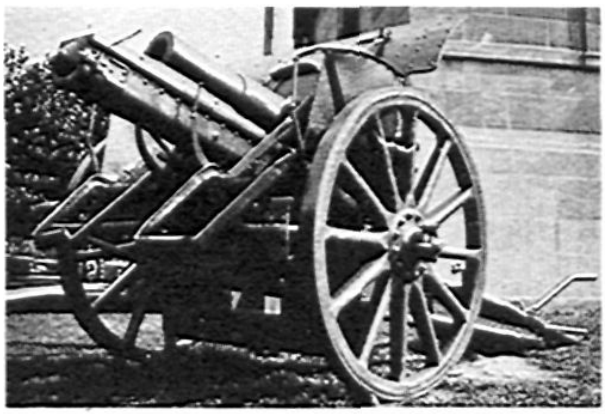


Sight bracket is of the oscillating type. Range drum is graduated for direct reading for the several charges.

GERMAN LIGHT FIELD HOWITZERS

By Lt. Col. G. B. Jarrett, Ord.

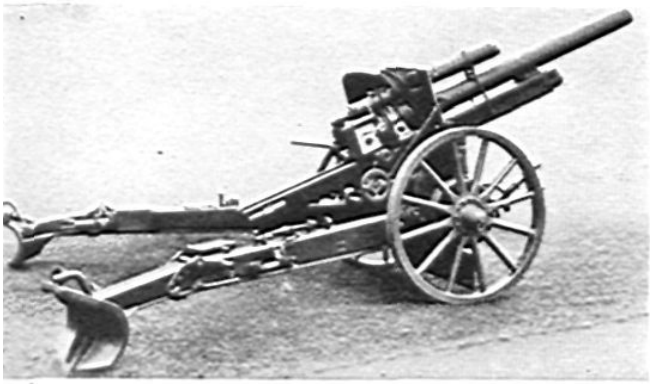
The concept of divisional artillery in all armies before and during World War I was to have a gun of around 3″ bore (to be used for the longer and flat trajectory ranges) and a howitzer of around 4″ (for high angle fire to take care of the targets behind hills, etc.). The combination of the fire power of these two weapons into a single artillery piece was explored by both French and German artillery designers during World War I. After the Armistice the American Caliber Board in the U. S., studying existing designs of all armies at the time, concurred in the viewpoint that such a combination was quite desirable. The Caliber Board further laid down the advisability of using 105-mm as the all-around Divisional Artillery caliber and to place it on a carriage allowing the maximum field of fire. This article is on German materiel, but the opportunity of giving a picture of how close ideas can run between rival designers is too interesting to pass up without a slight reference to it. The soundness of American basic ideas and the pay-off can be seen in the performance of the U. S. 105-mm howitzer M1, in this war.



1.F.H. 98/09 was the first "modern" 10.5-cm howitzer. Its tube was extraordinarily short, but its modified box trail carriage was efficient enough to be retained in the 1916 version.

In 1896 the Germans developed a satisfactory recoil system which was seen on their 77-mm F.K. 1896 n/A. In the years that have followed, this design influence has been seen through the many German designs of cannon accepted for production and used in both World Wars, I and II. The first of a long series, a 10.5-cm howitzer was developed by Krupp in 1898 that has been the German light field howitzer design basis for the past thirty years. The final analysis of the whole 10.5-cm howitzer development was to realize the optimum range and field of fire at no sacrifice in accuracy. However, in keeping with the tubes and the carriage, ammunition design was advanced step by step to realize an efficient piece.

The basic 1898 10.5-cm howitzer was on a carriage that did not give all that was desired as far as range was concerned. Therefore, shortly after 1900 the German designers built an entirely new and shielded carriage with a modified box trail. This trail permitted much higher elevations and, with the contemplated use of improved ammunition, the original 10.5-cm howitzer was mounted on it. This became the 1898/09 model. This new carriage improved the performance of the 10.5-cm howitzer, and the German war planners prior to 1914 had plenty of time to produce many such pieces.



1.F.H. L/28 is the transition piece between the 16 and 18 patterns. It was the first German 10.5-cm howitzer to have a split trail carriage.

This 1.F.H. 98/09 (light Field Howitzer 1898/09) had a single-motion sliding-wedge breech-block fitted with an axial striker. It is interesting to note that the original 98 howitzer had a forward-to-rear movement of the breech lever on the side of the breech, but in 1909 this system was altered to a right-to-left movement on top of the breech. Early in World War I both breech lever designs were encountered on the 1898/09 carriage.

An innovation over the original form, the new carriage was shielded. Recoil was a constant design with spring recuperators. Cradled on rear trunnions and balanced by an excellent equilibrator, this howitzer could be elevated quickly.

A panoramic sight was provided, mounted on an oscillating sight bracket with a range drum graduated in meters for each of the 8 charges. Thus elevation was given in terms of the range.

At first glance the caisson and limber for the 1.F.H. 98/09 could be confused with those for the 77-mm field guns. However, they carried the ammunition in wicker baskets, two each complete separate loading rounds set vertically in the compartments. These baskets weighed from 79 to 89 lbs. each. Limbers carried 24 rounds and caissons 34. In early 1914 German batteries consisted of 6 howitzers. Thus the 12 limbers and 6 caissons of the battery carried a total of 492 complete rounds when on the march. Before 1916 the battery was cut to 4 howitzers, to enable creation of additional artillery regiments for the expanding armies.

In 1916 the demands of position warfare pointed to the increasing need for even longer ranges of howitzer fire. The carriage for the 1898/09 was quite satisfactory at the time. Increased range was a matter of sufficient tube and perhaps ammunition improvement. Thus the carriage was retained, but a new tube and a new streamlined HE shell were put into production. This new 10.5-cm howitzer was known as 1.F.H. 16.

Although chamber and breech remained the same, the tube was almost doubled in caliber length (11.9 cals. to 22 cals.). The carriage appeared exactly like the original 98/09 version except that beneath the box trail was a special device permitting the entire piece to be jacked up on a firing platform. In

1.F.H. 18

In a French street, Germans are firing a 10.5-cm howitzer fitted with steel-tired wheels.

A variant appears here, on the Russian front. Prime mover is a standard personnel carrier. Wheels of the piece are the old wooden, steel-tired type, but with solid rubber tires mounted on them.

These pieces have the first pattern of pressed steel wheel, but with steel tires rather than rubber ones. In the left picture note the extreme litter of ammunition in the immediate vicinity of the piece; although the uncased projectiles are laid on canvas or paper, they are spotted where much sand and dirt will inevitably be kicked among them. At the right (a battery being fired at the Sportzplatz in Berlin before this war) you can get a good idea of tube length, piece silhouette, and pattern of this type wheel.

In this photo taken during the battle of France in 1940 the latest design of wheel appears.

A self-propelled weapon was obtained by mounting the 1.F.H. 18 on the chassis of a PzKw-II.

such position the weapon could be traversed 360º. This was a very early attempt at increased fields of fire for artillery weapons. However, this device had some hard-to-manage features which research shows the Germans most certainly abandoned in late 1918, in favor of the split trail idea. The explorative search for improvements by the German designer in 1916 is of interest, however, and the new piece was otherwise satisfactory.

Position warfare of the last war made difficult demands on the artillery support. In addition, the attrition of the war continually cheapened the shell. Some shell bodies actually were made of cast iron. The greatly thickened walls (devised to provide some fragmentation) caused the reduction of an already poor mix of explosive. This was carried to the extent that these shells were not seriously dangerous in the target area unless rather close to a direct hit—assuming they burst at all.

Thus, in the HE type a cast iron shell existed and also a steel shell. In the latter the charge of 80/20 amatol was usually about 3.3 lbs., and in the cast iron version about ¾ lb. Whenever an HE had a smoke producer added for ranging

purposes, the shell was marked with a vertical black stripe ½″ wide.

A special streamlined shell was provided. This was also the longest projectile fired. It had a false ogive but was not boat-tailed. Made of steel, it had about 4 lbs. of amatol. It used a slightly heavier powder charge than was normal.

A star or illuminating shell existed which was somewhat like a shrapnel and contained (instead of balls) a parachute and flare candle.

In World War I shrapnels, of course, were used. These were functioned by the usual powder-train time fuze. Two shrapnel types existed, one with lead balls and the other using steel balls.

Several varieties of a chemical shell existed, which were modifications of the streamlined shell for chemicals.

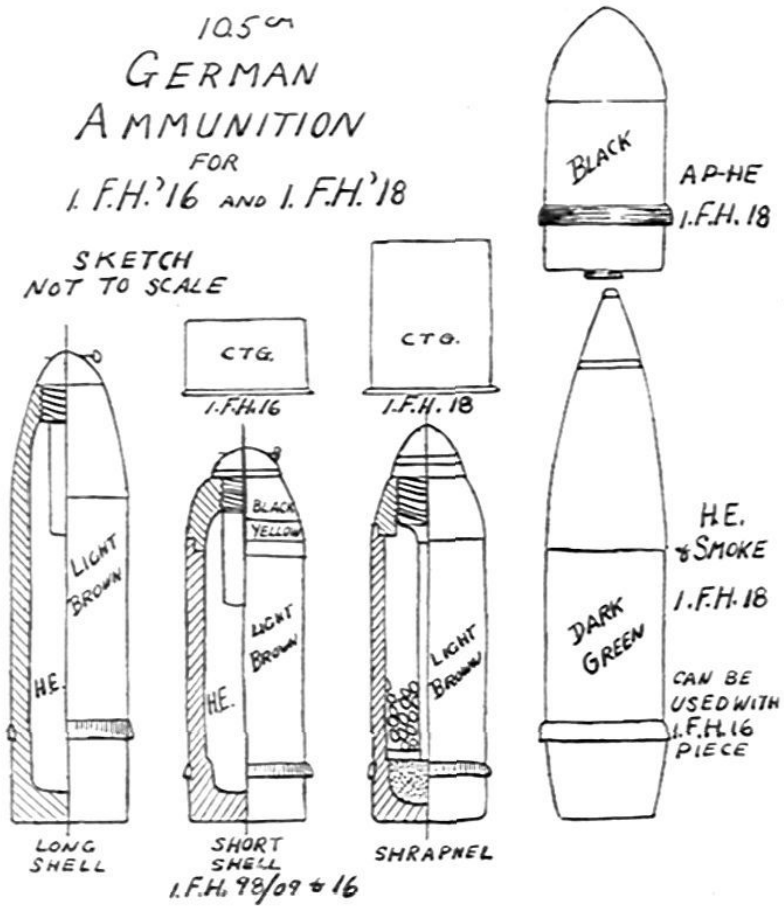
It should not be overlooked, however, that at this time—with the new 1916 10.5-cm howitzer on the latest carriage proving successful—the 77-mm F.K. was also increased in caliber length and adapted to this carriage. This was known as the F.K. 16, and marks a definite attempt to combine comparable German howitzers and guns on the same carriage. Extreme range for this gun was realized by the modified box trail, which

Loading an 1.F.H. 16 with the old style, or shorter, cartridge case. Either this or the longer type can be used in either the 16 or the 18 howitzer.

Here is the newer (longer) cartridge case for the 1.F.H. 18 howitzer. Zone increments 4 and 5 are seen.

Loading the newer and longer 1.F.H. 18 cartridge case in the 1.F.H. 16 howitzer.

Loading the newer 1.F.H. 18 shell in a 1.F.H. 16 howitzer. Maximum flexibility of ammunition and supply is gained by such interchangeability.



An 1.F.H. 16 caisson is shown here with the new style (1.F.H. 18) shell crate and cartridge case basket. The crate contains one fuzed HE shell. The basket carries 6 primed cartridge cases, each with increments for zones 1 to 6.

permitted high elevation. With the failure of the carriage jack and platform the way was open for the eventual split trail design. It should be pointed out that the split trail idea, permitting wider field of fire, had not come to the Germans at that time.

By 1918 such a carriage apparently was certainly well conceived and on the drawing boards. For the time, the performance of the 1916 howitzer was very good and the only really necessary tube changes would be in lengthened chamber to allow for a greater charge with increased range.

Little is known of these units built either at the close of or shortly after the First World War, but the 10.5-cm F.H.L/28 is likely a transition piece. The weapon commonly found in World War II is the 10.5-cm l.F.H. 18. It would appear to be a refinement over the L/28 version.

It should be noted that the L/28 has steel-tired wooden wheels, and doubtless was produced to a very limited extent considerably before 1930 and the advent of serious mechanization for modern armies. Use of the same type of wheel on the original 10.5-cm l.F.H. 18 at the start of production is also known. Later this same wheel was provided with a solid rubber tire, and still later the wheel was cast out of light alloys and fitted with a solid rubber tire. Thus the post-First World War German 10.5-cm divisional piece passed through stages of horse- to motor-drawn artillery.

The current 10.5-cm l.F.H. 18 is now well known, as all the Allied armies have encountered it as the main German Divisional Artillery piece. Its main characteristics in comparison with the earlier pieces are:

	98/09	*1916*	*1918*
Caliber	10.5-cm (4.13″)		10.5-cm
Length of Tube	11.9 cals.	22 cals.	94.5″
Weight of Piece	3,700 lbs.	3,045 lbs.	4,225 lbs.
Elevation	—13º—+40º	—9º—+40º	47º
Traverse	40º	40º	56º
No. of Charges	8	9	8+supercharge
M. V. (f/s, with full charge)	1,000	1,200	1,770+
Max. range 1915 shell	7,655 yds.	9,200+	
New streamlined shell		10,900+	13,500 yds.

Germany's present 10.5-cm l.F.H. 18 is a very satisfactory weapon, has a good field of fire, and an excellent (though not unusual) range. The howitzer is, however, radically lightened to conserve metal, and in a recent attempt to increase the range by stepping up the velocity a muzzle brake had to be resorted to. This one with the brake is called l.F.H. 18 M. M refers to *Mündungsbremse*, meaning "with muzzle brake."

l.F.H. 18 M is the latest version of this weapon, fitted with muzzle brake so it will withstand the effects of higher muzzle velocity.

Wisdom of using the brake is open to question. That a number of German brake designs exist in German usage might be partially explained by the facts that their research concerning them is still in progress, although on the battlefield, and that in desperate haste no time exists for much proofing at home.

The 10.5-cm l.F.H. 18 is drawn by either horse or motorized prime mover. Illustrations show both methods.

Existence is reported of a new 10.5-cm howitzer on a field carriage called l.F.H. 42. It has been seen mounted on a tank chassis as a self-propelled piece—an idea doubtless borrowed from the now-famous U. S. 105-mm howitzer on the M-7 motor mount, introduced by Montgomery's 8th Army at El Alamein in 1942.

Ammunition for the Second World War 10.5-cm howitzer is of four main types: HE, AP-HE, Chemical, and Hollow Charge. The HE and Chemical (smoke) have form factors which are practically identical. These two projectiles are quite conventional and offer nothing new. An AP-HE, uncapped, exists as a shell of opportunity. Use of this AP-HE can only be considered as in an emergency. The velocity of such a howitzer is so low, compared with high velocity AT guns, that an AP shell takes far too long to reach the target and strikes at too steep an angle of fall to be very efficient in modern armored warfare. In support of this view, only very limited quantities of this ammunition were ever captured in the German desert dumps.

The range of either the l.F.H. 18 or 42 weapons is not such as should cause undue alarm. Both are excellent pieces, yet substantially and undeniably matched by the American 105-mm howitzer. The latter, when served by an American crew, has a yet-to-be-equalled rate of fire. Ask a German prisoner.

THE $64 QUESTION

"Oh, Sergeant," all the trainees cried,
"We're puzzled by that song
About the Field Artillery Where
something rolls along.
We don't know what it was that rolled,
For nothing of that nature
Is mentioned by field manuals With
modern nomenclature.
We've never seen those things that hit A
dusty trail and race on.
So, Sergeant, kindly answer us. Now
what in hell's a caisson?"

—Maj. Fairfax Downey, FA

THE GERMAN GRAPHIC FIRING TABLE

By Lt. J. H. Hexter, FA

CHARACTER AND CONSTRUCTION

By means of their graphic firing table the Germans claim that they are able to get accurate values for all firing data that depend on the course and character of the trajectory. Some of these data can only be approximated from the regular German and American firing tables for targets not substantially in the same horizontal plane as the piece. Quadrant elevation, drift, fuze-setting, and several other items are found merely by an inspection of the graphic table, entirely without computation.

The basis of the graphic firing table is a series of contoured maps of trajectories, one map for each charge the piece fires. The theory of their construction and the method of using them will be easy to understand if the reader follows the explanation on the accompanying diagrammatic sketch. If one were to fire a round from a gun at 0 elevation, then raise the elevation 2 mils and shift 2 mils to the right and fire again with the same charge, and so on until the gun reached maximum elevation, then all the trajectories taken together would form the cover of an imaginary mass or (as the Germans say) the cover of the trajectory mountain (*Flugbahnberg*) for that charge. Like any other mountain, this one can be contoured and then projected on a flat surface to scale.

Suppose we cut the trajectory mass with horizontal planes at intervals of 25 meters and then project it onto a flat surface to a scale of 1:25,000. The result will be a contoured map of a very geometrical looking mountain.[1] A single contour line will connect all points level with the piece on all trajectories, another all points 25 meters above the piece, a third all points 50 meters above, and so on to the maximum ordinate of the highest elevation, which is the peak of the mountain. Each charge has to have its own map. For the American 105-mm howitzer seven maps would be necessary. A German 105-mm howitzer requires six.

The map of the trajectory mountain is the groundwork of the German graphic firing table. On it are superimposed a series of arcs (with their origin at the 0-point [gun position]) representing 1,000-meter intervals in map distance from the piece. To make it easier to read the map the distances from the 0-point are printed along its margin, and the altitudes of the contours are indicated every 500 meters. The mass of contours below the horizontal are bordered in red and the altitude numbers on those contours are underlined. The 0-contour—or contour of the horizontal itself—is a red line. Contours at 500-meter intervals are heavy lines, those at 100 meters are lighter, and those at 25 meters very light.[2]

Two further elements are required for the efficient operation of the graphic firing table. The trajectories themselves must be represented, but since we start with a contoured map projected on a horizontal surface, trajectories (leaving aside for the moment lateral deviation or drift) will appear on it as rays emanating from the point of origin or 0-point at the muzzle of the piece. Thus any straight-edge will serve to represent any trajectory. As the elevation is increased, the trajectory corresponding to it is represented merely by rotating (traversing) the straight-edge to the right from elevation 0, always keeping one point of the edge in coincidence with the 0-point. For convenience in interpolating between 1,000-meter range lines, the straight-edge actually provided by the Germans with their graphic firing table is marked from the 0-point at 25-meter intervals, on a scale of 1:25,000.

Finally, some handy means is necessary for reading elevations and corresponding ranges to the 0-contour. To place the elevation and range scales on this contour would clutter up the map, so on extensions of the trajectory rays (which, however, are not actually represented) in a convenient area beyond the map for each charge, a two-part scale-arc is constructed. On the lower half of the arc are the elevations for the trajectory rays, on the upper half the corresponding ranges at the horizontal as given in the standard firing table.

USE OF THE GRAPHIC FIRING TABLES

In using the graphic firing table the essential fact to remember is this: by mere inspection one can read from it (1) *the elevation for any range*, and (2) *the height above or below the horizontal of a projectile fired at that elevation at any given distance from the 0-point* (*gun position*). That is, one can read from the table the height of all trajectories and their distance from the firing position at every point on their course, the elevation at which they were fired, and the range at the horizontal corresponding to those elevations.

Charge

Suppose our materiel to be a German 105-mm light field howitzer (l.F.H. 18) firing an HE shell (F.H.Gr). We want to fire on a target that is 6,000 meters from the gun position and 1,000 meters above it. We choose the appropriate charge by finding on which trajectory map the 6,000-meter map distance line intersects the 1,000-meter contour. A cursory inspection of the trajectory maps for charges 1, 2, and 3 will eliminate them. On the map for charge 4 the 1,000-meter contour does intersect the 6,000-meter map-distance line, so we place the 0-point of the straight-edge at the gun position and push it across the contour map until it intersects the 1,000-meter contour line, 6,000 meters out from the gun position. Then, where the extension of the straight-edge intersects the elevation scale of the scale-arc we read an elevation of 720. According to rule the Germans will not take a target under fire at an elevation so near to that for the maximum range. Therefore, we will use charge 5.

Note that the mere fact that a charge is enough for a certain map range in the standard firing table does not mean that we can reach a target far above the horizontal at that map distance with that charge. Using the standard firing table for a target on a different level from the piece we can settle this question of the appropriateness of a charge only by a computation involving an arithmetic interpolation, two multiplications, and an addition. The American SOP on the whole has been to take a quick guess, add one, and start firing, but this has its disadvantages in hilly terrain where the minimum practical charge may be the only one with which we can get a trajectory high enough to clear intervening masks without leaving the target in dead space.

[1] For purposes of this construction lateral deviation (drift) is disregarded. It is assumed that the entire trajectory lies in the plane of departure.

[2] The 25-meter contours do not appear on the accompanying diagrammatic sketch.

Range and Elevation

Using the map for charge 5, we set the 0-point of the straight-edge at the gun position and rotate it until its 6,000-meter point coincides with the 1,000-meter contour line. Then we read the elevation 510 from the place where the extended straight-edge intersects the lower scale, the map range of 8,125 meters for the contour of the horizontal from the point where it intersects the upper scale of the scale-arc. The elevation we read is the *quadrant* elevation for the target under standard conditions. The site to the target is included in the elevation we read, and therefore the fire commands for site and elevation in this case would be Si 300, El 510.

Masks and Dead Space

By looking back along the straight-edge from the intended point of impact (6,000 meters at 1,000-meter height) we can immediately read the height of the trajectory under standard conditions at every point on its course, and thereby determine whether the projectile fired with charge 5 at El 510 will clear intervening masks. We know, for example, that the crest of a hill lies in front of the above target 1,600 meters from and 800 meters higher than the gun position. Can we clear the crest? An inspection of the trajectory ray to hit the target indicates that a round fired at elevation 510 has not intersected the 800-meter contour 1,600 meters from the gun position, and therefore it will not clear the mask. So charge 5 will not do; and since any smaller charge lacks the necessary range and any greater charge will bring fire into the mask or overshoot the target, the entire line from the target to the crest represents dead space for all charges of the German 105-mm howitzer firing from its present position.

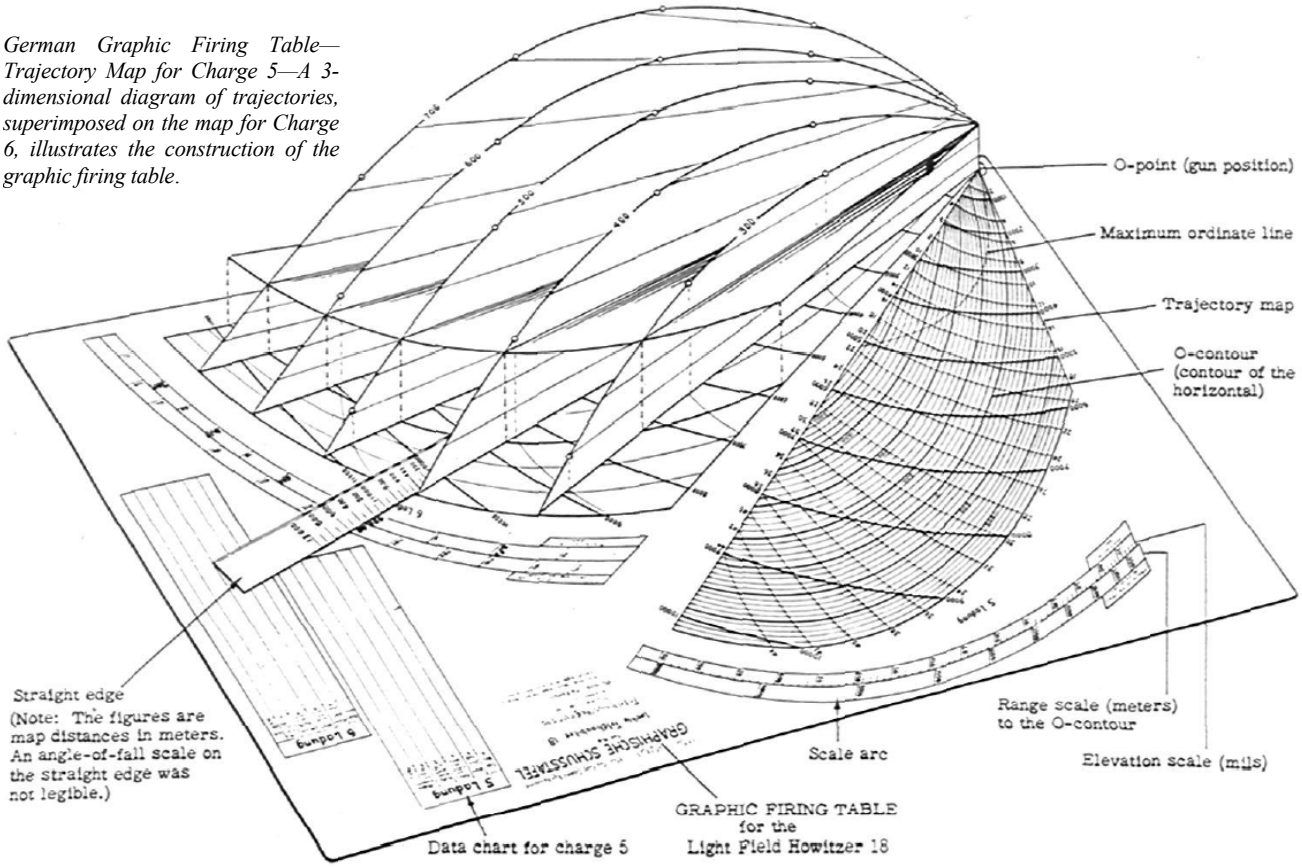
Drift and Fuze-Setting

Drift coincides closely with time of flight. The longer a projectile is in the air, the greater the drift. But time of flight is in the main a function not of horizontal distance from the gun position but of the length of the trajectory curve. There may be a great disparity in times of flight to points equal in map-distance from the piece but at different heights above or below it, and so on different trajectories the drift to these points will vary.

In the standard firing tables we can find the drift for the map-distance to the target or for the range at the horizontal corresponding to the quadrant elevation for firing on the target. These are the only alternatives the standard firing table offers, and neither is accurate if the target is considerably out of the horizontal.

To make it possible to determine drift and certain other data rapidly and accurately from the graphic firing table, the Germans have imposed another set of curves on the trajectory map. These are the curves of equal times of flight. They indicate the horizontal distances traversed along all trajectories at two-second intervals. A glance at the graphic firing table indicates that the equal-time-of-flight curves tend toward the 0-point as they move from left to right; that is, as the elevation increases, the horizontal distance traversed in equal times of flight decreases. Since curves of equal times of flight are represented on the trajectory in intervals of 2 seconds, for times between the 2-second intervals it is necessary to interpolate.

The curve of drift coincides with the time-of-flight curve. It is therefore unnecessary to represent it on the trajectory map. Instead, its values are set down in a data chart for each charge against the corresponding times of flight. The



German Graphic Firing Table—Trajectory Map for Charge 5—A 3-dimensional diagram of trajectories, superimposed on the map for Charge 6, illustrates the construction of the graphic firing table.

first of the several columns of the data chart gives time of flight in seconds, the second the corresponding drift in mils.

Revert now to our example of the target 1,000 meters above the horizontal at a distance of 6,000 meters. To find the time of flight we examine the trajectory map for the intersection of the map distance 6,000 meters with the 1,000-meter contour line. This lies on the 24-second time-of-flight curve. (Where the target does not lie on a time-of-flight represented on the trajectory map, it is necessary to interpolate.) From the data chart for charge 5 we read the corresponding drift, R 11.

In cut-up country full of draws and ravines round after round may be lost even very close to the target. Air bursts will make it easier to get sensings in such terrain. Fuze settings, like drift, are a function of time of flight. To find the fuze setting for a graze burst on a target not in the horizontal plane of the piece one proceeds just as in the case of drift, only instead of reading in the second column of the data chart opposite the appropriate time of flight one reads from the third column. German time fuzes are constructed for settings in degrees up to 360. In the case of our example for charge 5 with the target at 6,000 meters from the piece and 1,000 meters above it, the setting on the German time fuze according to the data chart is 151 degrees.

(RECONSTRUCTED) DATA CHARTS

Time of Flight (sec.)	CHARGE 5			CHARGE 6		
	Drift (mils)	*Fuze Setting (degrees)*	*Deflection Probable Error 50% Zone (meters)*	*Drift (mils)*	*Fuze Setting (degrees)*	*Deflection Probable Error 50% Zone (meters)*
13	5	88	2			
14	5	93	2			
15	6	100	3			
16	6	105	3	5	107	2
17	7	111	3	6	112	2
18	7	117	3	6	118	3
19	8	122	4	7	124	3
20	8	128	4	7	130	3
21	9	134	4	8	135	3
22	9	139	4	8	142	4
23	10	146	5	9	147	4
24	10	151	5	9	153	4
25	11	157	5	10	159	4
26	12	163	6	10	165	4
27	13	169	6	11	170	5
28	14	179	7	12	176	5
29	14	180	7	12	182	5
30	15	185	8	13	188	5
31	16	192	8	14	194	5
32	17	198	9	14	200	6
33	17	203	9	15	205	6
34	18	209	9	16	211	6
35	19	215	10	16	217	6
36	20	220	10	17	223	6
37	21	225	11	18	228	6
38	22	232	11	19	235	6
39	23	239	11	19	241	7
40	24	244	12	20	246	7
41	25	249	12	21	252	7
42	26	255	13	22	258	7
43				23	264	7
44				24	269	8
45				25	275	8
46				26	280	8

Selection of Position

In hilly terrain as in other kinds of country it is desirable to have the artillery well forward on the offensive, but emplacing it well forward may bring important targets behind the enemy lines into the area of dead space. By using their graphic firing tables the Germans are able to determine how far forward they can bring their guns and still reach a critical masked target in the enemy's rear.

Suppose a major crossroads lies behind both the enemy lines and a ridge that rises 1,000 meters in front of the crossroads and 250 meters higher. By reconnaissance we have located three possible gun positions: one on a level with the crossroads, the second 300 meters above it, the third 500 meters below it. Assuming that we are using charge 5 in the German l.F.H. 18, how far back must these positions be, if we are to fire from them onto the crossroads?

Case 1: G and T in the same horizontal plane. Cut to scale a small strip of paper 1,000 meters long. Using the trajectory map for charge 5, place the strip on the straight-edge so that the *far* end of the strip coincides with the red line of the 0-contour. With the 0-point of the straight-edge at the gun position, rotate the straightedge to the right and at the same time keep moving the paper strip up along it so that the far end of the strip remains in coincidence with the 0-contour. When the *near* end of the strip coincides with the 250-meter contour, remove the strip and read *from the straightedge* the distance from the 0-point (GP) to the 0-contour (T). In this case it is 5,150 meters, so the gun position must be at least 5,150 meters from the target to clear the mask.

Case 2: T 500 meters above G. Repeat the procedure for case 1, but instead of keeping one end of the strip in coincidence with the 0-contour, keep it in coincidence with the 500-meter contour until the other end touches the 750-meter contour (500+250). The distance that the guns must be from the target is read from the straightedge at the 500-meter contour (T); it is 6,000 meters.

Case 3: T 300 meters below G. Follow the same procedure as above with —300 and —50 (—300+250) as the contour lines for target and mask, and read the required distance (4,425 meters) as before. Notice that while in Case 1 the map-distance can be read from the range scale of the scale-arc, in Cases 2 and 3, where the target is not in the same horizontal plane as the gun, the range scale will not give the correct answer. In determining the possible locations for gun positions it is well to establish the correct habits by reading *all* distances from the straight-edge. The elevation for firing on the target, however, is read from the elevation scale of the scale-arc. In the above cases in order the elevations are 250, 403, and 132. Note that *while readings from the range scale give true distance to the target only if it is in the same plane as the piece, readings from the elevation scale give correct elevations for targets at all points on the trajectory*.

CORRECTED AND EXACT FIRING DATA

So far we have dealt only with uncorrected firing data and taken no account of the effect of weather, materiel, and dispersion on the determination of firing data. A metro message cannot be computed on the German graphic firing table, but it can be computed with increased accuracy for targets not in the same plane as the piece by making use of the table. Here again neither the map distance to the target nor the range for the quadrant elevation makes an accurate base of calculation, because the effects of weather and materiel are more closely related to time of flight than to distance or quadrant elevation.

Accurate computation of a metro message for targets far out of the horizontal is achieved by using the data for the range to the point on the 0-contour intersected by the time-of-flight curve on which the target lies. If the time-of-flight curve to the target is 20 seconds, the message is computed for the range at which 20-second time-of-flight curve intersects the 0-contour. The Germans somewhat vary the details of their procedure depending on whether the target is above or below the gun position.

Case 1: T above G. (1) Follow the time-of-flight curve from the target to the point where it intersects the 0-contour.

(2) Using the range to this point as the uncorrected range, compute the entire metro message and the deflection correction.

(3) Determine the algebraic difference in mils between the elevation for the map range to the 0-contour and the elevation for the metro-corrected range. This is the elevation correction.

(4) Apply the elevation correction to the quadrant elevation for the target read from the elevation scale of the scale arc.

Case 2: T below G. (1) The same as in Case 1.

(2) Compute the correction in meters for range wind at the point on the 0-contour thus determined.

(3) Apply this correction to the map-distance to the target. Read from the scale-arc of the graphic firing table the quadrant elevation at the corrected range.

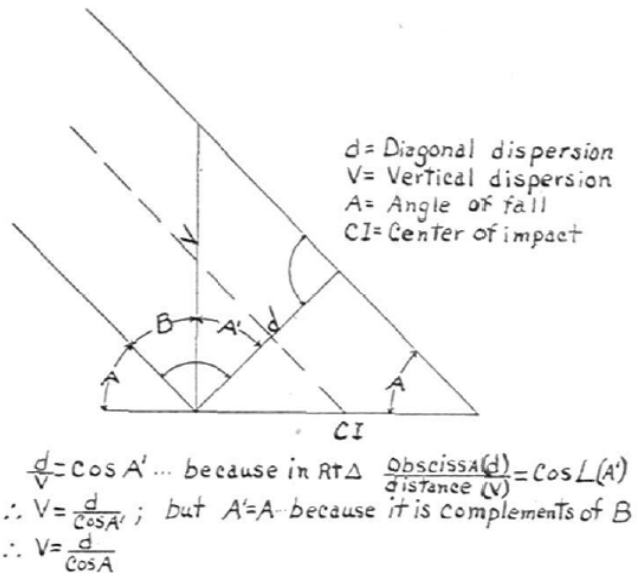
(4) Compute the rest of the metro message as in Case 1 (3), and apply the elevation correction to the quadrant elevation corrected for range wind.[3]

Angle of Impact

The angle of impact (*aufschlagwinkel*), the smallest angle between the long axis of the projectile and the surface of the target, is important in determining penetration, dispersion on slopes, and the chance of getting ricochets. The printed firing table is of no use for determining angles of impact for targets not near the same level as the piece, but these angles can be determined from the graphic firing table. Since the trajectory map is a contoured map, if we measure the distance between the two 100-meter contour lines enclosing our target we can approximate the angle of fall (*auftreffwinkel*) by the use of trigonometric functions[4] or by the mil relation. The straight-edge that the Germans use for representing trajectories on their graphic firing table has printed on it an angle of fall scale that makes computation unnecessary. If the slope of the terrain is approximately in the direction of fire the angle of impact can be ascertained closely enough as the sum of the angle of fall and the angle of slope of the terrain derived from the firing chart.

Minimum Elevation

Ordinarily after determining the elevation necessary to clear a mask the Germans add an arbitrary bound to take care of dispersion. If, however, friendly troops are near the mask and targets close behind it, especially when weather conditions are far from standard, the Germans believe in an accurate



computation of the minimum elevation. They first determine the necessary allowance for vertical dispersion on the basis of diagonal dispersion. Diagonal dispersion for the 50% zone is the perpendicular distance from the trajectory for one end of the 50% zone to the trajectory for the other end. It is a function of time of flight, and is found in the fifth column of the data chart.[5] Vertical dispersion for the 50% zone equals the diagonal dispersion divided by the cosine of the angle of fall, described earlier.

The 100% zone, outside which theoretically no rounds should fall, is four times the 50% zone. Moreover the Germans allow three times the total dispersion (100% zone) when firing a full battery under combat conditions. But for clearing masks only that part of the dispersion that is short of the center of impact needs to be allowed for. The total allowance is thus 6 times the vertical dispersion for the 50% zone. Having determined the time of flight to the mask on the appropriate trajectory map of the graphic firing table, we then find the corresponding diagonal dispersion in meters for the 50% zone in the fifth column of the data chart. The allowance (V) for vertical dispersion is then determined from the diagonal dispersion (d) and the angle of fall (A): $V=6.\frac{d}{\cos A}$. The dispersion correction is then added to the height of the mask, and the corrected trajectory is located on the trajectory map. Then a metro message is computed on the basis of the appropriate time of flight on the corrected trajectory. The method followed is that given above for targets above the gun position. If the metro correction is minus it is dropped, and the quadrant elevation to the mask corrected for dispersion is the minimum elevation. If the metro correction is plus it is added to the quadrant elevation corrected for dispersion to determine the minimum elevation.

[3]The Germans do not make clear the reason for the different procedures in the two cases.

[4]Actually by this method we determine the angle formed by the chord of the trajectory between two 100-meter contour lines and the horizontal, while the angle of fall is formed by the tangent to the trajectory and the horizontal at the point of impact. The difference, however, is negligible.

[5]The fourth column of the chart gives lateral dispersion.

A driver's control isn't limited to the vehicle he operates. TM 9-2810 says, "The vehicle driver (or crew) is the most important single factor in preventive maintenance. Only through him can the mechanic know what difficulties a piece of equipment is giving. If the driver (or crew) fails to take an interest in the vehicle, the vehicle and the efficiency of the company or unit will suffer."

THE ANTITANK GUN

By Lt.-Col. G. D. W. Court, RA

Before one can consider the tactical factors affecting the siting of antitank guns, it is essential to know all the characteristics of the various types of the guns—the points for and against. Let us therefore consider these various characteristics.

TOWED GUNS

(*i*) *Such Guns, Irrespective of Size*

(*a*) *Points FOR:*

The gun is very accurate, with a flat trajectory and high muzzle velocity. It has a good traverse with sensible limits.

At the fighting range of the gun, penetration is good.

Most guns are strongly made and will stand up to a lot of knocking about.

The breech mechanism is semi-automatic, which means that the ability of the layer and the type of target afforded by the tank, and not the gun itself, are the factors limiting the rate of fire.

(*b*) *Points AGAINST:*

Guns are comparatively difficult to manhandle. There is no wheel-purchase. They are heavy, considering their size, but *they will go anywhere, with enough men*.

Concealment of the flash is next in importance after fulfillment of the task (mission). The detachment (crew) are very vulnerable to small arms fire and attack by infantry, especially when on the move.

(*ii*) *Light Antitank Guns Only*

(*a*) *Points FOR:*

These guns are easy to conceal until opening fire, and hence can surprise the enemy more easily than can heavy guns.

Although heavy guns also have semi-automatic breeches, light guns really are rapid-firing because blast is not such a hindrance.

Light guns are very mobile. They are comparatively easy to raft across rivers, in that the unit can readily do its own rafting and can carry the rafting equipment on its own transport if necessary. This latter is a big point because it renders the antitank unit independent of Engineer assistance, which is nowadays difficult to obtain in view of the large number of calls on Engineers.

(*b*) *Points AGAINST:*

Light guns have a comparatively short effective range—depending, of course, on the particular gun. This is a less serious objection in European country than was the case in the desert.

Considering their size, I think it is a fair criticism to say that the light-type guns are heavy.

(*iii*) *Heavy Antitank Guns*

(*a*) *Points FOR:*

These guns have a long fighting range and equivalent good penetration at that range.

(*b*) *Points AGAINST:*

The life of the barrel of some heavy guns is limited. Blast counteracts the advantage of the semi-automatic breech and the result is:

A comparatively slow rate of fire.

Heavy guns are obviously rather a proposition when it comes to rafting. There is no question of using small folding boats.

Heavy guns are difficult to conceal, but it is by no means impossible to do so. This means that a unit must be really expert in the task of choosing gun positions and in the art of concealment and camouflage.

Finally, manhandling is frankly a problem, but not an insurmountable one. Experiments are being carried out with a detachable wheel under the trail.

The list of "points against" is possibly an impressive one but I think that it is outweighed by the "points for," especially by good penetration at long range.

(*iv*) *A Few General Remarks on AT Guns in General*

Antitank guns must be used boldly, but normally once they have been placed in action (if necessary, well forward), the gun must wait for the tank to come into the arc of fire—*NOT* go and seek it out. It does not become offensive in that sense until it is mounted in a tank.

Concealment is the main protection of the antitank gun, and this achieves surprise—which is the essence of success.

SELF-PROPELLED GUNS

Evolution of the Idea in the British Army

(i) First we had the 2 Pdr. mounted on the Loyd carrier. This promised to be an efficient little S.P. gun but was superseded by the 6 Pdr. before being tried in action.

(ii) Then we had the "Deacon"—an armored 6 Pdr. on a 4-wheel-drive chassis. It was really an emergency job. It was very conspicuous with a distinctive outline. As far as I know there were only three batteries equipped with this gun in the Middle East. These guns had two main uses: (a) As a mobile reserve, with towed 6 Pdr. or with armor, to hold ground already won by the tanks, subsequently handing over to a towed battery. (b) In close support of light armor; e.g., a section (2) or a troop (4) of Deacons operating with a troop or more of armored cars. This was done in the Eighth Army with one Deacon battery, and the experiment was considered to be a success in that the cars liked the armored 6 Pdr. support.

(iii) This was followed by the heavy self-propelled antitank gun. The following analysis of its merits and demerits is intended to be purely constructive, and are the impressions of the author of this article.

(*a*) *Points FOR:*

The breech mechanism is kept clean, which is an improvement on the inherent disadvantage of the towed gun.

There is no "bouncing."

It is quick into action when on the move (e.g., advance guards) and it can be got onto the objective quickly and more expeditiously than can towed guns. There is protection at least from machine gun fire for the detachment.

Cross-country performance is good.

The later models have all-round traverse, which is a "luxury."

Traverse is steadily geared and simplifies laying.

The whole machine is very steady on the gun being fired.

Blast does not hinder observation to the same extent as a towed gun, simply because the muzzle is higher off the ground.

It is very definitely a close support weapon with certain definite *limitations* as to its equipment and *reservations* as to its employment.

(*b*) *Points AGAINST:*

The self-propelled gun is difficult to conceal owing to its size.

If the engine or suspension goes wrong, you have lost a gun. There is no question of coupling it up behind a truck, although of course one self-propelled gun will tow another.

In many cases (owing to the presence of the enemy) the Gun Commander cannot always leave his self-propelled gun. This renders observation of fire more difficult.

If observation becomes impossible, however, the Gun Commander MUST observe from the upwind flank, and in this case some form of line communication is essential.

(*c*) *General Points:*

The self-propelled gun is a self-propelled *gun*, which is mounted on *tracks*, and has thin armor for protection of the detachment. Therefore, it is *NOT* a tank.

The turret is less heavily armored than a tank's, and it has no roof. Only the hull and everything that goes with it is of a tank. Therefore, it must not be *used* as a tank.

Having read as far as this, the reader will probably think, "So What?" The purpose of this article is to endeavor to crystallize in the reader's mind (and in the author's):

(a) The types of antitank guns in use today.

(b) The characteristics accruing to those types.

If the article stimulates a little thought—and perhaps even discussion—in relation to possible future guns as well as the present, then it has succeeded.

HI-LO CIRCULAR GFT FOR 105-HOW

By T/4 John P. Folmer, FA

Frequent use of high-angle fire in the South Pacific area has resulted in the circular GFT inserted in this JOURNAL. The standard "slip-stick" with inserts for the various charges was found adequate enough for low angle fire, but the necessity of changing the inserts and the smallness of the figures presented a problem after considerable usage. In addition, standard GFTs we have received do not include high-angle. The JOURNAL carried pictures of circular GFTs for 105-mm[1] and 8″ howitzers,[2] and 155-mm guns;[3] these inspired us to construct a circular firing table which would cover all 7 charges of the 105-mm howitzer, for both high-angle and low-angle fire.

Our battalion of the Americal Division Artillery has often used this circular table in service practice, with consistently excellent results. It has our complete confidence, and has shortened the time necessary to prepare fire commands for the batteries. In high-angle fire it has the advantage of making it impossible to interpolate in the wrong direction—a mistake that can often otherwise be made.

In constructing the circular table, all divisions were laid off as radii by angular measurements with a large, accurate mil protractor, which gave us greater accuracy than linear measurement by dividers or other methods. The approximate allotment of space was 3800 mils for low-angle and 2300 mils for high-angle, the remaining 300 mils being used as a "margin" between the two scales. To make best use of available space and still cover all ranges a light battalion might shoot in its normal role, spreads of 1,000 to 12,500 yards for low-angle and of 2,800 to 12,500 yards for high-angle were used.

Through the trial-and-error method, a segment of 61 mils was settled on to represent the distance on the range scale between 12,500 yards and 12,000 yards. Since the difference between the logs of 12,500 and 12,000 is 0.01773, this was taken as being proportional to 61 mils, thus establishing a unit of measurement for the rest of the scale.

To find the number of mils to set off the 11,000-yard mark, subtract the log of 11,000 from the log of 12,500. Dividing this difference of 0.05552 by 0.01773 gives a quotient of 3.13. Multiply the unit of measurement (61 mils) by the quotient (3.13), and you have the number of mils necessary to plot the 11,000 yard mark. This system is followed all the way through, all measurements being made from the 12,500 yard mark to prevent the accumulation of errors; for instance, for the 5,500 yard mark, use the difference between the log of 12,500 and 5,500.

After the range scale was completed, the desired divisions for plotting elevations, *c*, drift, and fuze setting were converted to exact ranges by interpolation from the firing tables (FT-105-H) and plotted radially, by inspection, from the range scale.

A prime advantage of our table is the logarithmic *K* scale, which permits use of a single fan instead of the double ones sometimes required. As the *K* is in yards per 1,000, the same logarithmic system is used for plotting the *K* scale, working 200 yards (or more if desired) in each direction from the 1,000-yard mark. It is important that the *K* scale be drawn on the table as shown, so that in various reproductions this scale will remain accurate.

By making the original circle at least 30″ in diameter (we didn't, much to our regret), greater accuracy, easier draughtsmanship, and more legible copies are assured. This can be reduced to about 18″ in diameter in copying, giving a range scale equal to a slip-stick 36″ long.

Several methods of reproduction are possible, the best available to us being photography. The finished copies were mounted on masonite, with a covering of cellulose acetate for protection. The computers keep ammo and other data on vacant corners of the acetate sheet.

The fan was constructed from a piece of plexiglass, all lines being scribed on the reverse side to minimize parallax error. A strip ¾″ wide along the ridge edge was buffed with sandpaper, enabling the computers to write (in pencil) minimum elevations for each charge, right on the fan.

To avoid the mistake of reading from the wrong charge, all charges except the one being used are covered with a strip of colored scotch tape or adhesive tape over appropriate spaces in the fan.

A small strip of transparent scotch tape, with a vertical black line drawn on it, is stuck over the *K* scale on the fan to indicate the *K* for the particular fire mission. For example, *K* equals —25 yards/1,000, range is 5,000. Stick the black-lined tape over —25, set fan so that the black line is over 5,000, read the elevation under the center line of fan.

The model illustrated appears rather crude, but this is due to the fact that we had to "beg, borrow, or steal," all the ingredients. With good materials available, it should be possible to turn out a much better looking product.

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[1] Page 292, April, 1943.
[2] Page 611, August, 1943.
[3] Page 756, October, 1943.

HIGH ANGLE
ELEV.
C
DRIFT
3
4
5
6
7
1
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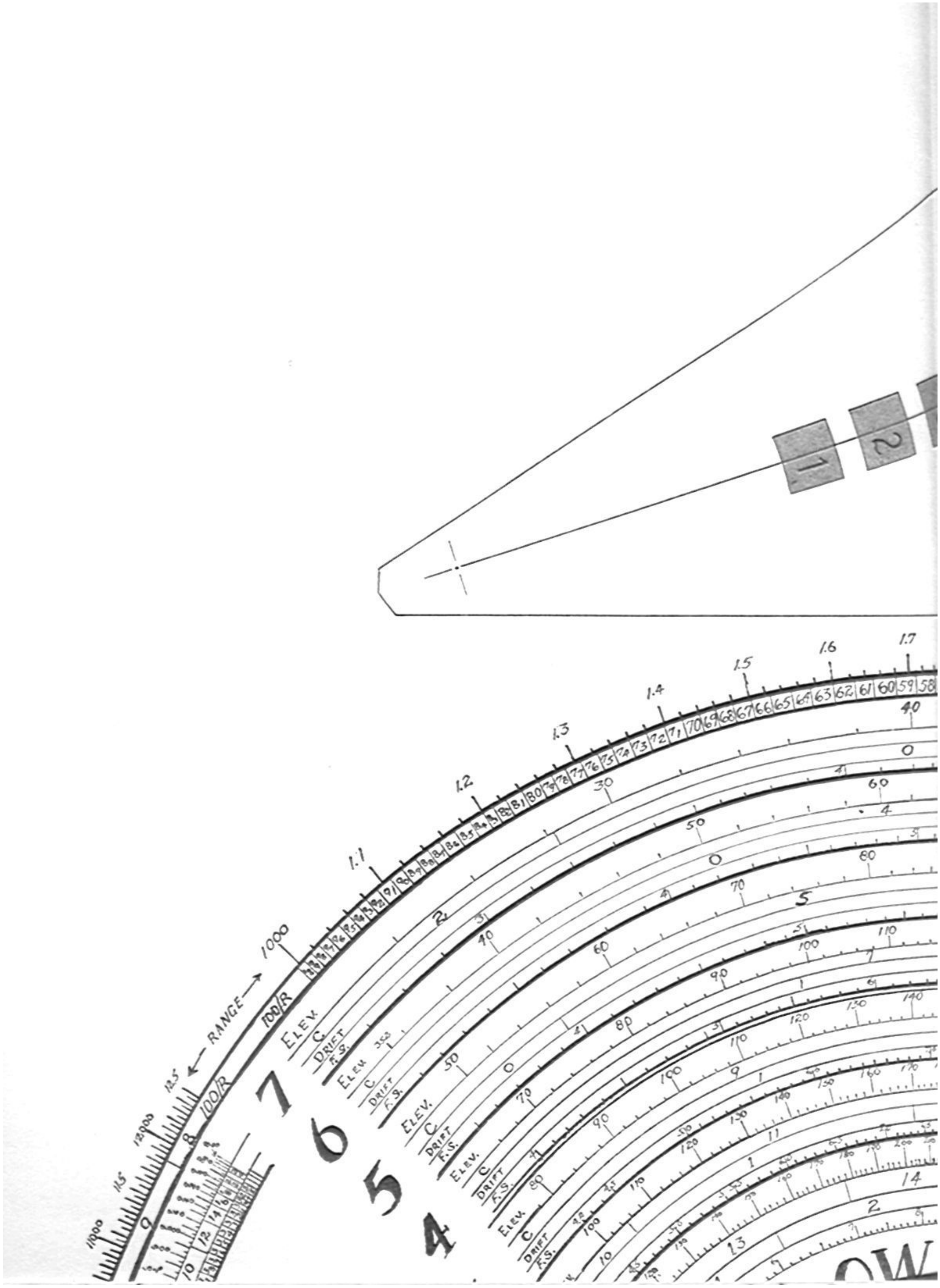
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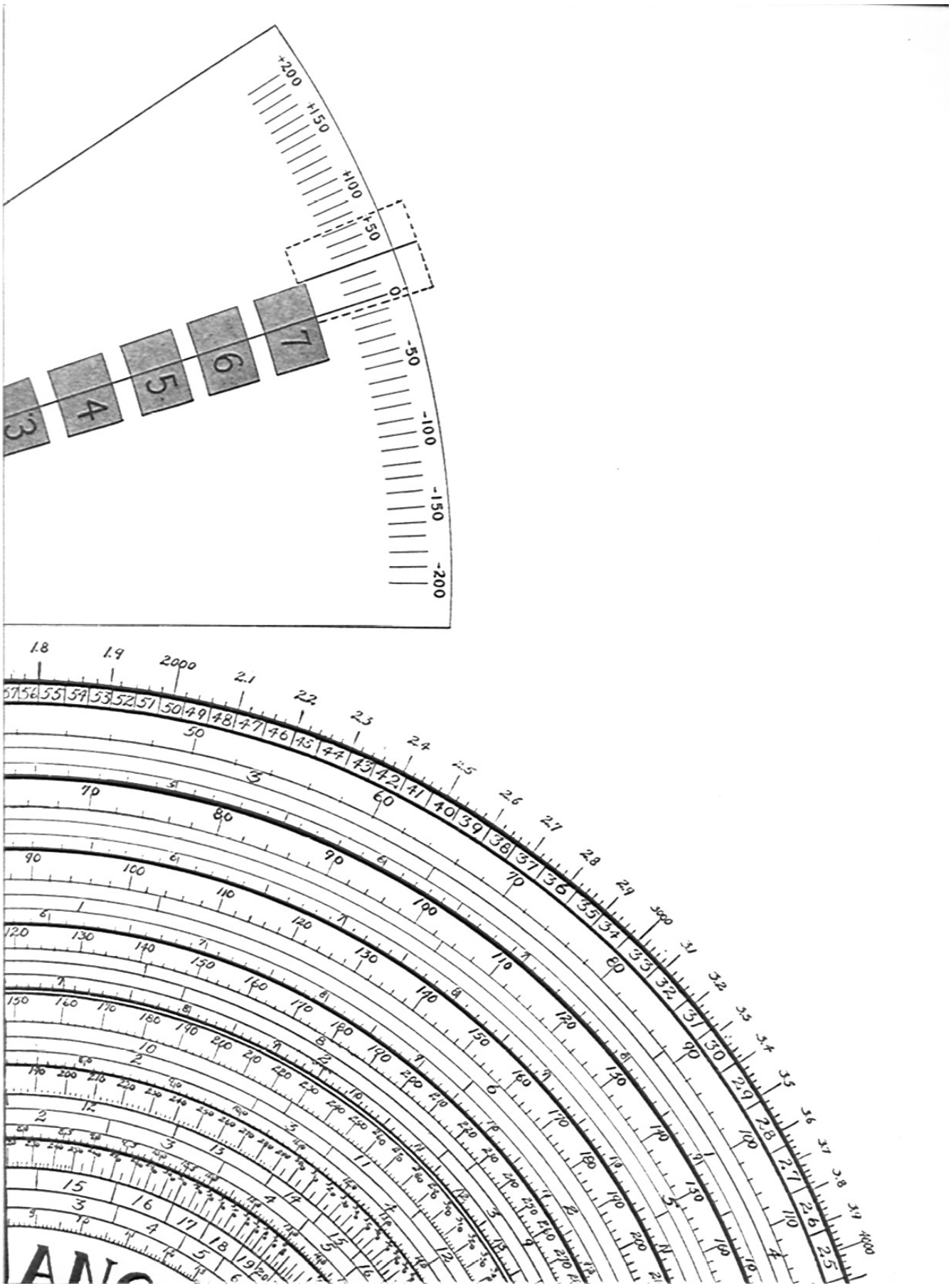
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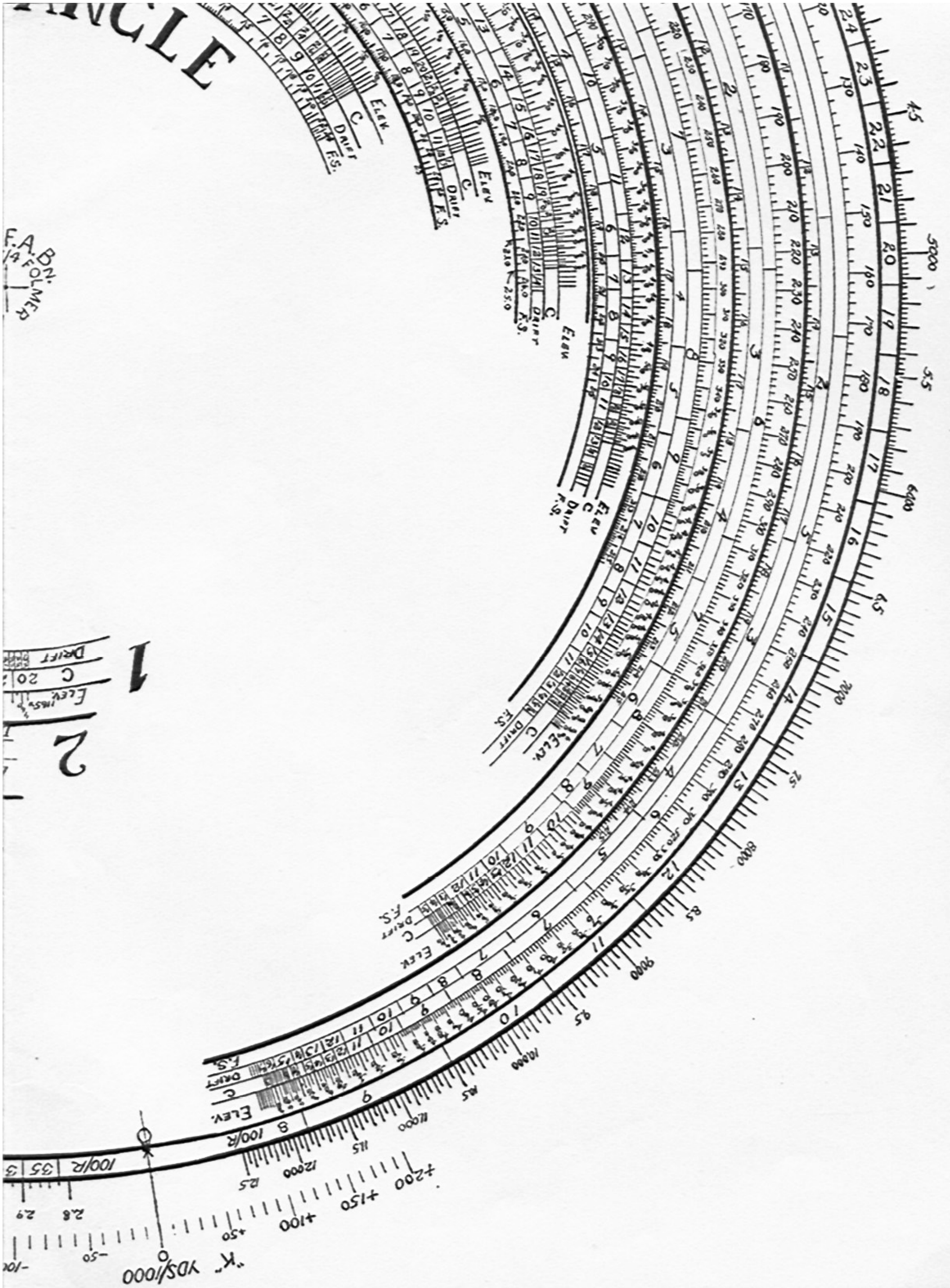
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SUMATRA

By Col. Conrad H. Lanza

Sumatra is the second largest of the islands of the Netherlands Indies. In size it is exceeded only by Borneo. In shape it is a narrow elipse, with its main axis (from northwest to southeast) approximately 1,100 miles long. Its breadth varies between 100 and 250 miles, with an average of about 160. Its area of over 178,000 square miles, thirteen times more than that of Holland, makes it three and a half times larger than Java.

In 1940 the population of Sumatra was reported as 8,250,000, or half a million less than that of Holland and only one fifth that of Java. Compared with those countries it is sparsely settled. In fact, it contains large expanses of uninhabited jungle wilderness.

The island's topography is based on the Borisan Mountains, which are close to and parallel to the southwest shore. On this side the slopes are steep, on the opposite one they are gentler. These mountains are high, jagged. Peaks rise to 12,000 feet. Many of the mountains are volcanoes, several being on the active list. Passes across the mountains are limited, and readily adaptable to defense on the southwest side. On the northwest side are uplands with an elevation of 3,000 to 5,000 feet—rolling country, containing a number of lakes. A large part of this area is jungle. In some sections plantations have been opened and are intensely cultivated.

These uplands slope gently downward toward the northeast coast which as a rule is flat and very low. Large sections are swamps, uninhabited and quite unsuitable for invasion landings. A number of rivers extend to the sea on this side; some of them are navigable for small ocean-going ships to ports located above the swamp areas. Much of this region is very unhealthy.

The southwest coast is rocky, narrow, and with limited beaches. It has a number of ports. More than half of the inhabitants live on this side of the Borisans.

This part of Sumatra has excellent roads, serviced in normal times by motor-busses. Roads on the northeast side are good, but their network is limited to the sparser population and to river lines which interfere with communications parallel to the long axis. On the southwest side the rivers are short and so are not serious obstacles.

Sumatra is almost exactly bisected by the equator. Its climate (except in certain mountain ranges) is uniformly torrid. It does not materially change with the seasons. Monsoon winds blow from the northwest from October to March, and from the southeast from April to September.

Due to the mountain chain rising sharply in rear of a narrow coast sector, the southwest coast has its rainfall about evenly divided between the two monsoons. At the center of this side the rainfall exceeds 180″ per annum. On the northeast side, southward from the equator, the rainfall during the northwest monsoon is about twice that falling during the southeast monsoon. At the equator the total averages around 140″ per annum and decreases southward to 100″ at the south tip of Sumatra. North of the equator the rainfall is less, decreasing to 80″ at the north tip of the island. It also decreases inland from the coast as the elevation increases: in the uplands it is about 60% of that on the corresponding section of coast.

A large part of the northeast side is mangrove swamp along the coast, and forest jungle and grassland in the uplands. All are obstacles to military operations.

Mangrove swamps are self-perpetuating. They are gradually extending the island into the sea. Seeds of the mangrove tree do not drop, but germinate on the parent tree, throwing off a shoot downward. After a new tree's weight has increased sufficiently it falls off into the water and mud below to become an independent tree. The rivers bring down a great quantity of silt which is stopped by the roots of the mangrove and eventually forms new ground.

Forest jungles are dense. They contain nearly all the Asiatic wild animals, including the tiger, elephant, rhinoceros, and numerous types of apes. The grass lands are thickly covered with tropical grasses, including the bamboo. These extensive areas require all the special equipment needed for jungle warfare.

The people of Sumatra are a Malay race without trace of negroid blood. A considerable proportion are Mohammedans. Chinese merchants are common in towns. On plantations laborers belong to many oriental races; they include Chinese, Hindus, Javanese, and men from other Dutch-controlled islands.

Sumatrians are a fierce and proud race. The Dutch completed the conquest of the island only in this century, after a long and costly war. It was not a complete conquest: the natives have tolerated the Dutch, but they are governed by their own Sultans and according to their own laws.

Women have a high place in society—very unusual in the Far East. Married women control the children and the family property, and maintain their own homes. Husbands have the right to visit the family but live separately.

There is no information as to how the Sumatrians have received the Japanese. Nor whether they have accepted or rejected Japanese propaganda as to "Asia for the Asiatics."

Sumatra has wonderful resources. It has two large and productive oil fields, both on the northeast side, on at each end of the island. Minerals are known to exist. Except for coal and minor quantities of gold, lead, and sulphur, they are undeveloped. Rice, tea, and tobacco form large and profitable crops. Rubber plantations abound. Spices of all kinds are a national specialty. If Sumatra were developed as is Java it could support a population of over a hundred million.

The nearly 3,000 miles of coast-line precludes a detailed discussion of all possible landing areas in a single article. It is also probably unnecessary: it is highly improbable that the Japanese could establish fortified sections of the coast at any but a few places. An invasion can be expected to have a choice of landing areas, with a very high probability that landings will not initially be opposed by other than minor forces. The general characteristics of various sectors will be described briefly, followed by a discussion of the strategical and tactical aspects.

NORTH COAST

The northernmost province is Achin (or Atjeh), whose

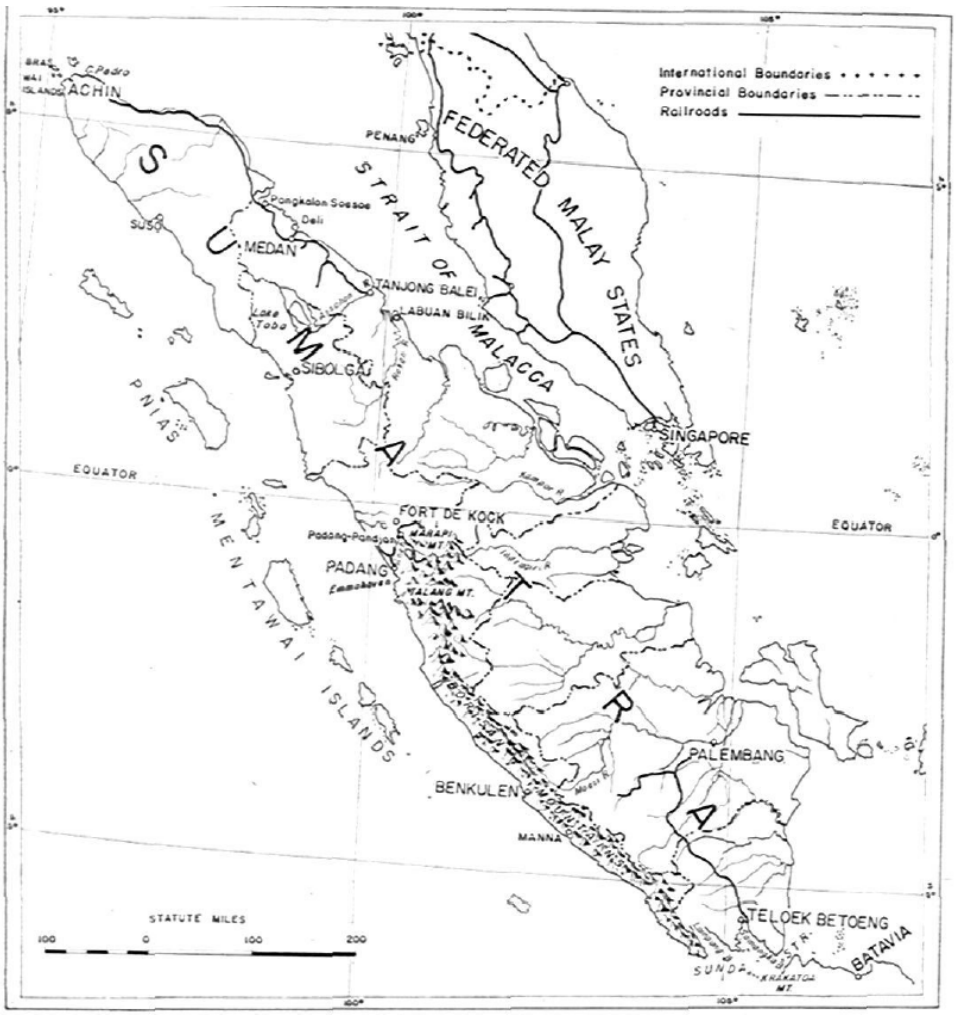
capital and port bear the same name. This port is suitable for a minor base. In the immediate vicinity the coast is swampy, but good landing beaches are available to the eastward. 25 miles to the eastnortheast is Cape Pedros, the north tip of Sumatra. Beaches are available along the coast to the eastward for nearly 200 miles. Back of the beaches the country is cultivated. There is a good road net, and a railroad which extends to Medan. An invasion landing on this coast can readily spread to the right and left.

Just north of the town of Achin are the islands of Bras and Wai. A superior naval force could seize them. Then they could be utilized as air bases (which, however, would have to be constructed).

Less than 150 miles north of Achin is Grand Nicobar Island. Capture of this island (as well as the other Nicobar Islands) should properly precede debarkations in north Sumatra. Occupation of Bras and Wai Islands would naturally follow. With these temporary bases a debarkation in north Sumatra could be covered from the air.

On the southwest coast of Achin Province is the small port of Suso. A road leads from here across the mountains to Bajoen on the opposite coast. The mountains run up to 11,000 and 12,000 feet, with very steep grades on the southerly side. This would be the hard route into Achin, which can be occupied more easily by landing east of the town of Achin. Suso might later be of value as a secondary port and base.

The Achinese are fierce fighters. They are Mohammedans. Their attitude might materially affect the course of an invasion.



East Coast

A large part of this coast presents straight, unbroken outlines from the sea. It is very low, dark green in color. Many rivers have extensive deltas which interconnect into a maze of waterways separated from one another by swamps. This coast is extremely hot, humid, and malarious.

Starting at the northerly end, there is a port at Deli. In an air line it is 175 miles from Achin. It is at the mouth of a river. A mud bank across the entrance changes position frequently. At present only small ships use this port but it could be dredged to any desired depth. Deli would be suitable for a small base.

Fourteen miles inland, and connected by road and rail, is Medan. This is a modernly built city, with usual civilized conveniences. It is the capital of the East Coast Province. A local Sultan has his headquarters here. The surrounding country produces rice, excellent tobacco, and rubber. Numerous roads exist; one crosses over the Borisan Mountains to Sibolga, passing by Lake Toba.

On the many plantations the labor consists of orientals from other Far East countries. None are Christians, and Sundays mean nothing to them. It is as customary to work on this day as on others. Laborers are allowed two holidays a month, following pay day; these, usually about the 1st and 15th of each month, are designated as *hari bazar* days (literally "big shop" days). All hands flock to nearby towns to dispose of their pay by appropriate celebrations.

Extensive oil fields are at Pangkalan Soesoe, 45 miles inland from Medan.

South from Medan, which is the most important center in north Sumatra, is Lake Toba. This is 75 miles off, connected by a good road. An active volcano of the same name is adjacent. This lake is the largest in Sumatra — 780 square miles; its elevation is 2,900′ above sea level and its depth 1,400′. The rolling surrounding country would ultimately make a good recreation area. Horses abound, but are of inferior breed.

The inhabitants in this vicinity are pagan Bataks. They keep pigs, which are not found in the Mohammedan sections. Cannibalism has been reported. The tribesmen deny this allegation, but ceremonial eating is reported to have been admitted. Old people who would soon die anyway, climb a tree. Their neighbors gather and chant suitable songs. The old person then drops to the ground—symbolical of a ripe fruit falling. He is hit on the head with a club, then eaten.

As the road across the island crosses a longitudinal road near Lake Toba, this area has a tactical importance. If military operations occur in this area, relations with

the peculiar natives who inhabit it need to be carefully handled.

Lake Toba discharges into the Assahan River. Near its mouth is Tanjong Balei (or Assahan), a pleasant town with a road following the river into the interior. A Sultan is located at this place, which is the center of an important coffee district. In its lower stretches the Assahan River is a broad stream, but the channel (which is navigable for ships of 2,000 tons) is narrow, winding, and constantly changing.

Some 50 miles southwest along the coast is the Paneh River, which has another small port—Labuan Bilik, 20 miles upstream through mangrove swamps. There is a sultan in this town too.

These rivers, with restricted channels which may have changed since the latest available charts were published, would be difficult to enter unless complete overhead cover were available. And this is not likely to be obtainable so long as the enemy holds the Malayan peninsula.

Seventy-five miles southwest of the Paneh River is the Rokan River. Thence for a distance of 120 miles to the Kampar River is an unbroken series of swamps extending up to 30 miles inland. A longer similar stretch extends for 275 miles from the Indragiri River to 5" South Latitude. No good debarkation areas exist in these areas. Between the Kampar and Indragiri Rivers it might be possible to debark, but there are no important objectives in this sector.

In the south part of this swampy coast is the Moesi (or Musi) River, a navigable stream which pierces the swamps to reach the sea. A hundred miles in an airline up this stream is Palembang, a large city and the center of the south oil fields. At the city the river is 1,200 yards broad. Palembang is noted for being unusually hot. It has a large floating population who live on rafts and in sampans in the river. The lower oil field is 10 miles down river, the upper field about 40 miles upstream. The refinery was at the latter field; it was reported as destroyed by the Dutch before the Japanese reached it.

SOUTH COAST

The south end of Sumatra includes the province of Lampong. It has several good harbors, and the surrounding country is mountainous and free generally from swamps.

There is a magnificent bay on the east side, 40 miles north of Sunda Strait. This is Teloek Betoeng, and could be made into an excellent base for military or naval purposes.

On Sunda Strait are two good bays, both suitable for invasion landings—Samangka and Lampong. Several smaller ones exist. Although landings are physically possible in south Sumatra, there are no worth-while objectives in this area other than the water passage through Sunda Strait, which is most important.

In Sunda Strait is Krakatoa Mountain, a most active volcano. In 1883 it had an eruption historic for the devastation it caused. Besides direct damage on the Sumatra shore from burning rocks hurled over it, enormous tidal waves exceeding 70′ in height swelled over the land. Ships were carried as much as two miles inland, and all towns at an elevation below 70′ were inundated and their inhabitants drowned. Following this the volcano relapsed into an inactive state for over 50 years. It has now resumed its activity, although not yet to an unusually dangerous extent. In view of its record and its position this volcano needs to be kept under observation.

Mt. Singgalang and Menangkabau village in the Padang Highlands, as seen from beyond a rice pond. Note the curious gables of the houses.

WEST COAST

As pointed out above, this coast is commercially the most important one. The majority of the population live on it. It is more developed than the east coast, and has no wide expanses of jungle. On the other hand it is very narrow, being confined between the sea and the Borisan Mountains.

Along the coast the climate is as torrid as elsewhere in Sumatra. The land quickly rises. A short distance from the sea, at elevations of 3,000′ or thereabouts, the climate is more pleasant. Good roads and numerous settlements make this the preferable side of the island on which to live.

From a military point of view an invasion on this side would be easier. It is improbable that the enemy could have substantial forces everywhere along this coast of over 1,000 miles. Invasions could be facilitated by seizure of islands off this coast, which are about evenly distributed 50 miles offshore; air bases could be built on them. This might follow an invasion, and would place the airfields where the enemy could not reach them with ground troops.

Although initial landings could hardly be prevented by the enemy, he might confine the invasion to the comparatively narrow coastal strip by seizing the restricted number of mountain passes. This would then require mountain warfare to dislodge him. As long as his lines of communications in east Sumatra are uninterrupted he could bring in reinforcements and conduct a protracted campaign. The mountain line is likely to be his first serious line of resistance.

About 300 miles north of Sunda Strait is the second-class port of Benkulen. This is a military station, originally established by the British in 1714. Their old Fort Marlborough is still in use, although it is now suitable only as a headquarters building or barracks.

The mountains back of Benkulen exceed 10,000′ in altitude and are a serious obstacle. Crossing them is a good road which eventually leads to Palembang. From the enemy's point of view, in addition to the road he can use for supply purposes the Moesi River westward from Palembang for a considerable distance. An invasion force would have to move all supplies

over the single road, with much steeper grades than those on the east side of the mountains.

Eighty miles southeast from Benkulen is the very small port of Manna. If Benkulen is occupied Manna would be a good secondary port where supplies could be landed to be further forwarded by road.

Northwest from Benkulen (220 miles) is Padang, the main center of activity of the west coast. This is the local political capital and principal commercial city, modern and about 5 miles inland. Its port is Emmahaven (on some maps Konninginne Bay, which was the name prior to Queen Emma's ascension to the Dutch throne). This is a good harbor but with wharves limited in number. One wharf is equipped for shipping coal, which in the past was much more important than now. Railroad coal cars are handled by machinery for direct dumping into colliers.

The bay on which this port is located contains numerous creeks, separated by hills. All are covered with dense jungle extending into the water. Hills are steep and rocky. Offshore rocks limit the possibilities of using landing craft. It would be easier to clear the wharf area by gunfire and bombing than to attempt to capture this section by landing in the jungle.

A good road and a railroad lead from Emmahaven to Padang. The latter, which is of narrow gauge, leads up into the mountains and branches over them to coal mines which are across the divide. Its principal business is moving coal, coffee, and spices downhill to the port. Its capacity for the heavy uphill traffic which would follow an invasion is very limited. When they reach the mountain area both the main line and its branches operate over steep grades. Going up, the locomotive is uncoupled from the head end of trains and attached to the rear: it pushes the train up the grade, using a third rack rail. In case of invasion this railroad would need rebuilding.

Roads in this area are good but narrow. For heavy traffic they need widening. The necessary stone can be found in the vicinity but tar or other binding material would have to be imported. Some of these roads have excessive grades.

The main ridge of the Borisan Mountains is only 15 to 20 miles from the sea. It varies in height from 3,000′ to 7,500′, with separate peaks and volcanoes considerably higher. They are very rough. There is a good road, directly eastward from Padang over the mountains. Near the ridge the road divides, one fork passing on each side of Talang Mountain to reunite on the east side. Talang is an active volcano, 8,440′ high. This road should be expected to be defended by the enemy.

The railroad, and another road, lead at first northward from Padang, up the valley of the Aneh River. At Pajoe-Tanam, about 30 miles out, a defile is entered at an elevation of 465′. Within 10 miles this rises to 2,500′, arriving at Padang-Pandjan. This defile is really a gorge, turning to an east-west direction. On the north side is Tandikat Mountain (7,925′) and on the south is Ambatjang Mountain (3,120′); both are covered with jungle. It should be expected that the enemy will defend this location.

Padang-Pandjan is an important road junction and railroad center. On account of its altitude it is patronized by Europeans and so has modern conveniences. The mountain valleys are thickly populated and cultivated. There are a number of lakes 10 to 15 miles long and 3 to 5 miles wide, with their long axes parallel to the mountain range. Around Padang-Pandjan and in the surrounding valleys, the climate is substantially cooler than on the coast. This area is suitable for hospitals and depots.

Seven miles northeast is Merapi Mountain, another active volcano, 9,290′ high. In spite of the mountains numerous roads extend northeast, north, and southeast through the mountains from Padang-Pandjan. Here the railroad divides: one branch leads northeast to Fort de Kock (42 miles from Padang), another goes southeast to the coal mines, 90 miles from Padang. The roads across the mountains lead to no important area, but disappear in the jungle. An advance over them leads to the Indragiri valley. This is not important in itself, but if held it would cut Sumatra into north and south sectors and prevent the enemy from moving troops from one end of the island to the other.

Northwest along the coast from Padang, 105 miles away is Sibolga. This has a good harbor with minor facilities. A road extends across the mountains to Lake Toba and Medan on the east coast. A good road connects Sibolga with Padang. This entire coast is cultivated. Cocoanuts form an important commercial crop. Everybody raises his own coffee. The inhabitants are reported as not so warlike as those of the north coast. There is no reliable information at this time, however, as to their relations with the Japanese.

THE MILITARY PROBLEM

Sunda Strait forms the boundary line between the command of Lord Mountbatten in Southeast Asia and that of Gen. MacArthur in Australia and north thereof. Sumatra is in the area assigned to Lord Mountbatten. As his forces are in India, an attack would presumably come from this direction. This is known to the enemy. He also knows that the same command threatens Burma and the Malay Peninsula. No main operation has yet been started against any of these objectives. It is improbable that the Japanese would try to hold strong forces in each area. His proper and more likely distribution would be to hold lightly in forward areas until he learns where the main invasion will come, in the meantime holding his main force in reserve.

It is known that the Japanese have constructed new roads and railroads leading westward from Thailand into Burma. This would indicate that his general reserve might be in Thailand, which would be a good location for it. Roads and a railroad connect Thailand with Singapore. There is of course sea communication from Thailand and other places in Japanese possession, to Singapore and direct to Sumatra.

In normal times good communications exist between Penang (in Malaya) and the Sumatra port of Deli. This is a 150-mile sea passage, and if not under attack a good route to bring in reinforcements and supplies. The best arrangement for the enemy would be to have a route from Singapore, directly across to Sumatra. This would be less than a 50-mile sea passage. There have, however, been no satisfactory port or roads on the Sumatra side in this vicinity. As the enemy does not lack energy and has at his disposition large labor forces, after two years some arrangement of this kind is probably already in operation.

Assuming that the enemy has arranged to bring in troops quickly, his holding forces could be expected to limit their initial operations to guarding the mountain passes leading to the southwest coast of Sumatra and putting forces at the north end of the island to cover a possible landing near Achin and a subsequent advance toward the oil field area around Medan.

Taking into consideration the location of the Allied forces in India, an invasion landing on the south end of Sumatra

would be far from the base of departure and its supplies would have to pass a long hostile coast. It would seem unnecessary for the Japs to maintain in this area any but minor forces.

An invasion on the northeast coast below Achin would be exposed to attacks by Japanese air forces based on both Malaya and Sumatra. It seems doubtful that the Allies would hazard a large fleet within Malacca Strait with the enemy holding both shores.

In view of this situation it would appear that whatever forces the enemy has would be near the north end of Sumatra, with their left flank guarded by strongly holding the mountain passes from the southwest coast.

Although the enemy may have only a relatively small force in Sumatra, in view of the threat to that island it should be expected that he has stored supplies and ammunition, established airfields, and opened new roads and improved old ones, to enable him to bring in additional troops quickly. Whether he could bring in as many troops as the Allies would largely depend upon what demands are being made on his forces elsewhere. If not required in other theaters of operation, very large Jap forces might be made available.

From the Allied viewpoint an invasion of Sumatra would be enormously facilitated if the Malaya peninsula were taken first; if this be done, Japanese lines of communication to Sumatra would be nearly cut and invasion landings might be made at any points. Conversely, an invasion of Malaya would be facilitated if Sumatra were first taken and air bases established thereon.

Assuming that only one of these objectives can be invaded at the same time, the Malaya peninsula is preferable as its fall would practically insure that of Sumatra. Although capture of Sumatra would facilitate an attack on Malaya, it would not by itself ensure the fall of this important peninsula.

An attack upon both objectives simultaneously would be best of all. This would require large forces and extensive sea transportation. In this case the attack which was making the best progress could be fed with reserves. Whichever succeeded first would be in a position to support the other attack immediately.

An attack on the Malay peninsula may be countered by the enemy's moving south from Thailand, and by other enemy forces' moving north from the Singapore area. It runs the risk of becoming bogged down, confined to a restricted beachhead. In view of this possibility Sumatra can not be ignored. An advance through Sumatra may be necessary to relieve pressure on Allied forces in Malaya.

Allied attack on either Malaya or Burma needs to be preceded by occupation of the Andaman and Nicobar Islands, extending northward from Achin. The southernmost of these islands is within fighter range of Achin. Unless these groups are taken the sea communications to both Sumatra and the Malay coast will be quite open to enemy air attacks.

Batik houses in Sumatra are built on stilts—their occupants must enter and leave via a ladder. They are elaborately ornamented and their roofs are of most peculiar shape. The Batik are brilliant chess players: chess is their national game.

The distance to Achin from Ceylon is approximately 1,000 miles, and from the Calcutta area about 1,300 miles. If Burma is first cleared these distances are reduced to 950 miles. Without the Andaman and Nicobar Islands there will be no land-based air service available for an invasion landing in Sumatra. These islands could be used as air bases for operations against Burma, Malaya, and/or Sumatra. Their seizure would not indicate the next objective, provided that air bases are established at both ends of the chain and near their center, threatening all three possible areas. This would not justify the enemy's changing the position of his reserves.

Assuming that the Malay peninsula is not occupied by the Allies, an invasion of Sumatra is indicated for its north end. The first mission would be to overcome as rapidly as possible the enemy's covering force in this area. Our troops would then proceed down the Malacca Strait coast, if possible jointly with a similar advance on the Malaya side of the Strait.

The southwest side of Sumatra could be occupied at any time. It might be a diversion of forces to do this earlier than necessary. If an invasion moves down the Malacca Strait side of Sumatra, ports on the west side will be automatically unblocked and can be opened and utilized as the campaign progresses.

Taking a wide view of the entire situation, and assuming that Sumatra will continue to remain within the area allotted to Lord Mountbatten's Southeast Asia Command, best chances of success seem to lie in two large expeditionary forces which will simultaneously proceed against both Malaya and Sumatra. With superior sea and air power (without which an invasion is not likely to succeed), the two expeditions can be supported as the situation develops. If either succeeds, the other will be materially aided thereby.

TM 38-250 says, "Never before in history have the lives of individuals, the success of armies and the existence of nations been so dependent on the proper functioning of mechanical equipment. Every member of the military forces has a definite responsibility. These maintenance responsibilities vary from the actual preventive maintenance operations, highly specialized repair and reconditioning techniques, to the supervision and inspection necessary to insure that equipment is actually ready for use. Ultimate victory depends equally on the efforts of all." So remember, Preventive Maintenance is a vital part of *your* war job!

Three Months on Bougainville

By Lt.Col. Howard F. Haines, FA

At Bougainville (as elsewhere) Marines landed ahead of the Army's troops. Their 75-mm pack howitzers have proved to be ideal weapons for such a situation. Marine at left (with 'phone) awaits the command FIRE.

As I write this the local war is not yet over, but now that we have graduated to real roads instead of swamp trails and to the luxury of box latrines, a report to date might be of interest to others coming this way.

First—the Battalion. The *U*th is an old regular battalion, steeped in the tradition of the old army and horse days. It was formed from, and is the successor to, the old *U*th FA Regiment at the time of the Great Change. Yarns around the mess tables are still of hard riding in the old days. It is somewhat unique in today's army in its combination of old experienced non-coms of from two to eight hitches in the Service and relatively young ROTC-trained officers. Six of the latter are graduates of V. M. I., the West Point of the South, and four (our non-ROTC replacements) of the Command OCS, the West Point of the Pacific.

After 15 months of training and defensive positions on two other South Pacific islands, we arrived on a South Solomon island aboard a venerable but reasonably comfortable transport of World War I days with vehicles aboard and scattered over an assortment of AKs and LSTs. We unloaded; set up temporary camp on a series of bare hills which soon turned to mud; and spent one week servicing and storing precious equipment we would need badly but could not take on the first move due to shipping space, making last minute preparations, and wondering how the food could be so lousy on a base we had held so long. We are faring much better here, and have for the past month.

When sailing orders were received the movement was made by combat team, and we began to realize the problem ahead of us. The battalion was to go into combat with three 2½-ton trucks, 13 ¼-ton jeeps (including one with a litter rack for the medics), and 5 radio cars. Period!

Officers and men were allowed only what they could carry on their backs. A shelter half, jungle hammock, slicker, extra pair of shoes, an extra fatigue suit, toilet articles, one "C" ration, one "D" bar, and spare underwear and socks. No blankets, no air mattresses, no bed rolls!

Worse, each battery was allowed only 4¾ tons of impedimenta, excluding guns, vehicles, and ammunition. That included kitchens, pioneer tools, fire control instruments, phones, wire, a few radios, .50s with mounts and nothing else. The ships had to be unloaded (including ammunitoin and 30 days' rations) and out in 5 hours. We did it in 4.

Loading was tough, but unloading was a madhouse. Time was of the essence. Everything came ashore in landing boats, and had to be unloaded right now, wherever there was a free foot of beach and passable surf. The beach was narrow, and kept getting narrower as the tide rose. Guns, men, and equipment were scattered along two miles of beach and one small island. Trucks stuck in the soft sand and rising waves, and there were no roads. We worked and sweated, had no time or place to dig fox holes, and offered up silent prayers of thanksgiving for the excellent air cover overhead.

Our first position was a beaut: about 1,000 yards inland in the edge of a swamp. It was marked out along a single trail cut into the jungle, just off a proposed main road that had been cleared but not graded. The last half of the road, and all the trail, were impassable for wheeled vehicles.

A hurried reconnaissance was made, battery areas assigned, the groans of the BCs laughed off, the men marched to position (less a 100-man beach labor party), and equipment dropped—under guard. Half the battalion then turned to, to start clearing living space and fields of fire, and the other half returned to the beach to scatter out, grab, and guard our equipment as it came off the boats. Finding it and protecting it from the advancing tide and our good friends and allies, the Marines—who had landed against worse odds before us, and needed it as badly as we did—was a major operation.

The tractors we had been promised and so badly needed did not arrive until later, but a Naval C-B bulldozer and passing Marine amphibious tank saved the day. Vehicles and guns (one at a time) were driven to the last navigable mud hole, stuck, and from there were dragged to position. Everything we had, including "C" rations and ammunition for the first two weeks, was dragged or hauled into the position in this way by friends who took pity on us.

Our first concern of course was to shoot. Survey was immediately picked up from Division Artillery control, base piece stakes located, then platforms corduroyed around the stakes, and the pieces (which had sunk to the axles on arrival) manhandled on to them.

The forest was cut—with the men taking turns on every available axe and some help from an engineer demolition crew—in front of us and the battalion registered the next day, before the arrival of all the guns. Clearing was a tremendous job, and continued for a week from daylight till dark. A 360º field of fire was required, and as the trees were tall and the forest dense, and both the line to be supported and the beach were well within the 2,800-yard minimum range with

high angle fire,* the clearing required was huge and the guns were necessarily left exposed in a clearing of tangled trunks, stumps, and fallen vines. All three of the batteries were jammed by force of circumstances into a front of less than 250 yards, with not over 50 yards' depth.

Dispersion of personnel and adequate camouflage were never possible in this position, though it is surprising what you can do by scattering large branches, and pulling tree trunks into haphazard patterns for use as parapets filled in below with sand bags.

This was the first example of the crying need, apparent all through the campaign, of a reduction in Charge 1 to allow high angle fire at shorter ranges, certainly not over 1,500 yards and preferably less. Clearing problems would be greatly reduced and concealment and camouflage made more effective. As it was, large areas of our front, as the lines advanced into higher ground, could only be supported by high angle fire due to the high trees and lateral ridge lines, thus eliminating any position within 2,800 yards.

In this first position, occupied for almost two months, the digging of fox holes and dugouts was impossible. The water level was only a few inches below the surface in dry weather (only a few hours of rain each day), and at ground level the rest of the time. One prolonged rain brought it one foot above the trail floats in the gun positions and floated the corduroy off the road. Everyone lived in log-and-sand-bag huts built above the ground as soon as possible. This was a big improvement over our early practice of diving out of a hammock into the mud under a log.

Fortunately for us, our battalion is still organized under the T/O of 1 April 1942, which includes the AT platoon and gives the firing batteries a strength of 107 men. Every man was needed and used to the limit.

Our supported infantry regiment not only had all three battalions in line, but had another one attached to it, also in line. We had previously organized and trained a third liaison section from the AT platoon, using the AT officer as LnO3. His regular duties were taken over by the Hq battery motor officer. The fourth liaison section and two forward observers were borrowed from another battalion in general support.

Three successive lines were occupied after the initial jump-off. From the start, liaison sections lived with and became part of their supported battalions. Each liaison officer remained constantly with the battalion commander, going with him on the advance and accompanying him on all tours of each successive line. He also directed and coordinated the work of the forward observers, and assisted in the observation of fire when needed. We used only older, experienced officers, who had the complete confidence of the Infantry Bn COs. Their advice on employment of the artillery, on the spot as each situation developed, was invaluable.

Two forward observers were sent out from each firing battery; to the 1st battalion from A, 2d from B, 3d from C. They reported to the liaison officer, and after conference with the infantry battalion CO were each assigned a sector of the battalion front. As there were usually two companies in line and one in reserve, one FO was usually assigned to live and work in close cooperation with a front-line company commander. Both, however, as well as the LnO, were required to familiarize themselves with the entire battalion front and were given charts showing the base point, check points, and important concentrations in front of and adjacent to the battalion front. These points, as well as normal and emergency barrages, were identified by them on the ground.

Officers of the batteries were rotated once a week so that all officers, including the battery commander, had front line experience and could take over at any time.

The writer, as battalion commander, lived with the infantry regimental commander, was present at all conferences, and accompanied him on the advance and on all tours of the regimental front. A forward CP with a couple of men was set up, or rather dug in, close to him. The battalion executive was used as an alternate in command liaison to keep him in touch with the infantry situation and the Bn CO with the battalion.

About the end of the second month when the situation had somewhat stabilized and the central part of the beachhead was required for air fields and other installations, the battalion moved to new and much more comfortable, though quite unorthodox, positions. Here again the minimum range of 2,800 yards with high angle fire* got us into trouble. A good part of the regimental front followed ridges topped by tall trees, and high angle fire was necessary to give it close support. The only position areas available to us were within 2,000 yards of the front. It was therefore necessary to move well to the flank outside of the regimental sector, and fire diagonally across the front to give close-in support.

The ground presented a choice between going into a ravine where the cover would have had to be cut down to fire out, or on top of a ridge. We found one point which had already been partly cleared (as the taller trees were within the edge of the glide angle for the bomber strip), with the surrounding trees untouched. This ridge was about 200 yards long, and there was another cleared hill nearby about 75 yards in diameter. Both had been cleared for some time, were covered with littered tree trunks and brush, and had apparently excited no interest on the part of the Japs.

We found good living areas under the trees at the base of the hill for one battery and on the wooded slopes and base of the ridge for the other two. One battery was emplaced in the form of a rectangle by digging pits into the sides of the hill just below the top. The other two were emplaced on the ridge, with the pieces staggered as much as possible among the fallen trees, between the forward and rear edges.

Camouflage was obtained by using the logs and branches as before, fitting the gun pits in between them and using them (with sand bags and judicious digging) as parapets. Nets were spread, tied into the logs and dead brush, garlanded with brown burlap, and scattered with brush. Gun pits were built for 6400-mil traverse, and sectioned wooden platforms built for the wheels. The center was left open for high angle fire. Circular trail trenches were dug and logged in with the radius slightly less than the length of the gun from axle to trail spades. In this way the wheels were always slightly ahead of the center of the platform and the breech dropped into the hole for high angle. Large shifts were easily made by putting a man on each wheel and alternately setting and releasing the brakes.

Large shifts were also facilitated by embedding empty brass shell cases in the ground in such a position that one would be approximately under the lunette when the gun was laid on each base or check point. The check point number, and the deflection, were painted on the case.

*Apparently the author refers to a situation where charge 1 is used with the 105-mm howitzer M2, with wheels and trail spades on a horizontal plane. Digging in of spades may not have been feasible where he was and at the time of which he speaks, but at the Field Artillery School targets as close as 1,100 yds. have been fired on with trails dug in to obtain an elevation of 80°.—Ed.

Bougainville's terrain is hilly, dense, almost impenetrable. Japs are dug in on far side of this mountain.

Aiming posts were used exclusively in the first position, but are impracticable in the present one. Distant aiming points are used by day. Lights have been rigged in the trees on the crest of the next ridge from 300 to 400 yards away, operated by remote control, for night firing. From the air the position is hardly discernible, and would be quite difficult to hit.

Skeleton gun crews, recorder, and telephone operators lived at their posts in log shelters dug into the hillside at the guns. Other personnel, less motor parks, were within 100 yards in dugouts, or tents with splinter-proof dugouts close by.

The battalion CP was established near the infantry regimental CP to facilitate liaison. The advanced CP was turned over to the Bn S-2, who was able to keep in close touch with the infantry situation and still spend a good part of each day with the battalion. The battalion commander came back to the battalion CP, but made daily visits to the regimental commander and usually one of the liaison officers or forward observers.

One of the two forward observers was returned to each battery after the line was stabilized and outposts pushed well out, and his place taken by a trained NCO. A forward observer was also stationed at important infantry outposts well out in front of the lines as long as they were in contact with the enemy. Liaison officers and forward observers visited all outposts and studied the ground to their battalion's front, as well as constantly covering the line, contacting company commanders and checking communications.

TERRAIN

The coastal plain is low, in many places swampy, with a large number of small streams. The jungle (except for a few small banana groves) is quite dense and the trees quite tall. The interior is exceedingly rough and mountainous, reaching elevations up to 10,000 feet.

On the regimental front supported by this battalion, swamp areas were encountered in places to a distance of 5,000 yards inland. In other sections the ground rose gradually after about 2,000 yards, developing into a series of lateral ridges covered with tall trees and separated by narrow, deep ravines. The present line varies from low flat ground to a 600-foot ridge which drops almost 400 feet steeply to the front. Other hills and ridges within our field of fire to the front and right front reach elevations of 1,000 feet.

This all makes vertical control exceedingly difficult. It was finally solved by carrying horizontal and vertical survey control to the entire front line and critical points in front of it to the limit of observation (from 100 to 50 yards). The balance was filled in from study of air photos, ground reconnaissance with infantry outposts and patrol, and infantry sketches and patrol reports.

It also necessitated the use of high angle fire to support parts of the front, and large clearings and exposure from the first position to cover the areas which were too close to be reached by high angle.

The swampy ground and absence of roads necessitated a tremendous amount of hand-carrying of supplies and equipment. Practically all wire had to be carried forward and laid by hand, guns and heavy equipment dragged in by tractor or tank.

COMMUNICATIONS

Wire is still the principal means of communication for field artillery. Radio is erratic in the jungle and rough terrain, but with supplemental antennae and a 608 set at the forward CP to relay from the 610 to FDC when necessary, it worked fairly well, and pulled us through some tight spots. Range in thick jungle is sometimes reduced to a few thousand yards.

Wire was laid from CP to batteries along trails by ¼-ton jeep, then duplicated as soon as possible by lines laid by hand in a straight slash through the jungle by compass from CP to guns. Lines through swamp were difficult to lay but stayed in: no one bothered them. Lines along trails and roads—even 10 to 25 yards off to the side and 10 feet in the air—were constantly going out. The beachhead developed so fast that trails were constantly being widened and straightened and new roads cut cross country. The trees thus knocked down carried a tangle of vines and smaller trees with them and sometimes took wires out 100 feet away.

We finally found it easier to lay on one side of the trail about 10 to 20 feet up, and keep a maintenance crew patrolling each line with men at each end ready to go out on call. Whenever we saw a bulldozer, a wireman would be attached to it to repair the lines as they went out.

At one time the battalion had 75 miles of wire in operation and was using the entire wire personnel and most of the drivers as wire men and wire carriers.

As the lines moved forward, forward observers with battery wire parties went forward with each assault company, liaison officers with attached battalion wire crews with each battalion commander, and the battalion commander and a wire party with the regimental commander. Routes were reconnoitered in advance as far as possible and wire hauled to the jeephead, thence carried to the jump-off by hand. We soon learned to take twice the map advance distance to allow for winding through the jungle. One liaison party actually laid over two miles of wire with one infantry battalion on an advance of 1,000 yards, map distance.

Wire-carrying parties of from 6 to 10 men were made up from the drivers and AT platoon and attached to each wire

party. Each two men carried one reel of W110 wire. We found that W130, while much easier to lay, was more work in the end as it went out almost as fast as it went in. One line was laid initially by each party. This was all that was possible, but at times it was almost an impossibility to keep up with the infantry advance. Duplicate lines were then laid, by more direct routes where possible, and taking advantage of any lines abandoned after the initial advance.

The wire plan, which worked out very satisfactorily, was to run the usual double line from CP to liaison officers, then a line from there to the forward observer with each company, T-spliced to the liaison line. The forward observer then ran lateral lines behind the front, with fingers running forward to each platoon along the company front. The liaison officer had a phone spliced in at his dugout at the infantry battalion CP, and each officer kept a wire man and a phone with him. In this way any point along the front could be reached and the LnO and FOs could talk to each other and to the CP, could assist each other in adjusting, and the LnO could control and direct his FOs. Lateral connections were added between battalions and to the regiment on each flank.

A switchboard was set up at FDC through which the FDC #1, #2, and #3 phones, the S-3 phone, and the direct line to Division Artillery (and for a while, the reinforcing battalion) ran. In this way all phones operated direct, but any combination of party calls could be set up for controlling or monitoring any mission or combination of missions. Several liaison officers and forward observers were frequently partied during close-in adjustments along the front.

Direct lines were run from computers to gun positions in addition to the normal simplex, which was used as an alternate means.

SURVEY

The survey section's big job was location of forward observers and infantry front lines.

Graphic computers were constructed and aiming circle stadia rods developed, based on a 5-mil intercept. For short distances a 10-mil intercept was used and the reading halved. For jungle work it is believed the 10-mil, or 1 yard on the stadia equals 100 yards on the ground, is preferable and will be employed in the future. For jungle work, where legs were often less than 50 yards and there were as high as 80 legs to a traverse, no other method would have worked with present equipment within the time limits allowable. The accuracy of a trained aiming circle operator, aided by the compensation of errors in a large number of stations, was phenomenal. Errors, as finally determined by accurate transit survey, were well under 1%. What we really need is a simple, light weight, one-minute transit with a quick leveling device. This would combine the accuracy of the transit with the portability and rapid operation of the aiming circle.

The section was divided into two crews, each assigned a guide and a machete detail to cut lines of sight, and rapid survey went forward right behind the infantry advance until the front line was reached. An infantry guard was then attached and the survey carried laterally along the line just back of the front, accurately locating the forward observers, battalion and company boundaries, and the line. Hasty vertical control was included.

A deliberate transit survey, including accurate vertical control, followed as soon as trails were straightened and improved.

Location by compass and infantry ground reconnaissance in the jungle is practically impossible. Infantry lines and boundaries were repeatedly located, first by firing in by forward observation, then by hasty survey. On that basis the lines moved to the map locations assigned.

Survey started from control brought to the vicinity of the initial battery position by Division Artillery, and was carried forward on the 1/20,000 photo firing chart. Discrepancies in the photo, and between it and the 1/20,000 Hasty Terrain Map used by the infantry, were determined and reported and corrections made.

The base point, the corner of a lake visible from the air, was never seen from the ground until after a month of operation, as visibility was never over 100 yards to the front and usually much less. It was then surveyed in by transit under infantry guard, and closed within a few yards.

OBSERVATION

Everything initially was by air or sound. The Cubs did yeoman service, both in registration and in terrain study. More distant missions were usually fired by SBDs, but several times when communication went out a Cub with a 610 radio went out over enemy territory and did the job.

Ground observation was conducted by sound. Concentrations were shot in close to the infantry line at all points considered vulnerable, and on terrain features used as reference points.

The FOs (and usually the LnO) went forward to the most advanced fox hole in the sector, accompanied by an infantry officer. FOs with the adjacent battalions were notified and, if firing on the flank of the regiment, a lateral wire connection was made with the nearest FO of the adjacent unit. Patrol clearance was obtained from the infantry; a warning went out through the infantry officer to get the men down in their holes.

The adjustment started with one round of smoke. This was sensed by all FOs who heard it, and brought in till it was located close to the desired point. Then the range was increased 100 yards and a battery salvo fired with HE. This was brought back until smoke was seen (rarely) or small fragments heard clicking in the trees overhead. This gave a center of impact of from 150 to 200 yards ahead of the line. The concentration was either pegged there or the range increased slightly before plotting, depending on the purpose and the terrain.

The assistance of the flank observers in reporting estimated azimuth of the sound in the initial stages of adjustment was most valuable.

Later on, it was possible to improve some concentrations as fields of fire were cleared ahead, and forward infantry OPs established. One tree OP was used to good effect near a river. Adjustments were made on routes of approach, river crossings, and a trail passing through a defile, by sending the FO forward with an infantry patrol. A check ground registration on the base point was also later made in this way. These approach concentrations were used to good advantage against Jap reconnaissance and combat patrols.

THE FIVE-GUN BATTERY

The writer has long felt that a fifth howitzer could be added to the 105-mm battery, with many advantages and no offsetting disadvantages. The last few months have increased this belief.

Several weeks before leaving for Bougainville the battalion

was able to procure an extra howitzer which had been salvaged. Prompt action by ordnance and good initial protection brought it back as good as new except for a few pits in unimportant places. Ordnance agreed to let us take it along as a spare, and considerable "procurement" equipped it for service. After promising to relinquish it on call, permission was obtained to put theory to practice. It was assigned to "B" Battery as a 5th howitzer section.

The battery commander was enthusiastic, and promptly organized and trained a fifth gun crew. We had time to try it out on several periods of service practice and a couple of maneuvers before leaving. It has been used here since the start of the campaign, and considerable firing has been done.

Three positions have been occupied; one in a swamp with a narrow front, one in a small forest clearing, and one on a ridge. In no case has the fifth position been difficult to obtain, or occupation or fire been delayed. Excellent results, good dispersion of pieces and personnel, and all-around fire have been obtained by using a W- or M-shaped position modified to fit the ground. Control is no more difficult than with four pieces.

From a registration or adjustment standpoint it is a natural. The center piece is used as the base piece, and the sheaf is automatically centered on the base point or target. Adjustments can be started with either the base piece or the center three pieces (depending on terrain) before bringing in the entire battery.

It is thus evident that the fire power of the howitzer battery can be increased by 25% with no increase over the T/O of 1 April, 1942, and only 11% from the T/O of 15 July, 1943.

"D" Battery

Opportunity was also afforded to try another interesting experiment, a fourth battery.

Due to the terrain it was impossible to employ normally the Cannon Company of our supported infantry regiment. It was therefore attached to us for tactical employment. As it was near our other batteries and seemed to prefer to work through us, we also took it over for supply and medical care. Thus it became to all intents and purposes a part of the battalion, and has been rechristened "D" Battery.

We conducted schools in artillery firing for its officers, who already knew forward observation methods, fire direction, and basic survey. Our S-3 procured a graphical 75-mm firing table and trained computers in its use.

Survey control was run to them, an orienting line established, the positions plotted on the chart, and they were fired through the battalion FDC on all concentrations not requiring high angle fire or extreme range. The plan proved entirely feasible and presented no difficulties of any kind. On unobserved fire there was always ample time to measure shifts and ranges for all four batteries and prepare data. When adjusting one battery, there was ample time to announce shifts to the other three before bringing in the battalion. The fourth reading was only a matter of seconds. "Correction all batteries" was heard and applied simultaneously by four as easily as by three. This was a 6-gun, 75-mm battery. It could as well have been a 5-gun 105-mm, or a 4-gun 155-mm battery. In no case did it present any problems or slow down or interfere with the delivery of fire in any way.

This is not necessarily a recommendation to add a fourth firing battery to every field artillery battalion, but the experience with this one proves that it can be done. The only additional overhead required is one computer, though it would probably be advisable to add another wire crew of from 4 to 6 men. Three more men and an additional light weight, one-minute transit could probably be used to advantage in the battalion survey crew, though this is not essential. This is a total of not over 10.

Under the 1 April 1942 Table, if a fourth battery is added, with a fifth howitzer in each as mentioned above, fire power is increased by 8 howitzers (or 66 2/3%) with an increase of 121 officers and men, or only 20%. On the basis of the 15 July 1943 Table, fire power is increased 33 1/3% (from 12 guns to 16) against an increase in man power of 110 (or 21%). The additional fire power could either be applied as another 105-mm or as a 155-mm battery. The former would simplify ammunition supply, the latter add weight and depth which would be an advantage in the jungle. It should be the split trail mount, however, for high angle fire.

Fire Direction

No radical changes were made or are contemplated from standard Fort Sill procedure. It has proved its worth many times over.

Before going into combat we had established the policy of using an interior piece as the base piece, centering the sheaf on the base or check point and opening to 100 yards between flank pieces before recording base (or check point) deflections. This was the natural and easy thing to do with the 5-gun "B" battery, but was equally satisfactory with the others.

Check points were registered in every 400 to 600 mils around the front for about a 4,800-mil arc, numbered, and data recorded for each. This information was on hand both at the CP and the batteries.

Shifts were made and corrections applied from the nearest check point. Formation of sheaf, graphs, obliquity tables, etc., were eliminated, as the sheaf for each point had been formed in advance at 100 yards. Duplicate battalion firing charts were prepared and given to each battery.

Vertical control was finally solved by the terrain sketch mentioned above, blown up and gridded to 1/20,000, contoured, and streamlined. All known elevations were spotted on it; others were interpolated and entered on the chart to facilitate speed. A "slip stick" was also made for the VCO, reading mils of site for any range and difference in elevation between gun and target in feet and yards.

"On the way!"

Slip sticks were also prepared on the old wooden slides (metal ones had been designed and manufactured in New Zealand for low angle) for high angle fire. These were quite a help and we soon found that the normal tendency of the computers to increase elevation as range increased, instead of reversing it, could best be countered by requiring them to set the slide and read the values for high angle. c was applied in the usual way for low angle. This procedure, with the elimination of applying 50/R and forming sheaf for every concentration, increased speed and decreased the possibility of error.

One minor complication arose with "D" Battery, which was soon overcome. The *c* for the 75s usually was different from that for the 105s. This made no difference until we came to bringing in the battalion following a battery adjustment. Then the corrections for all batteries of up or down so many mils gave a different range change in yards due to the *c* difference. This was rectified by applying an approximate *c/c* ratio; for example, if the 75 *c* was 8 and the 105 *c* 12, "D" Battery computer merely applied 2/3 of the announced change. The same procedure also applies if echelonment in depth within the battalion causes different charges to be used between 105-mm batteries with consequently different values of *c*.

ANTIAIRCRAFT, ANTITANK

The 37-mm guns of the AT Platoon were left behind, due to lack of shipping space. As there has been no way in which they could profitably be employed, and there has been no indication of the presence of tanks against us, they are still in the rear.

In their place the Division Artillery Commander procured for us six 20-mm naval-type AA guns on hydraulic pedestal mounts. The mount is excellent and very steady in firing. Considerable thought was given to the question of mobility, and a most satisfactory solution evolved. This was a trailer made from parts of wrecked truck frames and ¼-ton wheels and axles.

The frame was cut to a length of approximately 10′; a steel plate was welded in the center, and the mount bolted to it. A gunner's platform was made by cutting and attaching scrap sections of the interlocking metal matting used on air fields; these extended slightly beyond the wheels on either side and made an excellent platform for all-around fire. A chest was built at each end for storage of tools, parts, and ammunition. This gun, mounted in this way, can be towed satisfactorily behind a ¾-ton W/C (or in emergencies by a ¼-ton jeep) at ordinary road speeds.

It was emplaced by digging the carriage in to the level of the platform, with holes scooped out under the tires to keep them off the ground and prevent rot. A parapet was then built around the position with dirt and sand bags or damaged oil drums filled with sand, to the level of the lower edge of the gun shield.

This gun has consistently proven its merit.

It is felt that some sort of a dual purpose mobile AA-AT gun with a rapid rate of fire and 360º traverse is needed in the battalion. This could be either the 37-mm AA gun or some modification of the 20-mm referred to above. Considering its increased rate of fire and advantage of all-around traverse as compared with the 37-mm AT gun, the 20-mm should be equally satisfactory against the landing boats and light tanks against which positions must be defended in this part of the world.

The point is stressed that the AA-AT platoon did yeoman service and more than justified its retention in the battalion by manning the 20-mm AA guns; carrying wire, ammunition, and supplies; building roads; assisting in wire line construction and maintenance; and in the perimeter defense of the position. We would have had one hell of a time without it.

.50-cal. machine guns were mounted wherever fields of fire could be obtained, in the vicinity of the CP and service battery and in the cleared fields of fire around the firing batteries. As all three were close together, they were considered as a unit and the 12 guns set up for the defense of the area as a whole. Wherever possible they were incorporated into the perimeter defense and served a dual purpose.

Mounts were improvised. The rings were taken off the trucks and 30″ legs made from 4″ steel tubing. These were bolted, with a slight outward slant at the bottom, to the three tabs on the ring, and made an excellent air-ground mount. When first landing on a beach or arriving at a new position they can be set on the ground and fired from a squatting position, either horizontally or against aircraft. As soon as possible a circular hole about 2′ deep (depends on height and preference of the gunner) is dug inside the legs (letting them continue to rest on the ground), and a parapet built of dirt and sand bags. The ring, of course, can be remounted on the truck in a few minutes.

SECURITY

In the jungle, close-in security is essential and must be performed by the batteries without outside help. Our plan, which proved satisfactory, was to build a 4- or 5-strand barbed wire fence around the entire battery installations. To avoid an impossibly large perimeter, everything was pulled in as close together as possible, still maintaining reasonable dispersion. When possible the three firing batteries were wired in as one unit, and Headquarters and Service as another.

The undergrowth was cleared out around the fence for about 25 yards to afford visibility and field of fire, and dugouts built approximately every 25 to 50 yards along the inside of it. At least two men lived in each dugout, one always awake. Adjacent dugouts could see each other as well as the intervening space.

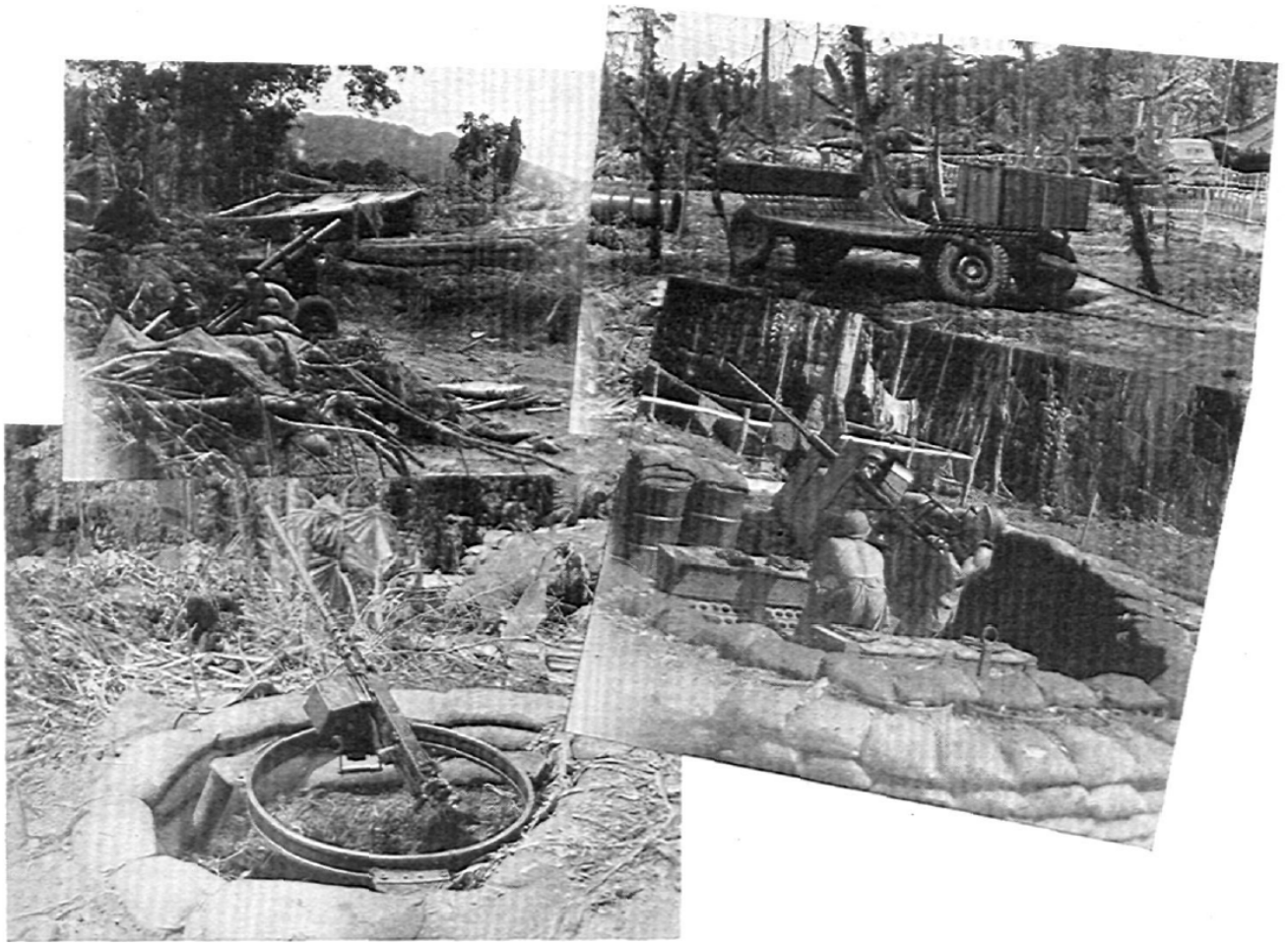
Dugouts for the men were grouped by section and dispersed through the area and along the inside of the perimeter. Gun crews, of course, were near the pieces, machine gunners at their guns. The defense posts were manned by roster from the entire battery and combat groups organized by section under command of battery officers for close-in defense in case of need. After dark anything that moved outside the perimeter was considered hostile, and no one left the perimeter. Firing was allowed only at targets that could actually be seen.

MATERIEL

he battalion is equipped with the 105-mm howitzer. It has functioned very well in every way, and has been consistently accurate at all ranges. A high percentage of high angle fire has been used, due to the terrain, with excellent results. Practice and coordination in high angle fire have developed a rate of fire of six rounds per gun in one minute, with laying checked before each.

AMMUNITION

Ammunition in general functioned satisfactorily. HE, fired with fuze quick in relatively light woods and fuze delay in dense jungle, proved most effective where concentrations could be checked. Range dispersion was well within the limits expected.



Ammunition must be kept off the ground and dry (or dried out frequently) to prevent deterioration. Smoke shell must be stacked on end to avoid an eccentric settling of the filler with consequent excessive dispersion.

One round of smoke, fired at relatively long range, fell 500 yards short. This was the only erratic round noted. It is necessary, however, to check the increments of all powder charges before firing, not just take so many out.

Our greatest difficulty was with lot numbers. At one time there were 80 lot numbers in this battalion. Lots were, of course, segregated and issued in complete lots to a single battery.

1½ units of fire were kept at the battery position in 4 piles of approximately 75 rounds each. Two piles were dug or built into the sides of the gun emplacements, the other two nearby. The balance was kept in the battalion dump. The best arrangement found was to make piles of 25 clover leafs each, laid on logs in niches cut out of the reverse side of a wooded ridge just above road level. This made for good drainage, shade, protection, and ease of handling, though the road itself was quite a job.

SANITATION

While this subject is covered last, it is by no means least in importance.

There seems to be a natural tendency to get careless on sanitation when entering combat. Other units get by, why shouldn't we? And that is the time to get tough and raise standards instead of lowering them Believe me, it pays dividends.

Lt. Col. Haines writes later: "Have just been able to get the enclosed prints of one of our gun positions behind a tree, the .50-caliber mount we developed, the 20-mm carriage, and a gun mounted on the carriage and dug in. The photography is the best available here.

"We have done a lot of very deadly shooting the past ten days. No change from my previous report but to emphasize the excellent work of the liaison officers constantly at the side of the battalion commanders, advising and assisting them and directing the work of the forward observers.

"The forward observers and their parties have done outstanding work. They went out on patrols and directed fire by wire and radio to the limit of range. At close range they went into front line pill boxes, directing fire with deadly effect on the Japs as they approached our wire, drew the fire in on them through the wire and up to the pill boxes. Then in several instances they and their parties assisted in the close-in defense with carbines and grenades.

"I also take off my hat to the gun crews, who have been firing night and day for ten days."

Still later, Lt. Col. Haines writes:

"Our artillery again proved its worth in the annihilation of the crack Jap 6th Division in its attempt to retake the beachhead during the month of March.

"I wound up with 13 105s, 6 75s (Inf Cannon Co.), and 24 4.2″ mortars, all fired through my FDC. 1,500 tons of ammunition in 30 days!"

Tank-infantry cooperation on Bougainville

BOUGAINVILLE—1944

By Capt. Robert F. Cocklin, FA

Those of us seeing action here at Bougainville for the first time have been greatly surprised at the methods necessary for accomplishment of our mission. Much of our previous training had pictured the rapid occupation of position (so that within a short time after arriving at the position we would be ready to shoot axial, small-T, or large-T), and all the SOP artillery training. [Undoubtedly our previous training will stand us in good stead, but (speaking as a firing battery commander) if some of the things discovered in the jungle were made known to battery commanders in the states then training for warfare in the Pacific would be facilitated.]

The battalion of which my battery is a part is a 105-mm howitzer outfit. We arrived here at T/O strength in personnel and very well equipped. On arrival the BCs were shown their particular areas, and I might add that they looked pretty sad. Before an occupation of position (as far as getting the guns in) could be accomplished, there was a day and a half's work clearing fields of fire, cutting paths through the underbrush, and digging pits. (We can dig about 2 feet; the rest of the pit is formed by the parapet.)

The first problem of major importance that I encountered was the organization of my battery in order to maintain a 24-hour firing schedule, maintain communications, send out FO parties, and also haul ammunition and set up housekeeping (cooks, latrines, supply, etc.).

At any rate, after a period of time the battery has been organized into three major sections: (1) the firing battery: 8 5-man gun sections, 4 recorders, and the executive; (2) the signal section: 6 switchboard operators, 4 radio operators, 12 wiremen and telephone operators; (3) the service section, which includes the 5th section, supply sergeant, cooks, KPs, and headquarters personnel. This completes the number of men which we are allowed on our T/O.

Quite naturally it is hard to maintain high standards of efficiency with such conditions existing. Our solution to the motor maintenance proposition is to have the motor sergeant and approximately 4 drivers from each battery join in with the service battery personnel for the maintenance of the battalion's vehicles. The vehicles can be handled in a battalion motor pool, utilizing these men for drivers when the need arises. When it is necessary to move the battalion as a whole, the batteries will be able to furnish additional drivers from the other sections.

THE LNO AND FO

No one was more surprised at the work cut out for them than were our liaison officers and forward observers. Heretofore they had scampered about on maneuvers, manning OPs and assisting company and battalion commanders. To appreciate their particular problem here, we will have to touch on the average infantry scheme of maneuver in this theater. In an advance, for example, the main body will do well to cover a thousand yards in a single 24-hour period. The scheme is to have large finger patrols investigate the area of advance, followed by the tedious moving up of the main body. Remember, except on rare occasions you can see no one more than 5 yards in front of you. High ground does not help on the observation situation as you can see only tree tops.

So much for the infantry tactics. What is our friend the liaison officer doing? He's out with the patrols. When resistance is encountered, quite likely he will withdraw the patrol, set off a smoke pot, and fire an FO adjustment by sound. This is the rule rather than the exception. The LnO no longer travels in a jeep with a trailer and all sorts of fancy equipment—he hits the ground and crawls with the infantry, lugging his radio, wire, telephones, etc., behind him.

You can see where he has radically changed the equipment he uses for his job. He carries a carbine (tommy-guns are available but most LnOs agree they are too heavy for this use), a couple of extra pair of socks, his poncho, and two canteens of water. His pockets are full of hand grenades, extra ammunition, and a couple cans of C ration. No mess kit is carried, but the spoon is a "must" item. But there is no room for the toilet articles, blankets, etc., etc., which are often considered as SOP. By and large this covers his particular job.

COMMO

Those of you in the communications business will be interested in some of the problems of the CommO. He naturally lays wire in some strange and indeed tough places. Most of it is put in by hand and has to be overhead. I can hear you saying now, "Well, what about 130 wire on the DR-8?" We have found that the 130 wire is not satisfactory for long lines in damp country. Chasing down wire troubles is not an easy job here, so whenever practicable we have resorted to the old stand-by, 110. Usually it can initially be laid a good share of the distance in a jeep, with following crews putting it overhead. From there on it is laid on foot, usually cutting paths with machetes as you go. It is slow, arduous work and one of the toughest jobs on hand. Anyone who has climbed some of the hills in this neck of the woods will know what we mean.

Most of the lines are double with an alternate. We have established a forward switching central to shorten future lines.

130 is OK for short lines, but will not stand up long down here.

Radio communication has been very satisfactory. We use 284s as well as the 600-series. Liaison officers and forward observers use the battery pack 610. The infantry is using the 300-series with very good results.

AMMUNITION

In our particular set-up the basic ammunition dump is established by the service command. Ammunition is picked up by battalion and distributed to the batteries daily. SOP here calls for 3 units of fire at the position at all times. Normal rate of fire is 150 rounds per battery per day.

Our biggest difficulty is keeping the lot numbers straight. Much of the time we have as many as 12 lot numbers of M48 alone; incidentally, we fire this almost exclusively. M54 plays a small part here, although smoke enters into the picture spasmodically. 5th sections and recorders need additional training along the ammunition lot number angle. Quite often the difference in lot numbers makes considerable difference in the range of the rounds fired, so too much emphasis on this angle is impossible.

MISCELLANY

Don't worry too much about your gun crews. The tremendous amount of firing will give them the polish that you desire. Chiefs of sections must be impressed with the importance of their checking minimum elevations as well as deflections and elevations.

Among some of the odd items that have been discussed among the various commanders is the need for a large-size carpenter's set that holds several hammers, saws, and other implements, as well as hinges, screws, nails, and other items essential to the proper sanitation and maintenance of your area. We are all agreed that there are many items of special issue to this particular theater that are of prime importance, but there are many other items that must be taken care of.

I cannot emphasize too strongly the necessity for having a generator to furnish ample light for your operations section. Practically every outfit in combat has one, but it has been either purchased or bargained for.

"GRASSHOPPER" SURVEY—Part II

By Capt. Henri Bourneuf, FA

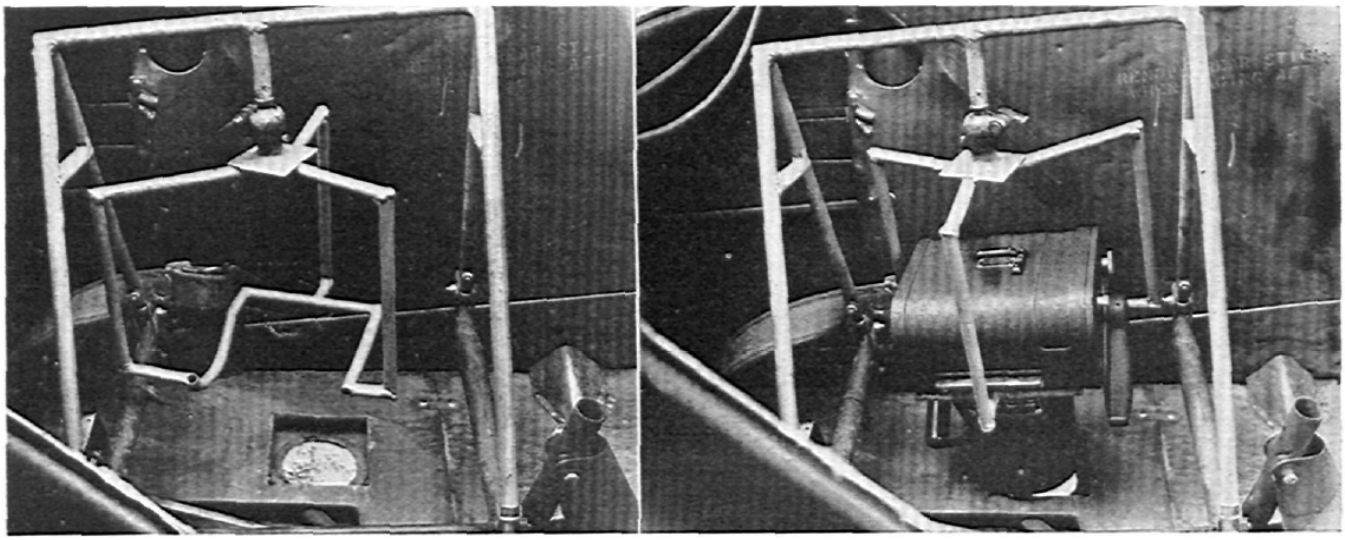
Col. J. C. McCole's excellent article of the same title in the February issue of this JOURNAL prompts me to describe another method of using the Cub for survey. The plan was conceived and accomplished by the Americal Division Artillery during combat operations on Bougainville. It worked fine, and enabled us to get true target area locations where no ground observation was possible.

The trick is to mount a camera in a Cub and take single verticals over the target area. The camera operator communicates by radio with three located stations in the perimeter, calling "Mark" every time he snaps a picture. Our Ordnance Company produced a simple but ingenious camera mount with cross-level bubbles, so the operator's only concern is that he is over the proper area and that the bubbles are level at the moment he snaps the pictures.

As the camera hangs quite level in its mount, leveling the bubbles presents no problem. A small hole was cut in the floor of the plane; the camera lens rides about 2″ above this hole. By computation, the bearings from the three OPs give the location of the plane at the time each photo was taken, and since the camera hangs plumb we get the true horizontal location of the center of the photograph. Laying on the propeller hub works out well.

Before flying over the target area we tested out the system by taking photos within the perimeter and then traversing to the point on the ground shown at the center of the photograph. On several trials the maximum discrepancy was 20 yds., so we were sold on the project.

"A"-frame mount for K-20 camera, showing details of construction (including ball-and-socket joint) and relation to hole in bottom of plane. Note that cross-level bubbles are attached to top of camera itself so that true leveling is possible regardless of variations of camera suspension in the frame. Rear seat has been removed, but—believe it or not—there is ample room for camera operator.



Since no maps or mosaics suitable for massed transfers of fire were available at the time, our primary concern was in making a mosaic that would extend control into the target area. We decided after trial that flying at an altitude of 5,000 ft. gave the best results, although for this system the exact altitude does not matter. Using a K-20 camera we got good coverage and good detail at this height. We had air supremacy on Bougainville, and at 5,000 ft. were beyond effective small arms fire range. The plane could fly higher if necessary to avoid ground fire and the results would still be good, but any error introduced by camera tilt naturally increases with the height of the plane so the best rule is to fly as low as safety permits.

Maj. T. W. Casey (our Div Arty S-3) did the flying, and in one flight over the target area obtained 30 control points, which were plenty for our purposes. We had a set of recent prints of the entire area, so to make these photos into a mosaic we simply had to find by inspection the center of our single verticals. In a few cases where determination by inspection was difficult we discarded the point since we had a surplus of control points. In the same way any photo can be discarded if there is any doubt as to the accuracy of the OPs' bearings or the bubbles' being level at the time the photo was snapped.

Example of "grasshopper" survey. In this particular test the airplane survey and the ground traverse differed by only 8 yds. on the X coordinate and 9 yds. on the Y.

The mosaic which resulted from careful work of Lt. M. C. Stewart (Div Arty S-2) and Lt. E. F. Mullaly (our battalion survey officer) was as accurate as could be well desired, and had a standard 1,000-yd. grid. Test firing produced deflection corrections of 1 and 2 mils and *K* changes from 0 to 16 yds. per thousand. Transfers were practicable anywhere within limits, whereas the previous photomaps could be used for accurate transfers only within the limits of one photograph and required a registration by every battalion participating.

Just after the original mosaic was completed the Japs began wafting metal into the perimeter in a most unfriendly fashion, and reproducing the mosaic had to be delayed while more urgent matters were at hand. If reproductions are clear the new mosaic will supplant all other maps for our division.

The principle of aerial photo survey may be used in other ways. Where panels are discernible, this method will help tremendously in determining front line locations—which is a constant headache in this type of warfare. If the situation prohibits the use of a Cub there is no reason why a combat plane could not be used; an SBD would be a very good plane for this purpose. Although the system was designed for jungle terrain where ground observation (except from tree tops) is non-existent, it could be used to advantage anywhere.

An ideal utilization of the plan would be on an intial landing where no accurate maps existed. A survey detail could land early, choose the three most suitable instrument locations, and set up instruments and radios. A small clearing makes a satisfactory OP since the only requirement is that the plane can be observed. Until the OPs were tied together each OP could take an arbitrary direction on any convenient reference point. By prearrangement a plane would come in and take pictures as outlined above. Meanwhile the other members of the party run a connecting survey, starting from an arbitrary point and a direction as close to true north as might be obtainable. The survey officer collects the data and returns to the base by the fastest available transportation. Assuming that photographic strips of the area have previously been taken and that transportation is not delayed, he should be able to return within 48 hours with ample copies of an excellent map controlled to permit unobserved and massed fires. I know of no other program which can approach this process for accuracy and speed in jungle terrain and I hope that others will find opportunity to make use of it. It has the advantages of having proved itself in combat and it works.

One of the greatest errors in the use of tires in the Army is driving on overinflated or underinflated tires. Now, more than ever before, this can have very serious consequences, because practically all tires going into service are made wholly or in part from synthetic rubber, and synthetic rubber is even more susceptible to damage from this cause than natural rubber. For your own safety, keep pressures as prescribed. Remember, a correctly inflated tire will never let you down!

Armored Artillery Support

By Capt. James J. Gibbons, Jr., FA

Where an armored field artillery battalion has been placed in direct support of a tank battalion, both units being organic in the same division, it is logical to assume that the zone of action of each assault company will include the zone of observation of one forward observer—that is, a forward observer will be active in each assault company's zone.

It is evident, then, from a study of *Series C, Radio Channels of Communication for the Armored Command*, Hq, Armored Command, 15 Sep 43, that a tank company commander has readily available, through the FO, a means of communication with the artillery FDC. Each forward observer's tank is equipped with a 508 radio, by means of which he is able to maintain constant communication with both the FDC and the command net of the supported unit. Therefore it is possible for the company commander to request artillery fire on targets in his zone by calling the FO on the tank battalion command net. This precludes the necessity for continuous personal contact between these two officers and allows the observer to maneuver from one point of observation to the next without being forced to remain with the company commander. The requested fires can be adjusted by the FO (who moves to a position from which the target is visible) or by the company commander himself (in which case his sensings will be relayed to the FDC by the forward observer).

If the commander of the supported tank battalion wishes to coordinate personally all supporting fires, the company commander desiring artillery support must first obtain his approval. It should be pointed out, however, that this procedure will cause no appreciable delay, since the FO is able to listen to all transmissions between the two tank commanders.

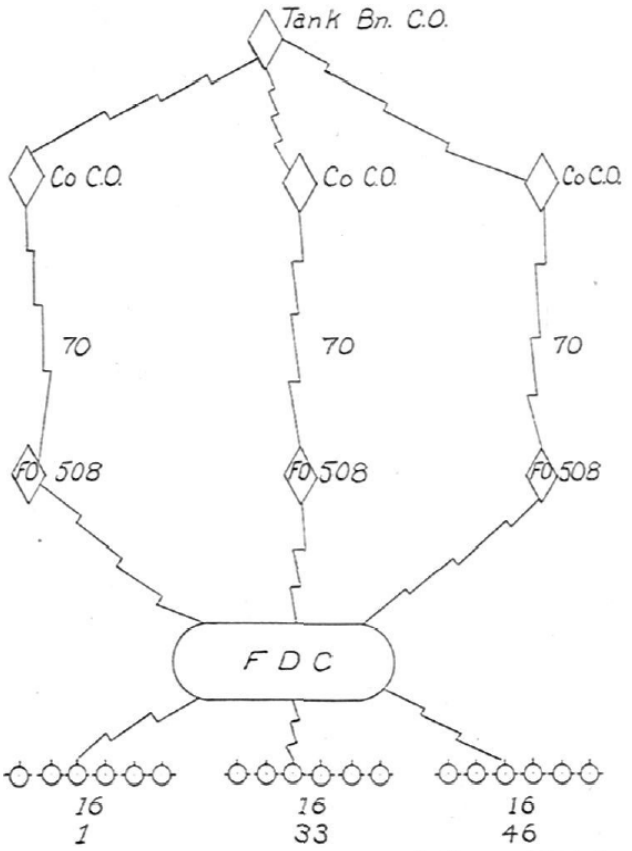
It is evident that the procedure for requesting artillery support would be simplified and would consume less time if the supported company commander could communicate directly with the FDC—as, for example, in the rare cases when the FO is not in such a position that he can move to observe the target, or when he has been disabled or killed by enemy fire. This direct contact can be made possible by including in the artillery plan the allotment of one of the artillery fire direction radio channels to each company commander. Then, when he cannot immediately designate his target to a forward observer, the company commander need only make his request for fire support directly to the FDC. No provision is included in *Series C* for such direct communications between the company commander and the FDC, but the system is feasible and has been employed successfully by several units in the field.

A frequent objection to such an arrangement is that it would cause confusion in radio nets, and also that supported unit officers are not familiar enough with artillery terminology to transmit their requests clearly and rapidly. It is believed, however, that the advantages to be gained from such a direct-communication system are well worth the time and effort required in training to achieve correct procedure.

This training, which can most effectively be carried out by artillery officers, should teach the officer of the supported unit such points as:

1. *Methods of target designation*, some of which are:
   - *a.* Pyrotechnics—which will designate his position. He then senses the flare or rocket in relation to the target.
   - *b.* Map or map-substitute coordinates.
   - *c.* A sensing, using as reference the base point or a previously fired artillery concentration.
   - *d.* An estimated compass direction and range.
   - *e.* Polar coordinates from any known point.
2. *The ability to recognize artillery targets*. That is, the officer of the supported unit must realize that it is wasteful of time and valuable ammunition to request artillery fire on targets which could effectively be destroyed or neutralized by the direct-fire weapons organic within the supported unit.
3. *A general knowledge of the functioning of the FDC*. He must realize that decisions as to whether or not a mission is to be fired are made at the fire direction center, and that a request which is made with the view of furnishing support for only a limited portion of the front may be refused because of the requirements of the command as a whole.
4. *A general knowledge of the effectiveness of artillery fire*—e.g., a battalion concentration of 105-mm howitzers represent a circle 300 yards in diameter, within which neutralization is assumed to be effective.

It is to be remembered that the mission of the artillery of an armored division is solely one of supporting the tanks and armored infantry. The effectiveness and tremendous value of such support have been proved beyond question. Therefore, it is expected of any armored infantry or tank officer that he be capable of requesting and adjusting artillery fire. It may be expected, also, of an artillery unit that it be willing and competent to furnish to officers of the supported unit such training as is necessary to enable them to utilize to the utmost the advantages of close supporting fires.



Radio Channels Available (per Series C) to the Supported Unit for Requesting Support.

VE TRANSFERS

By S/Sgt. H. M. Sisson, FA, and T/5 Alden R. Wells, FA

Recently I received a letter from an old friend who commands a battalion of 155-mm howitzers (non-divisional) which is on the Anzio beachhead. It contained numerous tips, "do's" and "don'ts," general advice, and information which I had reproduced and broadcast throughout my battalion. That it interested the men is evidenced by the accompanying charts, conceived and worked out by our Battalion Computor Chief and VCO for our 155-mm guns.

They were presented to me with the explanation that they resulted from one of my friend's tips—"Be sure that all officers and enlisted personnel concerned understand VE thoroughly. You won't be able to register every few hours, so you get a VE when you do register and use it with subsequent metro messages."

I believe my men "have something" and only can say to the objections some will raise—"This introduces another gadget to be carried around" or "If we all use such mechanical devices, who will know how to figure anything or understand underlying principles"—well, so what? Emphasis today is on speed and there isn't time to teach everything to everybody. Results are what count, and when results can be obtained as quickly and surely as is possible with these charts—then use them.—Lt. Col. S. Bloodworth, FA.

Use of these charts reduces the time required to compute a VE and VE transfer to less than 10 seconds, and the possibility of error by about 75%. The following illustrates their use.

Assume a difference between the adjusted and metro elevations of 10 mils and a base point range of 10,000 yards. It is desired to find the VE at 12,500 yards. Follow the 10,000-yard horizontal line until it meets the 10 mils vertical line. Then follow the nearest slant line until it crosses the horizontal line for the desired range (12,500 yards) and note that the vertical line met at this intersection is that for 14 mils, the VE sought.

Interpolation is just as easy. For instance, suppose the elevation difference had been 11 mils instead of 10. Proceed as before to the intersection of the horizontal 10,000-yard range line and the 11 mils vertical line. Then follow down in the center of the space between the slant lines which bracket the intersection until you meet the horizontal line for 12,500 yards—it intersects the 15 mils vertical line and 15 is the answer. Should there be any question about exact intersections, take that for the nearest mil.

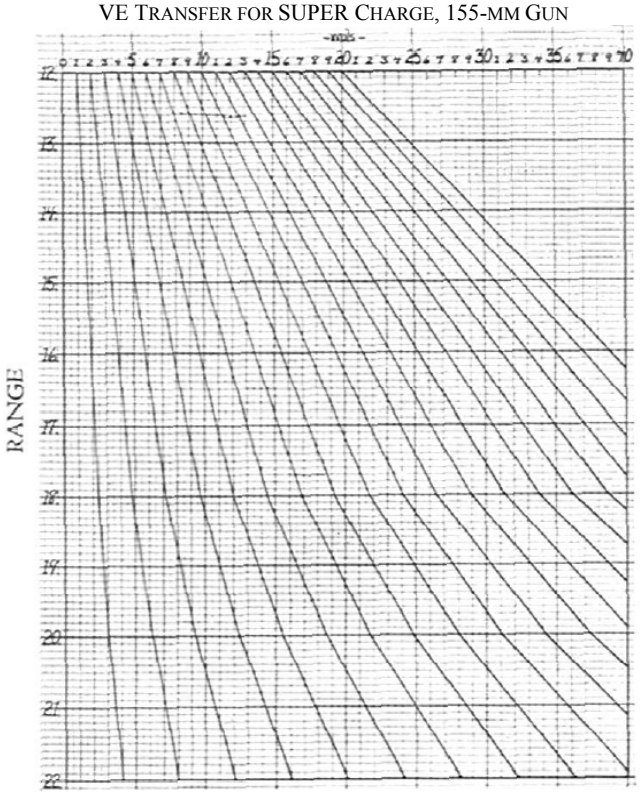
Ranges short of the base point are handled in precisely the same manner.

We computed each mil at each 1,000-yard range with data taken from FT 155-S-1, which gives yards per mil in round numbers and feet per second to the nearest tenth. If carried out further the charts would take slightly different shape, but not enough to change results since an answer is required only to the closest mil. Actually, we have found from practice that when we estimate interpolation on the charts to the nearest tenth of a mil, we frequently arrive at exactly the same answer as would have resulted from firing table computations to the nearest tenth of a mil.

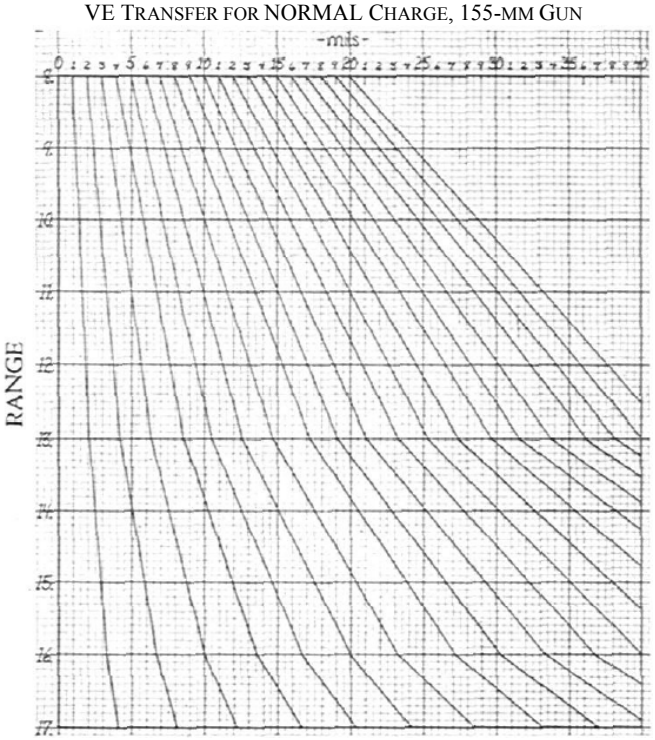
These charts eliminate looking up 4 factors in firing tables and making 2 multiplications and 2 divisions in computing VEs. Also, our experience has been that computed VEs are frequently erroneous unless two persons figure them and check calculations where differing answers are obtained.

VE usually is thought of as applying only with transfers on targets outside "transfer limits." Since it is in fact a refinement of K, however, there is no reason why with these charts VE transfers should not be used exclusively or as a rule.

VE TRANSFER FOR SUPER CHARGE, 155-MM GUN



VE TRANSFER FOR NORMAL CHARGE, 155-MM GUN



Finished charts are mounted on either side of a piece of heavy cardboard or light plywood, then waterproofed.

MOTOR OFFICERS AND S-4s, ATTENTION

For the guidance and convenience of all concerned with fuel supply of artillery battalions, these detailed tabulations have been prepared. Enough data is given that you can readily make up your own charts in case your vehicles are not up to T/E strength; should you do this, column 8 can most easily be filled in by dividing the same-line figure of column 6 by that in column 7.

FUEL CAPACITIES AND EXPECTED RANGES, IN MILES, OF FIELD ARTILLERY VEHICLES

1	2	3	4	5	6	7
	Fuel tank capacity	Range in	Extra gas drums on vehicle	Extra miles on vehicle from drums	Total range vehicle is capable of with own gasoline supply (col 3 + 4, col 5)	Total requirement for complete gasoline supply
	gallons	miles	gallons	miles	miles	gallons
Truck, ¼-ton	15	205	5	65	270	20
Truck, ¾-ton (command or weapons carrier)	30	240	10.	80	320	40
Truck, 2½-ton cargo	40	200	10.	50	250	50
Truck, 7½-ton	160	400	10.	25	425	185
Tractor, high speed, 13-ton, M5	100	160	10.	16	176	110
Tractor, high speed, 18-ton, M4	125	120	10.	10	130	135
Tractor, high speed, 38-ton, M6	300	108	10.	4	112	310
Truck, 4-ton, wrecker	60	150	10.	30	180	70
Truck, heavy wrecker, (M1	100	200	10.	20	220	110

FUEL REQUIREMENTS AND RANGES OF FIELD ARTILLERY TRACTOR-DRAWN BATTALIONS

1	2	3	4	5	6	7	8
	No. of vehicles authorized to unit	Total range on fuel carried in vehicle (miles)	No. of gallons necessary for complete resupply of all vehicles (including drums)	No. of drums available on vehicles for resupply	Capacity of available drums for gasoline resupply (gallons)	Gallons necessary for all vehicles to travel 100 miles	Resupply capacity in miles
T/O & E 6-25 105-mm Howitzer, Truck-drawn							
Truck, ¼-ton	22	270	440	22	110	176	
Truck, ¾-ton	27	320	1080	54	270	351	
Truck, 2½-ton	37	250	1850	74	370	740	
TOTAL			3370	150	750	1267	59
T/O & E 6-335 155-mm Howitzer, or 4.5-inch Gun, Tractor-drawn							
Truck, ¼-ton	17	270	340	17	85	136	
Truck, ¾-ton	27	320	1080	54	270	351	
Truck, 2½-ton	22	250	1100	44	220	440	
Tractor, high speed, 13-ton, M5	18	176	1980	36	180	1125	
Truck, 4-ton, wrecker	1	180	70	2	10	40	•
TOTAL			4570	153	765	2092	37
T/O & E 6-55 155-mm Gun, Truck-drawn **T/O & E 6-65 8-inch Howitzer, Truck-drawn** **T/O & E 6-95 240-mm Howitzer, M1918, Modified, Truck-drawn**							
Truck, ¼-ton	12	270	240	12	60	96	
Truck, ¾-ton	32	320	1280	64	320	416	
Truck, 2½-ton	13	250	650	26	130	260	
Truck, 7½-ton	18	425	3060	36	180	720	
*Truck, mtd crane	3	110	330	6	30	300	
Truck, heavy wrecker	1	220	110	2	10	50	
TOTAL			5340	140	700	1592	43
T/O & E 6-355 155-mm Gun, Tractor-drawn							
Truck, ¼-ton	12	270	240	12	60	96	
Truck, ¾-ton	32	320	1280	64	320	416	
Truck, 2½-ton	13	250	650	26	130	260	
Tractor, high speed, 18-ton, M4	18	130	2430	36	180	1875	
Truck, heavy wrecker	1	220	110	2	10	50	
TOTAL			4710	140	700	2697	26
T/O & E 6-365 8-inch Howitzer, Tractor-drawn							
Truck, ¼-ton	12	270	240	12	60	96	
Truck, ¾-ton	32	320	1280	64	320	416	
Truck, 2½-ton	16	250	800	32	160	320	
Tractor, high speed, 18-ton, M4	18	130	2430	36	180	1875	
Truck, heavy wrecker	1	220	110	2	10	50	
TOTAL			4860	146	730	2757	27
T/O & E 6-395 240-mm Howitzer, or 8-inch Gun, Tractor-drawn							
Truck, ¼-ton	12	270	240	12	60	96	
Truck, ¾-ton	32	320	1280	64	320	416	
Truck, 2½-ton	13	250	650	26	130	260	
Tractor, high speed, 38-ton, M6	18	112	5580	36	180	5000	
*Truck, mtd crane	3	110	330	6	30	300	
Truck, heavy wrecker	1	220	110	2	10	50	
TOTAL			8230	146	730	6122	12
*240-mm How Bn only.							
Crane, motor truck	3		150 (Capacity 20 hours' ordinary operation.)				

KWAJALEIN GLIMPSE

The following is an extract from a letter from the commanding general of the 7th Inf Div, Central Pacific Area. It was written to Col. Michael Buckley, Jr., formerly assigned to Field Artillery training in the G-3 Section of Headquarters, Army Ground Forces.

"Our Kwajalein operation was most interesting. I wish you could have been standing with me watching our preparation on the landing beaches. I never expected to see anything like it; and now I can die a happy artilleryman, having had the opportunity.

"The artillery battalions did a splendid job. They fired accurately and rapidly over a long period of time. They fired at practically the maximum rate for four hours, and then kept on without rest all the rest of the day, into an area 900 yards long by 150 yards wide. That is all the room there was on the island.

"The noise was terrific. In spite of the beating that the cannoneers took—lack of sleep, constant attention to accuracy, and the amount of weight moved—they were in tip-top shape at the end of the fight.

"They looked tough, hard; their eyes were bright. They had big smiles on their faces, and they were ready for more. They were the ones that carried the load. I certainly respect them. Perhaps the unsung heroes, however, were the ones who moved eight units of fire from the LSTs and into the gun positions. They certainly did work, and very willingly."

Fire Direction Must Be Flexible

By Lt. Col. H. S. Dillingham, FA, and Capt. J. O. Hoenigsberg, FA

The firing of 42,000 rounds of 105 ammunition through a fire direction center in an aggregate of 26 days and in terrain and climate varying from cold, snowy tundra of Attu to the bleakness and devastation of bombarded coral Kwajalein has necessitated certain procedures that might otherwise have been unknown to us. Basically, of course, the established fire direction techniques were used throughout and proved that the only adaptation needed is to the certain peculiarities of each operation. There are a few modifications, however, which we believe applicable to fire direction procedure and related battery functioning, wherever they may be used.

Equipment and personnel of the fire direction center must be divided for the ship-to-shore phase of an operation. Each group must be capable of and equipped for operation as a complete FDC. The complications encountered in one case following the loss of half our equipment and the temporary loss of half of our personnel after a small boat sinking proved that had such a division not been made, operation might have been so seriously hampered as to make our efforts ineffectual.

Our operating FDC is comprised of an operations sergeant, HCO, VCO, 3 computers, and a recorder. From the survey section may be drawn 3 additional computers, an HCO, and a VCO. Each firing battery has a trained fire direction team which, if necessary, may be called upon to supplement or replace the battalion group. Additional recorders are supplied, as described below, by the battalion switchboard operators. We have used five or six FDC radios and found two operators per radio necessary for 24-hour operation. Admittedly, the nature of the operation is the controlling factor for employment of personnel.

Equipment and men must be utilized more as the situation demands than as their T/O or T/E specifies. There can be no rigid adherence to the use of each man in his normally assigned duty. Personnel losses and the necessity for reliefs make vital the need for every man to be able to do every job in the FDC. Mere familiarity with the duties of another in his section is not sufficient—each man must know every other man's job as he does his own. In the event of casualties, the need is obvious. If firing is to be continued for an extended period at a high rate, relieving personnel by rotation has the great advantage of maintaining continuity and familiarity with the situation as it concerns FDC functioning. Then it is necessary for all personnel to be able to take over the duties of any individual relieved. In our opinion, the continuing pressure on a computer makes his job the most difficult and, for efficient, errorless operation, he must be relieved as much as is possible. Assigning other duties in the FDC is a less effective, but satisfactory method. Reliefs for FDC personnel can best be obtained, we believe, from the survey section for an island operation. Their duties are normally terminated early in an operation and the mathematically inclined and trained men fit easily into the FDC picture. We have qualified four survey men as computers and one as a recorder, whose duties are mentioned below.

Training all personnel in additional duties has another decided advantage. It provides flexibility to the functioning of the fire direction center by giving each man a complete understanding of every phase of its operation. Then when unforeseen needs for fire arise, few complications are too difficult to be overcome. On Attu the defenses of the enemy necessitated a great number of point target, one-gun missions. On occasion there were as many as six concurrent missions in FDC. It is apparent that modifications in communications must be made in the batteries and that computers who handle two missions at a time, with two GFTs and two computers' pads, must know their jobs thoroughly. It is necessary for them to preface each command with the designation of pieces to fire to coordinate the firing of these pieces to eliminate errors in identification of his rounds by an observer. Such firing makes necessary more frequent reliefs and replacements must be equally well qualified.

Later, there, another battalion augmented our personnel with two computers, an HCO, and a message center sergeant when two of their batteries were added to those being controlled by our FDC. Slight differences in technique made obvious the desirability of training all FDC personnel on an operation in the same procedure, down to the most minute

detail. No serious difficulty was encountered, but a knowledge of the methods of all others makes for quicker complete coordination.

We have found that the ideal method of controlling requests for fire is for all maps and photos to be similarly divided into areas of about 100 yards, as at Kwajalein. Observers then call for fire or identify targets on a common basis with infantry, naval gunfire spotters, and liaison pilots.

The fire direction center can add materially to the efficiency of the firing batteries by keeping the gun sections themselves aware of the situation as it progresses and the nature of targets fired upon, and by permitting all personnel to understand the necessary coordination and effectiveness they contribute. Beyond question, if gun sections are aware that landing craft are approaching the beach on which their preparation fire is falling or that an air observer has located an assembly of enemy troops, they have an interest in their work far greater than when they are automatically performing what might otherwise become tedious and lengthy missions. It is our policy to relay all pertinent information to the firing batteries immediately upon receipt.

This information is disseminated to the firing batteries through the modifications in communication previously mentioned. They consist of sound-power telephonic communication between each chief of section, gunner, and the executive. It is so arranged that any number of them can be netted for multiple missions. When the battery is firing as a unit, the fact that the gunner, chief of section, and executive are on the same circuit provides an additional check on the accuracy of transmission. Transmission of firing commands with the exclusion of interrupting noise in the battery position is important.

We find it necessary for the S-3 and his assistant to do much of the communication with observer personnel. If wire lines are difficult to keep in, all wire personnel will be out on the lines and not available as operators. In addition, coordination is a major problem in every operation and to do it indirectly by message, either written or oral, is neither prompt enough nor so free from the possibility of misunderstanding as is direct communication. Observers are always under stress. Logically, the interested officer at the FDC, more familiar with the needs of fire, can much more expeditiously grasp the import of vital messages and take the necessary action.

Of minor effect on the outcome of a battle, but important in its recapitulation, is the method of keeping the necessary records. We have found that by the addition of one man to the normal number of operating personnel, with the sole duty of keeping on a detailed form a record of each mission requested, the writing of the always-called-for reports is greatly simplified. These men are recruited from the switchboard operators at the CP, and rotate between their switchboard duties and that of recorder and the man previously mentioned from the survey section.

No report would be complete without mentioning the great simplification and increase of effectiveness of fire brought about by the use of air spot. Where great amounts of fire are brought to bear on small areas, the smoke and dust are so great as to eliminate any possibility of ground observation. Then the air spot serves an invaluable purpose. Surveillance of fire by air is much more comprehensive than localized ground observation and can give more accurate information as to the location of the preponderance of fire.

These are modifications which have been shown necessary for us in an operation. They are not necessarily new nor are they complete, nor are they applicable to every situation. Undoubtedly as our experience increases we shall find additional ways of making the operation of our FDC fit the particular circumstances under which we are functioning. Of one thing we are convinced: *it must be flexible*.

SOUND AND FRAGMENT ADJUSTMENT

By Capt. Jay D. Vanderpool, FA

Sound and fragment adjustment is a relatively new technique in the adjustment of artillery fire. It was developed through necessity by field artillerymen who were confronted by problems that had not been previously contemplated by field artillery instruction. Officers that we have received from replacement and training centers have not been familiar with the methods employed by experienced forward observers in the South Pacific. This is due, no doubt, to the fact that prior to this war there had been no major actions in tropical jungles. Only those observers who have been required to adjust close-support artillery in areas so overgrown by tropical vegetation that there was no possibility of observation have had to resort to this method of adjustment.

It had been assumed that firing data would be obtained from maps or firing charts (either corrected or uncorrected) or by observed-fire methods, but when American troops moved into the jungle-covered islands of the Pacific there were no maps available of sufficient accuracy for field artillery fire control. In several situations there was no possibility of obtaining observation in the dense jungle.

Available maps were hydrographic charts or uncontrolled photo-maps. The hydrographic charts were relatively accurate as far as the high-water line on the beach. Many of the details of the interior, however, had been filled by inspection and by reports. The available photographic units were concentrating on aerial and naval targets and had not had time to produce a satisfactory artillery map.

The uncontrolled photo-map that was employed during the Guadalcanal Campaign was accurate enough on the flat, coconut-covered coastal plains near the beaches. Photographic details of the hilly interior were displaced considerably, due to the distortion normal in uncontrolled mosaics.

ABOUT THE AUTHOR

Capt. Vanderpool served in the Hawaiian Division from April, 1937, to October, 1941, when he helped organize the 25th Div from the 22nd Inf Brig and the 8th FA. At Schofield Barracks during the attack of December 7, 1941, he later saw action on Guadalcanal—from December, 1942, until all Jap forces were liquidated the following February. He saw action in the New Georgia group from July, 1943, until the Vila Airstrip was taken on October 6th; during this period he fired normal OP missions, sound adjustments, and aerial adjustments. At present he is an assistant G-2 of the 25th Div.

The photo-lithograph map employed in the New Georgia action contained no detail except along the shore line, in the plantations, and around the Munda Airstrip.

The first time that I saw a sound-and-fragment adjustment was in December, 1942, on Guadalcanal. Some of our advance party (from the 25th Div) were observing an attack by Americal Division units to see if we could pick up a few pointers on jungle fighting from men that had been at the game for several months. The 132nd Inf was assaulting Mt. Austen (south of Henderson Field). A battalion of Marines equipped with 75-mm field howitzers (Lt. Col. M. L. Curry, commanding) was in direct support.

When the infantry reached the top of the hill they found that the ground dropped off into heavily wooded valleys with no visibility beyond a few yards. The forward observers pushed the fire ahead of the front lines as they advanced into the jungle. The infantry crawled up to within fragment range of the 75-mm bursts and then the fire would be pushed up another hundred yards.

When the infantry dug in for the night the fire was pulled back, by listening to the sound of the bursts, until the fragments were falling just ahead of the front lines. This, Col. Curry explained, discouraged night attacks. In the event of a counterattack during the night, an artillery barrage could be dropped in front of our lines and held there until the idea of walking through the fire had been abandoned. The Japs in this area were remnants of the 124th Japanese Inf that had made an assault through an artillery barrage on Edson's Ridge in November. They were now more hesitant about walking through American artillery fire.

The technique employed in sound adjustment is simple, but there are a few rules that will help avoid accidents. Any artilleryman can make an adjustment by watching the fragment pattern and listening to the sound of the bursts, but it is only with experience that he will become proficient.

There is probably no phase of artillery support that requires such close coordination between the infantry-artillery team as in a sound adjustment. The artillery observer must have a complete knowledge of the location of all of the troops in the vicinity of the impact area. This includes the location of the units to both right and left of the actual impact area. He must have a good working knowledge of the capabilities and limitations of his weapon and its ballistic characteristics. He must have a comprehensive knowledge of all of the communication means at the disposal of the combat team, from the infantry company outposts back to the field artillery position area. In addition to this he must be able to shoot. The infantry commander must be kept constantly informed as to plans for firing, otherwise patrols are liable to go into the impact area without the FO's knowledge.

If the vegetation is dense enough to require a sound adjustment, in all probability not even the infantry commander will know exactly where his front lines are. Of course he can take you to them, or tell you approximately where they are, but not with sufficient accuracy to enable you to place close-supporting fire without endangering our own troops. It is the responsibility of the supporting artillery unit to keep fire out of our own lines.

In areas covered by both a heavy primary and secondary growth, the matter vines and bushes usually delay contact between leading elements until the enemy forces are within a hundred yards or less. This presents a ticklish problem. The infantry commander is hesitant of withdrawing his front lines to a position of safety during an artillery adjustment. In heavy jungle fighting the advance is measured by yards, not by miles. Every yard represents hard work and casualties. Yet artillery fire may be required to soften the defensive positions prior to an attack.

The infantry column pushes up the trail

We ran into several situations of this nature while in support of the 27th Inf of the 25th Div during the drive from the Munda Airfield to Zieta Village, on New Georgia Island. The regiment was driving north from Munda in an attempt to cut the Japanese supply and evacuation routes that converged at Zieta.

In one instance, while pushing north along the Zieta Trail we hit a delaying force. They were well dug in, astraddle of the trail, and extending for 200 yards on either side. At this point the trail ran over rolling terrain that was so densely wooded that there was no visibility beyond twenty or thirty yards. The Japs were well dug in, in log- and earth-covered standing fox-holes. Tall mahogany and banyan trees prevented the employment of aerial observation.

The regiment advanced along the trail in column until the opposition was encountered. Companies were then deployed on a line opposing the enemy. Company commanders reconnoitered their respective fronts and located pillboxes within their sectors. An assault wire line (W-130) was laid along the front with a sound-powered telephone at each company. By employing this wire net and the sensings of the company commanders in addition to our regular FOs, we were able to adjust concentrations all along the line. Each FO and company commander was able to place a concentration exactly where he thought one was needed.

We opened up well over the front lines, with batteries firing salvos in turn. High angle fire was employed in order to avoid tree bursts over the heads of friendly troops as the fire was pulled back toward our lines. After each salvo the observers and company commanders in that sector reported to the battalion FDC the direction (by pocket compass) and the estimated distance of the burst. This was continued until all known targets were registered upon.

As the adjustments were fired in the late afternoon, the infantry commander decided to dig in for the night and to attack the next morning. Data was recorded and preparations were made for an attack the following day. As it turned out,

An intermediate objective: Zieta. It took nearly two weeks of jungle fighting to reach the village.

the Japs became dissatisfied with their delaying line after the artillery adjustment and moved out under cover of darkness.

A few days later, on the same trail, we ran into a similar situation. This time, however, the opposing lines were about 80 yards apart. Mortar fire was indicated, but was precluded by a lack of firing positions and by ammunition supply difficulties. Our battalion commander informed the commander of the 27th Inf that casualties must be expected among our own troops if fire was brought to bear on the Japs while the front lines were so close together. The infantry commander decided that the necessity of artillery fire was great enough to chance a withdrawal of 150 or 200 yards, so the infantry withdrew the agreed distance. Four or five riflemen remained in foxholes as local security for the observers. Our battalion commander and a couple of us remained with two telephone operators to adjust the fire. We selected good, deep, comfortable-looking foxholes and started adjusting our light battalion and the 136th FA Bn simultaneously.

We still had another problem to solve. The Japs must have known that the infantry had withdrawn—when hundreds move out of an area at the same time, they are certain to make noises that will give away the move to the enemy if he is only 100 yards away. We also knew the Japanese habit of following our withdrawing infantry in order to avoid the artillery fire that is creeping up behind them. The safest place for the Japs during an artillery concentration is as near our troops as possible. At the same time, they are not losing ground but are gaining it. This is not so serious on level ground but if a hill is sacrificed it may prove very important. As we had no desire to have a Jap skirmish line walking over us our battalion commander decided to out-fox the Nips.

We called for battery salvos, well over our position, for the initial rounds. High angle fire was requested. The batteries were then walked back to within an estimated distance of 200 yards of our observation (?) post. By this time we concluded that the Japs were getting out of their foxholes and moving forward. The battalion commander (he was handling the problem) sent a sensing of *Two hundred over*. We then sensed, without difficulty, a *Mixed short* on ourselves. A sensing of *Five zero short* was then sent to the FDC with a request for three volleys. No. 2 burst of the second volley landed about 10 feet to the right of my foxhole and shook me up a bit. I suggested that a 50-yd. increase in range would be more comfortable. The range was pushed up another 50 yards and that line designated as the near limit of the center battery (the one that had been adjusting). The fire of the flank batteries was not so critical as the shorts fell to one side of us. A 20-minute concentration was called for.

The fire of the medium battalion had been pulled back by the observer from the 136th FA Bn until the tail spray of the near bursts was cutting the treetops immediately overhead. The near limit of the impact area was then estimated to be about 200 yards away. (The trees were about 150 feet tall and the slope of fall was 1:3, so the tail spray fell below the trajectory.) During the adjustment the observer had changed to fuze delay in order to prevent a 155 tree burst over our heads. This proved to be a good decision. One round cut the top out of a tree 30 yards to our left and then traveled another 60 or 70 yards before it burst. The side spray cut into the ground to our front and the tail spray went over our heads. All wire communication was shot out before the end of the problem, but fortunately not before the near limit was designated. Our battalion commander was awarded the Silver Star for his handling of this problem.

At the end of the concentration the infantry pushed through our position. The scout on the point of the column was shot before he had gone 10 yards past our OP, thus verifying our belief that the Japs would be moving toward us in order to avoid the fire.

On another occasion the division commander directed that we blast a path along the jungle-covered trail ahead for 800 or 1,000 yards. Our infantry column had been held up for a couple of days by entrenched riflemen and machine gunners. The Japs were in well prepared positions that were capable of withstanding small arms fire. The trail ran along a stream bed in a valley leading north toward Zieta. The interwoven secondary growth was about 20 feet high. The primary growth was the usual jungle trees that reach a height of 150 feet. A snarl of vines and bushes made it difficult to locate enemy pill-boxes until a scout was within 10 feet of the hidden Jap.

We did not know for certain where the trail ran to, but its general direction for the last 600 or 800 yards had been North 15º West. This was in the approximate direction of the reported position of Zieta Village.

The artillery and infantry commanders were at the head of the column. A forward observer was out on each side of the trail, with the infantry assault companies. The LnO from the medium battalion was with the main party on the trail. The artillery commander coordinated the fire of the flank observers and that of the medium battalion; he was also able to maintain close liaison with the infantry commander.

A salvo from each battery, in turn, was called for, 700 yards to the front. The batteries fired Battalion Right with 30 seconds between salvos. After each salvo the observer in that sector sent a forward observer sensing based upon his estimate of the distance to the bursts. As a party line was being employed, this sensing could be heard by all of the observers and by S-3. When an observer endangered our men in another sector, he could be notified and necessary precautions taken. Adjustment was continued until the minimum range line for all batteries had been determined. This was an estimated distance of 200 yards for the light battalion and between 300 and 400 for the medium battalion.

At the FDC the survey control for the initial data had been obtained by telephone from the survey party, which had traversed to within about 100 yards of the main party at the head of the column. When fire for effect was called for, a line was

drawn on the firing chart from the near limit (established by the FOs) in the direction of North 15º West, the course that the Nip trail had been following. Both battalions were brought in astraddle of this line for fire for effect. The fire swept back and forth along this line for two hours in a 1,000-yard zone. After the first two hours the fire was jumped by irregular times and range bounds in an attempt to catch some Japs out of their foxholes. At the end of four hours the infantry jumped off. 2,400 rounds had been expended by our light battalions and 800 rounds by the 136th FA Bn.

We did not encounter a live Jap for over 800 yards after the infantry attacked. Trees and undergrowth had been blown into windrows by the shelling. It was only after the leaves from the shattered trees had died and withered that the Nip defensive positions could be seen. After a few hot days the stench indicated that there had been a considerable holding force in the area.

We had employed half quick and half delay fuzes during the fire for effect. This is SOP for us when firing into heavy undergrowth. The quick fuze burst strips the leaves with tree bursts, which correspond to time-shell air bursts in open terrain. The delay fuze goes on through and penetrates the dug-in positions. A delay fuze that strikes the top of a 150-foot tree will usually burst about the time that it hits the ground; the side spray from a projectile that bursts just as it is hitting the ground makes a nice pattern around the point of impact.

* * *

We have learned some new rules and have proven many old ones by our experiences that may be of some value to artillerymen that anticipate fighting in the jungle.

The first is close liaison. This can not be stressed too much. The artillery commander, LnOs, and FOs must know exactly what the infantry commander requires. Personal contacts and combat-team exercises are invaluable for developing this. The artillery observer must keep abreast of the tactical situation so that he will know where all of the troops within his sector are located. This includes adjacent units as well as the unit being supported.

If necessary, an artillery observer must be sent to contact and remain with adjacent units during a sound adjustment in order to prevent his own fire from falling on their men. This is especially true among green troops that are still a little gun-shy. If there is no visibility between units, as is nearly always the case if sound adjustments are indicated, it is somewhat nerve-wracking to have another combat team firing near your position. There is always the feeling that the other observer may not know where you are and will fire into your area.

We have often been called upon to handle missions that would normally be assigned to infantry mortars. This has been due to a complete lack of mortar firing positions and by supply difficulties encountered on muddy jungle trails. When there is a complete overhead cover of high trees, it is often impractical to cut a field of fire for the mortars. Mahogany trees six to ten feet in diameter are hard to cut or blast down. A banyan tree stands on scores of roots and practically defies blasting. Artillery, being farther to the rear, has better supply facilities than do the mortars.

We have found that when sound adjustments are indicated by the nature of the terrain and the character of the jungle growth, closer support can be given with high angle fire than with low angle fire. This is due to the fact that the 150-foot trees act as an overhead mask. This creates a dead space that prevents the fire from being pulled back where it is needed without getting an overhead tree burst. As high angle fire has less dead space, the fire can be pulled in on targets nearer our front lines. A burst in the top of a 100-foot tree cuts about the same pattern on the ground as an air burst with time-shell. Many fragments are retarded or stopped by limbs and leaves before they hit the ground, however.

If it is necessary, as in the case of the 155-mm Schneider, to make a low angle sound adjustment near friendly troops, we employ a delayed fuze. If fire is required very near the front lines, we pull it back, by sound, until the tail spray is cutting the treetops overhead. This is assuming that the trees are between 125 and 150 feet tall. As the tail spray does not follow the path of the trajectory to the rear, but instead falls below it, we have been able to pull the fire in this close. The side spray cuts the ground between 100 and 200 yards to the front. If we guess wrong and send a projectile through the treetops over us, the delay fuze does not function until the projectile has traveled far enough to keep most of the fragments to our front. (NOTE: the *near limit* of the dispersion scale is pulled in close to troops, not the center of impact.)

Sounds are muffled in the jungle. Until you have had considerable experience in adjusting by sound, do not make bold bounds toward friendly troops. Remember, if the foliage is heavy or if there is rolling ground between you and the fire, you are inclined to overestimate the distance to the bursts. Tree bursts sound much louder than normal impact bursts. With experience you can distinguish between most of the different sounds but everyone guesses wrong once in a while.

Quite often, when you are firing over a hill into a valley the round in the valley will sound far away. A 100-yard decrease in range may pull the burst back on the top of the hill and right into your lap. By firing all four guns in the battery you will be able to make a better estimate of the distance to

Typical vegetation—the men are taking cover behind a mahogany tree.

Supply difficulties—supplies and ammunition are often carried through miles of mangrove swamps like this.

the near limit of the dispersion scale. Never, if you are firing near friendly troops, adjust with one gun and then bring in the battery: the greater dispersion of four guns may cause shorts to fall behind our lines.

A safe rule is to start creeping by 100-yard bounds when the estimated distance is 500 yards. When the estimated distance is 300 yards and the fire must be pulled in closer, decrease the range bound to 50 yards. A creeping adjustment is admittedly a very slow method of accomplishing a mission, but it is far the safest.

There is another point to bear in mind: the fragment range is greatly reduced in the jungle. Fragments hit small twigs, trees, and bushes in flight. Every object that is cut tends to retard the velocity of the flying steel particle. This smaller effective radius of burst has some tactical advantages. Troops can crawl to a position nearer the artillery fire prior to an attack. This is especially true if the gun-target line is parallel to the infantry front lines. On the other hand, more ammunition is required to accomplish a mission in the jungle due to the reduced effective radius of burst.

Data for initial fire may be obtained in various ways. The tried and proven method of shooting yourself in on an observed fire chart will work but it is too slow and endangers adjacent units if not carefully controlled. The exact location of units on other trails is usually difficult to determine. An infantry column that has been driving along a jungle trail for several days is hard to locate unless they have been surveyed in. The only practicable method that we have arrived at is by the tedious process of traverse to the forward observer. This is not necessary if a good map or photo-map is available, but this map must have enough detail on it to enable a FO to locate himself accurately.

The OP for a sound adjustment should be on the highest ground available. From a height a better estimate can be made of the direction and distance of a burst. If you are in a wooded valley or ravine, it is very difficult to determine the direction of the sound.

At the OP every man must be in a foxhole. This practice is good insurance even though you intend to keep the fire 300 yards away. You may err in your judgment and drop a round on the OP. Then again, even the best of batteries sometimes fire "out." Or one of those rounds that defies the laws of dispersion and ordnance experts may fall short.

Foxhole construction is a matter of personal taste. Some men dig a hole that barely conceals a prone body (they haven't been fired at much). Personally, I prefer a prone type foxhole such as a rifleman digs. This may have been developed by my habit of looking for an abandoned foxhole in order to avoid the work of digging one. The hole should be just wide enough to permit you to lie on the bottom, with a little squirming room. It should be 2½′ or 3′ deep in order to give good protection. If it is deeper than this you may be buried by a near round before the graves registration section can remove your dog-tags. The vane-like roots of the mahogany tree rise a yard above the ground and offer good flank protection from fragments. This is the favorite foxhole site of many Japanese soldiers; as the Nips are forced to put in quite a bit of foxhole time, it must have its good points.

Communication is normal except that more lateral lines may be required along the front. A lateral line enables observers to assist one another make adjustments. It also permits more officers to assist the observer in keeping the fire in front of our lines.

During a sound adjustment an observer must be closer to the front lines than in any other type of problem. In fact, the only way that he can be certain that all of his fire is falling safely to the front of the infantry is to be in front of the leading elements, himself.

When front lines are only 100 or 200 yards apart the observer will have to conduct himself like a scout on a patrol in order to accomplish his mission without giving his position away. The FO party will have to be cut to a minimum in order to keep down noises that will disclose his position.

If all adjustments are by sound, very little equipment is needed—communication equipment and a small firing chart, map, or photograph are about the only essentials. BC 'scopes, field glasses, aiming circles, etc., are not necessary when you sense the bursts by watching the fragments kick dust in your face. They should not be used anyway unless absolutely necessary, as they would draw fire. Jap snipers rarely ever pass up a shot at a man carrying field glasses.

"DOWN UNDER" COMMENT

"Having had access to the JOURNAL and now being in combat, we have found many of its excerpts—and particularly those items on short-cuts to the solution of field problems—to be quite accurate and practical."—*A Field Artilleryman in the Southwest Pacific*

CHINA TODAY

By Col. Conrad H. Lanza

Prior to the entry of the United States in the war numerous and consistent reports from Chungking indicated that China was winning victory after victory over the hated Japanese invaders. This the Chinese ascribed not only to their greater numbers, but also to their superior fighting abilities.

There were so many of these stories that Americans had come to believe that the Japanese were bogged down in China. The Japanese were thought to be approaching exhaustion from their long, disastrous, and futile attack upon a peace-loving neighbor. Because our nation sympathized with the Chinese and thoroughly disliked the Japanese, the American press prominently printed glowing Chinese accounts of their successes. Little or nothing was printed from the Japanese side.

Americans thus formed an opinion that the Chinese were more efficient than the Japanese. It seemed that if China could defeat Japan, there would be no serious risk in the United States' going to war with the same mission. It should be no trick at all for the Americans to finish a job which the Chinese had so well begun.

It now appears that the general judgment as to the military situation in China had been hastily made and was not exactly in accord with the facts. More than two years have passed since the United States has been at war. In that period the fighting in China has all but disappeared in the northern area, and has been limited to minor areas in the central and south sections. In the greater part of China the war is nominal. A very extensive area is unoccupied by the Japanese, and the Chinese therein govern themselves. Schools and missions function. The Chinese laws are administered, and Chinese officials are at their posts. Yet life is not normal. The shadow of war lies over the whole country. In places its weight is crushing. It is a question how much longer the Chinese can bear it.

Conditions are best in north China. This is a land where wheat and millet and soya beans are raised in large quantities. Cattle and sheep abound. The people are fairly well fed. They transact considerable business with the Japanese, for no other trade is possible. Through long association the people have learned to get along with Japan, although they dislike that country. This dislike is general as to all foreigners. Yet, the Chinese have recognized that Japan introduced law and order in Manchukuo and other areas seized by her. It is perhaps a characteristic sign of true Chinese sentiment that, in spite of a common hatred of foreigners and of Japanese in particular, millions of Chinese voluntarily migrated (prior to the present war) from free China to Japanese-controlled provinces. Japanese rule was heavy, but it was orderly. The Chinese immigrants placed the well-being of their families, and the right of earning a living, ahead of political matters.

From time immemorial China has been accustomed to dictatorial rule. It has never known any other kind of government, so its people see nothing unusual in being under that form of government now. The humble Chinese citizen, unable to read or write, concerned with the problems of life, cares but little as to who runs the central government, even though he may well prefer a Chinese government in principle.

Historically Manchukuo never belonged to China. Beyond the Great Wall, it was the hereditary enemy of China. In the 17th century when the Manchus crossed the Great Wall and conquered China, their emperor became also Emperor of China. Prior to the arrival of Japan in Manchukuo, Chinese immigrants were not permitted to enter that country. Japan opened it, and some twenty or more millions of Chinese have since entered. As nearly as can be determined in the absence of any census, the Chinese in Manchukuo now outnumber the Manchus by perhaps three to one. According to reports of missionaries the two races get along well together and intermarry freely. On this rests the Chinese claim to Manchukuo. Opposed to this claim is that of Russia, which entered and controlled Manchukuo at the end of the last century. The Russians found Manchukuo necessary to properly connect their Pacific provinces with western Siberia and Russia and to obtain ice-free ports for her large Far Eastern commerce.

If the Yellow River is taken as the south boundary of north China, its area (exclusive of Mongolia, which is Russian-controlled) is around 600,000 square miles. In this vast territory the Japanese control nearly the entire country although their troops occupy only key points. These are so located that, due to the restricted lines of transportation, no great amount of traffic can be moved without passing through some Japanese control center.

Business is expanding. Looking forward to the days when American air fleets will be bombing their cities, the Japanese have been moving industrial plants from Japan to Manchukuo, Korea, and north China. Entirely new plants are being erected. The plan is to make the Japanese military forces in China independent of the home country for all materiel and supplies. Just how much progress has been made is unknown, but certainly much has been done. North China is that area which appears to be the furthest removed from early possibilities of an Allied invasion.

Manchukuo troops are serving with the Japanese. How trustworthy these are is questionable. The possibilities of raising, and supporting locally, large armies and air forces in north China, are considerable. This is not being overlooked by Japan.

The situation in central and south China differs from that in the north. Perhaps 70% of the Chinese live in these areas. In general they hate the Japanese, the hatred increasing in intensity toward the south.

Just as in the north, the Japanese occupy only key points and communication centers. Most transportation is normally by water—sea, rivers, and canals. A minor amount used to be by rail. With the Japanese blockade, and all rail and water terminals in their hands, it is impossible to move goods from one section of China to another.

This country is most densely settled. There are relatively few large cities, but innumerable villages peopled by farmers. In ordinary times the food produced suffices to maintain life—just barely and no more. When unusual floods or disasters arrive, food supplies decrease and famines arise. Every few years millions of Chinese have died through the recurrence of famines. To avoid this fate the Chinese must cultivate all their farms and have transportation to transfer surpluses of certain kinds of food from one area to another.

By blocking transportation the Japanese have succeeded in

causing a chronic status of starvation over large areas. In the few areas where excess food is raised (such as around Changsha) the Japanese have found it necessary to raid at least annually into the territory to seize or destroy stocks of food just after the harvest. In the great mass of central and south China this is unnecessary so no Japanese troops enter there.

Epidemics follow starvation. According to reports of missionaries now in south China, the number of Chinese dying of starvation, dysentery, malaria, and other diseases is astounding. Infant mortality is especially terrific. But the Chinese are hard working. They are the most patient people in the world. They are doing what they can to maintain life. Where this is impossible, they make no complaint. They lie down and die.

In every Chinese center there are soldiers—at least on paper. According to reports from Chungking, about 3,000,000 troops are carried on the rolls. In many areas the soldiers are so absorbed in trying to live that they are completely unable to find time for military training and often are physically incapable of military duties. In few places can enough food be found to support an assembly of troops over and above the members of the local community. If more troops move in and are fed from local sources, more citizens must die from starvation.

This lack of food prevents any major Chinese offensive. In fact, there has been none for years. Where there is a little food the local Chinese troops have some defensive value. They regularly resist the Japanese incursions into the Changsha area but have never been able to prevent them.

The Japanese bait offered to the Chinese is to abandon the Chungking government, and accept in lieu thereof the Japnese-sponsored Nanking government with the promise that its adherents will receive substantially more food through the Japanese control centers.

Strength of the Nanking government, whose leader is Wang Chingwei, is not exactly known. It seems to be gaining. According to Chungking reports it has about 300,000 troops in line with the Japanese in occupied areas and fighting with the Japanese in their occasional raids. It is assumed, without positive knowledge thereof, that more Nanking troops are in process of organization with a view to fighting against the Allies when they arrive in China. As in the case of the Manchukuo troops, there is no present way of telling whether the Japanese-trained Nanking troops will remain faithful to their present masters at the critical time.

The people of central and south China have only recently come to know the Japanese. Their previous contacts with foreigners had been largely through the great cities of Shanghai and Hong Kong. These were the center and the glory of the white man, built out of practically nothing, and where the oriental races were kept in subordinate places. When the Japanese appeared it was not strange that the Chinese felt and believed that they could never compete with the white man. They trusted firmly that the white races would quickly suppress the new upstart.

Since then the Chinese have become better acquainted with the Japanese, first through the battles around Shanghai and later around Nanking. The Chinese armies were beaten and afterward their people, to use no harsher term, were treated with savage severity. It is not a pleasant memory. Collaboration with the oppressor is not easy.

There is, however, a minority which, while heartily disliking the Japanese, feels that from a practical point of view a working agreement with Japan would be best. They think it is perhaps the sole means to avoid the extinction of a large part of the Chinese race through starvation and disease. This section of the community is represented by the Nanking government, which is of course opposed to the Chungking government.

There is a third government in China, the Communist. This is strong only in the northwest provinces. It is strongly anti-Japanese but is none too friendly with Chungking. The latter sees to it that little of the lend-lease arms and munitions received from the United States and Great Britain gets to the Communists. Giving this as an excuse, the Communists have done little fighting against the Japanese during the past two years. In their section of the country there is enough food to maintain life, although there is dearth of manufactured goods and of war materiel.

The energies of the Communists have been more concentrated on dissemination of doctrines than on fighting the enemy. They have had some success, and in their areas have introduced desirable social improvements. In their own provinces they are backed by a larger percent of the ordinary people than in the sectors where the Chungking and Nanking governments rule.

The Japanese trade control is by no means a complete blockade. It is a device—and a powerful one—for putting economic pressure upon a great nation. The Japanese allow some food to go through, but no more than enough to maintain a bare living. On food that goes through from one province to another a commission is paid to the Japanese.

Manufactured goods made in Japan are found generally through unoccupied China and even in Chungking. There is no other way for the people to receive clothing or the ordinary articles to carry on any kind of life. To pay for these things the Chinese must turn in to Japanese control centers whatever they produce. Cotton, grown only in certain provinces, either goes direct to Japanese mills or is transferred in limited quantities to free China. Tung oil, wolfram, and copper are produced for Japanese benefit. This trade is with the enemy, and according to the laws of war is completely irregular. It operates as a species of black market which on its face is represented as being contrary to regulations. Nevertheless it is perfectly known to and is strictly controlled by designated Japanese authorities. For many parts of China submission to this system is the only way to avoid complete starvation.

For those areas which do produce more than enough food for own use, the Japanese use different methods. At appropriate seasons, Japanese expeditions are sent there. They fight any Chinese forces in their way and destroy stores and any factories which the ingenious Chinese have managed to build. Cities are burned, the inhabitants are maltreated, the terror of Japan is spread through the land. These military expeditions are a combination of legitimate battles, of scorching the earth, of terrorism. They are a demonstration of the power of Japan. They prevent the perfecting of organized resistance in the few areas where troops might be assembled in larger numbers. They aid in maintaining a starvation status in those areas which remain faithful to the Chungking government. They disseminate death, famine, destruction. They have not removed the hatred of Japan.

Seven years have passed since this type of warfare commenced. Ferocious in some places, it is non-existent in others, where over vast areas there is no fighting. During this long

period of constant trial and intense suffering the Chinese spirit has remained adamant against the invader. It is a passive spirit, for the Chinese see no way to stop the Japanese unless the white man comes and does it for them. But if the Allies do come, the Chinese have no armies-in-being to aid. And if they had they couldn't feed them.

What has Japan gained in China? Our information on this is far from complete. The available evidence indicates that Japan is exploiting China with some measure of success, more so in the north than in the center and south. China is rich in resources. With the exception of oil, which so far has not been located in large fields, practically every kind of mineral and plant is to be had. It is one of the richest countries in the world. The labor supply is almost inexhaustible. Japan is forcing the Chinese to produce for her war needs on an expanding scale. The Chinese must produce to keep themselves and families alive. They can obtain food only as Japan allows it to be distributed. Only by selling to the Japanese can they obtain money with which to buy neecssities. There is no other market. Slowly Japanese control is spreading.

If the Chinese can not be aided in time, in their fight against Japan, they may come to accept the hated Japanese rule, as centuries ago and after generations of war they accepted Manchu rule.

As years go by, it is not strange that faith in the Allies may decline in China. The people have waited a long time for a change. The destruction of life and of property in their land exceeds imagination. If there is help to come, the Chinese want it to come soon.

The latest news indicates that Hong Kong and Shanghai, two wonderful and magnificent cities which were once the greatest commercial centers of the Far East, are now dying for lack of business. More serious is the symbol which they represent.

One had over a million and a half inhabitants, the other three and a half millions. American and European influences predominated and Japanese influence was patently minor. These two great cities were wealthy. They were gorgeous, rising in splendor amid surrounding Chinese drabness. They contained huge palaces and most marvelous collections of goods. They were emporiums of trade and finance. They were the center of western culture, the domain of the white races. They were a sign to the Orient that the power and the might of the white man were supreme. No Oriental ruled in those cities, nor could he occupy an important post. He served; he could not rule. This writer remembers that when Chinese just outside of Shanghai were dying in droves from starvation, inside Shanghai food was plentiful, while joy and mirth prevailed under the white man's laws.

In December, 1941, within the month, the wonders of the white man in the Far East were overthrown by an oriental race. The shock to the white man's prestige that this caused has not passed. It will take action to restore what was so suddenly lost. Well did the Prophet say,

> "Woe, woe, that great city, which was clothed in fine linen and purple and scarlet, and gilded in gold, and precious stones, and pearls;
>
> For in one hour riches so great were laid waste."

CHINESE 52nd ARMY

Inspection Trip—March 1943

By Col. Garrison B. Coverdale, FA

The Chinese 52nd Army, located on the Indo-China front with headquarters at Wenshun, China, was inspected by Col. Hubert M. Cole and myself in March, 1943. The events leading up to the inspection trip and the trip itself will be covered in this article.

While preparations were being completed for the starting of the Field Artillery Training Center in Yunnan Province it was considered that an inspection of an army at the front should be made. Col. Hubert M. Cole and I were ordered to make this inspection, and the necessary approval was obtained from the Chinese High Command. My Chinese assistant, Colonel Tai, was to accompany us to act as translator.

We left Kunming early in March with one Chevrolet truck and one jeep (all our motor transportation was salvaged from the Burma Road). The road was quite poor, but passable for the truck as far as Amichow. The country was mountainous and very rocky. Our elevation averaged about 6,500 feet with numerous steep slopes along the route. Villages were quite far apart and the people very poor.

The first night was spent bivouacked on the road in freezing weather. We arrived at Amichow about noon of the second day and left the truck and jeep in the grounds of the railroad station. This railroad was owned and operated by the French and before the war connected Indo-China with China. It was still operating from Amichow to Kunming. The equipment was in bad condition and no replacements were available. In traveling on the train between Kunming and Amichow the Chinese literally covered the entire train—on the front of the engine, and the tops and sides of all cars. Each Chinese had at least one large bundle with him and many had pigs, goats, calves, and chickens.

After leaving our two drivers with the truck and jeep we went to a Chinese hotel to get accommodations for the night. Our room was equipped with wooden bed frames upon which we spread our sleeping bags. Chinese hotels (hostels) are not very clean—especially the latrines, which are extremely primitive. The food was rice, eggs, a few vegetables, and some pork. If one could eat without having looked at the kitchen or surroundings the food actually was fairly good. We always asked for a bowl of boiling water in which to dip the chopsticks, rice bowls, and other dishes. Of course, we insisted that all food be brought to us piping hot. Before each meal we filled our canteens with boiling water so the water would cool sufficiently to drink.

During the afternoon all preparations were made for an early start the next morning. Arrangements were made for the two American drivers to stay with the Chevrolet truck at Amichow, and the jeep was made ready for the rest of the trip. Extra gasoline had been brought along in the truck and

we loaded the jeep as heavily as we could with extra cans of gasoline.

At 5 AM the next morning the three of us (Colonels Cole, Tai, and myself) in the well-loaded jeep left Amichow for the "front." It had rained for two days and the road over the first steep mountain was very steep and muddy, necessitating our traveling in low range for several hours. Large gangs of natives were working on the "road," hauling stone by cart and by hand to improve it. Our jeep was probably the first ever seen by these people and caused much gathering around and many comments. Due to the differences in dialect Col. Tai was unable to talk to these coolies. Everything went well until about 6 PM, when the jeep started to have motor trouble.

Col. Tai went to a nearby village to get help while the two of us tried to trace the trouble. As it was dark by the time Col. Tai got to the village the doors were all barred and none of the natives would come out to talk to him. As this did not appear so serious to us as Col. Tai led us to believe, we continued to work on the jeep, using flashlights until about 10 o'clock, when we finally got it running again. Again underway, we made good time until reaching the mountains close to Wenshun. There a group of Chinese soldiers in a Bank of China truck met us and welcomed us heartily. They had been sent out by the Army Commander to look for us, he having become worried for fear the Chinese bandits had gotten us. It seems that the bandits in that part of the country are particularly vicious, killing their victims each time as well as robbing them and also stealing all their clothing. We hadn't been alarmed at all even though Col. Tai had been unsuccessful in getting help from the village.

We were escorted by the soldiers to Wenshun, where a belated feast with the Chinese Chief of Staff was very welcome. We were given quarters in a school building and told we would meet the Army Commander the next morning.

As Field Artillery was our principal interest it was our first question after the introduction to the Army Commander was completed. He told us his battalion of Field Artillery (in China one battalion of Field Artillery per field army is normal) was right there at Wenshun and had been for about a year. It was Pack Artillery equipped with Japanese 75-mm pack howitzers. Only 6 howitzers were in serviceable condition, the other 6 being at the Chinese Ordnance. Further questioning brought out the fact that the Chinese Ordnance had had these howitzers for several months and there was small chance of their being returned inside of six months or a year. We asked if the unit at hand would put on a firing problem for us and were assured it would be a pleasure for them to do so.

As only one battery had enough animals to be mobile the problem was small indeed. Remember, this was the artillery for a field army! Wenshun was about 100 kilometers from the front and the battalion had been there for a year. After witnessing the problem they put on for us we could well see the reason for keeping them well behind the front lines. The animals were the small Chinese mules, but perfectly capable of carrying the loads if they had been properly fed and conditioned—which they definitely were not.

The Army Commander went along with us on the problem, he being mounted on a small 13-hand pony and we on British polo ponies the Chinese had captured from the Japs. The march consisted of about two miles through the village and the adjacent rice paddies. Going into position was very deliberate and slow with the OP about 200 yards to the front and left flank. We were to fire into a hill about 3,000 yards away and no precautions seemed to have been made to warn the people working in the fields. It seems to be the accepted custom to fire in any selected area and then it is up to the workers to clear out if they think it necessary. Most of them don't think it worthwhile to leave their work in the rice paddies, however.

After a considerable time the first shot was fired at the base point. The adjustment, aside from being slow, was fair enough. They then shifted to a target about 20 mils from the base point and after much discussion the problem was finished. We held a critique pointing out the extreme slowness and particularly the poor state of training of the gun squads.

When we got back to headquarters at Wenshun we tried to get permission to go to the front. The Army Commander put up every argument he could think of against it and stated we would see very little at best because it was a very quiet front. The road had been torn up most of the way and we would have to walk or ride. He estimated it would take about 10 days, and as that would make us late for the opening of the Yunnan Field Artillery Training Center at Kunming we decided against the trip. We left Wenshun after spending three days there, telling the Army Commander he should make every effort to send all his Field Artillery officers to our School.

The need for the School and Training Center appeared more important than ever at this time. We had already observed the poor state of training and the poor materiel in the rear areas so we were anxious to get the School under way. A definite need for mobile Ordnance units to go to the front was clearly indicated. Training on this score was started at the Field Artillery Training Center upon our arrival at Kunming.

Our trip back through the bandit area was uneventful though we were much more anxious about our safety on the return trip than we had been on the way out. The entire trip took about 10 days and the route covered was about the same the Japs would probably take if they decided to make a push to capture Kunming. Fortunately the Japs were too busy elsewhere to make the attack, as the Chinese Armies could not at that time have stopped a determined attack.

In the meantime our air forces were growing steadily in strength, and perhaps the Japs made a tactical error in waiting too long for the attack on Kunming. Shortly after our return to the School the Japs started bombing the area but by this time the Air Force had grown so strong that relatively few planes got through. Our Air Force took a tremendous toll of enemy planes and it appeared they discouraged any attack in force by the Japs. We were certainly relieved as time went by and our forces as a whole continued to gather strength.

I used to think that the British and German artillery were better; the British because it had more and better guns, the German because it had a more flexible organization. I find, to my gratification, that I was wrong. We have, at least, as many and as good equipment, and, in addition, we have better organization, and the best technique of fire in the world.

—PFC, AAF

Make Your Gunnery Practice Realistic!

Part II—Narrative of German Targets

A great many of these targets are of necessity forward observation targets. German camouflage and camouflage discipline preclude the possibility of standing on some hill and designating targets with the stereotyped speed of gunnery service practice with Signal Mountain as a reference point.

1. From a flank OP one can pick up an 88-mm antitank gun because, even though dug in, it has of necessity a high profile due to the equilibrators. When viewed against such a background as a pit on a forward slope, discovery of this weapon is next to impossible until it starts firing. The only method to use in this latter case is to be particularly alert at dawn and before dark in the evening. Keep a very close watch in your zone of observation because after the gun is emplaced it will fire one shot to check its range and sighting. After this it will not fire again until a good target is presented. This registering round is practically the only warning or sign that the 88-mm gun is in the vicinity until the fight starts, and it will be fired immediately after emplacement (or if emplaced at night, it will be fired at dawn).

2. We will assume that a tank attack has penetrated to the enemy's rear and around his artillery. The FO of an armored artillery battery in his armored OP is able to reach a point of observation. He is able to see evidence of muzzle blast, a gun is firing from a position in his front, there are numerous stunted trees in the area, and he can see four blast marks in a widely staggered formation. The gun which is firing is under a camouflage net, but the embrasure is open and the long tube of the gun denotes a long range piece; it is mounted on a pair of heavy wheels and is served by a fairly large crew. It is a gun and appears to be muzzle-heavy. Its split trail and large recoil and counterrecoil systems are noticeable. This can be recognized as a 105-mm gun battery, and artillery support is needed if the tanks are to overrun the guns.

3. When dug in on a slope, German automatic weapons and riflemen follow the usual methods of camouflage and use of foxholes. They are difficult to pick up, but one point often is overlooked in searching for this type of position when selecting targets. Instead of using the military crest, the Germans use half-slope tactics—and this means that they may be found not on or near the summit nor will they always be at the bottom of a hill. They will be found halfway up the slope, dug in on the forward or reverse slope midway between crest and foot. Thus, when designating a target such as slit trenches or other ground defenses, it behooves the artillery observer to search midway between top and bottom of the hill. The German slit trench will be more of a foxhole as we know it, and not generally long enough to lie full length for sleeping purposes. In most cases the spoil is removed, and on level ground the trenches are practically impossible to pick up. In rough ground they may be camouflaged by using the rocks and individual ingenuity of the soldier. Movement in the vicinity may betray such positions otherwise impossible to distinguish.

4. Tank concentratons may be spotted by aerial reconnaissance or photos and usually are a target for heavier artillery than 105-mm howitzers. These concentrations may be picked out on the photos by skilled interpreters, by picking up fuel trucks or fuel dumps and oil spots in the vicinity. As the tanks will be camouflaged, the only identifying characteristics to be noted will be those showing traffic on roads or freshly made tracks into the area. In addition to these, in the case of movements by the tanks in daylight in dry country, there will be dust which may be picked up by observers and should surely be reason enough for special observation of the area.

5. A basic principle of German tactics which is judiciously followed is the principle of letting the enemy extend himself to take an objective, then counterattack before he has time to consolidate his position and reorganize his forces. In this case the FO is of vital importance. He must be present and ready to bring down fire on any area that will allow a concentration of forces by the enemy, or on any terrain feature that will cover assembly for counterattack. The mobile reserve used for counterattack in many cases is transported in trucks and must be detrucked to fight. Aerial reconnaissance should be able to pick this up, and the point of concentration may be noted by the FO by increased activity in the area of the troop concentrations or in any likely area offering concealment. The dust or activity or artillery preparation during deployment will give evidence of this action. It is best to register on check points around the captured objective, and call for fire when the counterattack develops. Time fire is the most effective.

For instance, you noticed from your OP that men have been moving into an olive grove to your left front. They came from the enemy rear in trucks. There was considerable activity there prior to our taking the objective and a sizeable force seems to occupy the area. Since we may expect a counterattack, such would be the most likely place for the concentration of forces. Register on check points in front and to the left of your position and be prepared to use time shell to break up a counterattack. Planned defensive fires should be prepared *immediately* following capture of any objective.

6. Observers will not be able to pick up all enemy machine guns without help from the infantry. They should look for machine guns sited to cover every obstacle (natural or otherwise) by flanking fire. Also, they should expect all natural approaches to an objective to be covered by machine gun fire. Thus, at the head of a ravine emplaced to fire down its length, on the flanks and high ground near obstacles, and throughout a wooded avenue of approach, the observer may logically assume that he will find targets. A preparation should include fire on points of this nature, and sharp observation with help from infantrymen may fix these guns as point targets.

7. Steel-reinforced concrete pillboxes are a common occurrence throughout Italy, and more often than not they are blasted out of solid rock on forward and reverse slopes. They are camouflaged and in shape and color will conform to the surroundings. The slits and loopholes for firing and observation are most difficult to conceal, and the flash of firing enables them to be picked up by the observer. These will be located in the same type of strategic and commanding position as machine guns previously described. In general, indirect laying is not particularly effective against this type of installation, but smoke can blind the pillbox to enable someone to emplace demolitions or get close enough to use a flame-thrower. These pillboxes generally house automatic weapons and AT

guns in "tank" country.

8. On the high ground overlooking beaches of value for landing troops, there will be pillboxes and machine gun positions sited to cover the beaches with fire and to protect minefields and obstacles on the beaches themselves. These may be picked up on aerial photos and by aerial reconnaissance prior to landing. They are found among rocks along the beach, inside barns and houses, or at the base of any structure near the beach.

9. AA gun positions or dual-purpose guns in position may be picked up by aerial photo or intentionally drawing their fire by the use of planes. They have certain characteristics in that their positions or emplacements must be open on top when action is pending or in progress, they must be somewhat circular in order to permit all-around fire, and (in the case of dual-purpose guns) they must not be too deep to prohibit antitank fire. These positions must have a clear field of fire and therefore will be in the open more often than not. These targets are best suited for aerial shoots since they won't be seen as a rule by forward observers with infantry on the beachhead. These people will be concerned with pillboxes and machine guns firing directly on the beach.

10. There have been cases where tanks in dug-in emplacements have fired on landing boats in amphibious operations. These in effect are merly mobile pillboxes. They may be knocked out by fire from naval vessels. These emplacements allow the tanks to back out and move away in retreat if necessary, and the revetments or emplacements for a hull-down tank can be picked up by use of photos or aerial reconnaissance.

11. Barbed wire on beaches and in shallow water may be expected during landing operations. This type of obstacle is covered by fire of guns on high ground or terrain overlooking the beach. The barbed wire can be knocked out in the preparation. It is easily picked up in photos and by aerial reconnaissance. The same holds true for streams and rivers.

12. In country with bad roads one may expect division supply and ammunition dumps to be fairly close to the front lines, at least not over 12 to 15 miles behind the enemy lines. In this case they may be a target for heavy artillery. Regimental or battalion dumps will not be far behind the reserve lines for the respective units. These areas will be characterized by the activity therein and will be well cut up by tracks from both tracked and wheeled vehicles. The supplies will be dug in and well dispersed, but they may be picked up on aerial photos and by air reconnaissance. If the enemy is on the defense the camouflage will be nearly impossible to penetrate because of the more stable characteristics of defensive fighting. If the enemy is planning a major counteroffensive the observer will be able to discover the supply areas by the activity, waste material about the area (boxes, cans, etc.), new tracks round about, and the large amount of transport evidenced.

13. Enemy motorized units sometimes work from a battered village as headquarters. You may be able to pick up something in the way of AA defenses situated in and around the village together with fuel cans or barrels and water cans in shell holes or cellars of roofless houses. These will be camouflaged to look like part of the ruins; but if the presence of the unit in and around the village is known, it is a good target for a battalion concentration. An aerial reconnaissance or vertical photo will help in confirming location of vehicles and supply dumps.

14. A machine gun situated in a house in a village cannot be picked up by anyone but the infantry or FOs upon whom it is firing. One way to find it is by figuring the direction from which the fire is coming. It will be set back from the aperture through which it is firing to give flash defilade and to muffle the sound. Once its location is approximately determined it can be fired on.

15. Mortars situated behind walls or in roofless houses in a village are practically impossible to locate. With the help of the infantrymen the observers can locate the area from which the fire is coming and it is necessary then to batter the mortars and crews out of existence. It is not a point target. A mortar emplacement may be dug in in a cellar or behind a wall and have a very limited field of fire, the emplacements are small, and some may have overhead cover. If they cannot be accurately located it is best to concentrate a battalion on the area to neutralize the mortars and machine guns to allow infantry to approach them and clean up.

16. There have been cases where AT guns hidden in a village have allowed infantry and reconnaissance vehicles to pass them without firing a shot. They are placed along unblocked main avenues which are most likely for tank approach. In one case they were located by an observer who rode past them close enough to see the gun crews and the guns, 88-mm dual-purpose or tapered base 75-mm guns. They were well camouflaged in ruined buildings and commanded main approaches. These were taken under fire by adjusting the artillery fire behind the forward friendly elements.

17. Snipers in villages or manmade structures (such as the Abbey above Cassino) are nuisances which can be neutralized or destroyed by artillery fire to allow the infantry to advance. Their occupants will remain as far back from windows as possible when firing to hide and muffle flash and noise of firing.

18. Observers may be able to discover enemy OPs on a forward slope of a ridge or hill by movement or flash of sun on the lens of instruments used. These are small, well-camoufleged installations put in and occupied at night, and are exceedingly difficult to find. Smoke concentrations are recommended with some time shell fired prior to the smoke, if these OPs are found.

19. Engineers seldom will work in daylight, but with the development of night flying for our Cubs it should be fairly simple to pick up suspected engineer activity at night—river crossings, particularly. This is a good interdictory or destruction target for any type of artillery within range. In the case of engineers working in daylight an observer should be able to pick up the structure being erected and the concentration of material and transport to bring forward the supplies for fast work. Working parties cannot work under effective cover. In the case of demolition parties working on a road or bridge, time fire is very effective. Air reconnaissance and periodical photos will help to identify this type of target because of signs of activity and resulting new structures.

20. Infantry howitzers, which are the basic support weapons of the infantry, are necessarily within range of our guns when performing their missions. The 75-mm infantry howitzer has a maximum range of 3,870 yds. and the 150-mm a maximum range of 6,000 yds. These weapons can take great advantage of cover and defilade. Concealment is relatively easy because of low profiles. But they are emplaced within 800-1,000 yds. of the front lines, so their presence cannot be kept concealed for long after they go into action. They generally fire by indirect laying methods. Since usually they will not break defilade, an air observer is most effective in dealing

with them. They may be picked up by the smoke of firing and blast marks. They are horse-drawn and may be given away by their picket lines in nearby areas. If they come out into the open, as they may have to do, they are picked up easily in daylight and are a good target. They are stubby in appearance and cannot be mistaken for mortars or nebelwerfers. The 75-mm infantry howitzer has a 4-man crew, the 150-mm infantry howitzer a 7-man crew.

21. The multibarreled rocket gun (nebelwerfer) of the Germans is a fine target for an air observer, and can be picked up on the ground by the smoke and flame of the rockets. This is a low-profile weapon and easy to conceal, but generally it is fired from a position in the open due to flashback of the propelling charge. There will be considerable movement on the part of the crew which can be picked up since they take shelter and fire from there after loading. This weapon's characteristics allow it to take advantage of defilade but it is difficult to conceal when in action.

22. The low-profile 50-mm antitank gun may be expected to supplement the fire of larger AT guns. It will be found with the infantry, even in forward areas, commanding tank approaches to the infantry positions. This infantry weapon will not give away its position until it has a worthwhile target, so the artillery observer must either see that the fire of these weapons is drawn or merely blast suspicious areas and wait for the tank attack to identify these guns to him. Air reconnaissance and photos plus thorough reconnaissance by the assaulting unit are most valuable in seeking out these long-tubed, high-velocity, highly mobile weapons. Emplacements in infantry company defense areas usually will be on reverse slopes, with arcs of fire to one or both flanks.

23. A roadside house seems to jut out into the road at a slightly narrow place. This house is on a stretch of road commanding a line of sight of about 600 yards on each side of the house. A forward observer should be suspicious of anything of this nature; it is an ideal position for an antitank gun.

On looking at this house through field glasses the observer picks up a vision or firing slit in the part of the house which is seemingly in the road. The slit is about three feet above the ground. A 50-mm PAK could be hidden there. It is a very fine job of camouflage. The road does not seem to have been disturbed and there is no evidence of digging in the vicinity; the rock wall along the road is continuous. After the position has been knocked out it is noted that a 4 reinforced concrete extension has been put on the house; both texture and color of the concrete conform to those of the old house. The shoulder or bank of the road has been built to go around the house, and the top layer of earth has been picked or dried to conform exactly to the color and texture of the rest of the road. This type of position indicates the extreme distaste the enemy has for being observed.

24. A half-track has been fired on from both sides of the road while trying to negotiate an avenue between two vehicle traps in a small defile. There are small bushes on either side of the road that would afford concealment to machine gunners dug in. This was a converging fire from slightly behind the half-track, and the guns were near enough to command the traps and have their bullets pierce the armor. Using the half-track as an adjusting point, a time and white phosphorous concentration mixed would clear the area. The guns, being on the bank of the road, would have to be near enough to depress to cover all vehicles.

25. Two tanks have been knocked out by fire from what seems to be an open field with a few small straw stacks in it. As other tanks approach some movement is noticed at two of these stacks. It could be a 50-mm AT gun using the dummy hillock frame or the umbrella frame to camouflage the gun. Since there is every possible chance that there will be from four to six of these guns in the area, fields and terrain on both sides of the road or approach should be closely observed and an attempt made to knock out the remaining guns as soon as the two possibilities already observed have been neutralized or knocked out. Time fire is recommended as a direct hit with HE is improbable on so small a target.

26. In an area under attack by tanks which have penetrated some distance behind the enemy lines of defense, the observer is able to pick up some 88-mm AT-AA guns that are being hastily emplaced. The observer on one small hill is able to look across the tanks' line of advance to another piece of high ground. Three 88-mm dual-purpose guns are being emplaced at the foot of each hill to take the tanks in the flanks and rear after they have come between the hills into the open ground on the flank of the German artillery positions. A time fire barrage to neutralize these guns could be requested, and the fire not stopped until the tanks overran the 6 guns.

27. The objective is a ridge line, the attack is to take place at first light in the morning. All day the infantry has been pinned down about 1,500 yards from the ridge by heavy automatic weapon fire and mortars. The fire is coming from the vicinity of the objective. At night there is intermittent fire from the military crest. It can be seen and the observer could use an unobserved time concentration. *Note:* The German quite often sites his machine guns in strength at the base of a hill. These will fire to stop an attack until nightfall, then about half of these crews will fall back to the crest and fire intermittently all night. Those machine guns at the base will remain silent throughout the night. Before dawn the machine guns on the crest will move back down to the base, and all will be ready to open fire in strength in the morning. By this they hope to fool us into making our preparation on the crest. Thus, they will be in full force to surprise our attacking infantry. It has worked.

28. In this area along the beach you can see on this aerial photo many houses and stone outbuildings. About a third of them have vehicle tracks around and near them. They look no different, otherwise, from the dwellings of the coast inhabitants. Since there have been many cases of pillboxes built to resemble existing structures, these should be included as targets for the naval preparation. By "these" I mean all of the buildings near or commanding any of the proposed beachheads.

29. On the aerial photo here you will notice that tracks run up to, stop, and continue on beyond, several hump-like formations. Also there are tracks ending at, and tracks around similar objects in the same area. There were no such formations or tracks on the photos taken of this same area day before yesterday. I assume these to be the portable pillbox known as the "armored crab." They can be mounted on wheels and towed by horses or a tractor. They are about 5½′ wide, and about 3′ of length projects above ground. In each are two periscopes, two men, an MG-42 or MG-34, and ammunition for 5 to 10 hours of fire. They have about a 60º field of fire, and are emplaced to be mutually supporting. At the base of and on the sides of a ridge such as these emplacements on the photo, these "crabs" are a good target for our

preparation, and should be neutralized until our tanks and assault guns can take them under direct fire. The heavier the guns and concentrations that can be placed on them, the better chance our infantry will have of not being separated from their tanks in case the tanks cannot find them all.

30. Here on this air photo you can see a great many rock outcroppings at the base of and on the slopes of this hill. In front of the hill and in several places among the outcroppings you can pick up wire obstacles. They seem to be carelessly laid and don't conform to ground pattern. These obstacles must be covered by fire, and our interpreters have picked up what appear to be pillboxes. You can see here and here, for instance, what appear to be continuations of outcroppings but make a bulge in the strata line. Here are several that do not conform to the general shape of the outcrop in this area. These would make good targets for our preparation, and for fires to be called for by the LnOs or FOs.

31. Tanks have received fire from the general vicinity of a cornfield in which the corn has been shocked. While looking for the AT guns the observer notices movement and some smoke in and near one of the shocks. Time concentration and white phosphorous to knock out the crew and set the corn afire reveals that three 50-mm AT guns have been concealed by building a corn shock around the shield of the gun.

32. An air observer has picked up a concentration of tanks on the outskirts of the village to our front. Three of them were moving to take up new positions in the shadows of the buildings as the observer's plane came over the ridge to the right flank of the village. These tanks were somewhat smaller than the "Tiger" and larger than the PzKw-IV. The length of the gun rube indicated that the tanks were the PzKw-V or "Panther," which is a tank corresponding roughly in size and characteristics to our "Sherman." The observer reporting counted 20 tanks in shadows and partially concealed in buildings; there may be more.

33. An air observer reports new tracks in a small wooded area behind that ridge to our left front. That seems to confirm the location of that 105-mm outfit that started firing on us this morning. The sound and flash battalion fixed the location of a medium battery in that vicinity. The Jerries must be getting careless in this night driving. The observer also reports signs of digging in the area, and the enemy prime movers are unloading what appears to be ammunition. They are close to the supposed position and have not been fully camouflaged. They must be getting ready to support a counterattack or pull a fast one when they pull a trick like that. See if you can get division artillery to give us some counterbattery (help) while we put some time and white phosphorous on them to pin them down.

34. In order to take this airfield we will have to knock out all of the antiaircraft guns in the vicinity. They are too good at tank killing. On the photo you can see evidence of about 8 installations at this end of the field. They generally site a battery of six 88-mm dual-purpose guns with a pair of 20-mm dual-purpose guns in close protection. We believe that we have that set-up here. This is an oblique taken while the field was being strafed yesterday, and these guns were very active. This is a job for the heavy guns. A pair of P-51s could do the adjusting.

35. Our armored artillery FO reports that three 88-mm dual-purpose guns are moving into positions to stop our armored units which have penetrated the enemy lines to our front. They are just moving into position and the prime movers are unloading ammunition and have not moved out. They are located on the high ground here on the photo, and command this area which our tanks must use. He requests additional artillery and is going to adjust the M-7s for a time and HE concentration.

36. Our air observer reports that 15 motor vehicles are stopped in this defile shown on the photo because of two trucks knocked out by bombs. The range is only about 8,500 yards and the Germans are moving a lot of light antiaircraft up to protect the area. Engineers are at work clearing the wreckage. He requests the battalion at once. The motor transport cannot move off the road because of a cliff on one side and a stream about 40′ down on the other.

37. "B" Btry's FO reports enemy infantry deployed and starting a counterattack along the ridge and low ground forming a corridor into our salient toward the village in the German left rear. The attacking elements of the enemy are moving through the vineyard at —— on the photo. He will adjust on the edge of the vineyard and call for a time concentration when they come out of the vineyard for the assault.

38. Our air observer, on investigating the report on the infantry concentration here on the photo, says his fighter escort drew a heavy concentration of what appeared to be light antiaircraft fire when 3 of them strafed the area in question. The observer was able to locate 4 light installations and says they were 50-mm antiaircraft guns. He also saw quite a bit of movement by men firing small arms at the fighters. He believes that there is a large force of infantry there because of the large number of antiaircraft guns present and the amount of small arms fire. He says he can adjust the battalion and believes we should use the reinforcing battalion also.

39. The forward observer of "Baker" battery requests the battalion, time fire, on working parties laying barbed wire and erecting tank obstacles along the line AM-- to OA--. They appear to be a company of engineers and the parties total about 150 men. They are fortifying the north bank of the——River and are out of mortar range. They are erecting the obstacles at this ford which you see on the photo. Their wire is being laid along the fence of a cornfield which extends to the river and it extends to this olive grove here. He requests time fire to knock out the men and says he would like some HE later to knock out the wire and obstacles.

40. We found that the Jerries had set up a headquarters in these houses next to the vineyard shown here on the photo, and that a supply dump has been put at the lower end of the vineyard. A patrol sent out to verify this story says that it is true and that there is considerable light antiaircraft in the vicinity ranging from 20-mm and 37-mm to 50-mm. The infantry regimental commander wants the installations wiped out immediately. Request all artillery available and use surprise fire.

41. Air observer reports four Nebelwerfers behind that low ridge to the right front. They have evidently been brought up hastily to help stem our breakthrough on the —— Way about 3,000 yards this side of the ridge. They were firing just as the observer reached an altitude that broke their defilade. He noticed the flame and smoke and the smoke trails of the projectiles. They have not been camouflaged or dug in, although he says the crews seem to have slit trenches. He requests the battalion and he will adjust.

42. The air observer reports that he can adjust on a pack train moving up the trail on the reverse slope of that peak which is 5,000 yards to our front along this sharp-backed

ridge which is along our line of advance. He can count about 50 mules and says they are moving slowly on a steep trail. He requests the battalion using time fire, fuze M67.

43. FO "A" Btry reports our infantry is under artillery fire by 105-gun-howitzers hidden in the village at the foot of that mountain to our left front. To further identify the village the FO says that the village is in the corner formed by that ridge on our right flank and the mountain. Will request additional artillery and throw some time and HE into the village. Observer picked up the smoke of firing and was able to observe one gun firing from his OP, looking down from the aforementioned ridge. It had no overhead concealment and was evidently hastily emplaced.

44. After the beachhead has been established and the infantry is pushing inland to take high ground commanding the beachhead they are attacked by tanks which have been bivouacked at the foot of the high ground, poised for counterattack and concealed by the orchards, trees, and vineyards in the vicinity. These are 2 PzKw-VI, 8 PzKw-V, and 10 PzKw-IV. The Shore Fire Control Party refers them to the navy, since sufficient artillery to break up this amount of power has not been landed.

"Corrections All Batteries" in Yards Instead of Mils

By Capt. Robert P. Wills, FA

A battalion of light field artillery, upon arrival overseas, found itself with both 105-mm howitzer and 75-mm gun batteries. When massing the battalion, based upon the adjustment of one battery the problem arose of applying elevation corrections from an adjusting battery which had a different type weapon than had the non-adjusting batteries. Obviously, if adjustment was accomplished with 75-mm guns the elevation correction in mils would not apply to 105-mm howitzers. To overcome this the correction was announced in yards. For example, if the HCO had given the adjusting battery a range of 5,350, and that battery went into fire for effect at 5,800, then the adjusting computer would give the correction as "plus 450." Results were satisfactory.

A similar problem presented itself the first time high angle fire was used with 105-mm howitzer batteries. If the adjusting battery was firing at a considerably different range than any of the other batteries it very likely was using a different charge. An elevation correction of "minus 30" (in mils) determined by B Btry firing Charge 6, would not be applicable to a Btry which was firing Charge 5. Furthermore the adjusting battery might have changed charges. Suppose it had started at a range of 5,900 with Charge 4, Elevation 988, but finally went into effect with Charge 5, Elevation 1134. In this case the elevation correction in mils would be "plus 146" and applicable only if all batteries were firing at approximately the same range and with the same charge, a condition seldom existing. Again the correction in yards proved satisfactory; in the above example it would be announced as "plus 500."*

The author feels that FDC procedure, in order to be as simple as possible, should be so standardized that one method will fit the majority of possible cases. So, in light of the above related experiences the question presented itself, why not always have the adjusting battery computer give the range correction in yards? This was tried with an FDC that had learned the old way, and only slight difficulty was experienced in changing over. Later, with entirely new personnel, this method was grasped without a bit of trouble.

We have found that following the observer's range sensings by moving the index along the range scale and reading the new elevation was preferable to using c's. With this practice the computer habitually enters his table on the range scale and reads for the elevation scale in mils. Moderate range changes can be made without any arithmetic as is necessary when using c's. To return to the theme of this article, by giving the adjusting computer's correction in yards this habit of entering the table with the range scale is further adhered to.

Another advantage is the increased accuracy of the correction. For example, let us assume the HCO range to the target for B Btry is 6,000 yards and for A Btry 5,500. B Btry's initial elevation using Charge 5 is 370 and in fire for effect is 447, which corresponds to a range of 6,800. The correction in mils is +77, in yards +800. A Btry's initial elevation to correspond to 5,500 is 328; applying +77 we get 405, which corresponds to 6,385—a range increase of 885 yards, or 85 yards too much. The observer's initial locating of the target was 800 yards short but, by using mils, we bring A Btry in at a range 85 yards over.

Now for the disadvantages. The author can think of only two. One, a larger figure is used, as "+800" instead of "+77." The second disadvantage appears in an impact adjustment, when it might be argued that greater speed is attained during adjustment if the computer thinks in terms of mils only, using c's for changes. The first of these disadvantages is negligible and the argument for the second can perhaps be countered by stating, "Standardize the procedure so it will suit the majority of possible cases."

*See *High Angle Fire in FDC*, p. 254 of this JOURNAL for April, 1944. One correction should be made in the example given there: since high angle fire was being delivered, the minus sites of 5, 2, and 2 should have appeared in the commands as *Si 305, 302,* and *302,* respectively.

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NORTHERN NORWAY'S BATTLE

By Col. O. Munthe-Kaas

Military Attache, Norwegian Embassy, Washington, D. C.

Of all the 13 European countries which Hitler has attacked, Norway with her scarcely three million inhabitants is the least populated. Paradoxically, however, the country has a much longer coastline than any of the other, more populated lands. To successfully defend the 1,700 miles of Norwegian coast would be a tremendous problem even for a well-prepared, well armed and mobilized nation. For an unprepared peace-loving people to defend it against a superior enemy who comes like a murderer in the night is an insurmountable task.

None of the 13 countries, with the exception of Denmark, experienced a more stealthy attack than Norway. And nowhere else was the element of surprise, both politically and strategically, so complete and overwhelming.

Despite this, no country and no government—excepting the unconquerable great powers of Britain and Russia—offered such long and stiff resistance against Hitler as did Norway, where weapons were not laid down until after 62 days of bitter fighting and then only at the orders of the King and government, who believed that the liberation of Norway would demand long preparation from a base outside the country's borders.

THE NORWEGIAN CAMPAIGN WAS OVERSHADOWED

In 1940 the German land forces suffered no defeats except in the war theater of Northern Norway. Events in this section, known as the Narvik area, were followed by the world with a certain amazed interest until May 10th. Thereafter this campaign was completely overshadowed by the crushing blows which Hitler dealt Holland, Belgium, Luxembourg, France, and British Expeditionary Forces.

On 9 Apr 44 it was four years since Hitler attacked Norway.

There have appeared several Norwegian accounts of this attack, particularly regarding the events of the first days of the invasion. Also, from British, French, and Polish quarters have come books telling about the Allied troops' participation in the war in Norway—especially of the fighting in the Narvik area.

Up to now, however, there has been no reliable and fairly complete account of the Norwegians' own contribution to the fighting in this war theater of Northern Norway. Naturally no full and final report can yet be made, inasmuch as several of the information sources are still inaccessible.

This account (which covers especially the eastern part of the above-mentioned theater of war) is based on war diaries, the writer's own participation in the campaign, and certain other verified data. It has been written for the purpose of answering many questions about the Norwegian campaign from interested Norwegian-Americans, also in order to commemorate an outstanding military leader—the late Major General Carl Gustav Fleischer—and finally to pay tribute to the valiant Norwegian soldier, to whom I dedicate it.

O. Munthe-Kaas

It was only the recapture of Narvik on May 28th which received any attention, and this was probably due to the circumstance that British warships together with French and Polish battalions participated in the attack on the German-occupied city, which finally was cleaned out and made secure by two French battalions and one Norwegian. In the southwestern part of the Narvik area there were still some foreign war correspondents, who were able to disclose to the world that after seven weeks of domination in Narvik the Germans had been chased from the city.

In the eastern part of the war theater, among the mountains close by the Swedish border, the Norwegians were fighting entirely alone against the German troops. There were no correspondents on hand to send out accounts of the victorious Norwegian offensives in this region, and of the constant German defeats and withdrawals toward the Swedish border. As a result even most Norwegians still do not know much about the glorious pages which Northern Norway's units wrote into the war history of the spring of 1940.

NORTHERN CONDITIONS VS. SOUTHERN

It is desirable briefly to explain why it was possible to fight so long and successfully in Northern Norway while such was not the case in the south.

The fighting spirit and the determination to fight for the people's freedom and independence are equally strong in all parts of Norway. It was therefore not due to any internal conditions that the war of 1940 proceeded less favorably in southern than in northern Norway. It was exterior circumstances which, together with geographical and topographical peculiarities, caused the difference in battle results in the two regions.

In Southern Norway the German war machine seized the main cities and communication centers—Oslo, Kristiansand, Stavanger, Bergen, and Trondheim—so quickly and definitely on April 9th that mobilization was instantly paralyzed. Only a minor part of each of the five divisions in Southern Norway got a chance to fight, and this fight had to be brief inasmuch as it had been impossible from the very first day to obtain an ordinary set-up of battalions, brigades, and supply units. Actually the units which took up the fight were improvised, under-manned, and mixed. They had inadequate staffs, officers, equipment, and weapons. The fight they waged was in itself highly praiseworthy, courageous and determined, but in

the unequal match they were doomed beforehand, particularly when the Allied relief forces proved to be insufficient to halt the Germans' continuous advance.

In Northern Norway (consisting of the provinces of Nordland, Troms, and Finnmark, and forming the district of the 6th Division) the German coup-attack on Narvik and the nearby military training camp, Elvegaardsmoen, was certainly also successful. It was at this camp that North Haalogaland Infantry Regiment No. 15 and Haalogaland Engineer Battalion had their magazines. Mobilization of these units was therefore temporarily impossible, but fortunately the 2nd Bn 15th Inf Regt and a signal company had already been summoned away for neutrality guard duty in the Bardu region to the north. This was to prove of great importance.

But the capture of those places was not sufficient to dominate or paralyze all the military forces in Northern Norway. The mobilization which Maj. Gen. Carl Fleischer, commander of the 6th Division, ordered the night before April 9th for the provinces of Troms and Finnmark was therefore undisturbed.

The units called to arms were mobilized rapidly and systematically. A large number of officers residing in Southern Norway but assigned to service in Northern Norway failed, however, to reach their commands because communications had been promptly disrupted. Some officers, although seemingly shut off in Southern Norway, did succeed in reaching their mobilization points in Northern Norway by traveling through Sweden and Finland.

As will be seen, the possibilities for defense were not nearly so crippled in Northern Norway as in the south. The soldiers of the north could therefore—unlike those in the south—fight in their regular companies, batteries, and battalions under their own officers. The officers, to be sure, were few in number, but most of them were familiar with the region in which they were to fight, and they were well-informed. And it must be said to the praise of the 6th Division that in no other part of the country had the preparations for mobilization been better made, and nowhere else had the brief annual training periods been put to such intensive use.

State of Training

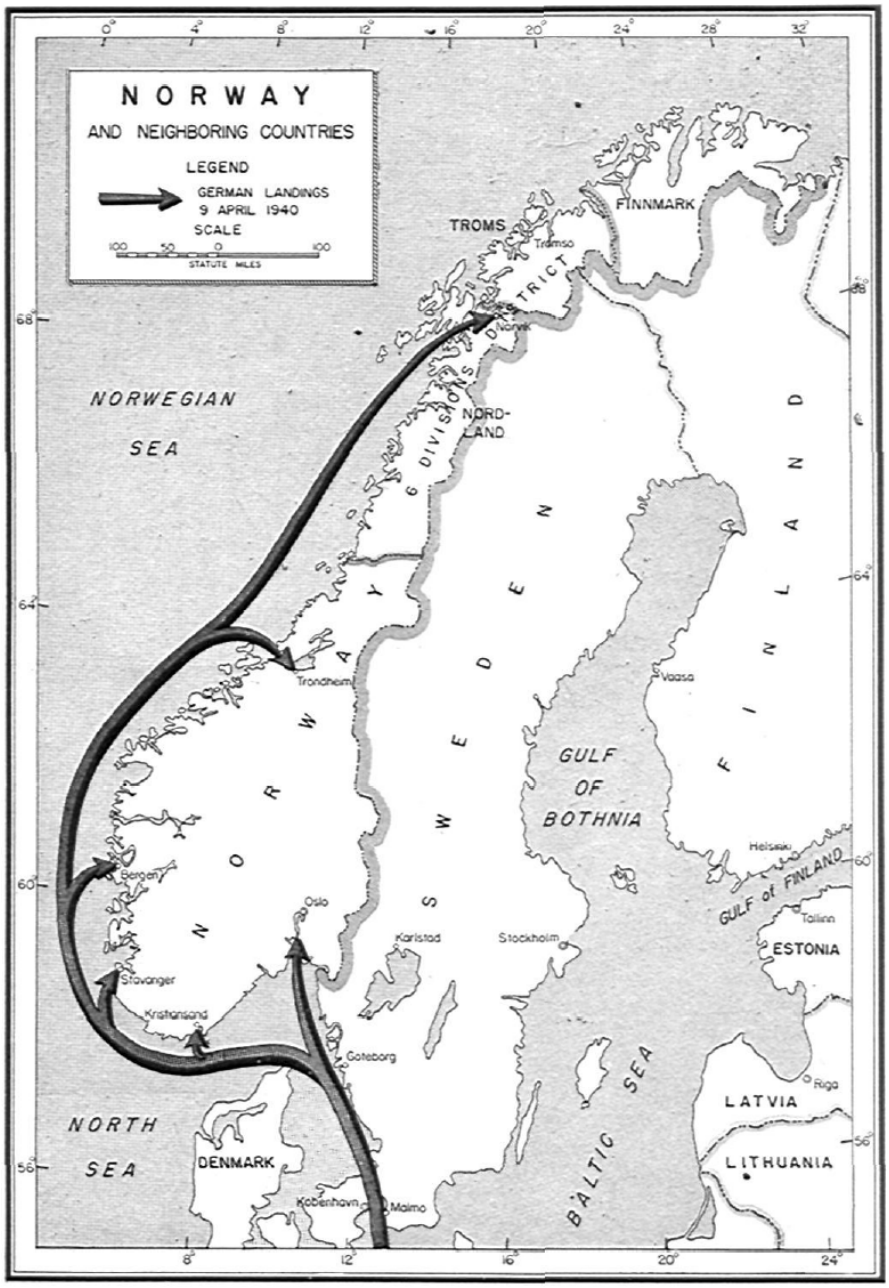
Of all the countries of Europe Norway had the shortest training period for soldiers, and her corps of regular officers was the smallest in numbers.

Of the soldier-classes subject to mobilization the majority had only been through a recruit school lasting 48 days. A couple of classes had had 60 days, some 72, and some 84 days. There was no regular repetition of training.

The reductions of the army ordered in 1927 and 1933 particularly affected those regular officers who had received the best of training at the 3-year military college in Oslo. A comparatively large number of these were dismissed, but naturally were subject to service in case of war. When war came to Norway in 1940 they had been away from their military careers for years, and they had had no training in the new weapons or methods of warfare. As a result they were not familiar with the great technical and tactical advances made during the years immediately preceding the outbreak of war.

As an example of the officer shortage after 1933 it may be pointed out that in each infantry regiment only one of the four* battalion commanders was on regular salary and in active

*2 line battalions, I reserve (landvern) battalion, and I training battalion (recruit school). A battalion had 58 officers and 705 other ranks, besides 151 non-combatant personnel.



peacetime service. Of the 20 company commanders only 3 had full military college training and were on active duty.

NEUTRALITY GUARD IN THE NARVIK AREA

In the fall of 1939 scattered neutrality guard stations were established by the 6th Division. Several units—regrettably not all—in this way gained 90 days of welcome repetition of exercises and training. This had great bearing on the various units' skill at maneuvering and endurance in the coming conflict, which for most of the time was a winter campaign.

In order to prevent the neutrality guard service from becoming too much of a disruption of the business life of Northern Norway, one battalion from South Tröndelag Infantry Regiment No. 12, and one battalion from North Tröndelag Infantry Regiment No. 13, were brought north. Both of these battalions were in Northern Norway at the time of the German attack.

What, then, was the situation on the Norwegian side the night of April 9th in the Narvik area?

In Narvik itself were stationed:

1st Co 1st Bn 13th Inf Regt
Northern Norway's Machine-Gun Btry (4 40-mm Bofors AA guns)
1 Engr Res Co

In the course of that fatal night the balance of the 1st Bn 13th Inf Regt was transported from its camp area at Elvegaardsmoen to Narvik in order to establish a stronger defense for the city and the railroad from Narvik to Sweden (the Ofot railroad). A heavy snowfall and the simultaneous arrival of German troops far superior in numbers nullified this move. The transfer of the battalion was, in fact, a three-way failure. The intended strengthening of Narvik's defenses was not accomplished. The battalion itself was lost to the Norwegians. Elvegaardsmoen and the valuable arsenals situated there for the activation of 4 infantry battalions, 1 battalion of engineers, and 1 medical company, fell into the hands of the German detachment which was sent against Bjerkvik and Elvegaardsmoen at the same time that the main body of troops of Gen. Eduard Dietl's 3d *Gebirgs* division occupied Narvik.

The 2nd Bn 15th Inf Regt with home base at Elvegaardsmoen was, as mentioned above, on neutrality guard duty at Bardu when the Germans struck. It was ordered by the 6th Div to proceed as rapidly as possible to Elvegaardsmoen, but a heavy snowfall delayed its march across the mountains between Salangsdalen (valley) and Gratangsdalen. Therefore the German detachment found Elvegaardsmoen without effective defense. Not only did Germans easily come into possession of the big camp establishment with its considerable stores of weapons, ammunition, clothes, equipment, provisions, etc., but they also gained a firm footing on the north side of the fjord where, in the Bjerkvik section, they created a base from which the attack could be carried farther north against the Bardu region, which is militarily the most important part of Northern Norway. Here were the training grounds and magazines for Troms Infantry Regiment No. 16, the 3d Mountain Artillery Battalion, the 6th Division's Officers' School, the 6th Quartermaster Company, the 6th Transportation Company, Bardufors Airport, Northern Norway's Arsenal, etc.

Farther north lay the city of Tromsö, the administration center for Northern Norway, with great stores of all necessities, an excellent harbor, ships, factories, seaplane base, etc.

The campaign in Narvik area would have taken a different and for the Germans a less favorable course if the 1st Bn 13th Inf Regt at Elvegaardsmoen had not been moved, but instead had been given a chance to take up the defense against a German landing in Herjangen, a fjord-arm on the north side of Ofotfjord.

A defense of Narvik requires long preparation and quite other military and maritime forces and auxiliaries than those that were available on that April night, and only on a few hours' notice, to stand off a powerful and well-planned surprise attack by the Germans. It would have been better if Narvik had been declared an open city inasmuch as its adequate defense had no time to be organized. Instead, all available forces could have been used for isolating the Germans at Narvik by preventing them from pushing eastward along the Ofot railway and northward toward Troms province.

As conditions were, the defense of the city was necessarily hopeless, and practically everything used by the Norwegians in the defense was lost, including the two armored ships *Norge* and *Eidsvold* with the greater part of their able and courageous crews. In a freer position, independent of the defense of the city, the Norwegian naval forces would have been able to fight it out with the German destroyer fleet on a more even footing.

However, on the night of April 9th no one knew for certain what would happen. That Norway should wake up in the morning and find herself fully involved in an undeclared but merciless war was hard to imagine, even though there were many indications of political complications.

The situation was not only unforeseen but also so unclear and strange that it was very difficult for the leaders to act with certainty and to do the right thing. For example, on April 8th the Norwegian government decided to postpone the question of general mobilization until the following day, while Gen. Fleischer found himself compelled to act on his own responsibility in order to supply the neutrality units through mobilization of the forces in Troms and Finnmark provinces.

NEUTRALITY GUARD IN TROMS AND FINNMARK

In Troms province the following units were under arms in the Bardu region on April 9th:

6th Division's Officers' School
2nd Bn 15th Inf Regt
3d Mountain Arty Bn (2 pack batteries with 4 guns each)
One Motorized Field Btry (4 guns)
6th Signal Co (less one platoon sent to Finnmark)
6th Medical Co
6th Transportation Co (less one platoon sent to Finnmark)
6th Quartermaster Co
One Field Hospital

In the east of Finnmark province were:

1st Bn 12th Inf Regt
2nd Bn 14th Inf Regt
Varanger Inf Bn
The Garrison Co at Kirkenes
One Motorized Field Btry (4 guns)
Three Field Arty Guns for special local defense
One Plat 6th Sig Co
One Plat 6th Transp Co
One Field Hospital

In addition there was a unit of Haalogaland's Air Force conducting maneuvers all over Finnmark with two flights of Fokker planes.

MOBILIZATION; NORTHERN NORWAY SEPARATED FROM THE SOUTH

The Division Commander with his Chief of Staff was on an inspection tour in East Finnmark when, at dinnertime on

April 8th, he received a report from the Norwegian government on the threatening situation. Orders were immediately given for the occupation of Narvik by 1st Bn 13th Inf Regt and for the transfer of 2nd Bn 15th Inf Regt and the motorized field battery from Bardu to Bjerkvik for the defense of Elvegaardsmoen and landing points in Herjangen.

Later in the evening the Division Commander ordered the mobilization in Troms province of:

1st Bn 16th Inf Regt
2nd Bn 16th Inf Regt
Res Bn 16th Inf Regt

and in Finnmark province of Alta Inf Bn. The Air Force unit was ordered to Bardufors airport and 1st Bn 12th Inf Regt in East Finnmark received orders to get the battalion ready for transfer to Troms province. The Defense Commander in Troms was to prevent the enemy from advancing northward toward Bardu.

When as early as April 9th it was clear that Northern Norway had been cut off from Southern Norway, and hence also from the government and the central administration, the Division Commander decided to assume charge of administration in Northern Norway. This was done with the knowledge and approval of the provincial governors. On April 10th the Division Commander flew to Tromsö, and on April 12th he set up his headquarters at Moen in Maalselv.

Halting the German Advance

The same snowstorm which in such high degree aided the Germans' conquest of Narvik and Elvegaardsmoen also served to put an instant brake on their further advance northward from Bjerkvik. Not until the evening of April 10th did a German advance company reach Gratangen, and then without encountering opposition.

From Gratangen the national highway leads eastward across a mountain stretch to Salangsdalen and from there on to the north. It was on the western slope of this stretch that the 6th Division's Officers' School was rushed forward to delay the Germans' further advance as much as possible. The Officers' School put up a hard fight, but because of its limited strength (about 100 men) it was easy to out-flank. Little by little the Germans forced their way forward to Lapphaugen, about 16 miles from their starting point, Bjerkvik. Farther than that the Germans did not get. At Lapphaugen they were definitely stopped by the Officers' School, 2nd Bn 15th Inf Regt, and a motorized field battery. An attempt by the Germans to send a minor force across Fjordbotneidet to Lavangen was thwarted by a company detached from 2nd Bn 15th Inf Regt.

The Germans established a strong defense position in the Lapphaugen area, and from there the operation was to be directed quickly northward. The Germans contended they had been put on the defensive only temporarily, but as it turned out they were—generally speaking—on the defensive for the balance of the campaign.

On April 15th the 1st Bn 16th Inf Regt was completely mobilized. 1st Bn 12th Inf Regt and Alta Inf Bn, after successful transports from Finnmark, reached the landing point at Sjöveien in Salangen on April 17th and 20th, respectively.

Start of Norwegian Offensive

After numerous patrol skirmishes the Norwegian forces launched an attack against the strong German positions in the Lapphaugen area on April 24th. The grouping was as follows:

At Fjordbotneidet as a right group:
1st Bn 12th Inf Regt
½ Btry of 3d Mountain Arty Bn
In Kolbanskaret as the main force:
1st Bn 16th Inf Regt
2nd Bn 15th Inf Regt
3rd Mountain Arty Bn (less ½ Btry)
One Motorized Field Btry
Division Reserves:
Alta Inf Bn, behind the right group
2nd Bn 16th Inf Regt—mobilization completed the evening of April 17th, now marching southward through Salangsdalen
2 companies of Scots Guards at Sjöveien, Salangen

These Scots Guards companies were a part of the British relief troops which had reached Northern Norway some days before. The two companies were made available for Norwegian defense, but not for offensive action. Therefore they did not get a chance to participate in the Norwegian offensive here under discussion.

The Officers' School had been dissolved and the members distributed among the various units for filling the many vacant officers' posts.

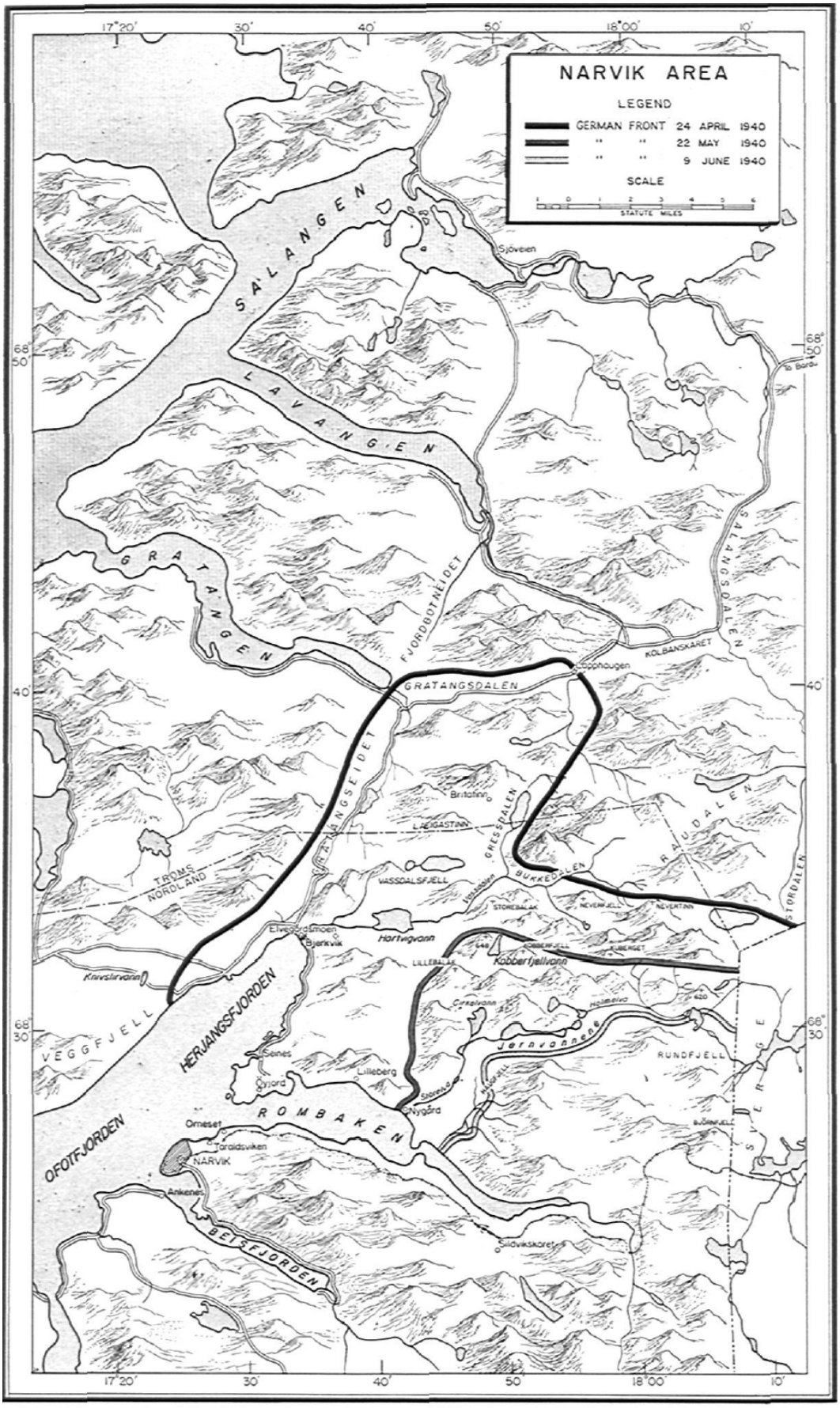
The attack on April 24th failed because of an extraordinarily violent snowstorm. Nearly 3 of snow fell in the course of 24 hours. Advancing through the loose, deep snow required such exertion that the attack finally had to be halted. The order to this effect was certainly a hard one to issue. The chances of knocking out the enemy quickly seemed unusually good. All indications are that the Germans would have had to withdraw from Lapphaugen. They had nothing to put up against the Norwegian artillery since their planes were grounded by the weather. The Germans feared circumvention of both flanks, and they could not count on any sizable reinforcements.

A retreat from Lapphaugen would have had to follow the highway back toward Gratangen and Bjerkvik. But the retiring units would presumably have met their fate in the intercepting flank and rear attack which the Norwegian right group, according to the plan, would have launched from Fjordbotneidet as soon as the main force had driven the Germans out of their defense positions and forced them to retreat.

Fortune-at-arms was still, however, on the side of the Germans. They not only retained their strongly threatened positions in the Lapphaugen area, but also made quick and able use the following night of an opportunity to attack the Norwegian right group. The assault was directed against 1st Bn 12th Inf Regt which—weary, sleepless, and frozen—had moved down into the valley south of Fjordbotneidet. The battalion's night guards were not able to check the Germans' surprise attack, which with great force was carried all the way to the main body of the battalion. This, in a disorganized and decimated condition, was forced to retreat to Lavangen under cover of the Alta Battalion. After reorganization the battered battalion consisted of not quite two companies. Three company commanders had been killed.

On April 25th the Norwegian units renewed their attack, and in the course of three days' fighting succeeded in driving enemy troops in the Lapphaugen area and at Gratangen back to new defense positions straight across the two parallel valleys: Gratangseidet in the west, and Gressdalen in the east. In the mountain region between these two valleys the Germans posted units with tremendous firing power from numerous automatic weapons.

East of Gressdalen lies Raudalen as a pronounced mountain defile. There the Germans had only observation posts.



FORMATION OF TWO ATTACK GROUPS

For further attack along the 15 - mile front, the 6th Div decided to set up two battle groups which were called the 6th and 7th Brigades. It would have been more accurate to call them half-brigades.

The Right Battle Group (7th Brigade) consisted of the following in addition to the brigade staff:

- 2nd Bn 15th Inf Regt
- Alta Inf Bn
- 3d Mountain Arty Bn (less one Btry)
- One Motorized Field Btry
- One Plat 6th Sig Co
- One Plat 6th Engr Co
- One Plat 6th Med Co
- 2nd Co Res Bn 16th Inf Regt (the Reserve Company established magazine guards)

The 7th Brig was to drive the enemy through Gratangseidet and thereafter recapture Bjerkvik and Elvegaardsmoen.

On April 30th a French detachment (consisting of two Chasseurs Alpin battalions and a field battery) was added to the right flank of the 7th Brig. As the detachment lacked skis, a company of 2nd Bn 15th Inf Regt was attached to it.

The Left Battle Group (6th Brigade) had the following troops in addition to the brigade staff:

- 1st Bn 16th Inf Regt
- 2nd Bn 16th Inf Regt
- Two Cos 12th Inf Regt
- One Btry 3d Mountain Arty Bn
- One Plat 6th Sig Co

One Plat 6th Engr Co
6th Med Co (less one plat)
3d Co Res Bn 16th Inf Regt (guarding Stordalen)

The 6th Brig was to drive the enemy out of Gressdalen and Raudalen and across the mountain plateau of Storebalak, Kobberfjell, Nevertinn, and Kuberget, and on toward Björnfjell and Sweden.

On May 1st the attack began against the long German front. It continued day and night in a series of battles in the valleys and in the mountains rising between the valleys. For the first time in this world war the German troops, which had grown so accustomed to victory, found themselves beaten. They had to yield one position after the other. They put all their ground strength into the defense, bombed and strafed the Norwegian forward units and their supply lines three times a day, and toward the end were receiving daily reinforcements to their Björnfjell forces by means of transport planes. But naught was of any avail. The retreat had to continue, and their final defeat seemed assured and imminent when the shocking events in Holland, Belgium, and France suddenly forced the Allies to withdraw their support from Northern Norway, just as they had already done from the southern part of the country. Thereupon the situation was instantly and entirely altered for the Norwegian Government. Even though the Norwegian troops were advancing steadily in their sectors, it was impossible to compensate for the French and Polish troops which had been fighting bravely, with honor and success, in the other areas. It was equally impossible for Northern Norway to do without the dominant British naval forces and the safeguarded supply routes from overseas.

MAY 13TH GERMAN DEFEAT

The Right Battle Group (the Norwegian 7th Brig plus the above-mentioned French half-brigade) had driven the enemy so far south in its battle area by May 9th that the Supreme Command could plan a combined attack against the German forces in the Bjerkvik sector. Here the Germans held three fronts: one facing northward against the above-mentioned battle ground, another toward the west at Knivslirvannene (lakes) on Veggfjellet, and the third—a sea front—for the prevention of landing attempts on both sides of the inner part of Herjangsfjord.

The aim of the combined attack was to capture the Bjerkvik sector and Elvegaardsmoen, and to hurl the Germans eastward toward the Norwegian-Swedish border at Björnfjell. If this should succeed, the way would be open for the two conclusive operations:

1. Recapture of Narvik.

2. Destruction of the main German forces in this theater, either by extermination or capture, or by driving them into Sweden, into internment there.

The attack took place on May 13th. It was preceded by heavy shelling from British warships: the battleship *Resolution,* the cruisers *Effingham* and *Aurora,* the repairship *Vindictive,* the netlayer *Protector,* and the five destroyers *Somali, Havelock, Fame, Wren,* and *Basilisk*. Most of the buildings in Bjerkvik were set afire and totally destroyed.

Under cover of the fire from the British warships the French Foreign Legion's 13th half-brigade (two battalions) was put ashore east and west of Bjerkvik. With the support of some tanks the Legionnaires launched their attack against German positions. As soon as these enemy positions opened fire they were silenced by well-aimed gunfire from the British warships.

From the north the Norwegians and the French Alpine troops also pressed their attack through. The result was that the Germans were driven eastward according to plan, and there they gradually established themselves in positions in the mountainous terrain from Lillebalak (southeast of Hartvigvann) to Rombaken. This new line of defense with front to the west was very strong, but was completely dependent on whether the German front to the north against the Norwegian 6th Brig would hold. The two German fronts formed almost a perfect right angle. If the one were forced back, the other would also have to withdraw if the danger of being cut off and surrounded were to be averted. More about this right-angled German front later.

RECAPTURE OF NARVIK

The battles of May 13th and the succeeding days had cleaned the Germans out of coastal regions of Bjerkvik, Öyjord, and Lilleberg. An attack on Narvik from the north side of Rombaken was now possible. It was carried out on May 28th under shelling by the British cruiser *Southampton,* the antiaircraft cruisers *Cairo* and *Coventry,* the five destroyers *Beagle, Fame, Havelock, Walker,* and *Firedrake,* and the sloop *Stork,* and also by a Norwegian field battery north of öyjord and two French batteries at Seines.

The infantry attack was carried out by the two Foreign Legion battalions and the Norwegian 2nd Bn 15th Inf Regt, which consisted of soldiers whose homes were in Narvik or in nearby districts. They certainly deserved the privilege to participate in the recapture of their own hometown. The landing boats of the attacking forces set out from Öyjord and Seines. The landing occurred at Orneset and Taraldsviken.

The attack, which had begun at midnight, succeeded completely, and as early as the afternoon of May 28th the Norwegian battalion commander was able to assume command in Narvik. This was an honor which the leader of the attack, the French Gen. Marie E. Bethouart, accorded his Norwegian comrade-in-arms.

Simultaneously with the attack on Narvik from the north, the Polish brigade attacked the German positions at Ankenes on the south side of Beisfjord. Their attack also succeeded. The Legionnaires and Poles, both in pursuit of German troops that had fought in either Narvik or Ankenes, met at the inner end of Beisfjord. These Germans were now forced to withdraw over Sildvikskaret to the Ofot railway and from there to the main German forces around Björnfjell.

The German units which had been forced to give way to the attacking Norwegian and French troops north of Narvik had the railway line as their shortest retreat route toward Björnfjell, and they too were being hotly pursued. During the days following the recapture of Narvik these units were driven farther and farther east toward Björnfjell.

NEW GERMAN DEFEATS

The Left Battle Group (the Norwegian 6th Brig) began its advance on May 1st from the recaptured Lapphaugen area. After having driven the Germans out of Gressdalen and helped the 7th Brig win the mountain ridge on the west side

of Gressdalen (Britatinn, Laeigastinn, and Vassdalsfjell), the brigade confronted the difficult problem of forcing its way onto the heavily defended mountain plateau which in the south rises steeply up from Bukkedalen. This valley runs in an east-west direction, and unites Raudalen with Gressdalen and Vassdalen. One has to climb some 1,500 feet to reach the plateau from the bottom of the valley. The peaks Storebalak, Neverfjell, and Nevertinn rise on the northern part of the plateau, and Kobberfjell and Kuberget on the southern.

Long and bitter battles were fought there, first to gain entry to the plateau and later for possession of the peaks. By May 15th the 1st Bn 16th Inf Regt had captured Neverfjell and Nevertinn, while the 2nd Bn 16th Inf Regt had taken Storebalak. Both were then directing their attacks against the dominating peaks to the south. The German defense of these was determined and tough. A German order was found stating that the Kuberget—Kobberfjell sector had to be held, cost what it may. If the defense of this sector had to be given up, the Germans' front to the west against the 7th Brig and the French troops would be threatened in its right flank and rear.

And that's how it turned out on May 20-22, when 2nd Bn 16th Inf Regt broke the German resistance in the Kobberfjell sector and gained the strongly fortified key position at Hill 648* (west Kobberfjellvann) and thereafter also Kobberfjell (914 meters), which had proved impregnable as long as Hill 648 was in German hands. From the southern part of this peak the lower-lying terrain to the south, including Lillebalak (572 meters), could be dominated, and it was there that the German positions had withstood, up to then, the attacks of the 7th Brig.

To the east of 2nd Bn 16th Inf Regt its sister battalion (the 1st Bn 16th Inf Regt) won one of its most important battles. Kuberget (820 meters) was captured.

The two battalions had now completely broken the Germans' northern front and chased the German units down from the plateau. The opponents of the 2nd Bn had to retreat more than 3 miles before they found new possibilities for a stand in Haugfjell, south of Jernvannene. The opponents of the 1st Bn withdrew in a southeasterly direction to the vicinity of Hill 620, about a mile from the Swedish border.

In close connection with the collapse of the Germans' northern front, the retreat on their west front began a few hours later, following severe pressure placed upon it by Alta Inf Bn and the French Chasseurs Alpin.

No Reserves

A strong pursuit on May 22nd of the torn and beaten German units on the two fronts would undoubtedly have produced conclusive results. But the conditions for such a pursuit were not present. There were no reserve units to throw in, and the supply lines could not be extended farther without extensive rearrangement.

So far as the 6th Brig was concerned, it was really a stroke of luck that the plan of attack succeeded until the immediate task—that of breaking the Germans' northern front—was accomplished. During the final two days all reserves had been thrown in. For three weeks prior the battalions had fought without relief. After gaining entry to the mountain plateau they had not had warm food because of lack of fuel, and what little rest one could get had to be taken in snowholes or under the open sky. The troops were too weary and sleepless to undertake an effective pursuit. But this was not all.

The means of communication had become entirely inadequate. Telephone cables had to be laid on the snow, where they would sink deep in the warmth of the midday sun. At night they would freeze so tightly to the snow and ice that they were ruined if they had to be taken up and moved. With the long fronts of up to 4 miles per battalion, and with wire connections covering a distance of 12 miles to the brigade command, communication by wire was very difficult to maintain.

And finally, ammunition and provisions had to be carried in rucksacks from supply points in Gressdalen and Raudalen. The ascents to the plateau were too steep for the use of horses. These difficult supply routes were already four to five miles long. They could not be lengthened without materially affecting the units' fighting strength.

Spring was beginning to make its presence felt. The snow had thawed in the bottoms of the valleys, where the supply lines led through trackless mire. With greatest difficulty sleds were replaced with a combined wagon and horse transport for a short time, but by May 23d the thaw was so advanced and the mires so impassable that the supply lines from Lapphaugen through Gressdalen to 2nd Bn 16th Inf Regt at Kobberfjellvann had to be abandoned, and to be replaced by a new truck supply line along the highway from Lapphaugen to Bjerkvik and from there to the east end of Hartvigvann.

German Front After the Retreat

After the German retreat of May 22nd to Haugfjellet, the Nygaardsvassdrag lay as a formidable obstacle to any continued Norwegian-French offensive. From good defense positions in the mountain slopes down toward Holmelva (river), Jernvannene (lakes), and Storelva (river), which together comprise the Nygaardsvassdrag, the Germans commanded the lakes and rivers, which then were in full flood.

What bridges there had been were destroyed by the Germans. The terrain offered no materials suitable for building bridges or rafts. The excellent bridge material which the Haalogaland Engineer Battalion had stored in the magazines at Elvegaardsmoen had fallen into German hands. To secure and bring forward wooden materials constituted a problem all by itself.

Since the nights were light it was impossible to undertake any crossing of the water gap by dark. Misty weather could have served the same purpose as darkness. A couple of nights the prospects were quite promising, but the mist never settled low enough. Neither the mountain artillery nor the mortars had smoke shells, so the defender could not be blinded by smoke while the river crossing was taking place. The Nygaardsvassdrag was therefore impassable to the two French battalions on the right wing from Rombaken to Cirkelvann, to the Alta Inf Bn from Cirkelvann to Övre Jernvann, and to 2nd Bn 16th Inf Regt along the Holmelva's wide stretch above Övre Jernvann.

Alone on the Norwegian left wing was there an area near the Norwegian-Swedish border where the attack zone was not blocked by major water obstacles, but 1st Bn 16th Inf Regt could not carry the attack alone. The forces in that area had to be strengthened, and it was preferable that the enemy be placed under pressure simultaneously from the north, west, and south. Everything seemed arranged for this after the recapture of Narvik on May 28th.

The German forces which had been driven out of Narvik

*648 meters—about 2,100 feet.

and Ankenes were retreating toward Bjornfjell, followed by French Foreign Legionnaires and the Polish Brigade. It was only a question of time before these Allied forces would be able to partake in the final battle: the capture of Haugfjell, Rundfjell, and Björnfjell.

Reinforcement of the Norwegian Northern Front

To increase the offensive power from the north, a group consisting of 2nd Bn 16th Inf Regt, the 3d Mountain Arty Bn, and extra mortars and machine gun units, was ordered to the mountain terrain near the border where up to then the 1st Bn 16th Inf Regt had been fighting alone.

Mountain battery on the last afternoon of fighting. The author stands in foreground.

Dense and persisting mountain mist prevented for several days the orientation and preparation necessary for a coordinated attack on Rundfjell, which now had become the Norwegians' immediate objective. Behind and south of Rundfjell was Björnfjell, the Germans' last bastion. With Rundfjell captured and French and Polish battalions advancing from the south toward Björnfjell, the Germans in Haugfjell area to the west would see their possibilities of retreat into Sweden severely threatened. The occupation of Rundfjell would, in addition, give the Norwegian artillery an opportunity to enfilade that part of the German front which was preventing the Alta Battalion from crossing the water gap between and east of Jernvannene lakes.

Finally, on June 7th the preliminary attack from the north could be begun, although only with the support of one of the batteries. Farthest to the east the Germans held their positions, but to the west, where the lone Norwegian battery could register, they had to give way. The Norwegians looked forward eagerly to the following day when the advance could proceed under cover of all the heavy weapons.

Suspension of Hostilities

But early in the morning of June 8th there arrived orders that the Norwegian troops should not carry the attack farther south, but should instead prepare to move northward—that is, back—to Stordalen. The order was not accompanied by any information supplying reason for this move, which seemed incomprehensible to the front commanders. They had not been kept posted on world events and had not the faintest suspicion of the Allied governments' decision to withdraw relief troops from Northern Norway.

No one could ever have guessed such a development. Instead it was surmised that Sweden would declare war on Germany and that the Norwegian group, when the time came, would advance from Stordalen to Swedish territory in order to join with Swedish forces and attack the Germans at Björnfjell from the east. Along in the afternoon an orderly reached the group with a written brigade order. The first two points in that order clarified the situation:

1. The Allied forces in Norway have been withdrawn.
2. Norwegian forces in Northern Norway are to be demobilized.

When the order became known it was as if the units had been paralyzed. Profound grief and anger filled men's minds. Some wept. For them Norway at that moment seemed lost—going under. All the fighting and all the tough endurance, all the victorious combats had been to no avail. They were standing before the very fulfillment of their goal: to see the long German retreat end in Swedish internment. The border was within easy sight, only a few kilometers away. Beyond the border were Swedish units ready to take the beaten Germans in hand. Indicative of the situation was the fact that the Swedes were then engaged in marking the border with flags so that the Germans would be left in no doubt as to when and where their internment would begin.

The liberation of Northern Norway had been so near—only a few days away. And now! Freedom seemed lost, even the right to fight and die for freedom.

An Abortive German Stratagem

The halting of the battle by the Norwegians gave an ambitious German battalion commander the courage to try to pin a feather in his own hat. He apparently figured that with a bit of bluffing he would be able to exploit the difficult position that so suddenly had befallen the Norwegians, in a way that would in the end be to his great personal advantage.

While the Norwegian units were making ready for the return march as ordered, a German major appeared at the post of the Norwegian group commander in the role of a parlementaire. He pretended that he was bringing orally a mutual order from the German and Norwegian supreme commands declaring that King Haakon and the Norwegian Government had capitulated and had ordered that all fighting should cease, also that the Norwegian units should immediately lay down their weapons and allow themselves to be conducted as prisoners to Björnfjell.

If this was not complied with, said the major, the Germans would attack at once, supported by more than 30 dive bombers from Vaernes airfield, some 370 miles distant. The Norwegians knew well enough what ordinary bombing and strafing planes were, but they had not yet been attacked by dive bombers. The major described the havoc that could be wrought by them and he referred to the infernos which these Stukas had just created for the troops in Holland, Belgium, and France, and at Dunkirk.

The major was informed that the order he had delivered was in conflict with the Norwegian order, in which the word capitulation was unknown. Regardless of threats, the group commander said he would act according to his orders. If the Germans should reopen hostilities in order to prevent the orderly withdrawal of the Norwegian troops, the responsibility for the results would fall on the German commander.

The German major, completely aware of the strong offensive position which the Norwegians occupied, refrained from making further threats. Instead he suggested that the troops on both sides remain in their present positions until the conflict

in orders could be cleared up by telephone communication with higher authorities. The group commander reluctantly agreed to this so far as it concerned his own command, but he pointed out that he could not hold back the units on his right flank: the written orders had reached them many hours earlier, and they were already marching northward.

The waiting period dragged on. It proved impossible to establish connection with the Norwegian higher authorities. Meanwhile the weather was misty with some snow falling, making visibility extremely poor. The Norwegian reconnaissance and advance patrols and guards had already been called in, and therefore reports were no longer coming in from outposts. But gradually there accumulated various indications that the German major had wanted to keep only the Norwegians and not the Germans stationary, and that the Norwegians were now threatened by a stratagem.

Finally the group commander felt convinced that two German columns, well shielded by the falling snow, were climbing up the mountain slopes on both sides of the Norwegians for the purpose of surrounding them and taking them prisoner. In that case the German major had violated his promise to keep his troops in the positions they were holding at the time of the agreement. There was still nothing definite to substantiate the group commander's suspicions. The situation was highly difficult. The group commander was determined that the Norwegian units were not to be taken prisoner in an ignominious manner after hostilities had been ordered discontinued. ALL the hard-fought and victorious battles of the entire campaign were not to be given an unworthy conclusion. If a new battle was to be avoided, the group would have to reach the high watershed (over 2,500 feet) toward Raudalen ahead of the Germans. Unnoticed by the German parlementaires, the group commander succeeded in giving orders for the units to proceed toward the watershed as quickly as possible. The snowfall served the Norwegians well. The units set out on their march without being detected by the Germans.

A few hours later the group commander and his staff were alone on the former Norwegian front line. Still more time passed before the German major finally received word from his superiors that he should not prevent the departure of the Norwegians. Nervous and disappointed, he departed.

The group commander and his staff immediately made ready to leave. After an hour's march he was approaching the strong mountain bastions of the watershed. It was no surprise to find them fully occupied by German troops. Here was the proof of the Germans' intended stratagem. The two columns were to serve as pincers, but they met too late to trap the Norwegian troops.

The group commander demanded passage by referring to the message which the German major had received, and which specified no interference with the Norwegian withdrawal. The German commander explained that his orders were to halt all Norwegian units, disarm them, and take them to Björnfjell. He had already seized two squads of stragglers from 1st Bn 16th Inf Regt. After having carefully considered the situation, however, and after futile attempts to obtain new orders by radio, the German company commander displayed the unexpected independence of issuing a pass for the group commander and his staff. The squads that had been taken prisoner were not released until the following day.

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In the morning of June 11th the Norwegian units were demobilized and sent home. They had been spared a humiliating military surrender. Only conditions outside the battle area had robbed them of the right to complete their winning fight for their native land, and had sent them home weaponless but undefeated.

The entire country was now in the hands of the enemy, a situation which Norwegians had never before experienced. The future seemed dark. There was no doubt that hard years and severe conditions lay ahead for the people. They would get time and opportunity to test their strength and their will for independence, and also to learn what complete trust in international peace policy leads to in this world. For the returning warriors it was painful to learn that the King and Government had left the country on June 7th, but in that act they discerned the beginning of liberation from foreign domination. The Battle Front lay behind. Ahead lay the Home Front.

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ODE TO THE GRASSHOPPER

I'm one of those pilots the people all dub
As a "grasshopper" pilot—I fly a Cub.
You've heard many tales of bombers and fighters
But nary a word of these small sturdy blighters.
A Cub is a plaything to people back home
But up at the front we come into our own.
When the enemy's shelling comes in thick and fast,
Does the Infantry call for a big bomber's blast?
No! They swear, whoop, and holler, and tear at their hair:
"Get that Goddamn Cub back into the air!"
For the Infantry knows that a Cub, although slow,
Can give old Tojo one hell of a blow.
Back and forth o'er our cannon, seeming to hang in the air,
We direct Allied fire on the enemy's lair.
Then out of a cloud comes the Rising Sun,
In the shape of a Zero; boy! do we run!
Down on the treetops, in and out 'round the hills,
While "Slant-eyes" still follows, trying hard for a kill,
He spends all his ammo, and then he must run
For maybe, by chance, a P-40 may come.
So back to his cannon, with shirt wringing wet,
Flies the Liaison Pilot, his job to do yet.
The radio sputters, "Mission accomplished—go home!"
(The four nicest words that we've ever known)
There is just one more thing that I'd like to say
Before landing my Cub and going my way:
Give the bombers and fighters their headlines galore—
Just give us more Cubs, and we'll *end this damn war!!*

S/SGT. EDWARD E. BAKER, FA

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ARMORED LUCK

On the Anzio beachhead our tanks planned a left hook. Just as it started its push the Germans launched a heavy counterattack against our positions. Our armor hit this in the flank, broke it up, and took several hundred prisoners. Our timing could not have been more perfect!

A German View of the Norwegian Campaign (Aus Dem Feldzuge in Norwegen)

TRANSLATED FROM "MILITAERWISSENSCHAFTLICHE RUNDSCHAU"

On April 9, 1940, to forestall English plans to expand the war theater, German troops had occupied the most important points on the Norwegian coast.

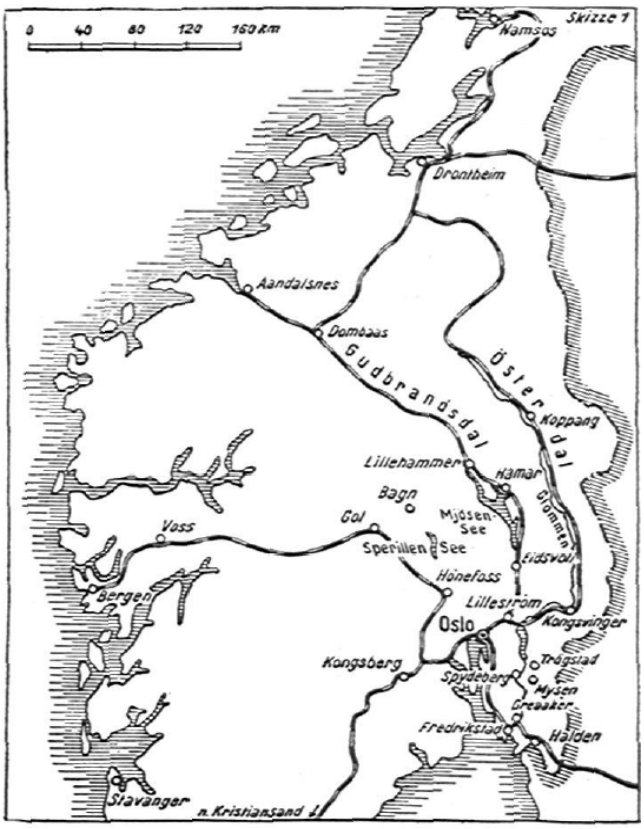
The task which was to be accomplished now was the establishment of land communications to Trondheim and Bergen, imperative for the securing of the coastal bases. To do this it was necessary to negotiate 500 kilometers in a farflung, snow-covered mountain region which gave all the advantages of defense to an enemy equipped with skis. Most of the route was through narrow valleys or desolated table lands. In the thickly wooded chain of hills of central Norway the 100 kilometer long Lake Mjös separates the march routes to the Gudbrand valley in which a highway and railway line lead to Trondheim and Aandalsnes (Sketch 1). The other, narrow gauge, railway line to Trondheim runs in the Österdal, which starts at Kongsvinger. On the railway line to Bergen the narrowing of the valleys begins as soon as Hönefoss. West of Grol, wild mountain chains separate the highway from the railway. Roads which were ice-covered or bottomless in thawing weather hindered the movement of the troops; deep snow in the meadow lands and insufficient mountain equipment impeded the fighting. It was necessary to take into account the blocking of roads and the destruction of numerous man-made structures.*

In accordance with orders given him by the Fuehrer, the chief-in-command of the army units against Norway, infantry General von Falkinhorst, intended to use the two units at his disposal since April 11, to destroy the first and second Norwegian Divisions which were in the process of mobilization in the Oslo region, and to advance along the railway lines to Trondheim and Bergen.

It was known that enemy detachments were stationed in Southeastern Norway near Fredrikstad-Halden and near Spydeberg-Mysen as well as in the direction of Lillehammer near Eidsvoll and Hamar. On the 12th of April, in order to widen the landing space around Oslo and to secure the flanks, one of the units (Verband) was ordered to march with its main forces, east to Lillestrom, and with two reinforced battalions southeast in the direction of Halden and Mysen. Parts of the other unit were to attack, in the regions northwest and west of Oslo, the 6th Norwegian infantry regiment stationed at Hönefoss and the 3d Norwegian infantry regiment stationed at Kongsberg. In order to leave the enemy as little time as possible for concentration of troops and preparation for battle, all available means of communication were employed for a rapid advance, and motorization was improvised for most infantry battalions and batteries. In the first days only the unit operating in the eastern direction had artillery at its disposal.

By this lightninglike thrust it was possible to defeat and dispose of the enemy on both flanks.

By 2 PM on April 13th, German troops occupied, in the southeast, the fortress of Fredrikstad which had been evacuated voluntarily by the Norwegians. On the same day after a brief

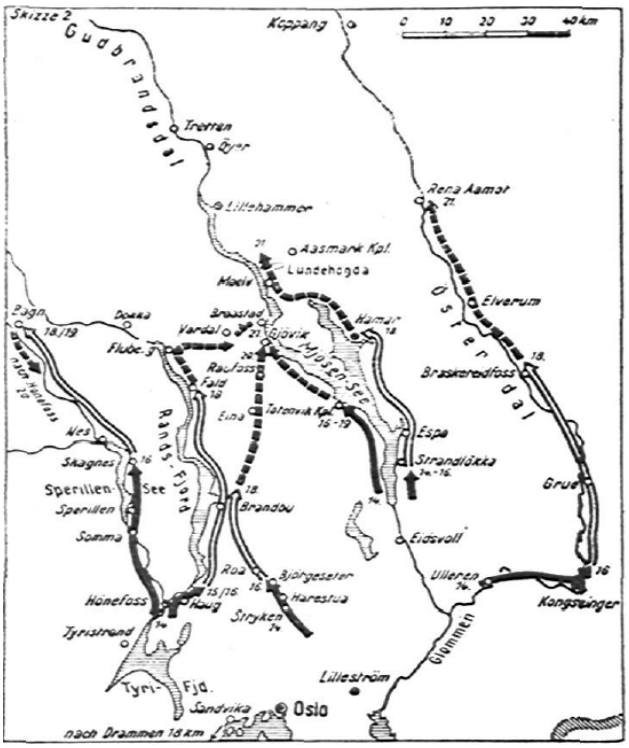


Sketch 1

battle they took the small mountain fortress of Greaker and despite a big bridge obstruction they reached Halden. The garrison and with it the commander of the first division crossed over to Swedish territory. Other fighting groups forced a crossing of the turbulent Glommen near Spydeberg, in a hand grenade battle. By evening the enemy was pushed back to Mysen with the aid of three bombers, and the fortress surrendered early on the 14th of April. On the night of April 15 the last strong point of the enemy, the fortress of Trögstad, fell into the hands of a German detachment advancing from Lillestrom to Mysen. Thus within three days southeastern Norway, so important because it adjoins Sweden, was occupied and several small fortresses were taken. One thousand men, 85 guns, and rich stocks of weapons, food supplies and clothing fell into German hands. On the western flank, too, the surrender of the 3rd Norwegian infantry regiment at Kongsberg on April 13 removed all danger.

On the 13th of April, the landing space was also widened toward the north. Motorized troops and an alpine battalion which had been brought up by rail had been advanced via Eidsvoll to the southern end of Lake Mjös. In addition one combat group split, its main forces driving via Sandvika (Sketch 2), constantly engaging the enemy and pushing to Hönefoss despite destroyed bridges, roads, and snowed-under mountain

*Translator's note: Bridges, tunnels, etc.



Sketch 2

terrain; and one battalion driving to Tyristrand via Drammen.

Now the German command could order the advance of the right unit on Kongsvinger and Hamar; and of the left unit along the road to Bergen. After English troops had landed on the 14th at Aandalsnes and Namsos, establishment of the line of communication to Trondheim and the securing of the rail line and highway near Dombaas became imperative. On the very same day parachute troops in small numbers jumped off at Dombaas, and dive bombers attacked the railroad to Aandalsnes. In order to establish land communication with Trondheim and to destroy the Norwegian forces barring the way, the commander-in-chief, in accordance with instructions of the Fuehrer, ordered the right unit to give pursuit through Elverum into Österdal and via Hamar into the Gubrandsdal. The left unit, whose Oslo forces were engaged at Hönefoss and Kongsberg, was ordered at first only to make strong motor reconnaissance via Raufoss to Lillehammer and on to Dombaas. In addition, the reinforcement of the troops at Trondheim was begun by means of air transports.

The right unit approached Kongsvinger and Hamar in two columns consisting of a reinforced regiment each. The right column threw back a weaker enemy at Ulleren with an advance detachment, on the 15th attacked on both sides of the Glommen with an augmented battalion at its disposal, and after a lively battle forced the Norwegians to retreat. On the 16th the regiment, reinforced by the battalion drawn from Trögstad, wrested the city and old fortress of Kongsvinger from the enemy, and turning north pushed into the Österdal. On the 14th, by means of reinforced reconnaissance the left column had located the enemy on the east shore of Lake Miös at Strandlökka. The enemy, resting his flank on the lake, seemed determined to offer stubborn resistance. The regiment which had been brought up from the Lilleström region during the night remained facing the enemy position on the 15th and 16th. Mountain chains under deep snow made impossible an encirclement of the enemy's east wing.

On the 14th the left unit was able to throw in only one motorized battalion, in the direction of Raufoss. In a badly snowed-under mountain valley it came on a one and a half mile long obstruction of trees and an enemy ski detachment which offered resistance until evening. Hönefoss, on the other hand, could be occupied without a struggle. On reaching this important junction the left unit was to cease further advance along the road to Bergen and to push ahead fast in the region between Lake Mjös and Lake Sperillen. For this purpose a newly arrived regiment was placed under it and followed the motorized battalion along the road to Stryken. Corresponding to the new intentions of the command, the left unit advanced on the 15th in three battle groups—the right one going via Stryken to Gjövik, and the other two, which had been formed by dividing the forces which had gotten to Hönefoss, going to Fluberg and Bagn. In the right battle group, the motorized battalion won Harestua on the 15th after some fighting, and on the 16th the leading regiment took Björgeseter. The battle group advancing on Fluberg had contacted the enemy in a dominating position and snowy terrain very close to and east of Hönefoss, near Haug. On the 16th, after the arrival of an armored company and a company partly equipped with skis, a surprise encirclement forced the enemy to retreat on a forest road covered with snowdrifts. The left battle group reached Sperillen on the 16th after forest fighting, some of which was stubborn.

In order to break the resistance of the enemy on Lake Mjös at Strandlökka and to achieve a rapid, decisive success for the advance on Dombaas, the command decided to advance the regiment in the Österdal far to the north toward Koppang, and to attack with all other forces in the direction of Lillehammer. The left unit thus had to advance along the western shore of Lake Mjös; march with its combat group which had arrived on the 15th, through Gjoevik, Fluberg and Bagn; and turn with the left group out of Bagn to either Lillehammer or Tretten, depending on the situation. The combat group on the western shore of Lake Mjös was formed by the alpine battalion and above all by the motorized battalion drawn off from the road past Stryken.

On the 17th a boldly conceived coup of the commander of the right unit caused the rigid front at Strandlökka to begin to give. A battalion brought in from southern Norway made a surprise push from the western shore of Lake Mjös toward the enemy's road of retreat over ice which was barely strong enough to hold and in places kneedeep through melted ice. The enemy left his position post-haste. Late in the evening the German vanguard, which after crossing had immediately turned north, reached Esoa. The opposition which the Norwegians had evidently intended to offer along the general line Kongsvinger—southern part of Lake Mjös—Hönefoss, was overcome. In his retreat on Hamar the enemy attempted to hold back the German pursuers by blocking highways and blowing up bridges, but did not rally any more for effective resistance. Late in the evening of the 18th Hamar was in German hands.

The regiment in the Österdal was held up by destroyed bridges and minor battles, and was unable to reach Elverum until the evening of the 20th. It had already been occupied on the day before by branches of the combat group which had advanced east of Lake Mjös.

On April 20th these units, now under the regiment in Österdal, contacted a defended tree barricade three kilometers in depth south of Rena Aamot. There developed a fight of some duration, in which the regiment coming up from Elverum took part, forcing the enemy to retreat. The latter took up another defense position along a sharp curve in the road before Rena Aamot, but was beaten at nightfall. At midnight Rena Aamot was occupied.

The combat group pursuing east of Lake Mjös was reinforced by a motorized machine gun battalion, reached Moelv on April 19, and located the enemy on the dominating mountain height of Lundehögda.

An attempted advance of the machine-gun battalion on the 20th along the shore road and then, on a mountain road, failed. A battalion surging ahead on lorries to flank Aasmark Kpl. (fortress) got into ravine-filled terrain in heavy snow flurries and after fighting with motorized enemy could not penetrate into Aasmark until the evening of the 21st. In the meantime, in the afternoon, the decision had been reached at Moelv. There, in snow a meter deep, infantry, reinforced by units of machine-gun battalion, had attacked the Lundehögda from the east and taken it.

With that, the defense in this section collapsed and the road was open to Lillehammer. The Norwegian High Command's intention to hold the territory on both sides of Lake Mjös until the arrival of English forces had failed. Two battalions of the English Morgan brigade which had been disembarked at Lillehammer and sent into the battles of Aasmark and Moelv could not alter the result. They suffered heavy losses and could not take part in the next battles.

In the meantime the left unit had continued the attack on the 16th with all its combat groups. On the western shore of Lake Mjös on which the alpine battalion was stationed at Totenvik Kpl. between the lake and mountain ridge, a battalion from Oslo was brought into action in addition to the motorized battalion from Stryken. They did not get to take part in the action since, on the night of the 20th under threat of pressure against his western flank, the enemy withdrew to the dominant height near Braastad north of Gjövik.

By evening the combat group starting out from Stryken also reached this place, with the panzers in the van. This group, reinforced by an artillery section, had taken Roa on the 17th after light fighting, then advancing along a steeply rising mountain road had put to flight a Norwegian ski unit and reached Eina on the 19th despite very bad road conditions.

On the shore road to Fluberg on the eastern side of long-stretching Rand Fjord, the Norwegians had attempted to slow down the German penetration by rearguard actions, tree barricades, destruction of bridges, dynamiting of rocks. But as early as the 19th the combat group advancing via Brandbu-Fald was in Fluberg, and on the 20th turned off toward Gjövik. While the advanced battalion, after overcoming tree barricades (some of which were mined) and bridge obstacles, was meeting with enemy opposition along the highway, another battalion on the 21st pushed across the northern heights into the flank of the enemy, forcing him to give up his position and abandon two guns. After a further advance the combat group met part of the forces from Gjövik which, holding firm to the line which they had reached at Braadstad, advanced with a strong left wing toward Vardal. Through a fast advance the main forces of the left unit were made available for further action on the 21st.

On the extreme wing, the combat group advancing in the direction of Bagn, reinforced by two panzers and a captured two-gun battery from Oslo, had reached the northern tip of Lake Sperill on the 17th. On the 18th it crossed a frozen riverbed near Nes, the high bridge having been blown up, and on the 19th got as far as Bagn, where the enemy was holding the slopes into the valley. In view of strong opposition from the enemy, who was threatening our flanks and rear with his ski units, it was impossible to execute the order to turn east toward Dokka and from there to make contact with the forces in Fluberg. As a result the combat group rode back to Hönefoss on the 20th. A strong holding force remained near Nes, while the other units were drawn east of the Rand Fjord to Fluberg.

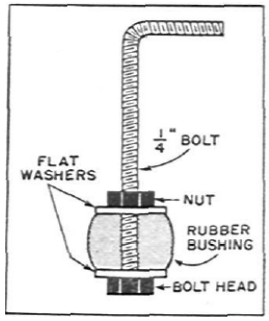
Thus, within nine days, two weak units with almost no heavy infantry arms or artillery had, in a bold and irresistible advance, occupied southeastern Norway and penetrated 150 km north on a wide front. The first Norwegian division and the third Norwegian infantry regiment were destroyed. The enemy's forces on both sides of Lake Mjös had suffered serious setbacks, and his plan to maintain his positions south of the Gudbrandsdal had been frustrated so fast that the fourth Norwegian brigade which started out from Voss (on the road to Bergen) could not get into the action.

Here is a simple expedient to prevent seepage from oil or fuel lines. It was designed for use when the R975-C1 radial engine has been removed from a 105-mm Howitzer Motor Carriage M7, or Medium Tank M4, but is applicable to many other instances.

Materials required for this device are a 1¼″ × 3″ standard bolt and nut, two 2¼″ flat washers, and enough electrician's rubber tape to form a rubber bushing between the washers.

Insert the head end of the bolt into the open end of an oil line. Tighten the nut, expanding the rubber bushing to form a good seal. Only moderate tightening is necessary. The 90º bend one inch from the end of the bolt makes it easy to keep the bolt from turning as the nut is tightened.

CPL. EBEN L. LEWIS, FA, in *Army Motors*



"Over here even an old copy of THE FIELD ARTILLERY JOURNAL is considered indispensable. It is the one magazine we read over and over and still enjoy one hell of a lot."

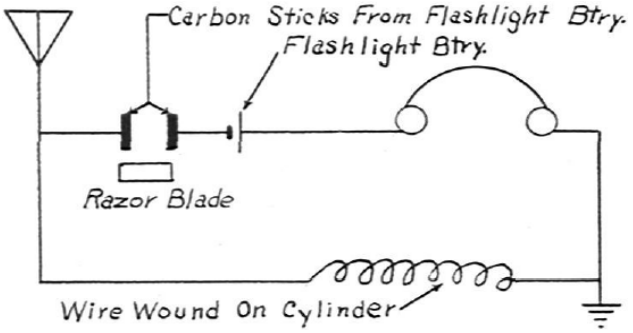
LT., FA, OVERSEAS

Not in the BOOK

EDITOR'S NOTE: *This feature is devoted to ideas sent in by our readers describing methods or devices which, though not specified by official literature, have proved useful in service.*

MUSIC (?) FOR YOUR DUGOUT

There's no limit to a GI's ingenuity. One battery on the Anzio beachhead has a "Razor Blade" crystal radio set for every dugout! Each antenna is about 70 yds. of wire—any kind. The coil is about 75 ft. of copper wire (combat wire will do) wound around a grenade container. Ear phones?—ask GI where he picks them up! The carbon sticks act as a crystal, the razor blades as the "tickler."



This "Razor Blade" radio pulls in from two to four stations—and sometimes all four at one time!

LT. WILLIAM H. ROSEE, FA

SIGHTING AND LAYING

We have a new slant on laying an armored (M7) battery at night. We made a tube about 1½″ in diameter and 12″ long from an old piece of plexiglass, painted it blue, mounted it on a base, and rigged a GI flashlight beneath it. When it is possible to make a daylight reconnaissance I take all the chiefs of sections along and each one marks his position with a stake; the aiming circle is set up and an initial direction read to each. When the battery comes in we set up our blue "tube-light" directly beneath the aiming circle and each piece lays on the light with the deflection originally read to his stake. From then on we lay the battery exactly as we would in the daytime, except that each gunner lays on the blue "tube-light." Using this method we have cut 75% off the time formerly required to lay the battery at night, and have made no sacrifice in accuracy.

Another time-saver is for the chief of section to put his far stake in when the daylight reconnaissance is made. It is then a simple and quick procedure to line in the near stake after the occupation of position. Also, the chief of section can make sure his stakes are down an "alley" where they will both be visible when the sun comes up.

Our artillery mechanic, Sgt. Gregory Goodman, rigged up a simple bore-sighting aid. He simply cut a band of tin to fit snugly over the muzzle and soldered cross-wires onto it. We now have one for each howitzer and carry them under the muzzle covers. It's a constant reminder to the chief of section to check his sighting and laying equipment and eliminates the old trouble with straps and strings.

LT. PAUL H. GOSSER, FA

THE WIRE CORPORAL AND HIS M-2 COMPASS

After separating the staff officers from their M-2 compasses assign the latter as prescribed in the T/E, to include the 4 wire corporals. Next hold a few classes on the use and care of the instrument, followed by several outdoor maps and compass exercises. All members of the wire section should participate, the section being divided into several groups with each equipped with a compass, M-2 (or even a pocket type) and a map or photo.

Orient the wireman and point out the location of their next station. Give them a compass direction (in degrees for those with pocket compasses and in mils for the possessors of the M-2s), also a distance. Then release each group separately with a time interval between them, or give them separate starting points and bearings to their destination. Station yourself at this point and await the arrival of the various groups. You will be pleasantly surprised at their accuracy, although a few, of course, will miss their objective.

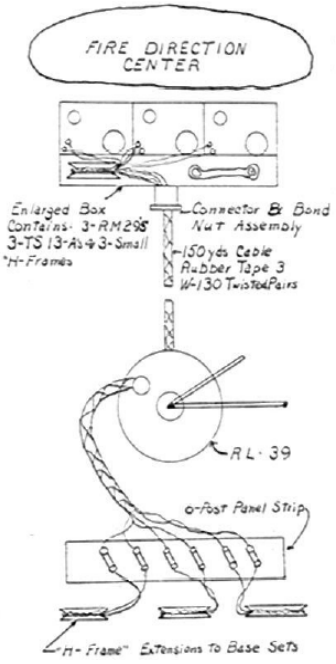
These exercises can be made more elaborate and difficult as the wiremen grow more efficeint. Give them the coordinates of their next station and have them measure their own compasses, include several stops in their itinerary, with an officer or NCO at each stop to check their direction. Make each succeeding point more difficult to locate.

Having achieved a fair amount of success at this they are ready for the next step, the actual laying of wire by compass. Four men equipped with an M-2 compass, a DR-4 filled with W130A or W110B, and a compass direction, is your best bet for laying that CP line if time permits. The line will be well off roads or trails, away from vehicular traffic—and laid with a minimum of wire in an almost straight line. This line could supplement your already existing circuit, or in a deliberate occupation of position be the only line to the OP or batteries.

Wire laid in this manner will be more difficult to recover. If the terrain is such that it cannot be traversed by vehicle, the wire must of course be picked up by hand. In most instances, however, wire can be recovered by a ¼-ton or the ¾-ton wire trucks.

CAPT. BEN ZIONTS, FA

RADIO DIRECTION CENTER



Our system of providing radio communication to the FDC is shown in the accompanying diagram. It consists of 3 RM-29 remote controls in a chest from which a cable runs to the Radio Direction Center and into a panel strip. Each operator runs a short line from the panel strip to his remote control at his set. The remote controls in the chest are used as telephones by the Radio Corporal. The chest also contains handsets and extensions for the remote control lines coming out of the cable on small "H" frames. All wiring shown is W-130 and the 3-twisted-pair cable is rubber taped; 150 yards of this will nicely fit an RL-39 and DR-8. A cover for the box is essential to prevent the TS-130 from falling out and to protect the equipment from rain, etc.

In cases where wire is in or expected in shortly, the Radio Corporal operates the 3 controls in the chest and keeps the S-3 informed as to what communication is received. A system of rings was established in order to let him know which remote control was ringing.

Where wire is not expected in, the remote control boxes are lifted out of the chest and extended to the individual computers by the extensions.

Radio set 610 can be used to work on "C" (our alternate channel) with forward parties that do not have wire. 609 sets can be shut off when the battery wire line comes in.

One improvement being considered is a plug and socket arrangement to replace the terminal strip; it would likely be made out of a 6-prong tube base and socket.

SGT. EDWARD H. RHODES, FA

Diary of War Events

(As Reported in the American Press: Edited by B. H. W.)

MAY, 1944

1st U.S. and British planes bomb 19 railroad centers in France and Belgium.

U.S. 8th Air Force bombs Pas-de-Calais area of France.

War Department announces loss of troop ship in Mediterranean, with 498 officers and men.

2nd U.S. Navy units returning from Hollandia-Humboldt Bay invasion bomb and shell Truk-Ponape area.

Allied planes and PT boats sink 20 Jap barges trying to escape from Wewak.

Allied planes bomb 14 more railroad centers in France and Belgium; U.S. Liberators pound Pas-de-Calais area.

3rd R.A.F. bombs concentrations of tanks and trucks at Mailly, near Rheims, and ammunition dump at Chateaudun.

5th Soviet warships and planes sink 11 more German ships evacuating troops from Sevastopol.

6th U.S. fliers from Italy bomb 5 Romanian cities that handle German traffic for the Russian front.

Soviets sink 8 more Axis ships escaping from Sevastopol.

Japs within 9 miles of Loyang.

7th More than 4,500 Allied planes make daylight raid on Reich.

9th Red Army clears enemy from Crimea.

More than 4,000 planes make day-long raid on "Atlantic Wall," lose 16 planes.

10th 2,000 Allied planes raid invasion coast and Belgian targets; lose 7 planes.

President names Acting Secretary of the Navy, James U. Forrestal, to succeed the late Frank Knox.

11th Japs capture entire length of Hankow-Peiping railway; fierce fighting continues in other Chinese sections.

Allied armies in Italy launch full-scale offensive from Cassino to Tyrrhenian Sea. Gain up to 3 miles.

13th U.S. heavy bombers raid German aircraft plants at Tutow.
Japs advance to the outskirts of Loyang in Honan Province.

15th Allied forces in Italy break Gustav line. All sections of front advance.

Flying Fortresses from Britain bomb Pas-de-Calais area.

China opens offensive in Yunnan Province with more than 20,000 American-trained troops.

Gen. Stilwell's Chinese troops in Burma capture Tarongyang, advance to within 10 miles of Kamaing.

16th Allied forces now within 4 miles of Formia.

Chinese troops advance to Shweli River, encircle Jap troops at Tatangtzu.

U.S. Army, Navy, and Marine planes bomb Jaluit (in eastern Marshalls).

17th British and Poles encircle Cassino.

Gen. Stilwell's forces in Burma cut road to Kamaing, close in on Myitkyina.

18th U.S. planes from Italy bomb Ploesti, and railroad targets at Belgrade and Nish.

U.S. Army planes between 7 Dec 41 and 15 May 44 destroyed or damaged 32,149 enemy aircraft, a loss ratio of about 5 to 1.

Gen. MacArthur's troops leap-frog another 125 miles of the New Guinea coast, capture Wakde Islands (within 1,000 miles of Philippines).

19th More than 1,000 U.S. heavy bombers raid Berlin and Brunswick areas. Destroy 125 fighters, lose 26 bombers and 19 fighters.

20th 6,000 Allied planes blast defenses of invasion coast.

Chinese and U.S. forces converge on Myitkyina.

Navy bombers pound Pamarushiru.

U.S. troops crush enemy resistance on Wakde Islands.

21st Allied armies in Italy capture Fondi.

Chinese and U.S. troops occupy 1/3 of Myitkyina.

22nd Flying Fortresses bomb sub base at Kiel, shoot down 22 planes.

23rd Chinese troops capture Chefang, cut Burma Road.

U.S. planes fly 207 sorties over Wotje atoll in Marshalls.

Allies in New Guinea extend bridgehead across Tor River.

24th Terracina and Lenola fall in Italy.

Chinese maintain their gains at Myitkyina, other units progress toward Kamaing.

25th More than 2,500 heavy and 1,200 medium bombers with hundreds of fighters attack France, Low Countries, Germany.

Chinese wipe out 1,000 Japs at Tatangtzu on the Salween front, also gain toward Lashio.

R.A.F. hits Berlin, Aachen, Antwerp, and targets in France.

26th British capture Aquino.

27th American troops invade Biak Island, in the Schoutens (200 miles northwest of Wakde-Sarmi area, only 900 miles from Philippines).

29th Americans on Biak Island move half mile closer to Mokmer airfield.

Australians driving toward Wewak capture Bunabun Harbor without opposition.

Chinese and American troops enter southern part of Myitkyina, blocking Jap retreat.

30th U.S. forces win first tank battle in the southwest Pacific: repulse counterattack on Biak Island. 8 Jap tanks destroyed, 3 others knocked out.

Chinese and Americans cut Kamaing-Mogaung road, beat off enemy counterattacks at Myitkyina.

31st Allies move on Rome steadily, despite Nazi counterattacks.
In constant day and night attacks, Allied planes made May history's greatest in aerial warfare.

Biak beachhead holds tenuously against greatest Jap strength met since Guadalcanal.

Japs capture Kungan, menace Changsha.

For Heroism and Service

CONGRESSIONAL MEDAL OF HONOR
(Posthumously)

PVT. ROBERT D. BOOKER, for conspicuous gallantry and intrepidity at risk of life above and beyond the call of duty in action. On 9 Apr 43, in the vicinity of Fondouk, Tunisia, Pvt. Booker, while engaged in action against the enemy, carried a light machine gun and a box of ammunition over 200 yards of open ground. He continued to advance despite the fact that two enemy machine guns and several mortars were using him as an individual target. Although enemy artillery also began to register on him, upon reaching his objective he immediately commenced firing. After being wounded he silenced one enemy machine gun and was beginning to fire at the other when he received a second mortal wound. With his last remaining strength he encouraged the members of his squad and directed their fire. Pvt. Booker acted without regard for his own safety. His initiative and courage against insurmountable odds are an example of the highest standard of self sacrifice and fidelity to duty. The Distinguished Service Cross and Purple Heart had been previously awarded him. Address, RR 2, Callaway, Neb.

DISTINGUISHED SERVICE CROSS
(Posthumously)

PVT. RICHARD FERRIS, for responding to a call for a volunteer cannoneer. He took a position at one of the big guns which was firing in support of infantry units landing on the beach. Despite heavy enemy machine gun and artillery fire, Pvt. Ferris's gun continued to fire at enemy shore installations. He was struck by a shell fragment. Although wounded, Pvt. Ferris insisted upon returning to action after his wound had been dressed. He continued at his post and laid down such accurate fire that his gun succeeded in silencing two enemy machine guns and two field artillery pieces, and caused four tanks to disperse. This action enabled the infantry to establish the beachhead. Address, 310 Morris St., New York, N. Y.

DISTINGUISHED SERVICE CROSS

PVT. STANLEY L. GINISH, for volunteering to enter enemy territory to re-establish a line to a forward infantry battalion which was in a critical situation without artillery support. For six hours he moved through the dense jungle, repairing the line despite fire from enemy snipers and patrols. At one point, Japanese cut the line three times within a few minutes after it had been repaired. Pvt. Ginish stationed himself at this point and remained until the messages had cleared. Address, 201 Front St., Pawtucket, R. I.

LEGION OF MERIT

COL. JOHN P. CHEHAN: In the Southwest Pacific Area from 6 Apr 42 to 22 Dec 43, as executive officer and deputy commander of large base and base section installations he contributed immeasurably to the success of the installations by his superior ability, initiative, leadership, and resourcefulness. Charged with the supervision of supply, transportation, construction, hospitalization, and evacuation activities, he was conspicuously successful in conducting these activities in direct support of combat operations. In addition to performing all duties in an outstanding manner with complete disregard for his personal health and well being, he assumed many additional responsibilities beyond the call of duty. His marked fidelity and unremitting devotion to duty on his assignments were an important contribution to the successful operations of these activities. Address, Coalgate, Okla.

BRIG. GEN. CHARLES R. DORAN: As Commanding Officer, School Troops, Field Artillery School, Fort Sill, Okla., and Commanding General, 17th FA Brigade, Fort Sill, from 15 Jul 42 to 15 Feb 43, by his untiring efforts and his constructive and administrative ability combined with his excellent judgment and professional ability, he established and maintained an exceptionally high standard of training in the troops even though coincident with the rapid expansion of the Field Artillery School which involved the solving of many difficult and complex problems. His successful efforts contributed largely to the high degree of instruction maintained at the Field Artillery School. Address, 1021 Johnson St., Lafayette, La.

SGT. LIONEL R. FOURNIER, for services from 2 Sep 43, to 5 Feb 44. As chief of section in a battery of field artillery he displayed outstanding qualities of leadership, initiative, and devotion to duty. During the attack on Kiska, Sep 2 and 3, 1943, he successfully and efficiently directed the movement of a battery of 105-mm howitzers over hazardous mountain terrain. At Kwajalein his section performed its duties in a superior manner as the result of his determined leadership. Address, 72 Oak St., Saratoga, Calif.

COL. MAYLON E. SCOTT: As Assistant Chief of Staff, G-4, Western Defense Command and Fourth Army, from 8 Jul 42 to 14 Sep 43, by his sound military judgment, keen foresight, exceptional qualities of leadership, and unremitting attention to duty he successfully solved the complex problems of supply and shipping existing in the Western Defense Command, including Alaska, and planned and organized the highly efficient supply system which is now established in the command. The successful outcome of the operations against the enemy on Attu and Kiska Islands in the Aleutians was due in a large part to this officer's outstanding service in procuring adequate shipping, and procuring, distributing, and loading supplies and equipment for the task forces engaged in those missions. Address, 3325 N. W. Franklin St., Portland, Ore.

T/5 WILBUR C. SIMPSON: During the Tunisian and Sicilian campaigns his unit was a separate battalion, at various times attached to every United States Army Division, except two, in the campaigns. As battalion mail clerk he was faced with unusual difficulties due to the constant change of headquarters. Despite these obstacles all mail was handled with dispatch and safety over long distances by vehicle, when one could be spared, but when none was available he showed remarkable initiative in contacting other nearby units and making the trip with them. His realistic understanding of what mail meant to soldiers under combat conditions contributed greatly to the morale of the unit. Address, 810 Rutledge Ave., Charleston, S. C.

SILVER STAR

CAPT. ROY L. ATTEBERRY: As representative of the Division G-3 at an advanced command post during the attack 3 Feb 44, on Kwajalein Island, and receiving information that groups of natives were present in bombproof shelters in the vicinity, he made an investigation of these shelters as the attack progressed in order to rescue any natives who might have survived. Under cover of a rifleman, he entered a shelter and found two natives, and a Japanese with a grenade in his hand. He disarmed the Japanese, thereby removing the possible source of casualty to other members of the attacking force. Address, Box 885, Monterey, Calif.

PVT. 1ST CLASS LLOYD H. GARDNER, for plunging into a storm-swept sea at Kwajalein Atoll to rescue two soldiers from drowning after his amphibious truck capsized. Pvt. Gardner was reloading a landing barge in the lagoon during a storm when his 2½-ton amphibious truck upset, dumping 12 men into the sea. Pvt. Gardner saw a man sinking and swam to his rescue. He succeeded in getting a life preserver around the victim and, dragging the soldier with him, swam to the rescue of another soldier. He kept both men afloat until a small boat picked them up a short time later. Address, Ponca City, Okla.

CAPT. JOHN O. GIVENS, for gallantry in action near Cape Iris, New Guinea, 19 Feb 44. Address, 2012 N. W. 20th St., Oklahoma City, Okla.

CAPT. PERRY H. GRAVES: In April 1943, in Tunisia as artillery observer and liaison officer, he accompanied the commanding officer of an infantry unit to the front-line position. Here he found the best observation post offered an excellent view of the enemy positions but afforded no cover for himself. Realizing the danger, he selected a more covered position for his radio operator but, without regard for his personal safety, occupied the observation post he had selected. Under heavy enemy artillery and mortar fire he occupied this post until he was wounded and his radio operator killed. It was due to his courageous and tireless efforts that his battalion was able to give such continuous and effective artillery support to the infantry. Address, 408 S. Franklin St., Robinson, Ill.

CPL. RALPH E. HAMEL, for gallantry in action at Mt. Tambu, New Guinea, 27 Jul 43. Address, R.F.D. 1, Bostwick, Neb.

LT. DONALD W. SCHROEDER, for gallantry in action near Tambu Bay, New Guinea, 22 and 24 Jul 43. Address, 109 McGraw St., Seattle, Wash.

PVT. 1ST CLASS BENJAMIN TESTONI, for gallantry in action near El Guettar, Tunisia, 30 Mar 43. When intense enemy fire severed a communication line, he proceeded voluntarily and at grave risk through heavy enemy artillery and mortar fire to repair the line. He fearlessly remained at his task until communications were restored. Address, Booth St., Thompsonville, Conn.

LT. EDWARD C. WALTER, for gallantry in action near Mateur, Tunisia, 23 Apr 43. When vital communications were disrupted, he voluntarily proceeded over terrain swept by intense enemy fire and personally delivered an important message. He then returned to his own area and directed effective artillery fire on enemy strongholds. Address, 1212 E. 4th St., Muscatine, Iowa.

S/SGT. HENRY J. WAWRZASZEK, for gallantry in action near Gela, Sicily, 10 Jul 43. When enemy tanks disrupted communications, he fearlessly left his position of safety, risked the hazards of street fighting and repaired the lines. His courageous action restored communications and enabled accurate artillery fire to be directed on the tanks, forcing them to withdraw. Address, 102 Barberry St., Rochester, N. Y.

LT. EUGENE J. WEINBERGER: In the Tunisian and Sicilian campaigns he served as an artillery forward observer for his battalion. Without regard for his personal safety he travelled over strange and difficult terrain and in the absence of roads used pack mules to transport his equipment in order to establish observation posts, often in front of his own lines, from which he brought accurate and deadly fire upon the enemy. His courage, calmness, judgment and devotion to duty were important factors in inflicting heavy casualties and materiel damage upon the enemy. Address, 7943 Blackborn Ave., Los Angeles, Calif.

CPL. BILLY L. WILLIAMS, for gallantry in action near Troina, Sicily, 4 Aug 43. When a radio operator was wounded during an engagement with the enemy, he left a position of comparative safety, crossed terrain exposed to enemy artillery, mortar, and machine gun fire, and administered first aid to the wounded man. His coolness in the face of grave personal danger inspired his comrades. Address, Tallassee, Ala.

T/4 THOMAS LEE WILSON: At Nashville, Tennessee, 2 Feb 44, when a gasoline stove in a mess truck exploded, the flames enveloped an enlisted man, setting fire to his clothing. T/4 Wilson at the risk of his life tackled the man, threw him to the ground and with his own body and hands smothered the flames. Address, 3165 Monroe St., Chicago, Ill.

PVT. KENNETH WISE, for gallantry in action near El Guettar, Tunisia, 30 Mar 43. He voluntarily proceeded under heavy enemy machine gun, mortar, and small arms fire to establish an artillery observation post in advance of the foremost infantry elements. His successful accomplishment of this mission assured close artillery support and facilitated the advance of the infantry. Address, 970 Sheffield St., Washington, Penna.

SOLDIER'S MEDAL

S/SGT. WLADYSLAW DUDEK, for heroism in the vicinity of Gela, Sicily, on 10 Jul 43. Sgt. Dudek and another enlisted man were washed overboard from an amphibious vehicle during a landing operation. Sgt. Dudek climbed back aboard the vehicle, removed his pack, and plunged into the choppy water to rescue his drowning companion. Although this attempt was unsuccessful, his courageous act at the risk of his own life exemplified quick thinking and courageous leadership. Address, 57 Withworth St., Thompsonville, Conn.

PVT. ROBERT E. HEATON, for heroism at Yeppoon Beach, Queensland, Australia, on 28 Nov 43. Address, 99A Spencer St., Boston, Mass.

PVT. MERRILL JOHNSON, for heroism at Saidor, New Guinea, 3 Jan 44. Address, Norton, N. C.

PVT. 1ST CLASSS RAYMOND J. KLINE: On Enubuj Island, Kwajalein Atoll, 4 Feb 44, upon seeing another soldier suddenly enveloped in flames from burning unused increments of gunpowder which had become accidentally ignited, he rushed into the flames with utter disregard for his own personal safety and succeeded in leading the soldier out of the flames to a place of safety, thereby saving his life. Address, 115 S 27th St., Bellings, Mont.

S/SGT. JOSEPH J. KUSCH, for heroism at Saidor, New Guinea, 13 Feb 44. Address, 5829 W. Dixon St., Milwaukee, Wis.

PVT. KENNETH TATE, for heroism at Saidor, New Guinea, 3 Jan 44. Address, Webster, Pa.

ROLL OF HONOR

LT. JEROME H. ASH, killed in action in North Africa, 17 Oct 43.

LT. IRVIN N. BORMANN, died in North Africa area, 1 Feb 44.

LT. WILLIAM F. CAREY, died in European area, 22 Apr 44.

W.O. WILLIS COLLINS, struck by lightning at Leesville, La., 21 Apr 44.

LT. HENRY L. ESPENSEN, killed in action in North Africa, 11 Jul 43.

CAPT. ED R. HALBACH, killed northwest of Mustang Field, El Reno, Okla.

LT. COL. WALTER H. HINSCH, died at Camp Shelby, Miss., 15 Nov 43.

LT. COL. JOHN McPHEETERS, killed in action in North Africa, 25 Mar 44.

LT. LAMBERT C. ROOT, killed in an air crash in European area, 24 Feb 44.

LT. ROBERT G. SHELTON, died at Camp Maxey, Tex., 17 Dec 43.

CAPT. HOWARD A. SMITH JR., killed in action in Italy, 1 Nov 43.

LT. MAURICE K. TOPSON, died in motor vehicle accident in European area, 14 Dec 43.

PVT. JAMES C. WADDELL, killed in action in Italy, 22 Jan 44.

LT. COL. HENRY C. WALKER, died in European area, 24 Feb 44.

LT. RUSSELL W. WALER, died in Southwest Pacific area, 25 Dec 43.

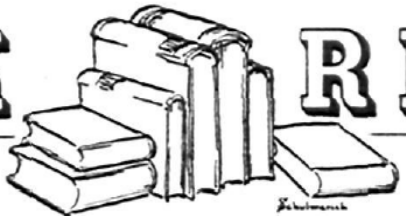
CAPT. RAYMOND W. WASHAM, killed in action in North Africa, 6 Nov 43.

LT. WILLIAM J. WEAKLAND, JR., died at Camp Gordon, Ga., 7 Dec 43.

LT. JOSEPH R. ZAGATA, killed in action in North Africa, 10 Jul 43.

CPL. HENRY ZAKRZEWSKI, died at Camp Shelby, Miss., 27 Jan 44.

BOOK REVIEWS



GIRAUD AND THE AFRICAN SCENE. By G. Ward Price. 282 pp. i. ill. The Macmillan Co. $3.00.

General Henri Giraud, a four-star general of the French Army, has had a colorful career. Notwithstanding, it is doubtful whether the American public would have been much interested in his doings had he not become prominently identified with the Allied invasion of North Africa in November, 1942.

His connection therewith was partly accidental. The Allies were seeking a general who would have the authority and prestige to quickly swing French forces into cooperation with their own plans. They dabbled with Marshal Pétain. They made approaches to General Weygand. Neither was satisfactory. At just about the right time Gen. Giraud escaped from confinement in Germany. He filled the bill for Allied needs, and was immediately engaged. Thereafter he worked heart and soul to direct French military forces in North Africa to aid the Allied invasion.

Mr. Price gives a good biography of his hero. He explains in considerable detail many of the events which occurred in connection with the North African campaign. His sources of information were General Giraud's records, which were placed at his disposal, and some personal observations of his own. For Price was a war correspondent, and a good one, and observed carefully what was going on.

It would have given greater weight if authorities for important statements had been more accurately referred to. It is stated (without revealing the authority) that the original date for the invasion had been fixed for the night of 27/28 November and was changed almost at the last moment to 20 days earlier in order to prevent the enemy from learning about it. It is claimed that the enemy believed the expedition, noted as it approached Gibraltar, was headed for Malta. This seems unlikely, as Malta was too small a place to handle 500 ships, stated as having been counted at one time.

Yet the book is instructive. It throws light on the political angles of a campaign where international politics had a dominating influence. Giraud gave of his best to aid his allies. He had many disappointments. From early contacts he had expected that he would be the C-in-C of the Allied expedition. He had prepared a plan which provided for an invasion of North Africa in the spring of 1943. It was to be accompanied by an uprising in France, coupled with an Allied landing in that country. The landing in Africa would be primarily to provide for the quick transfer to France of 200,000 troops of the African army. Giraud's plan was rejected, and he was himself relegated to a subordinate position under the American Gen. Eisenhower.

In spite of misunderstandings, Giraud worked with the Allies and to their mutual advantage. He was not so successful with his own people. From the beginning he met a hostile reception from the Free French leader Gen. de Gaulle. The latter had not been consulted about the North African invasion and knew nothing about it until he read of it in the newspapers. He immediately took steps to assert himself as the real commander of the French in North Africa.

With considerable political ability, de Gaulle gradually inserted himself into North African matters. He got a Council appointed with himself and Giraud as the leaders. He then later secured the elimination of Giraud from all matters not military. Recently Giraud has been eliminated as the military leader of the French.

It seems unfortunate that in a great nation like France, important differences should exist between high ranking officials at such times as these. Price's book explains the situation clearly, and points out some probable consequences of the chaos which may be expected to appear in France after the Germans have been driven out. In this he agrees with Field Marshal Smuts of South Africa, who has made a similar prediction.C. H. L.

WITH MY HEART IN MY MOUTH. By Duncan Norton-Taylor. 167 pp.; endpaper maps. Coward-McCann, Inc. $2.50.

As a general picture of conditions in the Pacific, this is by far the most interesting correspondent's story I have yet read. True enough the picture is always changing, but all newly-captured spots go through about the same stages and throes of development from mud to modernity; thus the reader can often substitute the place-names of the spots he's most interested in.

Norton-Taylor went into the Pacific area on behalf of *Time* magazine, and spent about 3 months there. He was a trained correspondent, all right, but not a case-hardened war correspondent; as a result his heart was often in his mouth. His very freshness to scenes of the type he describes gives him a new approach, one which mentions the interesting little details of daily life which are often overlooked as being commonplace, by those more familiar with them. In easy, highly readable fashion he describes places and events in New Caledonia and the Solomons, the start of the New Georgia campaign, bombardment of Vila Airfield, and the Battle of Kula Gulf. It's a job well done.

ATLAS OF GLOBAL GEOGRAPHY. By Erwin Raisz. 63 pp.; ill. Harper & Bros. $3.50.

Far from producing another gazetteer, Dr. Raisz (Lecturer in Cartography at the Institute of Geographical Exploration, Harvard University) has produced a completely new conception and execution. His maps bring the world into true global focus. Although his technique may be frowned upon by some cartographers, none other so well portrays on a flat surface the true inter-relation of the world's areas.

One of this atlas's greatest contributions is its effort to show the "geographical landscape." Instead of using colors to distinguish political boundaries or to show elevations, clear and logical symbols show at a glance the character of the terrain (such as whether mountains

are snow-capped or low and rolling), the extent and intensity of cultivation, relative sizes of major cities, etc. This treatment opens up complete new vistas to the student of geography and to those interested in the inevitable inter-play among the peoples and countries of the world. It is an essential complement to the conventional, detailed atlases with which we have been so long familiar.

A series of cartograms closes the book. This includes such things as the distribution of races, languages, and population, and other major statistical data lending themselves to that treatment.

Dr. Raisz has undoubtedly pioneered an approach to a general understanding of the world which will become more and more important as it is developed further.

GERMANY: A Self Portrait. Edited by Harlan C. Crippen. 458 pp.; bibliography; index. Oxford University Press. $3.75.

Mr. Crippen, a professional journalist, publishes a selection of 45 writings from 34 German authors. The originals appeared at various times since the period of the first World War. These selections have been chosen with a view of presenting the origin, rise, and nature of Naziism.

Some of the selections are historical. Others are short stories. All are believed to represent a correct description of Germany. Their authors include renowned writers, such as Anthon Zweig and Thomas Mann, the industrialist Fritz Thyssen, the statesman Gustav Streseman, the communist Rosa Luxemburg. They include some distinguished sufferers from Naziism. Naturally they had an intimate contact with and knowledge of the Nazis. Their accounts may have been influenced by the treatment they received, but so far as can be determined they have truthfully set forth the facts.

Germany is not described—only one aspect of it, but an important one at this time. For the Nazis have controlled Germany for over ten years, and right now are conducting one side of a gigantic war. It is well to know about them and what they stand for.

The selections are arranged in a chronological order beginning with the period just prior to the first World War. Each is dated, and connected with the next by a short narrative which briefly explains the political situation at the time.

Crippen's book is not a history, neither is it a military work. It is a series of pen views illustrating the conditions within Germany during the past quarter century. Its appeal lies more to students of psychology and of sociology, yet the military student can not ignore conditions which have made it possible to organize and equip an astounding war machine.

This book is a handy manual. It forms a reader's guide for the works of the 34 German authors whose writings have been drawn upon. Most of the selections make very interesting reading.

C. H. L.

A SHORT HISTORY OF CANADA FOR AMERICANS. By Alfred Leroy Burt. 263 pages; illustrated; maps; index. University of Minnesota Press. $3.00.

Americans will read this book with pleasure. The author, Alfred Leroy Burt, is a Canadian-born former head of the history department at the University of Alberta who has been living in the United States for the last 14 years where he now is professor of history at the University of Minnesota.

Knowing both Canada and the United States, Mr. Burt writes with conviction and for a purpose. "The future solidarity between these two North American countries depends on mutual confidence born of understanding." An entertaining narrative style assisted by more than 100 illustrations, photographs, and maps carry the reader from the pioneer days of the Hudson Bay Company and the Royal Canadian Mounted Police to the present.

Although this is a history of Canada, Mr. Burt shows how closely its development, its political fortunes, and its periods of depression and prosperity have been interwoven with those of its southern neighbor. In doing so he gives new meaning to some of the familiar events in the history of the United States.

F. B.

THE LISTENING POST. By Thomas B. Morgan. 236 pp.; index. G. P. Putnam's Sons. $3.00.

Unsuspected by the average person is the importance and the thoroughness of the Vatican as a leading news-gathering agency in the world today. Thomas B. Morgan, who spent 18 years on Vatican

Hill as correspondent for the United Press, reveals unusual data on the ways and means employed by the Holy See in ascertaining the veracity of events in Nazi-held Europe, despite the "protective presence" of German troops at its very portals.

Every means of communication from carrier pigeons to the ultimate in mechanical equipment is used to bring the news to Rome. The author cities the case of Poland, whence a courageous nun feigned a pilgrimage to the Eternal City to carry authentic news to the Holy Father. She had committed to memory a 3,000-word report written by a Polish Bishop describing the conditions in that country.

When Mr. Morgan, a war correspondent in World War I, journeyed to Rome in 1919, the great Cortesi (Salvatore Cortesi), representative of the Associated Press, told him that only three things in Italy were of interest to Americans—the state of health of the Pontiff, the assassination of the King, and the eruption of Mt. Vesuvius. Slim matter for a man with a nose for news! To keep himself busy Mr. Morgan delved into the history of the Vatican and emerged with interesting stories on the growth of the Holy See and its position as a peacemaker. He recounts how in the year 410 Innocent I quelled the mighty Alaric armed only with the glitter and brilliance of his canonical robes. During the Middle Ages the Pontiff was appealed to on many occasions to act as intermediary when the kings of Europe were shaping the map to suit their vanities.

The epoch of easy-going journalism ended with the advent of Mussolini and the election to the Papacy of Pius XI, the "fighting" Pontiff, who achieved the settlement of the Roman Question; this culminated in the signing of the Lateran Treaty, ending the 59-year seclusion of the Pope. Mr. Morgan believes that Mussolini's claim to history is based more on this than on any other political action.

When the present conflict began the Vatican was well aware of it and undertook many actions to avert it, not without rude insults from members of the Nazi hierarchy. The government of the United States also tried to avert it: Pres. Roosevelt sent as his personal envoy to the Vatican Mr. Myron Taylor, who was assisted in his efforts by Harold Tittman, able diplomat and former counselor of the American Embassy in Rome. Their mission of peace proved beyond reach, for "Il Duce" played poker and duped everyone. Myron Taylor returned to the United States, but in December, 1941, Mr. Tittman became a voluntary prisoner of Vatican City, from where he witnessed the allied bombing of Rome in July, 1943.

Although Mr. Morgan is not a Catholic he enjoyed the friendliest relations with high-ranking prelates of the Holy See. Naturally, his principal contacts were with members of the Vatican Secretariat rather than with the Pope. Colorful portraits are sketched of Cardinals Merry del Val, Gasparri, and Maglioni. He outlines the rise of Vatican diplomacy and the necessity for it. It is interesting to note that the Vatican was the first to send diplomats abroad and the inaugurator of a school for their training; this is the basis for recognition of Papal nuncios as Deans of the Diplomatic Corps in countries where there are nuncios. (In the United States there is an Apostolic Delegate, who carries no diplomatic portfolio.)

Pius XII, the present Pope, was well known to Mr. Morgan as the former Secretary of State, Cardinal Eugenio Pacelli. To him the Nazi menace is well known for he was nuncio to Germany during the last war, and later remained to witness the uprisings of the defeated people.

Of interest to many Americans is Mr. Morgan's account of Francis J. Spellman, Archbishop of New York and Military Bishop for Catholic members of the United States Armed Forces. As a young prelate in Rome, Archbishop Spellman amazed his brother prelates by his athletic prowess and his ability to do whatever was needed in a job. Other Americans too have left their mark on the Vatican.

To both Catholics and non-Catholics *The Listening Post* is a revelation in the far-flung influence of the organization of the Holy See. Many parts of Mr. Morgan's book are personal, all are interesting. His style is light and in spots humorous. Through the pages are many shrewd observations and simple explanations of questions the average reader wishes answered. C. P.

26th DIVISION; Summary of Operation in the World War. Prepared by the American Battle Monuments Commission. 85 pp.; pocket maps. Government Printing Office. $1.25.

Even during the present war the American Battle Monuments Commission is steadily, quietly, and efficiently pursuing its assigned work under the chairmanship of Gen. John J. Pershing. This particular

booklet is based on historical studies prepared primarily to determine the front line of each American division for each day of its active operations. Consequently it is essentially a front-line infantry study. Operations of other arms, movements of reserves, and other phases are covered only in sufficient detail to afford a complete understanding of the infantry action. This is facilitated by inclusion of three large 1/20,000 operations maps.

In addition, casualty and strength returns and enough other material are included, to present a connected history from organization of the division until the end of its service in Europe, and to portray its action in proper relation to the operations of the corps and army with which it served.

WIND IN THE SAHARA. By R. V. C. Bodley. 224 pp. Coward-McCann, Inc. $3.00.

Full of idealism aroused by high pronouncements during the last war (in which he served as a British officer), Bodley was completely disillusioned by the scheming craft at the peace conference. Lawrence (of Arabian fame) recommended he go live with the Arabs. Why? Well, why not? So he did.

His friends thought he'd be back in a few weeks, but it was seven years before he returned. That time he spent in the depths of the Sahara, not living just with the Arabs but truly as one of them. He built up his own herds, shepherded them himself, adopted the Moslem religion, came as near to *being* an Arab as any Occidental could.

These people he was with were utterly different from the dirty and degraded Arabs of the Mediterranean shore, with whom our troops have become so well acquainted. His friends lived deep in the silent fastnesses, in a land of weird beauties and solitude. They had not been corrupted by invading white influences. Their lives were like those of Biblical days. They are a pure race, rightfully proud of their heritage. There is much of value for us in this sensitive, intimate account of this strong, little-known people.

MILITARY APPLICATIONS OF MATHEMATICS. By Paul P. Hanson. 447 pp.; illustrated. McGraw-Hill Book Co., Inc. $3.00.

Mr. Hanson, a retired army officer, is now instructor in mathematics at The Manlius School. Both his background and recent experience fit him for preparing this book which applies in military situations the mathematics learned in secondary school and previously.

His selection and arrangement of material presuppose an entire understanding of arithmetic plus a knowledge of the fundamental principles of elementary algebra and plane geometry and trigonometry, and the ability to do logarithmic computations. For the benefit of those who have not recently studied mathematics and of those whose preparation falls short of the above requirements, he includes a mathematic refresher in condensed form which reviews all the mathematics needed for an understanding of the body of the book. It is so arranged that each individual can use it according to his needs.

The book itself is divided into chapters on military maps, field artillery gunnery, the mathematics of air navigation, and military applications (including range finders, motor transport, and practical military engineering). Well over half the volume is of direct use and benefit to prospective field artillerymen and to those whose mathematics training is a bit lopsided or who want to advance themselves. It is the most directly applicable book in its field, especially when one considers the frequent practical exercises (for which answers are given in the back of the book).

HITLER'S GENERALS. By W. E. Hart. 213 pp.; index; photographs. Doubleday, Doran & Co. $2.75.

Hart is the English name of a German who left his country in 1938. He later joined the British Army. Discharged on account of disability, he became an English journalist.

Hart had served in the German army for several years as an officer. Based upon this experience, and subsequent study, he presents a series of biographies of seven German generals and two admirals. Due to differences in age and grade, it seems that Hart could have had little personal contact with the men he writes about. He was, though, in a position to become acquainted with their general reputation, and has undoubtedly studied available records.

The first sketch in the book covers Field Marshal von Fritsch. He is Hart's hero—the organizer for victory for the German armies in Poland and France. This he may well have been. He was relieved as the German commander-in-chief in February, 1938, as the result of a disagreement with Hitler. Hart's account of how Fritsch came to go does not agree with some other accounts. In the absence of statements from the principal actors, it is yet too early to decide just what did happen.

Fritsch was succeeded by Field Marshal von Brauchitsch, who commanded the German armies during the campaigns in Poland and France and in Russia up to the winter of 1941-1942. At that time von Brauchitsch pointedly and publicly told Hitler that his proposal to go on to Moscow was all wrong. This impolitic action led to retirement.

Von Brauchitsch was in turn replaced by Marshal von Rundstedt, whom Hart considers as another military genius, although below the level of von Fritsch. He consequently considers that Hitler here made a good selection. Von Rundstedt extricated the German armies before Moscow, although not without loss. After completing this mission he was transferred to the command of West Europe, in the spring of 1942.

Germany did not believe that the Allies would invade Europe in that year. They did consider it possible. Von Rundstedt was given 25 to 30 divisions to defend France and the Low Countries. Hart considers that this force was so small that Hitler was gambling with destiny and counting upon von Rundstedt's ability rather than on strength. This criticism hardly appears justified. Thirty divisions sufficed for the task assigned during 1942 and 1943. In 1944, since Hart's book went to press, invasion of west Europe appears to be more probable. According to late reports von Rundstedt's command has been increased to over 60 divisions.

Short sketches are given of Field Marshals von Keitel and Rommel, who are represented as palace pets and devoid of real ability. In this there will be differences of opinion. According to some accounts Keitel first arose to high estimation in Hitler's view, as the result of his solution of the interior crisis in February, 1938, which resulted in the retirement of von Fritsch. Hart admits that Rommel, although mediocre as a general, has outstanding energy and ambition.

A chapter is devoted to Field Marshal von Bock, who succeeded von Rundstedt as commander-in-chief on the Russian front. Bock was not very successful and is rated as only an average general, suitable for commanding in minor operations.

The other sketches cover Field Marshal von Milch, admittedly a great organizer of air forces, and the Grand Admirals Raeder and Doenitz, neither of whom has accomplished much in the current war.

Hitler's Generals is well written—the German author acknowledges aid in this respect. It lacks the authority of scientific biography. As a popular work it fills a timely need for information regarding some leading Germans engaged in conducting war against the Allies.

C. H. L.

PADEREWSKI: Pianist and Patriot. By Antoni Gronowicz. 216 pp.; illustrated. Thomas Nelson & Sons. $2.50.

Mr. Gronowicz has written a sympathetic and understanding account of the life of a great man, not a formal biography of just the artist or simply the statesman. It is the story of a fine man, one who deeply loved his country and devoted much of his life to her search for freedom. He had a deep affection for his fellow men; he took great delight in using his genius for their benefit and pleasure.

Such a book could be written only by an understanding compatriot who was a friend of the subject. Besides knowing Ignace Jan Paderewski well, Mr. Gronowicz grew up in that same part of Poland that had been dominated by czarist Russia, and his father, like Paderewski's, was an estate manager.

Jessie McEwen's translation makes this a splendid gift for an older youngster.

MILITARY MAPS AND AIR PHOTOGRAPHS. By A. K. Lobeck and Wentworth J. Tellington. 256 pp.; profusely illustrated. McGraw-Hill Book Co., Inc. $3.50.

The last few years have brought increasing cooperation between the scientist and the soldier. *Military Maps and Air Photographs* results from the happy collaboration of a Professor of Geology at

Columbia University and an Instructor in the Department of Military Topography and Graphics at the U. S. Military Academy.

By using a larger-than-standard page size their drawings and photographs are large enough for practical study and use. Their emphasis on the whys and wherefores is a refreshing departure from common efforts to teach "by rote." All efforts are directed toward practical use in the field and in combat. Material includes questions and answers based on comparisons of maps (furnished) and air photographs (incorporated), and examples of stereoscopic pairs for examination. The whole affair is a "honey."

A PICTORIAL GUIDE TO MANY LANDS: The British Commonwealth and Empire. Edited by W. J. Turner. 312 pages; endpaper map, 48 color plates, 173 black and white illustrations. Hastings House. $5.00.

Canada, Australia, New Zealand, South Africa, India, East Africa, and the Colonial Empire are the theme of this round-up. History, geography, economics, and way of life are outlined and illustrated. This approach gives a more rounded understanding than could otherwise be had in so compact a form. Because of both format and content this book makes an ideal gift, including to a youngster first learning of the world at large.

FROM WILDERNESS TO EMPIRE: A History of California, 1542-1900. By Robert Glass Cleland. 372 pages; appendix; index; illustrations. Alfred A. Knopf. $4.00.

Although not a native son, Dr. Cleland has been a Californian for 55 years, since moving there at the age of 4. He has wandered over all of the state, covering a good bit of it by saddle horse and pack train. Long a member of the History Department at Occidental College, he is now with the Huntington Library. From personal interest and profession he is ideally fitted to recount the history of the Far West.

In writing *From Wilderness to Empire* there were two principal objectives: to avoid a local or provincial point of view, and to write an accurate history with a zest and flavor that would make it of general interest. The book is rounded and without bias, and has indeed a tang and vividness that make it absorbing.

Quite properly the emphasis is on the long and too-little-known period of first discovery, exploration, and development practically as an independent State. Discovery of gold brought this isolation to an end, and before long started a flood of immigration. A separate volume will recount the state's complex growth and development since the turn of the century.

A list of desirable works on California is included in the appendix. It is much more helpful than is a cursory bibliography, as enough is told about each volume that the reader can have an idea as to whether it likely will cover the ground he is most interested in.

UNDERSTANDING NEW ZEALAND. By Frederick L. W. Wood. 258 pages; photographs; index; endpaper map. Coward-McCann, Inc. $3.50.

Understanding New Zealand is at once colorful and authoritative. The author weaves a bright thread of high adventure into the fabric of solid, informative text, and gives the reader a vivid sense of the little Dominion's reality.

Mr. Wood has shared the life of the country for eight years as a Professor of History at Victoria University College, Wellington, and he has the true historian's knack of seeing it in relation to the various factors of its being.

New Zealand is something of a departure from the usual pattern of British colonies in that the early settlers were voluntary economic adventurers from the solid middle class rather than dissatisfied people who felt oppressed in the mother country. This fact has contributed naturally to a close filial tie with Britain which has been reinforced by economic ties.

Still the proud little country has an unmistakable identity of its own. It is characterized by the intelligence of its people and their skill-adaptation to the challenging conditions of pioneering. These add up to an impressive record of progress.

The native Maori now constituting between five and six per cent of the population is a social factor with a comparatively mild "problem" content. The force by which this proud, intelligent people was subjected to the *pakeha's* domination was not harsher than necessary

for the purpose. Despite their basically different social and economic philosophies the two races live together with a rather unusual degree of mutual respect and some identity of interests which is sharply accented by the global war. F. E. J.

THE POWER WITHIN US. By Haniel Long. 37 pages; endpaper map. Duell, Sloan & Pearce, Inc. $1.50.

Four centuries ago a small group of Spaniards, headed by Cabeza de Vaca, wandered for eight years throughout our Southwest and Mexico, from the shore of the Gulf of Mexico to Mexico City. De Vaca's report to his king was necessarily guarded, tempered for the royal ear. Between its lines, however, were many suggestions of a true mystical feeling about man's increase in inner life from danger, from effort, and from taking thought of his fellows.

Mr. Long perceived this feeling, and brings into the open the rich inward history embedded in the original report. He does so by writing a "supplemental letter" which, historically accurate, portrays an authentic mysticism in combination with universal appeal. Although written in the form of prose it is poetry in its finest form. It is the meditation of a thoughtful man on powers he could not name or even profess to understand, but who—by giving when he had nothing, found within himself the steady currents of adaptation and sympathy.

SUBJECT INDIA. By Henry Noel Brailsford. 259 pp.; sketch map; index. The John Day Co. $2.50.

The author prefaces his work by stating that "I believe that India is the concern not merely of Britain but of all the United Nations, and that America with China may have a part to play in shaping its future."

With this amazing kind of frankness the author proceeds to treat of India, its past history and the present, politically, economically, and socially. There is just enough past history to orient the reader before Mr. Brailsford projects himself completely into the current affairs of India.

The press today is lavish in the space devoted to the Churchill theme that the Empire Policy will continue. Mr. Brailsford, as would be expected from his previously quoted belief that India is the concern of all United Nations, disagrees completely with Mr. Churchill and foresees that Britain as an Empire is on the wane, that she is being slowly liquidated as a political monopoly, and that she is becoming but one of an affiliated group. This book cannot be too highly commended for its lucidity. At a time when the publication of a book merely demands that it be sensational or highly publicized, this John Day publication merits profound study. A. E. G.

TURKEY: Key to the East. By Chester M. Tobin. 170 pages; illustrated. G. P. Putnam's Sons. $2.00.

In the brief space of 170 pages the author brings into view the political reality of Turkey and promotes a clearer understanding of its national objectives. This has required a careful selection and arrangement of pertinent facts with no room for rambling.

The history of the country, its peculiar relationships with the rest of the world, and the national and international forces that have contributed to its uneven course, are condensed into a direct and very enlightening account of this rather shadowy member in the family of nations.

Turkey has been a victim of harsh propaganda and greed. It has been interpreted variously according to special interests and the popular notions thus engendered have persisted. This book contributes to a wider knowledge of the country and higher respect for its principles. F. E. J.

MILITARY PSYCHOLOGY. By Norman C. Meier. Foreword by Lt. Gen. Ben Lear, U.S.A. 368 pp.; glossary; index. Harper & Bros. $3.00.

Gen. Lear's remark that this book "might well be used as a text by our universities, colleges, and high schools" is probably the most explanatory phrase that could be used in describing this book. It is at once a text-book, a working outline, and an indication of an education.

In his foreword Gen. Lear has said much in a very short space, and his words could well be used in a review of *Military Psychology*. The context is excellent and thought-producing. Psychologically, all that is necessary is here detailed. The title might mislead readers to believe

that only military matters are analyzed, but the work proves much more inclusive. Psychology is psychology, whether it be military or civilian. The only difference, it seems to this writer, is that more emphasis is placed upon the fact that military means men, and segregated men especially.

Gen. Lear's observation that "Our young men and women were not well grounded in geography, political and economic," and that they were lacking in historical knowledge, both world-wide and national, would be eliminated to a great extent were it possible to interest them in the *Military Psychology* written by Mr. Meier. This is not meant as an indication that *Military Psychology* would automatically instill knowledge or intelligence in the younger readers, but it does mean that an appreciation of the basic principles treated in this work would arouse an interest in the student that might well provide the necessary impulse to make them seek voluntarily those many facts and sciences which together constitute knowledge.

An important book for the military and the civilian, especially in the latter class, statesmen and educators. A. E. G.

THE WOUNDED GET BACK. By Albert Q. Maisel. 230 pp. Harcourt, Brace & Co. $2.50.

This is an encouraging book—encouraging because the O.W.I. reports that nearly 97% of the lives of American soldiers and sailors wounded in action are saved. *The Wounded Get Back* is an eyewitness story of how this medical miracle has been achieved. Mr. Maisel spent five months, on the Navy's invitation, in the South Pacific theater. He traveled to every part of the battle zone from New Zealand to the Solomons, and writes vividly of every aspect of the medical front from the great base hospitals, the battleships, the airplane ambulances, and hospital ships to the forward outposts of the jungles. He has caught the workaday humor and the high heroism of the doctors, nurses, corpsmen, and of the ordinary G.I.s themselves. His book is an inspiring report on a part of the war which will be of interest to everyone who has a friend or relative in the service. M. E. M.

OUR JAPANESE FOE. By Ian Morrison. 129 pp. G. P. Putnam's Sons. $1.50.

This work purports to "give full credit to Japanese culture," and states that the "Japanese are a nation of idealists."

Mr. Morrison endeavors to sketch briefly the factors which have contributed to the Japanese social, political, and spiritual growth. He has done this from his many years' experience in the Orient. Whether or not his conclusions are accurate is another matter. Recent arrivals from neutral countries who were residents of Tokyo during Doolittle's raid upon that city are at complete variance with Mr. Morrison's conclusions as to the Japanese ability to "take it."

That the Japanese are a bitter foe is admitted. That they are fanatic is admitted. These Japanese traits have been long known to the general reader of periodicals. Where Mr. Morrison has neglected a strong opportunity to add to the body of knowledge is in his lack of a comparison between Naziism and Japanese Militarism. Fundamentally, the principles which govern Naziism and those which control the Japanese "sense of mission" and "sincere conviction of the fundamental altruism of the new order they [the Japanese] are attempting to create" are identical.

The price of the book is not sufficient to dent the student's slim budget, and for information it is a good book to read. The conclusions drawn, however, should be scrutinized with great care before being accepted in full. A. E. G.

BOMBARDMENT AVIATION. By Keith Ayling. 224 pp.; index; ill. Military Service Publishing Co. $2.00.

Beginnings, development, and present technique of aerial bombardment are the theme of Mr. Ayling's latest book. A former R.A.F. operational pilot, Mr. Ayling has a knowledge and background that command the respect of flyers and permit him to write in a flowing manner, without a fumble. Without a "dry" bit in it, this book is filled with concrete examples of what our bombers have been doing, how they have gone about it, and why. In short, *Bombardment Aviation* gives a comprehensive history of bombing organization, development, and accomplishment to the end of '43. It is a fit companion for his recent *Combat Aviation*, which has attracted so much attention.

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JEZEBEL THE JEEP. By Fairfax Downey. 150 pp.; ill. Dodd, Mead & Co. $2.00.

Maj. Downey has written a delightful war-based story, the life and loves of Jezebel and her driver, Pfc. Johansen. It runs from Jezebel's birth on the assembly line through her death in Sicily—really a bit further than that, for (akin to the ancient Phoenix) at least part of her rose from the scrap heap. In the course of her career she did honorable and truly heroic service with an artillery battery through the North African campaign and in the island invasion. Incidentally, the course and incidents of these battles are faithfully followed with historic accuracy.

In the first World War Maj. Downey served with the 12th FA and as a BC in the 31st FA. Between wars he was a newspaperman, and later a free-lance writer. Commissioned a major in this war, he served at Ft. Bragg and on staff duty in North Africa. Just recently he has returned to civil life.

ABOUT PEOPLE. 105 drawings by William Steig. Duell, Sloan & Pearce. $1.50.

In these sketches Mr. Steig often reaches deep into the subconscious. Some of the drawings have a nightmarish quality, some will haunt you for many a day, others bring uproarious bellylaughs. Nearly every one will recall some mood, incident, or dim recollection from the distant past. Psychologically they are sound, with some perhaps verging on the psychopathic.

NEWS OF THE 45TH. By Sgt. Don Robinson; illustrated by Sgt. Bill Mauldin. 158 pages. University of Oklahoma Press. $2.00.

The *45th Division News* has recently had a big play in the civilian papers, which those who follow Army writing considered long overdue. Sgt. Don Robinson and his staff started from scratch during the "national emergency" and kept the paper coming out regularly as the 45th trained in various parts of this country before going into action in Sicily and Italy, where the staff worked so close to the front lines that they got in the way of operations.

News of the 45th is a straightforward, often humorous tale of the tough grind of newspapermen who believe that getting the paper out is second in importance only to getting the U. S. Mail through. The book gives a deftly written account of the transition from the fuzzy-chinned, yardbird training days to the tough, bewhiskered veterans of combat. It has an eye open for the ludicrous but it sticks to facts, and not once does the author drag in the hoary old gags known to Caesar and Sun Tzu which other soldier-writers insist on passing off as World War II.

It is a good, amusing book, and has set a high target for any other outfits which plan to issue informal divisional histories—and I certainly hope that each division is working on one. R. G. M.

THE STORK RUN. Edited by Becky Reyher. 56 pp. Hastings House. $1.00.

"They" say that the nation's birthrate is leveling off after its sudden wartime increase. Maybe so, maybe so. But there is still a pretty good annual crop, and 'most anyone related to some of the harvest will get lots and lots of laughs out of the collection of baby cartoons, taken from the best in *Collier's, The New Yorker*, and many another publication.

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