The FIELD ARTILLERY Journal

JUNE, 1943

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ARTILLERY PHONES at the front nestle in any shelter available, as our cover emphasizes.

HONORS have justly come to many Field Artillerymen in this war. Recognition is their due. In this JOURNAL are noted a considerable number of awards and citations. Full information is not now available, however, so this listing is admittedly incomplete. We therefore ask that all artillerymen cooperate by forwarding to us a copy of all awards and citations of which you may know, as well as any available information bearing upon the death of any artilleryman as a result of enemy action, or the demise of any Association member.

MOST MEMBERS, including those overseas, mail in their renewal dues promptly upon receipt of expiration notices. Due to busyness, maneuvers, and whatnot, a few delay for quite a while. In those cases we are not always able to furnish all the back copies desired, even though we do mail a few extra issues after actual expiration.

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And speaking of the *Military Review*, special laurels are due its staff for maintaining its high standards despite the extra work involved in monthly publication. $3 is well invested in a subscription.

ADDRESSES ARE CHANGED on our stencils the day they arrive. A large number are cared for each day—but still, not quite enough. Each month some mail and magazines are returned marked "Moved—no forwarding address." So if your JOURNAL hasn't been arriving, the chances are your stencil is in our "hold" file. Moral: whenever you move, let us know where you've gone just as soon as you possibly can. We'll do the rest.

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INVASION ROUTES
into
WEST AND SOUTH EUROPE
Statute Miles
ICELAND
GREAT BRITAIN
NORTH SEA
SWEDEN
NORWAY
DENMARK
GERMANY
POLAND
FRANCE
SPAIN
SARDINIA
CORSICA
SICILY
MALTA
GREECE
CRETE
YUGOSLAVIA
BULGARIA
HUNGARY
AUSTRIA
Berlin
Paris
Rhine River
Danube River
Loire River
Rhone River
Po River
Alps Mountains
Pyrenees Mts.
Rhodope Mts.
Balkan Mts.
Ligurian Sea
Tyrrhenian Sea
Adriatic Sea
Aegean Sea
Mediterranean Sea

ROUTES INTO EUROPE

A Study in Terrain

By Col. Conrad H. Lanza

It has been officially announced that an invasion of Europe will be made from the west and/or south, in conjunction with continued Russian efforts to advance into central Europe from the east. The mission: destroy the power of Germany and capture its capital—Berlin.

Russia is engaging on her front about 220 Axis divisions, of which some two-thirds are German. At least 100 German divisions are in occupied western Europe, or in GHQ reserve, from time to time changing places with divisions in line in Russia. About 100 more Axis divisions belonging to vassal states are also in European areas. Russia desires that an invasion be made on such a scale as to absorb this mass of unengaged Axis divisions and thereby make it impracticable for the Axis to replace exhausted divisions in Russia. To accomplish such a mission would require that one-half or more of the 200 available Axis divisions be engaged in battle. The magnitude of the invasion task is apparent.

Selection of invasion routes depends upon

1. **(a) Sea route, with particular consideration to the rapidity in which successive waves can be landed.**
   (b) Debarking facilities, with special reference to rapidity and safety.
2. **(a) Distance from debarking area to the objective; in this case, Berlin.**
   (b) Probable resistance en route to objective.

The nearer a debarkation area is to its base, the more rapidly transports can make round trips. In the Straits of Dover it might be possible under favorable circumstances to make two round trips per day, but if the route be from Algeria to south France (about 450 miles each way) it might take four or five days per round trip and eight times as long to concentrate a force on land as would be required near Dover.

Debarking facilities are closely connected with the sea voyage. Transports need to be discharged before they are available to return for the next wave. This will depend upon weather and sea, nature of the shore, etc. Ports would be valuable, and will be essential for large invading forces. Ports which would be useful have already been severely bombed, and are reported as unusable or can be expected to be in that condition by the time they are captured. It is quite possible to recondition ports rather rapidly, however, provided the necessary experienced personnel and equipment arrive promptly on the job.

It will take an appreciable time for an expeditionary force to advance far inland. During this early period of an invasion, on account of short land distances, the needs for motor and rail transportation will be reduced to a minimum; much material of this class need not be landed until later, by which time a port may be available. But of course careful planning is required throughout.

Possible invasion areas are reviewed briefly in the following pages, in counter-clockwise sequence beginning with Norway.

NORWAY

Norway is not on the direct road to Berlin. Nevertheless its capture would be useful and would be an essential preliminary for certain other invasions. Norway furnishes the Axis with raw materials, including nickel, copper, chromium, molybdenum, fish, lumber, paper, and some agricultural products. Some German industries have been established in Norway, and considerable Norwegian labor is working for the Axis in Germany. It may be unwilling labor, but it does aid the Axis. Norway is a base for German submarines and air forces which raid convoys bound to and from north Russia.

Our possession of Norway would remove this menace and also give close connection with Sweden. At present Sweden has only restricted access to the outside world; all its exports are practically at the disposal of the Axis, including a large and valuable ore trade. It is quite probable that if the Allies drive the Axis out of Norway, Sweden would join the United Nations. In any case its commerce with Germany could be stopped.

Estimates of the Axis forces in Norway vary from 10 to 20 divisions, of which 2 or 3 are at Narvik, isolated from the balance in south Norway except as sea and air transportation are available.

The most effective method of invading Norway would be to strike on the south coast between Kristiansand and Oslo. Here are satisfactory beaches for debarking, with considerable ground for maneuvering. Good roads and railroads lead into the interior. The minimum immediate opposition would be 6 enemy divisions, and the maximum 14 or 15. If the landing were successful it would cut the enemy's line of communication with Germany and prevent his being reinforced except by air. It would enable all other German positions to the north to be attacked from the rear, and would most quickly open a route to Sweden.

While most promising as to possible results, this route is difficult. It involves a sea approach from Britain of 500 miles, the latter part of which is exposed to attack from both flanks by light naval and air forces. As 500 miles is a long distance from bases for fighter planes, the enemy would probably have the advantage in the air. The coast is strongly fortified, and it is the location in Norway in which the enemy's troops can be most quickly concentrated.

In west Norway there are a number of ports, without intervening beaches, suitable for landing. These ports lie within fjords—narrow and bordered by high ground. Ports lie between the sea and the mountains. There is little ground for maneuvering around them. Roads leading inland pass through high mountains and are actually defiles; all of them have been prepared for defense. In 1940 the Allies seized two of these ports, there being no opposition at that time. The expeditions failed, due to loss of supplies at debarking points; enemy bombing made impracticable the supply of troops which did not exceed a division in strength.

The enemy's main force in Norway (at least 6 divisions) is held in readiness in central south Norway, and can within 24 hours reach any part of the coast southward from Trondheim (inclusive). An attack on Norway from the west would not interfere with the enemy's communications with Germany and would leave him free to send more divisions to Norway if he found it necessary to do so.

An invasion of west Norway at (or south of) Trondheim is not promising unless it is coupled with an invasion of south Norway.

The most valuable objective on the west Norway coast is Narvik. Through this port large ore shipments used to be made to Germany. It is now a submarine and air base, and fish depot. About 2 enemy divisions, possibly 3, are reported at Narvik and vicinity. Since 1940 the Germans have been constructing a motor road and a railroad northward from near Namsos Fjord to Narvik. This is a distance of over 350 miles, over mountains and glaciers, and is a major engineering job. After three seasons of work the head of this new line of communications (at the beginning of winter, 1942-1943) was reported as still 100 miles short of Narvik. Some work had been done on the last section, and the present plan contemplates completing the task by autumn of 1943. If and when this is accomplished Narvik will no longer be isolated, and the Axis can then reinforce that point by an interior line.

An attack on Narvik in 1940 succeeded. It was at that time held by about a reinforced regiment with only minor air support. The sea approaches were not defended. But now the entire area is organized for defense and has both air support and considerable artillery. It would not be impossible to recapture Narvik, but it would be much more difficult. There are places within 50 miles where troops with light materiel can be landed. Thereafter it would be mountain fighting. Air support would be needed, and initially would have to come from naval carriers. After the road and railroad reach Narvik, its capture will increase in difficulty.

DENMARK AND NORTH GERMANY

The possibility of landing in north Germany, from the Baltic Sea, should not be excluded from consideration just because it now seems hazardous to attempt. A force landed there would have the shortest distance to go to reach Berlin, around 100 miles, over terrain which offers no important obstacle.

This coast can not be reached unless the sea passage by Copenhagen has first been secured. And Copenhagen will be difficult to take, unless Norway is in our possession. Possession of Norway is essential to Allied military operations within the Baltic Sea area.

Copenhagen was secured during the Napoleonic wars by a direct naval assault. If this can not be repeated, it will be necessary to reduce it through landings in Denmark. The shore line along the north and west coasts offers no special obstacles to landings, but the location of Denmark makes it possible for the enemy (utilizing its excellent road system) to concentrate troops rapidly in that area. At least 40 divisions are available for that purpose. Unless Norway is first taken, the enemy will have air bases north, east, and west of Danish landing areas, and will further be able to attack ships with submarines and light naval surface units. Until the German divisions in Germany are drawn off elsewhere an invasion of Denmark does not look promising. This time may not be so far off.

If the route to the Baltic is opened, it would enable landings to be made at as many places in north Germany as desired. This coast is not yet strongly defended. The best chance of success would be after the Axis armies are heavily engaged either in Russia or against invasion armies elsewhere. When this occurs, an additional invasion by the Baltic route may secure decisive results.

NORTHWEST GERMANY, AND THE DUTCH COAST EAST FROM TEXEL

The sea journey to this area from Britain averages about 250 miles. Overhead cover could be furnished for expeditionary forces. Most of the coast is bordered by a string of islands separated from the mainland by a few miles of mud flats or shallow water and under effective artillery fire from batteries on the mainland. It would consequently be difficult to organize preliminary bases on them. Ship channels between the islands lead to ports. All are heavily defended. The entire country for miles back of the beaches is fortified. Very large enemy forces, totalling 50 divisions or more, can be concentrated in this area through a dense system of roads and railroads. Strong enemy air forces are in the vicinity, and numerous airfields will enable him to reinforce his air fleets within 24 hours.

By reason of the very strong forces which the enemy has in this area an invasion here does not seem advisable unless coupled with invasions at other points. If the invasion is made, an advance toward Berlin over the shortest route would require a 200-mile advance north of the Elbe River. This line of approach will have the Baltic Sea to cover the left flank and the Elbe River to cover the right flank. The front will gradually increase up to 80 miles. This indicates a fighting front of 20 divisions, exclusive of the right flank guard and a rear guard covering toward Denmark. As a landing north of the Elbe

will cut the enemy's line of communications with Denmark, a minor expedition to free that country is indicated. This in turn will open the Baltic route, and permit landing in rear of the enemy's right if he is facing an invasion army coming from the mouth of the Elbe River.

If a landing is made west of the Elbe River, the distance to Berlin is increased to 250 miles. In this case it will be necessary to cover both flanks of an army advancing into the interior, which would necessitate very large forces.

THE LOW COUNTRIES, SOUTH OF TEXEL

The sea route to this area averages about 100 miles. This favors rapid augmentation of an invading force. Air cover from British bases is available. Ports would be excellent, if reconditioned.

This coast has been extensively fortified by the enemy. He has been so proud of his accomplishments in this regard that a regular tour has been arranged of the sector to show visitors how impossible, or improbable, it would be for an assailant to break through. With excellent communications the enemy could concentrate up to 50 divisions in this area within a short time. He is equally prepared to bring in strong air forces. His airfields have permanent garrisons to prevent seizure by parachute troops.

The enemy has prepared obstacles to prevent advances from the coast should its defenses be passed. Bridges have been arranged for demolition; antitank ditches exist; the able-bodied population has been removed, together with all supplies, rolling stock, and motor transportation. Light enemy naval forces with air support reconnoiter far to sea all night and during fogs, to give warning of the approach of invaders.

The coast defenses, according to latest reports, consist of strong points deeply buried with 50 feet of concrete overhead cover, believed sufficient to protect against the heaviest bombs. There are several of these, mutually supporting one another. They have permanent garrisons, an independent water and power supply, and are stocked for prolonged resistance. All around fire is provided. Special care has been taken to insure OPs overlooking probable landing beaches, so as to maintain a constant artillery fire on them. The guns are in turrets projecting above the strong points.

If a landing is made north of the Rhine, that river will cover the right flank and the sea the left flank, with a front not exceeding 40 miles to start with—which could be covered by 10 or 12 fighting divisions. An advance through Holland will find numerous canals and possible inundations, which are not such serious obstacles as were at one time believed. The front will increase in width until the east boundary of Holland is reached; there it will be about 100 miles wide.

Here the advance will find the German West Wall. This, constructed in 1938 and 1939, has been overhauled and improved. It is at least as strong as the coast defenses. If this is pierced, an advance toward Berlin would be the same as heretofore discussed for a landing west of the Elbe River. The total distance by this route to Berlin is 350 miles, and the invaders' right flank would have to be protected for the entire distance.

If landings had not already been made in northwest Germany, such landings would be indicated as soon as the West Wall had been pierced.

If landings are made in the Low Countries south of the Rhine River, the initial coast defenses to be broken through are similar to those mentioned above. An advance through south Holland and Belgium will meet a strong enemy line following the Meuse River, partly based on a system of fortresses (such as Liège and Namur) between which additional works have been built. The West Wall would also have to be crossed, as well as the Rhine River. The entire distance to Berlin is at least 50 miles longer than for landings north of the Rhine. An advance by this route would have the Rhine to cover the left flank as far as the west part of Germany, but strong forces would be needed to guard it. The right flank would be entirely exposed and as the advance progressed would require constantly more troops. Against an invasion by this route the enemy could concentrate some 40 divisions or more from Germany and 20 or more from France. This sector would be one of the hardest in which to successfully accomplish an invasion.

NORTH FRANCE AND BRITTANY

East of the Seine distances from England vary from 30 to 90 miles, with excellent beaches to land on and good routes of communication leading inland. The coast is defended in the same manner as in the Low Countries. The coastal garrison is weak, being merely for observation and local defense of the more favorable landing places. In rear are divisions in readiness, who can be brought into line within a few hours. In the raid on Dieppe in the summer of 1942, the enemy discovered the invaders more than an hour before our artillery preparation was fired by naval vessels and about an hour and a half before troops landed. This was sufficient to alert all local forces and start to the menaced sector both the divisions in readiness and important air forces.

An advance on Berlin from this area would require covering 500 miles. Two routes are available. If the advance turns to the left it will pass through Belgium and meet the same obstacles as already discussed under the Low Countries. Our left flank would be protected by the sea and overhead cover could be provided from air bases in Britain, but the right flank would be completely exposed and in a dangerous position. The enemy could concentrate at least 20 divisions initially in this area and could build this up to the limit of his reserves.

If the advance is initially directed in the direction of Reims, both flanks will be exposed and the enemy will have troops available to strike simultaneously from both flanks and the front. The front could be as wide as desired—with a minimum of some 80 miles and a maximum of double this or even more.

The enemy has prepared a line of defense along the Oise River, which connects in Belgium with the Meuse River line. Another line extends through Sedan, Verdun, Toul, and Epinal; this includes fortresses long in existence but which have been completely reconstructed and connected by suitable secondary works. Then there are the West Wall and the Rhine valley.

West from the Seine, the entire coast to include all of Brittany has been covered by strong defense systems. Ability to land is about the same as east of the Seine, except that distances from England vary from 80 to around 100 miles. Distance to Berlin is increased to 650 miles.

There is no worthwhile objective for an invasion in this area except Paris or the line Paris—Orleans. The latter could not be held, however, unless the Seine and Loire Rivers are held from the cities mentioned down to the sea. This would give a front of about 360 miles and would require 70 to 80 divisions to hold (exclusive of reserves which would be needed). To secure the line of the Loire would require invasion of Brittany. A preliminary objective might be the seizure of the Cherbourg peninsula by landing simultaneously on both sides.

An invasion of Brittany is considered by many as most promising. If the initial landings are made on both sides of the base, they would be some 80 miles apart overland. The enemy would have probably 20 divisions available within the first few days. If these can be overcome and the 80 mile gap closed by a line from Mont St. Michel to Nantes, the peninsula to the rear can be reduced by a separate operation and the excellent port of Brest captured. There would then be space for airfields, troops, and depots for a further advance to the line Paris—Orleans, which would require troops in proportion to increasing lengths of front. Once established, all advances could be supported by new landings on the north coast which would constantly threaten the enemy's right. The Loire is an excellent obstacle to cover the right flank.

An invasion by this route will tend to reproduce the situation as it was in 1918, by eventually building up an Allied line extending from the English Channel to Switzerland. If no other operation were undertaken there would be an important difference. Since Italy is now an Axis Power, the enemy is free to debouch from that country—he would be in a position to attack the right and rear of Allied forces in north France. To prevent this possibility it would be necessary to clear the enemy out of all of France and block the line of the Alps from Switzerland to the Mediterranean Sea; this would reproduce the situation of the winter of 1939-1940. (For further discussion of this case, see next two portions.)

All this indicates a campaign which would involve millions of troops.

WEST FRANCE SOUTH OF THE LOIRE RIVER

This coast has good beaches, but the sea in the Bay of Biscay is at times very rough and may for days be unsuited for landing. Should this condition occur after an expedition has been partly landed it might lead to a dangerous situation for troops on shore. The sea distance from British ports will run up to 500 miles, and expeditions will be exposed to attack by planes, submarines, and motor torpedo boats for nearly the entire journey.

North of the Gironde River an advance inland would have both flanks exposed, and back of a well protected coast would find numerous streams which would make good lines of defense. The enemy would have 20 to 25 divisions available for this area, without drawing on GHQ reserves. This is not an area which by itself would probably be worth while.

A landing south of the Gironde River, if proceeding inland keeping south of the Garonne River until it had built up to strength, would have the Pyrenees Mountains to cover the right flank and the line of the Garonne on the left. This country is rough (due to numerous spurs extending outward from the Pyrenees) but it would be practicable. Best chance of success would be to couple this invasion with another landed near Narbonne on the Mediterranean and moving eastward, as discussed below under South France. Success in this area will isolate the Axis from Spain, cut off Axis imports from that country, and open the possibility of Spain joining the United Nations.

Operations in this area, if on an extensive scale, will draw enemy reserves to the tip of his southwest wing (800 miles from Berlin), from where they could not quickly be withdrawn for action in other theaters. If enough Axis troops can be engaged in South France it will then be easier to stage invasions further north.

The distance from the Atlantic to the Mediterranean coast in South France is 250 miles, with good roads and railroads parallel to the Pyrenees Mountains. A front line extending across this distance and facing north would require 50 divisions, including reserves.

SOUTH FRANCE (LESS CORSICA)

Assuming that Corsica is first established and organized as a base for invasion forces in order to reduce the sea distances from North Africa from 450 miles to 150 miles, it is possible to land anywhere on the south French coast, so far as beaches are concerned. Harbors are numerous.

East of Toulon mountains approach the sea, with poor communication lines over them. Beaches are in general in front of towns and cities. In between, the rocky shore will prevent landing other than troops and light equipment. People have been evacuated from towns having beaches, and by liberal use of concrete their houses converted into strong points to cover the beaches. If landings are made here the expeditionary force will be crowded into a narrow coastal strip, unfavorable for an advance inland.

West of Toulon, excellent lines of advance are available by using the Rhone valley. This coast is not quite so rocky and more favorable for landing. The important ports of Toulon and Marseille are being converted into fortresses and the entire area is being fortified. A large

part of the local population has been impressed for labor on this project.

From the Mediterranean to Berlin, by advancing up the Rhone valley and thereby turning the Alps and Switzerland, is 800 miles. There are favorable defense positions across the Rhone, but there are practicable detours by which they can be outflanked. There are excellent roads and railroads through this area; at least three lines are available: one in the valley and one on each flank. There is ample space to employ large forces. The right flank, covered by the Alps, would need but minor forces to watch it. Excluding forces coming from Italy, the enemy could have 25 divisions within South France within a few days.

An advance from the vicinity of Marseille would be facilitated by the simultaneous landing of other forces at Cette, to advance north and northwest and maintain liaison between Allied forces in the Rhone valley—and still another expeditionary force near Narbonne, to proceed westward toward Toulouse to meet a force from the southwest coast of France, as already discussed.

It would be possible to reverse these landings and start at Narbonne. After junction has been made with a force coming from the Atlantic and a line established north of the Pyrenees Mountains, an advance north from that line could be supported by landings near Cette and then later from near Marseille and Toulon.

After central France has been reached, an advance around Switzerland toward Berlin will cover the same route as from Brittany or the Pyrenees area.

ITALY (WEST SIDE), TOGETHER WITH THE ISLANDS OF SICILY, SARDINIA, AND CORSICA

Probably Allied Headquarters in North Africa is studying plans to capture the islands of Sicily, Sardinia, and Corsica before proceeding to invade the south side of Europe. We could establish bases there, to shorten the round-trip transport routes from bases to debarking areas.

Sicily has ample terrain (mainly on the south side) for airfields and bases. There are numerous small harbors all along this coast, and good beaches. A large part of this area is a slope towards the sea. Consequently villages and towns for some distance inland are clearly visible to ships and could be taken under fire by naval vessels. The country is densely populated. According to statements from the enemy, all towns have been organized into strong points.

The south side of this island is separated by a high mountain range from the narrow coastal strip of the north side. This contains excellent harbors at Palermo and Trapani, but little maneuvering ground: large forces would be crowded in this area. There are but few passes over the mountains, the two main ones (each having a road and a railroad) being near Palermo. The mountain range culminates at the northeast end of Sicily in Mt. Etna, over 10,000 feet high. South of this mountain there are excellent ports, including Catania, Syracuse, and Augusta. Messina at the northeast tip of the island is a good port, but would be under artillery fire from the Italian mainland.

When Tunisia is in our hands the south shore of Sicily will be about 200 miles away. Debarkation on this shore can be covered by naval ships (there being deep water close to shore) and by air cover from Tunisia or Malta. There is no information as to the enemy garrison in Sicily.

Sardinia is generally mountainous, but there are level areas for airfields and for assembling troops. The south end of the island is less than 200 miles from North Africa. Beaches suitable for landing are restricted in number. Occupation of Sicily and Sardinia will reduce the sea voyage from Africa to the Italian mainland (one way) from 100 to 200 miles. Outside of the time saved by shortening the route, the elimination of enemy air and naval bases on these islands is important. Once captured, only small garrisons would be required to hold these islands—for without control of the sea it would be almost impossible for the enemy to retake them.

Corsica is a necessary advance base for operations against either South France or the Ligurian Gulf. The island resembles Sardinia, being mountainous, but with ports, airfields, and space for assembling large forces.

From the French border to the Arno River the coast of Italy resembles that of South France, being a narrow strip between the sea and steep mountains, unsuitable for large bodies of troops. There are a considerable number of passes over the Apennine Mountains all prepared for defense. Assuming that landings were made in this area, and that an advance over the mountains was attempted, the enemy would have better communications between passes on his side of the mountain than our forces would have on the coast—which in general has but one lateral road and one railroad, part of the latter being single track. As the railroad is electrified, it could not be used by invaders unless it was reconverted to steam or a new source of power provided.

From Genoa to Berlin is some 600 miles. It is covered with natural terrain obstacles, most suitable for defense. If the Apennines are successfully crossed the next obstacle is the valley of the Po River. This is full of water courses, hedges, ditches, cultivated lands, and stone villages. It would be difficult for armored forces to operate off roads during most of the year.

After the Po valley come the Alps. Unlike most American mountains, they go straight up from the Italian plain, with extremely steep slopes and few passes. Should the Alps be crossed, south Germany is full of mountains and forests—with the Danube River across the line of advance. Taking everything into consideration, an advance on Berlin by invading on the west side of Italy is about as complicated as could be imagined.

The Italians have about 80 divisions available to defend the mainland. Until recently only 3 German divisions were in Italy, but it is understood additional divisions are arriving. Italian divisions are especially trained to operate in mountains, since their country is mostly rugged. A large part of the artillery is equipped with

lighter guns than usual to facilitate their being maneuvered in rough country. Roads and railroads in Italy are excellent.

South of the Arno River the coast is more favorable for landings, and as far south as Naples the mountains are away from the coast, leaving space for maneuvering. Landings made in this sector would at once threaten Rome, and if successful would place the harbor of Naples at the disposal of the Allies. The country is very much cut up by hills, woods, hedges, and small towns. In view of the enemy's strength, a landing in this territory would be exposed to an encircling attack; a small force would not be likely to succeed.

THE ADRIATIC AND SOUTH ITALY

On the Italian side of the Adriatic and near its entrance is the port of Brindisi. Less than 50 miles away overland, on the south shore of Italy, is the naval base of Taranto. Both are strongly fortified. The terrain in this sector is rough but practicable for maneuvers. If these two places can be taken, further operations in the Adriatic can more safely be undertaken as soon as bases have here been established. The sea distance from the west entrance of the Adriatic to North Africa is 600 miles, and to Sicily 375 miles. Although the enemy has 80 divisions in Italy he probably could not employ more than 20 at the most at this extremity of the Italian peninsula. An expedition landed in this area could be considerably smaller than for a landing on the west center of the peninsula.

Operations in the Adriatic would seek to ultimately seize the excellent ports of Venice, Trieste, and Fiume at the head of the Sea, from where an advance on Berlin could start. These ports are only 500 miles from Berlin, but in the way are the Alps and several other mountain ranges and river lines. It would be a hard job. Nevertheless it would not be impossible, since campaigns in this part of the Alps between 1916 and 1918 demonstrated that passage over them could be forced against strong opposition.

If the Italian peninsula from Brindisi to Venice is not first seized, the enemy would be able to attack convoys passing by. It would seem almost essential to neutralize this territory. Landings can be made almost anywhere in this area, but the further north they are the greater the force the enemy can bring against them up to the limit of his 80 divisions—unless landings elsewhere engage them in whole or in part. For operations around the head of the Adriatic, Hungarian and Croat divisions may be expected to appear in line. There has recently been an increase of these hostile forces, and it is not certain how many divisions are now equipped. It would be safe to count upon at least 20 of these divisions in addition to Italian divisions and any that Germany may spare.

If the east side of Italy is occupied there will be a choice as to limiting the occupation to Adriatic coast or crossing the Apennines and seizing all of Italy. The latter would be the safer procedure and could be facilitated by invasions on both coasts of the Italian peninsula at the same time.

On the east side of the Adriatic are numerous small harbors and airfields, all in Axis possession but in territory where the population is friendly to the United Nations. The reasons for clearing out enemy bases on the west side of the Adriatic apply equally to his bases on the east side. This shore of the Adriatic is mountainous, with few passes leading inland. It would not be necessary to cross the mountains initially. The advisability of a major landing at or south of the small but good port of Ragusa (Dubrovnik), with a view of advancing toward Salonika in connection with an invasion in that vicinity, should be considered. To accomplish this, Brindisi and Taranto are necessary preliminary operations.

Both flanks would be exposed in an advance from the head of the Adriatic. The left flank can be held with restricted forces, along a choice of several stream lines leading south from the Alps. After the Alps were crossed both flanks would have to be held, as it would be possible for the enemy to attack either as easily as the front. A very large invasion force would be required.

THE AEGEAN SEA AREA

The south entrance to the Aegean Sea is covered by an outer defense line through Kythera, Krete, Scarpanto, and Rhodes. Kythera is a small island with a poor port, difficult currents off the coast, frequent storms, and rough seas. It is believed to be an enemy base for motor torpedo boats, but little is known as to the garrison. This island is too small for a major base.

Krete, an important base, is occupied by about one corps of two divisions plus accessory troops. There are large airfields, the excellent harbor of Suda Bay, and several smaller ports—all on the north side. Krete is divided longitudinally by a mountain chain with summits up to 8,000 feet and which have some snow all the year around. There are but a limited number of passages over the mountains, none with good roads. The south side of the island has a small port at Tympakion; the most fertile valley in the island extends eastward from this place and would afford space for troops, were there suitable facilities for landing them. Against opposition it would be difficult to cross the mountains from the south side. An invasion from the north side will find that outside of the ports there are but few places practicable for landing. All ports are defended, as are all airfields. Best plan to capture Krete is to land at all possible points simultaneously, coupled with extensive parachute attacks. If a foothold is once obtained, with a practicable beachhead on which reinforcements can be landed, the ultimate capture of the island will be but a question of time.

Scarpanto is a secondary base and is strongly defended. Rhodes is a major base for naval and air forces and has at least one division (with accessory troops) as its garrison. Due to the rocky shores and the fact that the islands of the outer defense system are within easy air supporting distance of each other, an invasion of any

of them will require extensive air cover. The nearest Allied airfields are in North Africa, 250 to 350 miles away.

The enemy's inner line of defense across the entrance of the Aegean includes the islands of Keos, Syros, Mykonos, Ikaria, and Samos. The last two are strongly held, but in March of this year the others had not had their fortifications completed. Samos has good ports and is suitable for a base. Its southeastern end is within easy range of the Turkish coast. Should Turkey enter the war on the side of the United Nations, it might be difficult for the Axis to hold Samos. Samos in turn would be a good point of departure for an attack on Ikaria. If these two islands are captured, a practicable line of approach to the head of the Aegean Sea will be open.

There are numerous other islands in the Aegean Sea. Their garrisons vary from 30 men to a regiment. Airfields, submarine bases, and ports for light naval surface forces abound. To pass convoys between the islands while leaving them in enemy possession would be possible but dangerous. It would seem necessary before debarking on the mainland to clear out the Aegean Islands. Although there is not yet information to that effect, it would be possible for the enemy to establish an intermediate defense system between the outer and inner belts, or to establish a new belt extending west from Mytilene; and this possibility must be taken into consideration.

South Greece has only two good ports: the Piraeus near Athens and Patras on the west side. Occupation of Athens and vicinity together with the Peloponnesus, would afford bases. The entire coast around Athens (including the island of Salamis just off Piraeus) has been covered with defenses. Latest reports are these do not include the island of Euboea.

There is no information as to defenses of Patras. The coast is so open that landings can be made generally in the vicinity, but it is bounded by mountains between which and the sea an invading force would find itself restricted. An invasion of north Greece by advancing inland from south Greece, will encounter difficult terrain, no resources, and strong opposition.

For a march on Berlin an invasion would preferably start from the north head of the Aegean Sea. The one good port is Salonika, with a secondary port 100 miles to the east at Kavalla. Salonika was the base for an Allied expeditionary force in 1918, and that invasion was most successful. Best route is via the Vardar valley, which has a road and a railroad. Seizure of Salonika and vicinity would be on the enemy's line of communications with most of Greece, and this country could be best reduced by operating south from Salonika without the necessity of first attacking Athens. Salonika is very strongly defended, with extensive fortifications extending along both sides of the Gulf of Salonika. An attack on this place and subsequent deployment therefrom will be facilitated if another invasion is made at the same time in Albania, to march eastward.

To resist an invasion at Salonika, and east thereof from around Kavalla, the enemy has the Bulgar army of 30 divisions—all fresh, as they have so far only had minor engagements in this war. Bulgars are good fighters, are now equipped with German weapons, and have German leadership. Many Bulgars are very pro-Russian, and it has been alleged that they will not fight if the invading force contain Russian troops. German divisions and special troops are continuously arriving in this area, but there is a lack of definite information as to their strengths. There are also a few Italian divisions. It is about 900 miles from Salonika to Berlin.

Further east the Sea of Marmora, with its wonderful port of Istanbul, would make a superb base. Experience indicates that if the enemy arrives there first and secures the Dardanelles, it will be no child's job to oust him. To prevent this possibility the Turkish Army is reported as in position covering Istanbul from the land side. A large part of the Bulgarian Army is opposed to them, and it would seem that regardless of whether or not Turkey joins the United Nations, at least 15 Bulgar divisions will be required to guard against an advance from Istanbul.

Between Salonika and Istanbul, and parallel to the north shore of the Aegean, lie the Rhodope Mountains. West from Adrianople the mountains are rough, rise to 8,000 feet, and have only trails across them; these are blocked by concrete fortifications. Opposite Adrianople is a good passage through the mountains with road and railroad. Thence to the Black Sea are more mountains.

If Istanbul comes into Allied possession it will be practicable to turn the line of the Rhodope Mts. by landing invasion forces on the Black Sea shores of Bulgaria. The Axis has foreseen this possibility, and for several months has been constructing a defense system in this sector. An advance inland in this area will have the Danube on its right and the Rhodope Mts. on its left, with a front of not over 150 miles. This front is divided longitudinally into two sectors by the Balkan Mountains. Excluding the width of these mountains the front of each sector would be about 50 miles. Each sector has a port, Varna and Burgas (south). Very large forces would not therefore be initially required. It might be possible to secure some Russian troops for this front.

From Istanbul to Berlin is about 1,100 miles. There are so many possible lines of advance that it would be out of place to consider them here. Possession of Istanbul will ensure direct connection across the Black Sea with the Russian Army, and will enable troops to be landed also in Rumania, if desired. The enemy is reported as fortifying all of his Black Sea coast, indicating that he is counting on the Allies' eventually securing Istanbul.

CONCLUSION

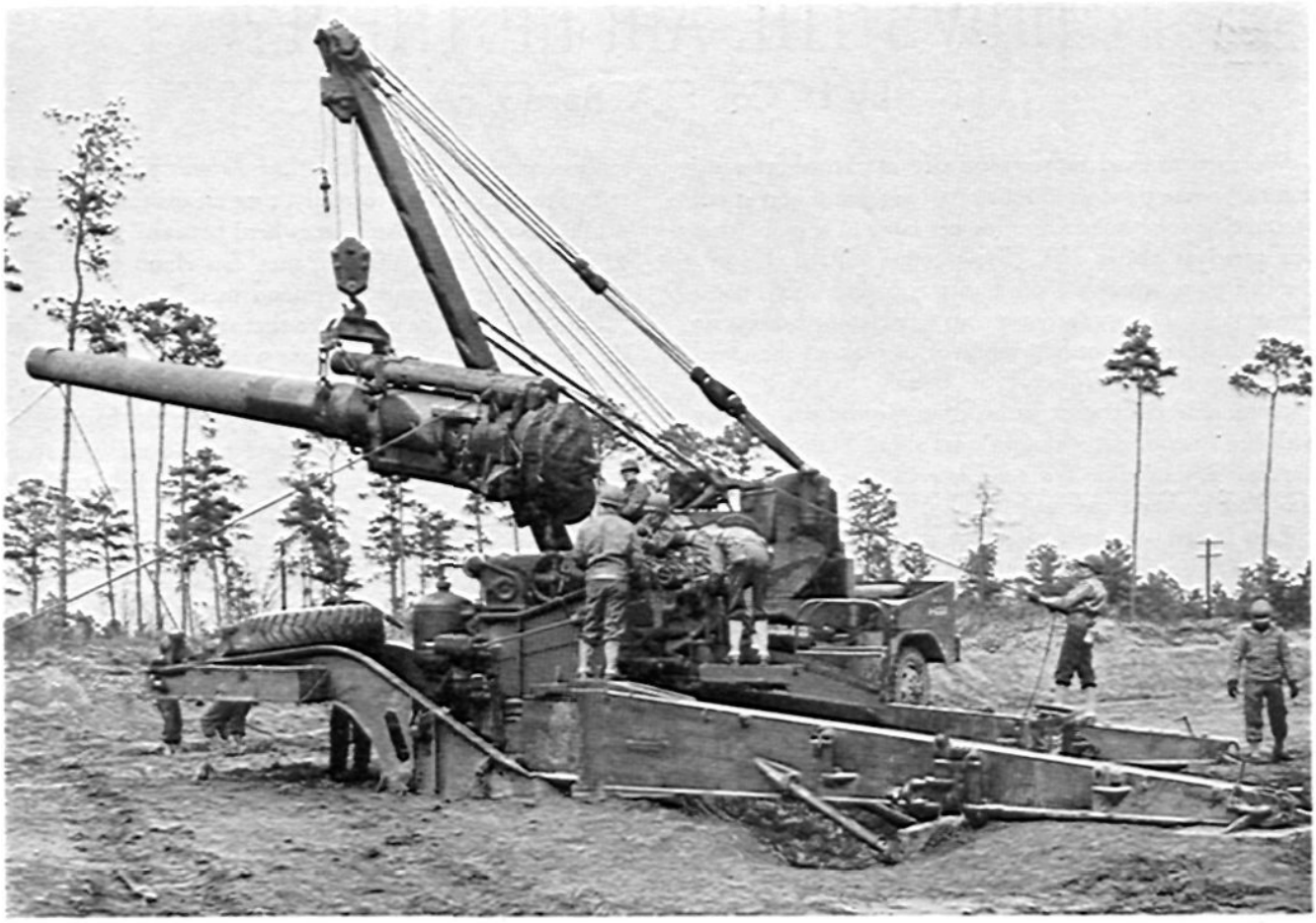
The foregoing discussion is a mere outline of possible routes of invasion of west and south Europe, without reference as to which is best.

It seems clear, however, that in view of the enemy's strength, an invasion involving but a few divisions is not promising. Best chance of success appears to be in employing very large forces, at as many different areas as possible, and as nearly simultaneously as practicable. It will be a great and difficult task.

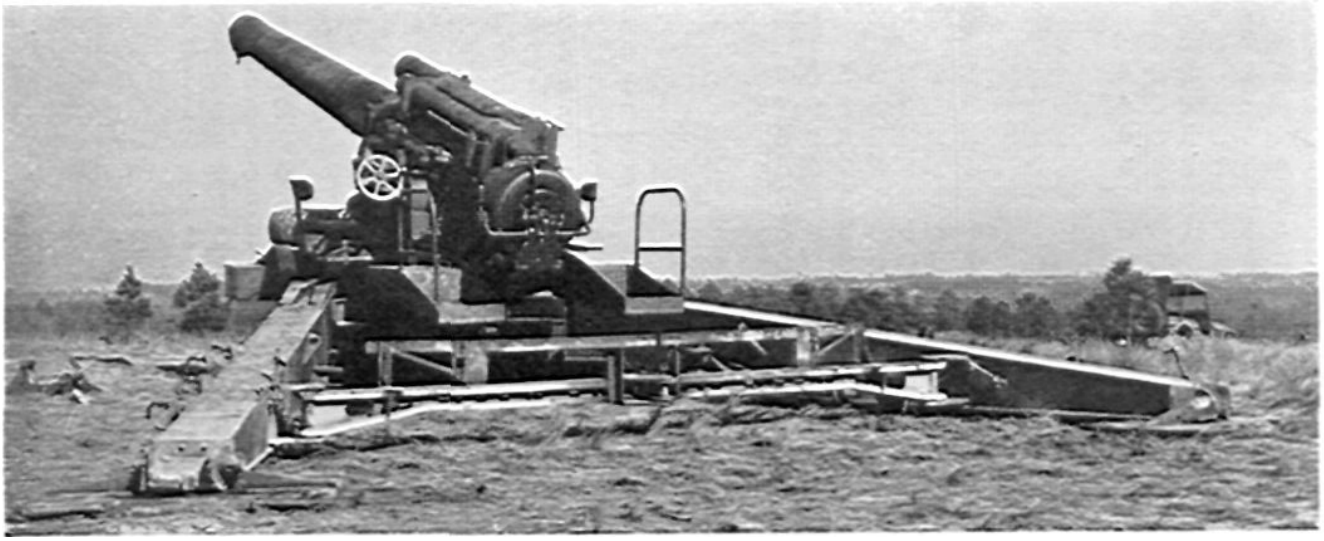
The New

240-mm

Our new 240-mm howitzer, M-1, is more mobile, more powerful, and even more accurate than its 1918 counterpart. It travels in only two loads, on high-speed trailers. Less digging is required for its emplacement, and this is speeded by a clamshell bucket. This is attached to the battery crane, which also eliminates the time-consuming jacking of loads into position. Large spades on either side of each trail make this weapon as stable as its predecessor. And split trails permit a wide field of fire as contrasted with the bowling-alley fire of the older howitzer.



HOWITZER, M1 ★



"HOW'S THE AIR UP THERE?"

By Lt. Col. F. A. Bardo, FA

We used to read rather regularly of record-breaking flights. Some pilot would make a long jump at a speed of three to four hundred miles per hour in a plane that was rated at under 200. How come? Well, he just climbed up to where a good, husky tail-wind would boost him along. The war's censorship has clamped down on items of that sort, but how many of us realized they held a meaning for the artillery?

In pre-war days what little firing we did was mostly with the 75-mm. gun—ranges were short, high-angle fire impossible, *maximum ordinates low*. Now, however, the situation is much changed.

Last December a new piece was to be tested at a range of 24,000 yards—well within its maximum range. A metro message was duly taken (Fig. 1). Looks pretty long—has eleven lines. But line 13 was required—and if I've read my tables correctly, that means this projectile would have to climb to somewhere between 36,000 and 42,000 feet! How many planes can climb that high? and what sort of winds are found there?

Fig. 2 hints at the answer to that second question. On this particular day the ballistic wind blew at 207 mph. All right, you say, just correct for it. But that isn't always possible, either in test firing or on the battlefield. This particular wind was nearly a head-wind, and it so shortened the effective range that the target field couldn't be reached!

To make a long story short, examine the remaining figures carefully. You will notice that on several days clouds or other conditions prevented a reading being taken for the required altitude. And when readings were available, conditions were too adverse for conducting the tests. Matter of fact, it was nearly Christmas before they were run off—and even then there was a range correction of nearly 6,000 yards and a deflection correction of about 200m.

Dec. 2, 1942 1000

M	U	M	M	U	M
2	0	3	4	1	
0	4	1	2	5	0 3
1	4	3	3	7	0 3
2	4	3	3	7	0 3
3	4	4	3	6	0 3
4	4	5	5	4	0 3
5	4	5	6	1	0 3
6	4	6	7	1	0 2
7	4	6	8	1	0 2
8	4	7	8	5	0 2
9	4	7	9	5	0 2
0	4	7	164	0	2
1	4	7	177	0	2

Figure 1

Dec. 3, 1942 0800

M	U	M	M	U	M
2	0	3	2	7	
0	5	3	0	4	0 7
1	5	2	0	8	0 7
2	5	2	0	8	0 7
3	5	0	2	3	0 6
4	5	1	3	1	0 6
5	5	0	3	6	0 6
6	5	2	5	6	0 5
7	5	2	9	3	0 5
8	5	2	9	0	0 5
9	5	2	8	3	0 4
0	5	2	109	0	4
1	5	1	135	0	3
2	5	1	139	0	3
3	5	0	207	0	2

Figure 2

Dec. 3, 1942 1245

M	U	M	M	U	M
2	0	3	4	2	
0	4	3	0	3	0 4
1	4	2	0	8	0 4
2	4	2	1	2	0 4
3	4	4	1	6	0 4
4	4	5	1	8	0 4
5	4	5	2	2	0 3
6	4	6	3	1	0 3
7	4	6	3	7	0 3
8	4	7	4	6	0 3
9	4	8	5	7	0 3
0	4	8	7	6	0 2
1	4	8	8	5	0 2
2	4	8	9	9	0 2
3	4	9	130	0	2

Figure 3

Dec. 7, 1942 0732

M	U	M	M	U	M
3	0	3	3	5	
1	1	2	3	3	0 7
2	1	2	3	3	0 7
3	1	3	3	6	0 6
4	1	3	2	7	0 6
5	1	3	1	6	0 6
6	1	4	0	5	0 6
7	5	0	0	9	0 5
8	5	5	3	0	0 5
9	5	6	3	0	0 4
0	5	6	2	8	0 4
1	5	9	2	9	0 3

Figure 4

Dec. 8, 1942 1348

M	U	M	M	U	M
2	0	3	3	7	
0	3	1	0	4	0 6
1	0	6	1	2	0 6
2	0	6	1	2	0 6
3	1	3	1	6	0 5
4	1	7	1	2	0 5
5	2	0	0	9	0 5
6	4	5	1	3	0 4
7	4	6	2	7	0 4
8	4	5	2	5	0 3
9	4	4	2	4	0 3

Figure 5

Dec. 12, 1942 0930

M	U	M	M	U	M
2	0	3	4	3	
0	6	4	0	7	0 4
1	6	4	1	0	0 4
2	6	4	1	0	0 4
3	6	4	1	1	0 4
4	6	4	1	0	0 4
5	6	2	1	0	0 3
6	5	5	1	4	0 3
7	5	3	2	2	0 3
8	5	1	2	9	0 3
9	5	0	3	9	0 2
0	4	9	6	8	0 2
1	4	8	104	0	2
2	4	8	174	0	2
3	4	8	229	0	1

Figure 6

SOME LESSONS

1. Metro messages can tell you about possibilities of reaching targets, as well as about data corrections. This information will not always hamper you—it may open new vistas, unsuspected opportunities.

2. Do not disregard startling figures—you will just have to get accustomed to working on a larger scrap of paper!

3. Train both telegraph (radio) operators and officers that a 7-figure line may sometimes contain eight digits. Verify the fact, of course, but don't just throw out some figure in order to keep a neat, 7-column chart.

4. Train officers to recognize where this extra figure belongs. Easy?—yes, but first contact with the new and strange can yield weird and wonderful results.

5. Believe—and act upon—the results you compute. After all, it's the biggest stuff that is most affected—and this is the very type that is most expensive, hardest to supply, and does the most damage to either the enemy or the wrong barnyard.

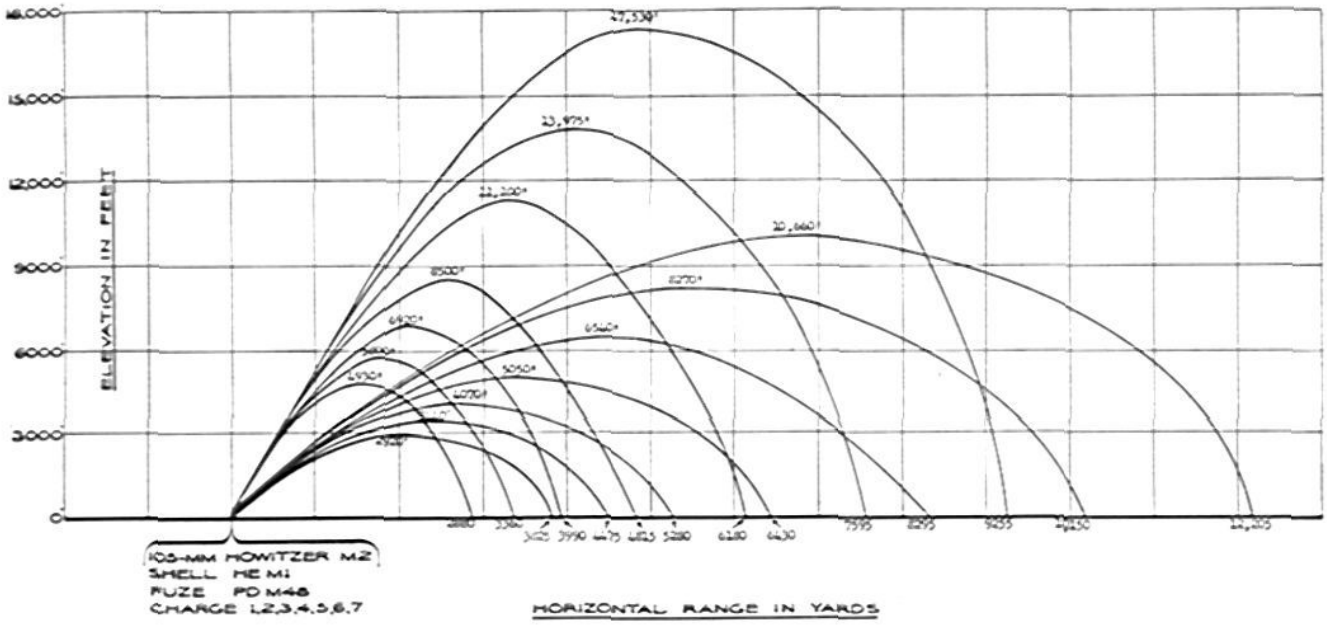


Figure 1

AIR DANGER ZONE OF FRIENDLY ARTILLERY

By Maj. Howard C. Price, Jr., FA

When air units are working in close support with ground troops the trajectory of the ground weapons creates a problem. One incident (from World War I) is on the records: a plane and a 155-mm. projectile met en route to their respective objectives; result: no damage to the enemy.

From the pilot's point of view, enemy aircraft and ack-ack are his chief worries while on a mission. He is surprised to learn that field artillery is also using the same space to project missiles which vary in size from 14.6 pounds to 360 pounds and are capable of reaching a height of 43,495 feet. This trajectory therefore is a problem for air support aviation, as friendly artillery must be either by-passed or passed over at a safe altitude.

There will be times when the friendly artillery will not be firing, as well as sectors where medium and heavy artillery will not be present. It is thus essential that close cooperation be maintained between the artillery section of the supported unit and the air support party. In all cases the artillery plan of fire should be made available to the air support party.

To operate without prohibitive losses, the liaison plane as well as the artillery observation plane must remain in rear of friendly installations—beyond effective range of enemy small arms fire from ground troops. They must also operate generally over the artillery position area; otherwise, they would be in danger from high-angle trajectories of friendly artillery.

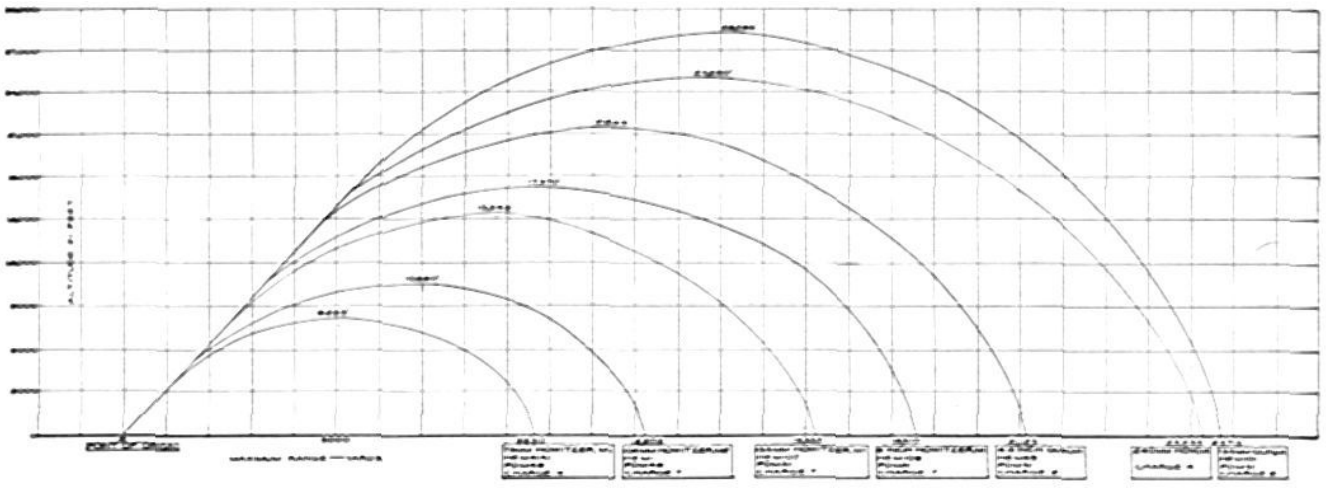


Figure 2

Where does the air danger zone extend? Several units of an air support command used a formula of 3/5 of the range as a rough guide for pilots to use when flying in close support of ground units. Others, never before realizing that such a zone existed, immediately demanded more information concerning it upon learning of this added hazard to close support, liaison, or observation missions.

When one considers the number of cannon in the field artillery plus the different type projectiles and the various powder charges used, a maze of figures presents itself. Figure 1 illustrates trajectory curves for the 105-mm. howitzer M2. In one case, the maximum range was used with each of the seven charges, and in the other the maximum elevation of the howitzer (65 degrees quadrant elevation) is shown with the resultant curves of each charge. It is believed that by using the maximum range of a piece with its resulting maximum ordinate, a curve is obtained which in the majority of cases will allow a sufficient safety factor. The curves shown in Figure 2 are determined by this method. It must, however, be kept in mind that in certain situations the path of the trajectory will be much higher, especially when operations are conducted on terrain where high-angle fire is necessary.

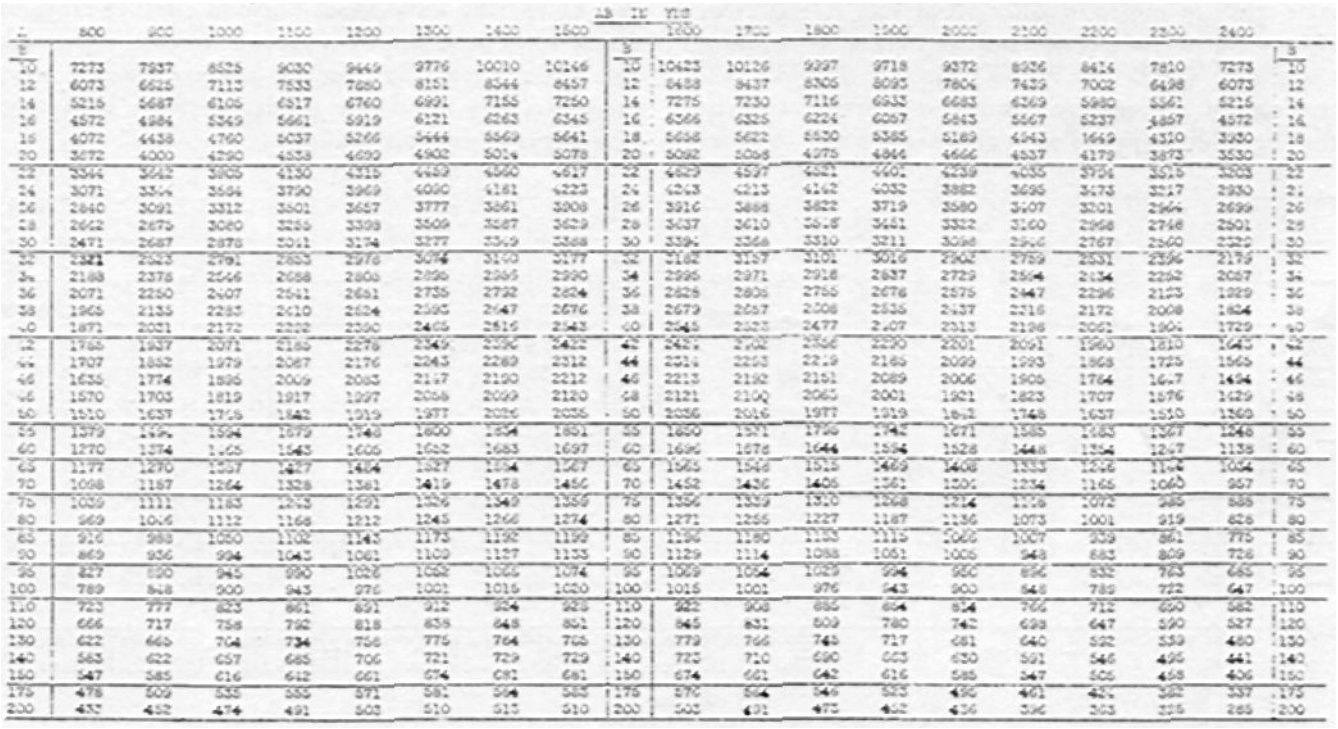
Data for determining the danger zone of friendly artillery was obtained from the Ordnance School Ballistics Laboratory. From this data the attached figures have been constructed. Note that the curves have been plotted from only three points and not from a series of points along the path of the projectile.

READY SHORT-BASE TABLES

By S/Sgt. Eric Waldman

"I. G."'s article *Really Rapid Support* (page 346 of the JOURNAL for May, 1942) was along the line we had been working toward. Some of our computers, however, found a chart more convenient to use under some circumstances.

Use of either graph or chart is equally simple. The oriented aiming circle and the BC 'scope both lay on a rocket fired by the Forward Observer. Angle A is the difference between Y-azimuths to the rocket and of the base. Angle B equals the 'scope's measured angle, less Angle A. On "I. G."'s graph, trace the correct Angle A up to its intersection with the curve for the correct Angle B, and read the range. When using the chart, select the column whose heading is nearest the value of Angle A, and opposite Angle B read the range; interpolation is simple.



Celestial Navigation for Desert Warfare

By Lt. Col. T. L. Crystal, Jr., GSC

SUMMARY

"Because he knows his way among the stars, the navigator can find his way to any point on earth.

"This feat can be performed by anyone who has had a high-school education. The navigator travels in the symmetrical universe of Ptolemy, in which the earth is the exact center. The sky is a star-studded sphere. Except for the sun and its satellites, which move along the line of the ecliptic, all the stars are fixed in their positions relative to the celestial coordinates, just as points on earth are fixed on the terrestrial coordinates of latitude and longitude. As the earth rotates, the celestial sphere, its axis through the north star, appears to revolve from east to west around the earth—with the earth apparently remaining fixed.

"Once this ancient concept of the universe is comprehended, the trick of celestial navigation resolves itself from complication to simplicity. Beneath every star at any given moment is a point on earth, the substellar point, at which the star is directly overhead. These points move as the stars move, parallel to the lines of latitude around the earth. The positions of the sun, moon, and planets, and of 50 navigation stars and hence of their substellar points are listed in the almanacs relative to Greenwich, England, for every instant of the day. By measuring the height above his horizon of two or more stars, the navigator locates their substellar points relative to his dead-reckoning position. He locates these points in turn by consulting his almanac and his chronometer, an accurate watch set on Greenwich time. He can now locate himself relative to Greenwich and plot his position on his chart."

———

With this method an excellent instructor can teach a high school graduate to compute an observation and plot his position after an hour's study and practice. The above quotation and Figures 1 and 2 are, with appreciated permission, reproduced from the excellent article on *Aerial Navigation* in *Life*, September 28, 1942.

PREFACE

This is written as a supplement to the very excellent article in the November, 1942, issue of THE FIELD ARTILLERY JOURNAL by Major (then Capt.) Robert Amory, Jr., on the same subject. Having studied all his possible solutions, I have picked the easiest, then codified it so it can be taught to non-commissioned officers. I am grateful to Maj. Amory for his review of and helpful comments on this article.

Right here I would emphasize my belief that anyone who uses celestial navigation when he can effectively use ordinary map dead-reckoning and has an accurate map, etc., is slightly touched in the head. Celestial navigation is used to check the above system, and when all other systems have failed. There are very few landmarks or maps in a desert. The error at the end of four days of following a compass course can be many miles. A star shot can reduce this to five miles. It may save your life—or win a campaign.

Equipment required is:

More than just cursory interest.

One Air Corps Bubble Octant—which might be borrowed from your friend in the Air Support Command.[1]

H.O. 214—only that volume that applies to your latitude. If you are at 35 degrees North Latitude, get the volume from 30 degrees to 39 degrees, etc.; each volume, $2.25.

TM 1-206, *Celestial Air Navigation;* 35c.

A radio to get Arlington Time Signals. These are broadcast nearly hourly on 113 and 9425 kc. (See TM 1-206 for details of the method.)

A good watch—better buy your own.

American Air Almanac—for the current period; 65c.

GENERAL

Recent radical improvements in the methods of computing celestial observations make practical navigation so simple that it is easily within the grasp of any student with a high school education. This article will attempt to prove that without any previous knowledge of either astronomy or celestial navigation, accurate locations can be plotted after approximately one hour of study, if certain basic equipment is used. With very little practice the computation time for any observation can be cut to less than five minutes. Because of ever-present and indeterminate variables (such as accuracy of the observation and weather conditions) it is impossible to define the mean error, but locations with an accuracy of five miles are extremely simple.

Too often the writer has delved into navigation texts and been left completely confused by the too numerous ground rules. His first celestial "fix" was a very well constructed triangle with each leg approximately 800 miles long. This was the result of deep and involved computations, insufficient study, and doubtlessly subnormal ability. It produced well understandable results. The present method involves no computations other than addition, subtraction, and interpolation.

It is well to explain that the intent of this article is to prescribe a fixed method which if followed will yield surprisingly

[1]Not "required," perhaps—a transit or AC can be used, but it is much easier and more accurate to use an instrument designed primarily to do the job at hand.

quick and accurate results. No attempt is made to explain any ifs, ands, buts, or other possible methods. Definitions are given only for those things which have a direct bearing on the process involved. It is well realized that there are many inquiring minds that will not be satisfied with this very prescribed and little-explained routine. Those minds are very readily referred to any standard book on the subject where they are privileged to wander to their heart's content and to create as much order out of that very confusing mass of data as they can. The prime text on the subject is, of course, the book which carries the name of the father of modern navigation, Nathaniel Bowditch. Two other excellent manuals are War Department Technical Manuals 1-206 (*Celestial Air Navigation*—35c) and 5-235 (*Surveying*—50c).

The method here proposed is based on the use of the Navy Hydrographic Office Publication No. 214 (*Tables of Computed Altitude and Azimuth*) and the *American Air Almanac*. These two books carry former methods up to the point where all fixed factors have been computed to the required degree of accuracy and where the entry of the variables is delayed until the last possible moment. This means that the required computations to complete the solution are nearly nonexistent. The technique is relatively new: H. O. 214 was first published in 1940 and the *American Air Almanac* was born in 1941.

For the convenience of the novice a blank form is provided. Two explanations of how to use the form follow. The first explanation is relatively long and complete, and is written primarily for the person who knows absolutely nothing about navigation or the *Air Almanac*. The second is for one who does know, and for the person who through using and understanding the first explanation graduates quickly to the second brief outline.

BASIC PRINCIPLES

All celestial navigation is based on certain prime principles which have gradually come to light through the centuries of man's study of the heavens. In brief the more important findings are:

a. The sun is the base point of our celestial sphere. It actually has a movement of its own, but as its orbit has a diameter of only about 280 miles its relative movement (for all practical purposes) is considered nil.

b. As an observer is situated on the earth and takes all his measurements from there, the earth is considered to be at the center of our celestial sphere.

c. The earth has only two important simultaneous motions:

(1) It rotates from west to east on its polar axis, once each day.

(2) It revolves in an elliptical path around the sun, making a complete circuit once a year. The sun is located at one of the foci of the ellipse.

d. The stars, although they do have relative displacements among themselves, are at such a great distance from the earth that their movements are practically unimportant. They are considered as being fixed bodies.

And thus it is seen that all celestial movements are predictable. Having computed where the earth will be at any given time (this is the function of the almanac), it is possible to determine the observation angle—as seen from the earth—of any of the heavenly bodies which can be of assistance in practical navigation. (See Fig. 1.) In reality

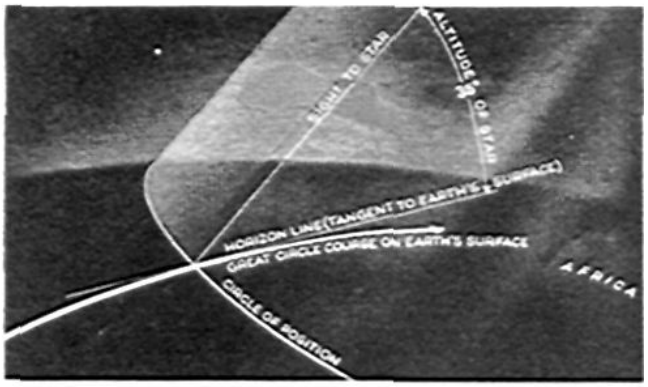


Figure 1
Sextant sight measures angle of star above horizon, places navigator on circle of position, on which height is constant. The center of circle is substellar point. The distance to complement of the substellar point can be read from sextant: 1° = 60 nautical miles.

this is only a problem in spherical trigonometry; it yields to normal methods of solution. These normal methods, however, are so cumbersome and tedious that great study has been placed on simplifying the required computations.

The basic principle involved in this method is comparable to placing a dunce's cap on a round-headed dunce. Let the earth be the dunce's head and the star be the point at the very tip of his cap. Any six legged termite walking around the bottom of the cap and looking up at its peak would always keep his head cocked at the same angle.

Apply this to navigation. (See Fig. 2.) Put the dunce's cap on the earth with the star at its tip. We use a sextant to measure the angle at which the termite cocked his head. The circle which the cap makes on the earth is called a "circle of position" with reference to the star. Any two legged G.I. measuring the angle of that star above the horizon from any point on this circle would get the same reading. This vertical angle is called the "height" of the star.

This may be better understood if thought of as an angle-measuring chore. The angle determines an observer's position on the earth with reference to the star's substellar position—the point on our earth that lies directly beneath the star. If the sextant measures 90°, the observer is directly at the star's substellar position, and reading in the almanac tells him his Latitude and Longitude. If the sextant measures 80°, the observer is somewhere on a circle on the earth's surface. The center of this circle is the substellar point and its spherical radius is 10°. (See Fig. 1.) This circle is the "circle of position"

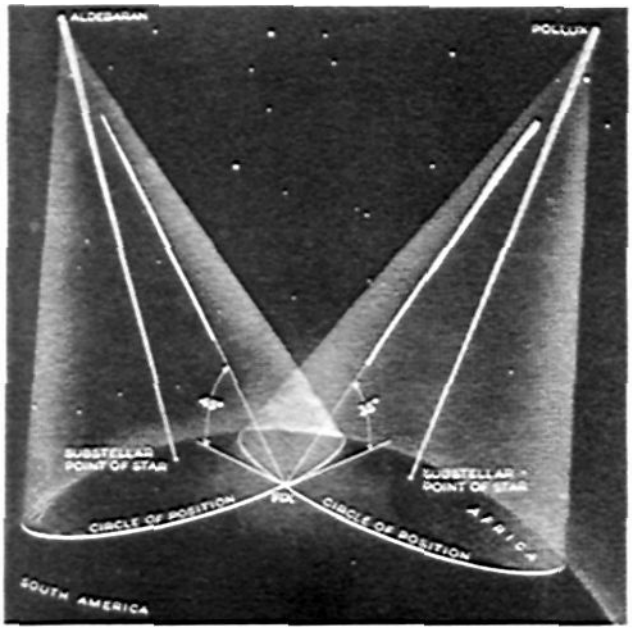


Figure 2
Position is fixed by measuring the altitude of second star. Since he has now located himself on two circles, the navigator must be at one of these points of intersection. Since one point is absurdly remote, he knows he must be at the other.

for that observer with reference to that star at this one instant. To fix your position, another observation on another star is needed. The intersections of the two circles give you the two possible locations that you may be in to secure the measurements you got. One of these is hundreds of miles away from your estimated location, and is discarded. The other is your present location. (See Fig. 2.)

The *Air Almanac* gives the location of selected heavenly bodies with respect to Greenwich observers for any day, hour, minute, and second over the current four-month period. From the time relation between any two spots on the earth's surface, the time of the observation is converted to Greenwich Civil Time and the actual location of the body is determined.

H. O. 214 is a series of tables which have already computed the altitude and azimuth of any usable celestial body as observed from any point other than Greenwich. Entering this book with our assumed latitude, the latitude of the substellar spot (declination), and the angle between your meridian and the meridian of the substellar spot (LHA), we end up with a line of position. This is, in fact, the portion of the are of the circle in our locality whose center is on the line joining the earth's center and the celestial body. Any observer on this circle would measure the same altitude of the sun—but a different azimuth. Because our plot is only 50 or 60 miles long on our charts the are is, for all practical purposes, a straight line, and is so drawn without introducing appreciable error.

No involved explanation is made here, nor is it considered desirable, of the various kinds of time which can be used in navigation. Following our already stated rule of talking about and explaining only those things which are most pertinent, time becomes very simple. Suffice it to say that the almanac is computed on the time which is used at Greenwich, England. This is merely a historical custom and a tribute to the excellent work done by the astronomers at the Greenwich Observatory in years past.

TECHNIQUE

Procedure is extremely simple. It requires[1] an aircraft type Bubble Sextant inasmuch as desert warfare rarely offers a sea horizon to get your sextant level. It also requires an accurate chronometer. With the Bubble Sextant (or more properly "Octant") the observer measures the angle between the horizon and, in our first example, the sun. At the instant he gets the sun in his field of view with the bubble alongside it, he records the time his chronometer shows. He changes this time (applies the chronometer error) to the exact time which it is at Greenwich. This time is called Greenwich Civil Time (GCT). The exact time is extremely important. An error of only 4 seconds introduces a geographical error of one mile. This error can be minimized and entirely eliminated if the observer is able to receive a radio time signal.[2] Having computed the GCT, enter the *Air Almanac* with the date of the observation and the GCT of the observation; from the column headed "Sun," determine the Greenwich Hour Angle (GHA) and the Declination (Dec). The assumed Longitude (Long) east or west of Greenwich is now subtracted from the Greenwich Hour Angle, thus giving the Local Hour Angle (LHA). We have thus discovered two factors which are required—the declination and the local hour angle. With a third factor now assumed (latitude north or south of the equator), we enter H. O. 214 and secure the altitude and azimuth of the sun for that instant. This is called the computed altitude and actually is the altitude which would be measured by an observer at the assumed latitude and longitude if the observer actually were at the assumed latitude and longitude. Suffice it to say that the observer very rarely guesses exactly where he is. This computed altitude is now compared with the altitude the observer measured with his octant. The difference between these two is the number of miles he is toward or away from where he thought he was. The azimuth obtained from H. O. 214 gives the bearing of where he is from where he thought he was. Thus by plotting where he thought he was (his assumed latitude and longitude), drawing a line at the azimuth already determined, and measuring the distance indicated above, he ends up with what is called a "line of position." This result is, of course, merely a line across the map, and is not by itself sufficient to locate him. If, however, he plots the line

[1]Not "required," perhaps a transit or AC can be used, but it is much easier and more accurate to use an instrument designed primarily to do the job at hand.

[2]Division, Corps, and/or Army Signal Officers should provide frequent (at least eight-hourly) accurate time broadcasts day and night, on frequencies which the troops concerned can receive.

CELESTIAL NAVIGATION FORM 214

For use in computing celestial observations using U. S. Navy Hydrographic Office publication Number 214 and the American Air Almanac.

Observed Body ____ Assumed Lat. ____ Long. ____ Date ____

ITEM	READING	SOURCE	ITEM	READING	SOURCE
Chronometer		Radio and watch	Observed height (h_o)		Octant
Correction		Watch error & Greenwich difference	Correction		Air Almanac
GCT		Computed	True height (h_t)		Computed
$GHA_u(\Upsilon^*)$ _h _m		Air Almanac			
Interpolation _m _s		Air Almanac			
*GHAY		Air Almanac			
*SHA		Air Almanac			
GHA		Computed			
Longitude		Assumed with same min. as GHA			
LHA	E W	Computed -- integral deg.			
Declination	N S	Air Almanac			
Latitude	N S	Assumed -- integral deg.			
Azimuth		H O 214			
Δd/1'•					
Δd	+ -	H O 214			
Altitude		H O 214			
Computed height (h_c)		Computed			
True height (h_t)		Above right			
Intercept		Toward			
Greater observed toward	Miles	Away			

REMARKS

• Needed only when observed body is a star.

Figure 3. Celestial Navigation Form

and then travels in a known direction at a known speed for a known length of time (or waits until the sun changes its bearing by 30° or more) and takes another observation, he will secure another line of position. Move the first line forward by the amount of the change of position, and at its insersection with the second line is his position at the instant of the second observation.

This difficulty of getting only one line of position from the sun is entirely eliminated by observations made at night because bearings are taken on more than one heavenly body, each of which yields a line of position. These make an intersection which accurately locates the observer immediately.

DETAILED EXPLANATION OF SUN COMPUTATION

The reader is referred to Form 214 (Fig. 3). The following steps will determine a line of position for any observation:

1. Enter the name of the body to be observed where indicated (in this case the sun) and your assumed latitude and longitude. These can be up to 100 miles in error without seriously affecting the accuracy of the final result. If your computations later show that you are more than 100 miles off, it is recommended that you assume closer coordinates and rework the sight.

2. Level the octant and take a reading on the sun. At the instant both the sun and the bubble are centered, record the time shown by your chronometer in the space following "Chronometer." Record the altitude indicated by your octant after the symbol "h_o." This symbol literally represents "height observed."

3. If your chronometer is set exactly on Greenwich Time, there is no need to correct your recorded reading. If on the other hand (as is generally the case) the chronometer is set on any other zone time, it must be corrected to the Greenwich Zone and also for any error in the chronometer. To convert Eastern War time to Greenwich Time requires adding only 4 hours to Eastern War Time. Enter the indicated time correction after the "Correction" (under "Chronometer"), and adding or subtracting the one from the other get the Greenwich Civil Time (GCT) of the observation.

4. It is necessary to correct the observed altitude (h_o) of the sun for refraction and parallax. Inside the front cover of H. O. 214 is a table which gives the correction—varying from zero to minus 7.8 minutes for different altitudes. Enter this after the "Correction" (under h_o), subtract, and you have now determined the true altitude (h_t).

5. Enter the *Air Almanac* with the date of the observation and the Greenwich Civil Time determined in paragraph 3 above. This date, it must be noted, is the date at Greenwich and will be readily noticed as "tomorrow" if, using the 24-hour clock, the chronometer reading plus its corrections is greater than 2400. In the column at the top headed "Sun" and opposite the correct GCT as indicated at the side, extract from the table the Greenwich Hour Angle (GHA) and declination. Enter these two figures after "GHA_u" and "Declination." The GCT arguments in this table are only given for each ten minutes. If, as is normally the case, the observation was taken at any time other than the exact minute given, it is necessary to turn to the very back of the book where on top of a cloth-bound page—the back of the Star Chart—the interpolations for odd minutes and seconds are given. The Greenwich Hour Angle determined above is entered after "GHA_u"—meaning uncorrected Greenwich Hour Angle. The interpolation obtained is entered after "Interpolation." Adding these two quantities together gives the corrected Greenwich Hour Angle (GHA).

6. After "Longitude" the assumed longitude is now written. The minutes of the assumed longitude are made to agree exactly with the minutes determined in the "GHA" immediately above it. Thus when these two figures are subtracted, an integral degree is the result. This is the Local Hour Angle (LHA). All observations taken in the United States are West (of Greenwich).

7. The assumed latitude, to the nearest degree, is now entered after "Latitude."

8. Using these bottom three entries ("LHA," "Declination," and "Latitude"), enter H. O. 214. Choose the section which corresponds to the assumed latitude. Pick the column across the top of the page which most closely corresponds to the declination determined previously. Use the column on the side of the page for the LHA determined above; extract from the table and enter opposite the corresponding figures shown on the form, the values for "Azimuth," "Δd," and "Altitude." This gives the altitude for the tabulated declination. Normally, however, the tabulated declination is not exactly equal to the one determined above, and it is necessary to interpolate

between the tabular value and the above-determined one. The symbol "Δd" is called "differential d," and is the change in altitude for one minute of declination change. This figure must be multiplied by the difference between the declination determined above and the tabular value of the declination used. A multiplication table to do this has been provided inside the back cover of H. O. 214. This result is entered to the right of "Δd′." By observation of the table, it is determined whether the altitude is increasing or decreasing as the tabular value approaches the determined value. The interpolation must be applied in the proper sense; that is, added or subtracted as the case may be. When this is added to or subtracted from the altitude, we have arrived at the computed altitude or "h_o." In using these tables it is important that the legend at the top of the page be read carefully, for if the declination and latitude are both north, a different page must be used from where the declination is north and the latitude is south.

9. The true altitude (h_t) determined previously is now written underneath the computed altitude (h_o) and the difference between them is computed. This difference is called the "altitude intercept."

10. This difference is counted actually in minutes of are—which on the ground are nautical miles. If the observed altitude is greater than the computed altitude, this result is labeled "toward"; if it is less, it is labeled "away." This actually shows whether you plot the line of position toward or away from the heavenly body on the azimuth indicated above. (See Fig. 4.)

11. *a*. Draw two vertical parallel lines to represent two meridians one degree apart. (See Fig. 5.) *b*. Draw a single line perpendicular to these to represent the lower parallel of latitude. *c*. At one of the interior intersections, erect a line at an angle to the parallel equal to the latitude. *d*. Measure the portion of this line intercepted by the two meridians. It is equal to a degree of latitude when laid off along one of the meridians. (It is perhaps easiest to do this work with an ordinary drafting compass.)

12. Through your plotted assumed location, draw a ray at the azimuth given in the form opposite "Azimuth." Measure on this line the distance indicated by the altitude intercept. This is measured either toward the body or away from it as determined by the rule given in paragraph 10. At that point erect a right angle to the azimuth line, and this line is your determined line of position. If you have followed the rules, you are somewhere on that line.

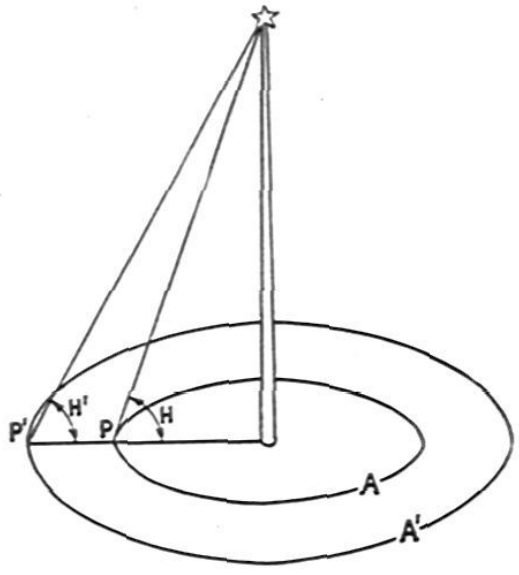


Figure 4. "Flagpole Analogy"
Consider an observer at P and then at P', looking at the star on top of a convenient flagpole. Vertical angle H is greater than H'. Therefore circle A is TOWARD the flagpole from circle A'. Thus the "GOT" rule—Greater Observed Toward.

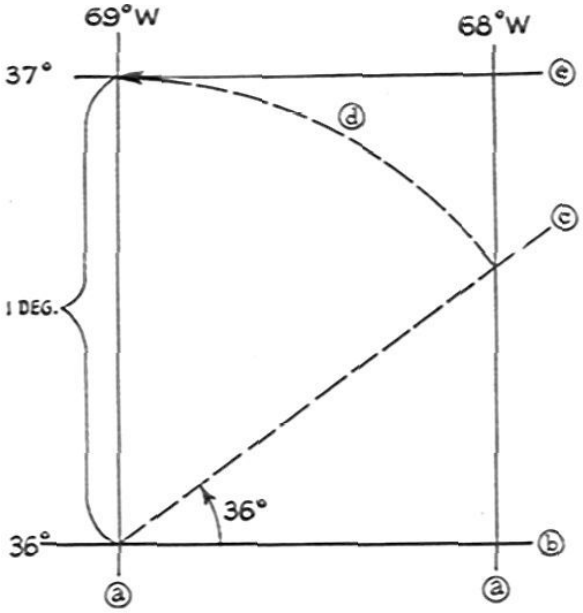


Figure 5

This same procedure is followed to compute an observation taken on the moon or any planet.

OUTLINE OF INSTRUCTIONS (SUN, MOON, OR PLANET)

1. Measure the altitude of the body and record the angle after "h_o." Correct this angle for refraction and parallax, using the table inside the front cover of H. O. 214. Write this correction after "Correction" under "h_o." Subtract, and get the true altitude "h_t."

2. Record the time of the observation after "Chronometer." Apply the correction to change this to "GCT."

3. In the *Air Almanac* for the date of the observation, find the "Declination" and also the "GHA" that is closest to the GCT determined above. Correct this for the odd minutes and seconds by table at the back of the *Almanac*—on back of the Star Chart. This now gives you the "GHA."

4. Make the minutes and seconds of your assumed Longitude equal to the minutes and seconds of the GHA, subtract, and get the LHA.

5. With this LHA, your assumed Latitude, and the Declination obtained in paragraph 3 above, enter H. O. 214 and by simple extraction get "Alt," "Δd," and "Az." The altitude must be corrected by using "Δd" multiplied by the odd minutes and seconds by which the declination differed from the tabular value. To multiply, use the table in the back cover of H. O. 214 and enter this after "Δd′."

6. Add "Altitude" and this last determined "Δd′" to get the computed altitude (h_o).

7. Find the difference between "h_t" and "h_o." This is the number of miles you are toward or away from your assumed location.

8. Plot your assumed location, draw a line at the azimuth determined in paragraph 5, and measure off the distance determined in paragraph 7.

9. Erect a perpendicular to your azimuth line at this point. You are somewhere on this line.

STAR COMPUTATIONS

The only difference in computing a star shot from one on the sun, moon, or a planet, is that the *Air Almanac* does not tabulate the GHA and Declination of every star on the sheet for each date. This requires a simple use of only two additional factors, viz., the GHA?? and the SHA.

The GRA?? — verbally handled by this rank amateur as "GHA with horns"—appears on the date sheet in the Almanac. It is actually the Greenwich Hour Angle at any particular instant of the *zero deflection point* in the sky. This has been chosen as a spot in the group of stars called Aries (the Ram) by the ancients, and the symbol depicts the Ram's horns. This value obtained from the date sheet must be interpolated exactly like the $GHA_{??}$ in Form 214 to get the corrected GHA??.

Then, because the position of all stars is likewise measured from this zero point (the "first point of Aries"), the Sidereal Hour Angle (SHA) of the star must be subtracted from the GHA?? to get the GHA—which is what we are seeking. The SHA for all usable stars is tabulated on the back cover of the Almanac.

Having thus determined the GHA, the remaining portion of the solution is the same as for the sun.

OUTLINE OF INSTRUCTIONS (ANY STAR)

1. Measure the altitude of the star and record the angle after "h_o." Correct this angle for refraction and parallax, using the table inside the front cover of H. O. 214. Write this correction after "Correction" under "h_o." Subtract, and get the true altitude "h_t."

2. Record the time of the observation after "Chronometer." Apply the correction to change this to "GCT."

3. *a*. In the *Air Almanac* for the date of the observation, find the GHA?? that is closest to the GCT determined above. Correct this for the odd minutes and seconds by the table at the back of the Almanac—on the back of the Star Chart. This now gives you the "GHA??."

b. On the back cover of the *Air Almanac* find the SHA and Dec of the star used. Enter these values.

c. Subtract SHA from GHA?? and get the GHA.

4. Make the minutes and seconds of your assumed longitude equal to the minutes and seconds of the GHA, subtract, and get the LHA.

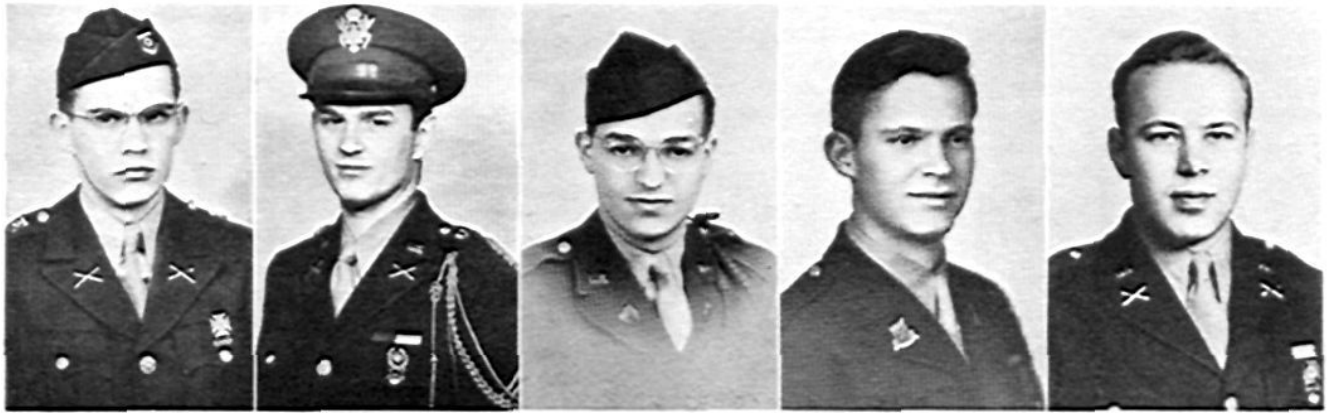
5. With this LHA, your assumed Latitude, and the Declination obtained in paragraph 3 above, enter H. O. 214 and by simple extraction get "Alt," "Δd," and "Az." The altitude must be corrected by using "Δd" multiplied by the odd minutes and seconds by which the declination differed from the tabular value. To multiply, use the table in the back cover of H. O. 214 and enter this after "Δd′."

6. Add "Altitude" and this last determined "Δd′" to get the computed altitude (h_o).

7. Find the difference between "h_t" and "h_o." This is the number of miles you are away from your assumed location.

8. Plot your assumed location, draw a line at the azimuth determined in paragraph 5, and measure off the distance determined in paragraph 7.

9. Erect a perpendicular to your azimuth line at this point. You are somewhere on this line.



John E. Kingsley *Burdette L. Dodge* *Raymond C. Odioso* *Oliver L. Holmes* *William C. Rescorla*

AWARDS OF ASSOCIATION MEDALS

Recognition is given by the U. S. Field Artillery Association to those R.O.T.C. cadets who best exemplify, in outstanding soldierly characteristics, the high standards of the arm. We extend heartiest congratulations to these young men:

Cadet First Sergeant Burdette L. Dodge, Oregon State College; expert gunner; gold star award; member Oregon State Rifles, Oregon State College Rifle Team, Phi Gamma Delta.

Cadet First Sergeant Oliver Lockhart Holmes, Colorado State College.

John E. Kingsley, St. Bonaventure College; member Officers' Club, R.O.T.C. Band, St. Bonaventure Symphony Orchestra, Delta Sigma Beta.

Cadet First Sergeant Raymond C. Odioso, Duquesne University; Second Lieutenant, Scabbard and Blade; member Duquesne Cannoneers, American Chemical Society.

Cadet William C. Rescorla, Michigan State College; member Plateau and Drum, Officers' Club, Alpha Phi Omega, Pi Mu Epsilon (mathematics honorary), Sigma Epsilon (business administration honorary).

TRAINING AA GUNNERS

By Lt. Col. Dwight E. Moorhead, CAC

"An ounce of prevention is worth a pound of cure" might be paraphrased "1,000 rounds used to adequately train prior to combat are worth 10,000 rounds used to practice during combat." This principle, with full force, applies to the training of AA gunners before they are faced with the job of knocking an enemy plane out of the sky. Training develops those characteristics and reactions that become second nature under fire. This experience (with luck) can be gained in actual combat, but the chances are good that a poorly trained crew will not live to perform its mission. The "tempo" and nature of modern warfare do not give the gunner the chance to grow his spurs under fire. He must go into the fight prepared and equipped to do his job.

The modern aerial target is fast, fleeting, and highly maneuverable. It is a primary threat to the life and functioning of ground forces and to the success of their operations. Antiaircraft units have one purpose in life—to attack and destroy enemy aircraft.

This job of destroying aircraft can be done by trained, alert, courageous, and aggressive crews. Of primary importance is the old saying "Training begins at home (training camp)."

This discussion is concerned primarily with training aids and methods used in training AA automatic weapons gunners and crews. They are fully applicable to supplementary artillery weapons.

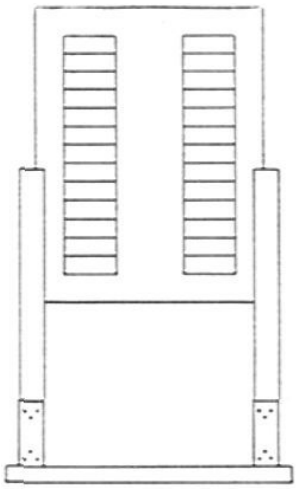
TRAINING AIDS

The following training aids and methods of using them are in use at the Tank Destroyer School. The program is designed to instruct students, regardless of previous knowledge or experience, in the proper method of manipulating, tracking, and firing the caliber .30 and caliber .50 machine guns on the various types of mounts of the Tank Destroyer Battalion. Targets and methods are those that are available to units at their own training posts.

The program emphasizes alertness as well as the time element. Low-flying attack, pursuit, or dive-bombing planes offer a maximum firing time of eight to ten seconds, or an average time of three to six seconds. This is not much time to see the target, train the weapons, and open and adjust fire. Therefore, the gunner must be adequately trained to meet such conditions.

Targets used in the training program are as follows:

I. Stationary targets, "AA," "A," "B," "C" (TM 9-855, par. 46).
II. Airplane silhouette targets for use on AA caliber .22 training range (TM 9-855, Figures 21-31).
III. Gliders (commercial).
IV. Radio-controlled AA target, model OQ-2A.
V Rocket target, M2 (TM4-236).



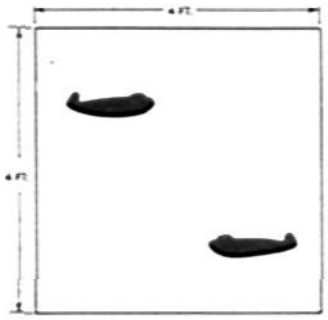
THE STATIONARY AA. "A" TARGET
FIG. 1

Stationary Target

The stationary targets, AA, as illustrated in Figure 1, are supplied by the Ordnance Department. They are mounted on target cloth which is stretched on a frame made of 1″×3″ lumber. Their frames are mounted in simple stands to hold the frames at the desired height from the ground and to facilitate replacement. These targets are placed 1,000 inches from the firing point.

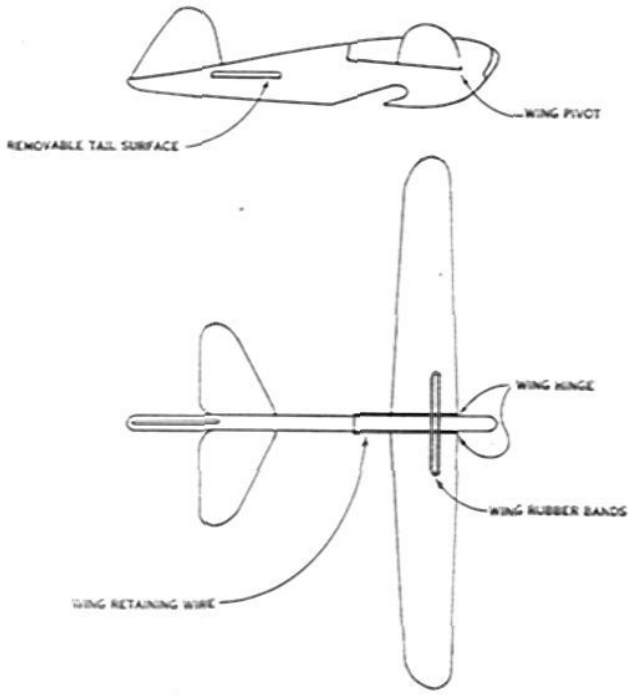
Airplane Silhouette Target

Airplane silhouette targets are made locally by the range section, of a size to fit the standard frames for the AA caliber .22 training range and which will represent the average target to be taken under fire. These targets also are placed 1,000 inches from the firing point. For the training conducted at the TD School this scale distance represents a range of 1,000 yards. Weapons larger than caliber .22 are not recommended for this range as the supporting and trolley cables are quickly cut with larger caliber weapons.



SILHOUETTE TARGET FOR 1000?? RANGE
FIG. 2

This type of range can be built easily from materials procured locally. Poles can be obtained from local telephone companies or lumber yards, or may be cut if woods are available. Stranded wire rope is recommended for the guide and trolley wires although solid No. 8 wire makes a suitable substitute. The pully diameters should be as large as possible, to make operation of the targets easier. A suitable drum for the moving cable is made by welding two steel automobile wheels together and mounting in a frame stand.



THE GLIDER
FIG. 3

Glider Target

The gliders used in our work at the Tank Destroyer School are obtained from a commercial company. They are made of balsa wood, have a wing spread of approximately 15″, and are about 10″ long. They are launched from a launching device furnished by the company. In Figures 3 and 4 are shown the glider and launcher. The targets reach an average height of 75 feet and remain in the air from 15 seconds to two or three minutes, depending on wind conditions and the trim of the glider. The wings fold along the fuselage during launching and open under rubber band action when the glider stalls at its maximum altitude. These gliders are very inexpensive and are a most effective training aid for the preliminary stages.

Radio-controlled Antiaircraft Target

The Radio-controlled Antiaircraft Target, OQ-2A, has been standardized for issue to service schools, training centers, and larger units. It is a gasoline motor-powered airplane with a 12′ wingspread, and is controlled from a station on the ground. The targets are operated and maintained by especially trained ground crews of two officers and seven men. Owing to the complexity of the equipment and the special training necessary for the crew, these targets are not issued to small units.

Substitutes for these targets are the balloon, M1, and the towed sleeve target. Balloons are available for training purposes but have the disadvantages of being slow, maintaining a fairly uniform course, and presenting a rising or receding course only. The towed sleeve has similar shortcomings in lack of maneuverability and restrictions to certain defined courses, and may not be available in many areas unless government flying fields are in the vicinity.

Rocket Target

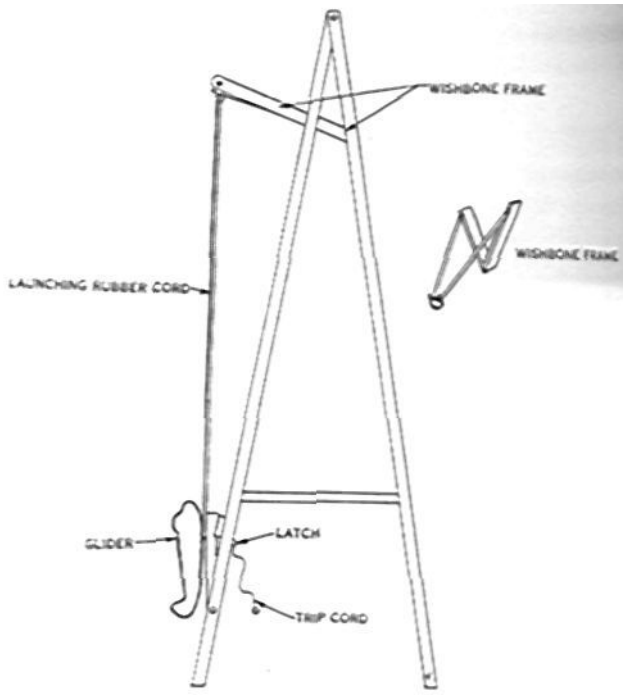
Rocket target, M2 (described in TM 4-236) has certain advantages. The target is a tube approximately 6′ long with four semi-circular fins on one end for guiding the flight. It attains a velocity as high as that of the modern combat airplane, but must be fired on certain restricted courses. These targets are furnished by the Ordnance Department and are launched from a self-contained device. They are simple to operate and crews can readily be trained to load and operate the rockets.

TRAINING PROGRAM

Good training aids alone are insufficient to make a good program, just as well-worded conferences and lectures will fall short of the mark unless well presented. Both must be properly co-ordinated.

The training program should be clear and simple. It should be consistent and should carry the student in progressive steps from the elementary phases to the advanced phases.

The program of the Tank Destroyer School is 44 hours in duration—not long enough to make *students* expert gunners. The program is laid out to teach principles and illustrate methods in order that the students may return to their own organizations qualified and capable of giving instruction to their own men. Nevertheless, each student does fire sufficient ammunition on each course to become familiar with the targets and their



A LAUNCHER FOR THE GLIDERS
FIG. 4

proper use and with the gunnery principles involved.

Instruction and practical work emphasize the use of tracer stream for fire adjustment, smooth tracking, and a maximum volume of fire during the short firing period. The firing period against aircraft attacking ground troops may vary from three to ten or twelve seconds. Effective AA action depends on a minimum time for observation and adjustment of fire, a weapon capable of rapid traverse and elevation, and a high rate of fire. The problem is met, at present, by observation of the tracer stream and adjustment of fire by the gunner. Adjustment is based on selecting a point along the trajectory at the range to the target, and bringing the point on the target.

The program is opened with instruction in the proper position for firing the various AA mounts in the Tank Destroyer Battalion. Preliminary marksmanship consists of dry runs, making use of sighting targets, model planes, and the small liaison planes (known generally as "cubs"). The purpose of these exercises is to familiarize the student with the "feel" of the gun in free traverse and elevation and to give practice in tracking aerial targets.

Next step is to accustom the student to fire and continue to track smoothly at the same time. This period consists in firing 40 rounds per student of caliber .22 ammunition with the caliber .22 Trainer, M3, which makes use of the model 1917A1 caliber .30 MG with substituted parts.

Training then makes use of the caliber .30 MG on pedestal or vehicular mount. Recoil action and vibration are apparent with this gun; the student learns to fire with the free gun and gets the first taste of using tracer stream for fire adjustment. The guns are fired against stationary AA targets (Fig. 1) with 40 rounds per student for each target, at a range of 1,000 inches. This phase of the training should not be passed over, as it accustoms the gunner to the feel of the free gun, illustrates the principle of tracer stream adjustment, and will save ammunition later on in wasted firing at higher rates of fire on the longer range targets.

Then the program moves on to targets at greater ranges, simulating actual aerial targets as far as possible. The problem is to train in tracking and firing at rapidly shifting targets having a much higher angular travel rate than encountered in normal land or water-borne targets. After experimenting with many different devices and "gadgets," the glider target (Fig. 3) was adopted for this phase of training. Size of the target, firing range, and angular rate of travel represent to scale the movement of modern aircraft at the ranges of 200 to 1,000 yards. Gliders are less expensive than balloons and are a much better target. Their courses are not only more realistic but are also unpredictable. All movements of attacking planes are reproduced, including climbing, diving, and soaring in crossing and incoming courses. Of primary importance is their interest-stimulating value which results in more training in less time.

At this point in the training program the use of the tracer stream is coming into full play. The next step is to carry on to targets at greater ranges (farther out along the trajectory curve) and also to train in firing the caliber .50 MG from the free mount. This phase involves firing from vehicular mounts and will include firing from the power-operated turrets. OQ-2A radio-controlled targets are used at ranges varying from 300 to 1,200 yards. This target cannot be equalled for realistic training and should be used to full advantage whenever it is available.

All of these targets are slower than actual aircraft. As a final step the rocket target, M2, is used to impress the student with the actual speed of modern combat planes and the difficulty of firing at them on short ranges. Each student is given the opportunity of firing on one target course. The targets are not normally recoverable.

Throughout the training the student loads ammunition, cleans guns, and corrects minor troubles.

WHAT, NO FOOT REST?

Men of an Engineer Combat Battalion have made an excellent portable field desk out of spare pieces of plywood. Used both in the field and in the battalion offices, this desk has helped speed up the outfit's clerical work no end.

The desk is approximately 32″ long, 24″ high, and 17½″ wide. Its bench is about 17½″ high, 18″ long, and 10½″ wide. The typewriter, bolted down on the flap, swings right into the knee-hole recess when the desk is closed. The bench is also made to fit snugly into this recess by turning it upside down and resting its top on the floor of the desk.

An ingenious bit of engineering, all in all.

—The Maintenance Engineer

OPEN CABS*

Riding along in a military truck today, you can see out the front, you can see out the sides, you can see out the back. But look straight up and everything goes dark. What is this, a vitamin deficiency? No, it is simply that the top of the cab shuts off the view.

In rich, full-blooded military language, this is called "limited visibility." Let the combat situation require clear vision all around and the driver is handicapped. Let an enemy aircraft fly overhead and drop a bomb—the driver and his assistant would never know what hit them.

But not any more. A new fashion in vehicle design will enable the driver and assistant driver to see clearly what hits them. And maybe even take steps to get out of the way. The new fashion in truck design is open cabs (Figs. 1 and 2). No more metal roofs, no more metal upper-sides and back. Instead, fresh air and sunshine, the great open spaces, and a view of the stars at night.

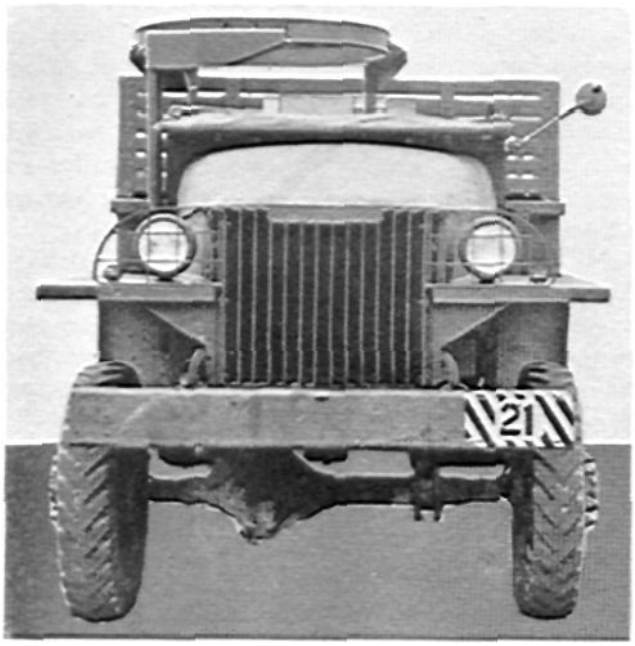


Fig. 1.—Open cab, front view. With the top down the driver's visibility is unlimited. The gun ring is low enough to preserve the "low silhouette."

The new open cabs will be used on as many types and tonnages of trucks as possible. You can expect your 1½ tons, 2½ tons, 4 tons (tractors, wreckers, everything) to come complete with open cabs.

What about your sinus trouble? What about the rain? Weather protection will be furnished on the open cabs in the form of collapsible canvas tops and side curtains.

Fig. 2.—Another of the open cabs. The collapsible top and side-curtains (not in picture) shelter the driver. That's a mount for a machine gun above the top.

Now, since the greater visibility of the new open cabs allows the driver and his assistant to spot an oncoming attacker, what arrangements have been made to help them fight back? Good ones. A gun mount or "ring" has been provided on trucks with open cabs (Fig. 3). When a German ME-109 roars down to strafe what he thinks is meat on the table, he'll be greeted by a hail of slugs from a .30- to .50-caliber machine gun swinging around in every direction on the gun ring mounted above the truck's open cab. When a band of green-spotted Japs break out of the jungle to courageously attack what they think is an undefended truck, they'll get the same dish—machine-gun slugs.

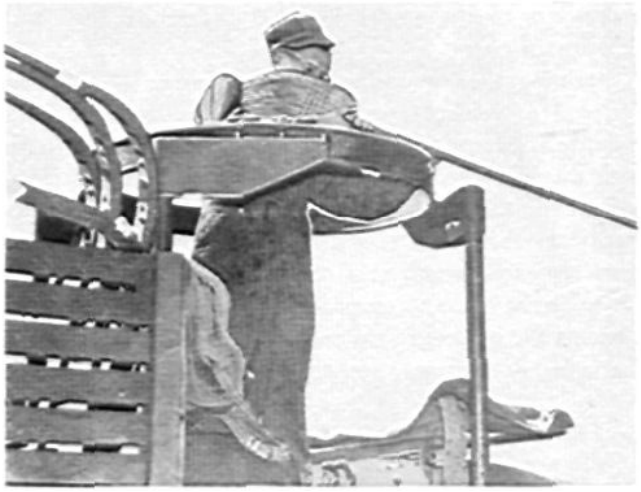


Fig. 3 — The assistant driver manning a .50-caliber broom mounted on the gun ring. Take out the seat cushion, fold the back of the seat forward, and the assistant driver has a metal platform to stand on to enable him to fire downward at targets on the ground.

This—the necessity of firing at both aerial and ground

*Republished from *Army Motors*.

Fig. 4.—Sweeping the sky clear of enemy planes. To enable the assistant driver to fire at aerial targets, the seat cushion is taken out, the seat is thrown up, and he has a clear area of floor space to dance around on. The gun ring allows a machine gun to fire in all directions.

Fig. 5.—The metal platform that appears when the back of the seat folds forward. The collapsible top folds over the windshield to blackout reflections.

targets (Figs. 3 and 4)—has been foreseen by the designers and steps taken. Or rather *step* taken. Yank the seat cushion out, pull the back of the seat down—and the gunner has a metal platform to stand on when firing at ground targets (Fig. 5). Or yank the seat cushion out and throw the seat frame up—and the gunner has a cleared area of truck floor to waltz around on when firing at aerial targets.

To complete the military character of the gun rings, they've been made universal—interchangeable—with the gun rings on other trucks. The ring sits down in a couple of clamps and sockets and can be easily taken out—or simply adjusted for height. This adjustment for height preserves the precious low-silhouette of the truck.

Getting back to the canvas top of the open cab—the top is a singularly uncomplicated thing and can be put up or down in a jiffy. Furthermore, the canvas top matches the battle-ability of the new open cab and gun ring. It's stapled permanently to the top of the windshield frame and when the windshield lies flat on the cowl (like the jeep's), it folds over the windshield and blacks-out any give-away reflections. (See Fig. 5). This kills the need for the burlap bags, liquid black-out solutions, etc., that some of the boys in the field have been using as anti-reflectors.

As stated above, the windshield, like the jeep's, either stands upright or lies flat on the cowl. As an added attraction, the windshield glass can be swung up out of the frame to give even greater visibility and also allow cooling breezes to flow over both the driver and assistant.

To retain the driver personnel within the cab, the cab is provided with metal side panels which are cut away to allow entrance and exit. A safety belt stretches across the opening. On trucks above 2½ tons, there'll probably be doors on the cabs.

Among the miscellaneous features of the new open cabs is the fact that "the maximum practicable amount of storage space for stowing the driver's and assistant driver's personal equipment shall be provided." This probably means the assistant driver will be able to get both feet into the cab. But of course we may be wrong.

Anyway, and all joking aside, we have the assurance of an officer who ought to know, that the new open cabs will be appearing very shortly in the field on many late-model vehicles.

And after riding around in the cold and wet yesterday in one of them, we can definitely promise you that the new canvas tops and side curtains offer complete protection from the elements. The side-curtains are good and tight; celluloid windows in the side curtains allow plenty of visibility and at the same time offer maximum weather protection; the canvas roof slopes downward, overlapping the side curtains and providing a tight seam. Take our solemn word for it, the new open cabs are fully protected—definitely weather-proof.

Achoo!

"The artillerymen adjusted here and adjusted there for reasons known only to artillerymen, then all hell broke loose and the tanks fled, leaving their cripples behind."

—LT. GEN. GEORGE S. PATTON, JR.

Jap landing barges and lighters on the Lunga River had no chance . . . .

Massing the Fires of Division and Corps Artillery

By Col. E. B. Gjelsteen, FA

This article is restricted to consideration of the quick massing of fires of any or all battalions of Division Artillery and Corps Artillery. It is not concerned with the other aspects of fire direction, such as organization for combat and prearranged fires.

Fundamental Principles

Before discussing Division Artillery and Corps Artillery fire direction technique we should review very briefly some fundamental artillery principles:

a. Artillery can always support an attack or a defense as soon as it is in position. Before a common control is established, the support must be by battery observed fires, the adjustment of these observed fires usually being by forward observers. At this stage unobserved fires and the massing of fires are not possible.

b. As soon as possible the battalion commander establishes a common control among his batteries so that fires can be massed within the battalion. There are two ways of establishing this common control. The quickest method is by firing. Each battery registers on a common point, termed the battalion base point, and reports to the battalion fire direction center the direction of the fire (azimuth) and the range. Starting from an assumed base point on the chart the battery lines of fire and the battery positions can now be plotted in their relative positions. Fires can now be massed within the battalion, but each massing of fires must be preceded by an adjustment by one of the observers. The other method of establishing a common control is by survey. This takes longer than control by firing. The control by firing usually requires 30 minutes, whereas about two hours of daylight are required for survey. After the common control is established by survey, unobserved fires and surprise fires (fires without a prior adjustment), as well as observed fires, are possible. When the control is initially established by firing, the control by survey replaces the control by firing as soon as possible.

c. In order to establish control by firing, registration is necessary. This is the method used when it is necessary to mass fires quickly. Even if the common control is established by survey, it is always desirable and often necessary to register to supplement this control. The concentrations are much more accurate after registration than before registration. Thus the supported troops get more support per round after registration than before. Furthermore, the charts available in a great many theaters are uncontrolled mosaics. The scale varies in various parts of the mosaic, and there are many distortions. These can be corrected only by registration. Artillery always registers unless the Division or higher command prohibits registration. After survey, registration can be accomplished with one gun, firing about a dozen rounds at the most. These rounds need not be fired from battle positions but may be fired from surveyed registration positions.

d. Artillery never delays support of the supported troops pending the establishment of a common control. But it can use only battery fires until a common control is established, and unobserved and surprise fires are not possible until survey has been completed.

e. Artillery observers have an artillery battalion behind them. They hunt with 12 howitzers. The progress of the battle will be gauged by the forward movement of the artillery forward observers. We can look on these forward observers as being supported by a battalion of infantry and a battalion of artillery. The infantry commander points out the target to the forward observer.

Within a few minutes the forward observer can place the fires of a battalion on this target. The infantry then jumps in and grabs this target which has been pounded by the 12 howitzers of the battalion. This continues for other targets.

f. When the battalion commander has established a common control and can mass fires, the battalion has taken nothing away from the batteries. Fires can still be by battery when desired.

FD TECHNIQUE: *In the Division*

Now let us consider Division Artillery fire direction technique. The four artillery battalions are the first reserve of the Division Commander. The employment of artillery battalions is the employment of a reserve. Artillery is the first reserve of the Division Commander because of its responsiveness. Any or all battalions of the Division Artillery can be placed on a target within 5 minutes. The artillery can be committed as a reserve, accomplish its mission, and be withdrawn to normal missions in about 10 minutes. When an infantry reserve is committed it cannot be withdrawn. But, since artillery can be withdrawn on completion of its mission, the Division Commander should turn first to his artillery and try to solve his problem by artillery before committing infantry reserves.

The ability of the Division Artillery Commander to mass the fires of his battalions, and thus use them as the first reserve of the Division Commander is dependent on four considerations:

a. A common control must be established among the battalions. As within the battalion, this common control among battalions can be established in two ways, by firing and by survey. The control by firing is established by having each battalion register one of its howitzers on a common point termed the Division Artillery Check Point. Then by a system of plotting azimuths and ranges, each battalion ties itself into an arbitrary Division Artillery horizontal and vertical control. This common control by firing can be established in less than an hour. As in the battalion, the fires of the Division Artillery can be massed on this control only after one of the battalions has adjusted on the target. The other method of control is by survey, the Division Artillery establishing two or more points into which the battalions ties their survey. Division Artillery control takes nothing away from battalions; they can still shoot by battalion or by battery. The necessity for registration in the battalion has already been mentioned. Division Artillery can coordinate registration by having the registrations so performed as not to disclose an undue amount of artillery. For instance, if one battalion has already been firing, all the registrations necessary in the Division can be secured by this battalion. Then again, since this battalion will send roving guns throughout the area to fire during the night, other battalions can take advantage of this. Fires are restricted to those that could normally be performed by the battalion already in position. Another manner in which registrations can be performed is by high burst during the early morning hours before the attack. This will be about from 30 minutes to 2 hours before the attack and should disclose no information to the enemy.

. . . . against massed fire from GPFs on Guadalcanal. Projectiles are stacked on brush close at hand.

b. In order to mass the fires of the battalions they must be reasonably close together. The battalions must be able to shoot into common areas. Generally if the Division attacks on a frontage of 6,000 yards or less, all the battalions can be massed in all parts of the division zone of action. With frontages of 10 miles or so, of course, the fires of the Division Artillery cannot be massed because it is physically impossible for the battalions to shoot into common areas. Generally when the infantry regiments of the Division are engaged in a coordinated attack, the fires of the artillery battalions can readily be massed. In order to determine quickly the areas into which each battalion can fire, and what battalions can fire in a specific area, the Division Artillery Commander maintains a chart of fire possibilities. This may be on the situation map or it may be on an overlay in connection with the situation map. The chart of fire possibilities is merely the graphic representation of the zones into which the battalions can fire.

c. In order to mass fires quickly, electrical communications are necessary. Telephone, of course, is the best, with radio as an alternate means and for use before wire communications are established. For massing of fires there are local phones in the Division Artillery fire direction center, one local phone for each battalion. Each local phone is marked by the number of the battalion with which it connects. These local phones are ground return circuits, and thus the local phone marked "51" can communicate directly and only with a phone in the fire direction center of the 51st Field Artillery Battalion. The fire direction phones are operated by whatever personnel are available in the fire direction center of the Division Artillery. When a mission is assigned, it is the most important work at that moment. A fire mission takes priority over all other missions. The S-3 will usually send the mission to one of the battalions himself. All other staff officers become Assistant S-3s and telephone operators at the call "Fire Mission." The Division Artillery Commander himself will be glad to function in this capacity. This is the climax of his career as an artilleryman, the massing of the fires of his battalions.

d. Before the fires of the battalions can be massed, all the battalions must be trained in the methods of battalion fire direction technique. The Division Artillery is no better than its battalions. The massing of fires requires the complete and thorough training of all personnel within the Division Artillery.

In assigning missions to battalions the Division Artillery Commander includes the following:

a. The coordinates of the target. These coordinates may be known from a study of the map, from the report of liaison officers and forward observers who can determine the coordinates of targets when photo maps are available, from an adjustment by one of the battalions, from air observers, or from higher headquarters through sound and flash ranging or aerial interpretation of photos.

b. Possibly the nature of the target. It is not necessary, but the battalions like to know the kind of target on which they are firing.

c. The ammunition to be expended on the mission. Usually the battalion commander determines the amount of ammunition to be expended, but when the mission is assigned by Division Artillery the battalion commander it not familiar enough with the situation to make an estimate of the ammunition required. For this reason the division commander, who understands the situation and the importance of the target, prescribes the ammunition when he assigns a mission to a battalion. The ammunition is given in terms of volleys. A volley is one round per howitzer, so for a battalion a volley is 12 rounds of ammunition.

d. The time at which the mission is to be fired. Time may be stated as a designated time (such as 1035) or "Fire at once."

Light battalions usually fire with each battery firing with flank pieces 100 yards apart, and with all batteries firing to hit a single range line. Just as successive rounds from a single piece and the four pieces of a battery have probable errors, so the batteries of a battalion will have probable errors so that the area covered by a light battalion, firing at center range and open sheaf, will be from 150 × 150 yards to 200 × 200. There are likewise probable errors among the battalions, and when two light battalions are placed on a single target, each battalion being given the coordinates of a single point, the area covered approaches 300 × 300 yards.

The batteries of a medium battalion fire with 200 yards between flank bursts, so a medium battalion covers almost 300 × 300 yards, about the same area covered by two light battalions. Three battalions, one of them a medium battalion, will cover an area approaching 400 × 400 yards. Four battalions will cover that full area.

We have now reached the saturation point, and the area covered will not be appreciably larger regardless of the number of the battalions placed on the target. Eight battalions, five of them medium battalions, have been fired on a single point, and the area covered has been less than 500 × 500 yards. If the area to be covered and the battalions available fit into any of the above figures, the battalions can be given the same coordinates, those of the center of the target.

If a larger area is to be covered the area is divided into battalion portions. A light battalion can be assigned an area about 200 × 200, a medium battalion one about 300 × 300.

The dimension in the direction of fire can be doubled by having the batteries fire at different ranges. A light battalion can cover an area approaching 400 yards in depth by firing 1-*c* apart, that is, one battery fires to hit the center of the area, one battery increases its range 100 yards, and one battery decreases by 100 yards. The medium battalion can cover about 600 yards in depth by shooting 2-*c*'s apart. If it is necessary to cover still larger areas, they are attacked successively.

General support battalions are the principal means

employed by the Division Commander to influence the course of the action. The Division Artillery Commander always has these battalions available for his use and he uses them in accordance with the general plan of the Division Commander. Direct support battalions, however, have been assigned their mission by the Division Commander. To use a direct support battalion for other than its normal direct support mission is a command decision which should be made by the Division Commander.

To illustrate the assignment of Division Artillery missions, two examples are given at the end of this article.

In the Corps

Corps Artillery is massed in the same way as the Division Artillery. Corps Artillery battalions use exactly the same technique employed in Division Artillery battalions. Corps Artillery battalions must be able to function as Division Artillery because they are often attached to Divisions and they will often have a reinforcing mission. In both of these missions they are employed exactly the same as is the medium battalion of the Division Artillery. Therefore a Corps Artillery battalion must be trained to have the same responsiveness as a Division Artillery battalion.

All field artillery battalions are much the same. They differ as to calibers, they may attack different targets, and they may have different higher commanders. The Division Artillery is the first reserve of the Division Commander, and it attacks targets of particular interest to the Division Commander. The Corps Artillery is the first reserve of the Corps Commander, and it attacks targets of particular interest to the Corps Commander, these targets often being beyond the immediate interest of the Division Commander. But from the Battalion Commander down, artillery functions much the same whether it be Division Artillery or Corps Artillery.

ILLUSTRATIVE EXAMPLES

Below are shown two examples of division artillery fire direction technique. The 1st Infantry Division is attacking. The organization for combat of the 1st Division Artillery is as follows: 1st Field Artillery Battalion in direct support of the 1st Infantry; 2d Field Artillery Battalion in direct support of the 2d Infantry; 3d Field Artillery Battalion, general support, and reinforce the fires of the 2d Field Artillery Battalion; 4th Field Artillery Battalion (medium battalion) in general support.

Example One

The 2d Infantry, making the main effort regiment of the 1st Infantry Division, is stopped by enemy on a wooded hill.

The liaison officer, 2d Field Artillery Battalion, is able to determine the chart location of the target. He reports to his battalion commander as follows: "2d INFANTRY HELD UP BY ENEMY ON HILL AT KM 6349. ATTACK RENEWED AT 0840. REQUEST ALL POSSIBLE ADDITIONAL FIRE."

The battalion commander, 2d Field Artillery Battalion, who is authorized to call on the 3d Field Artillery Battalion, sends a message to the latter: "NEUTRALIZE KM 6349 FROM 0837 TO 0840 IN PREPARATION FOR ATTACK OF 2d INFANTRY. MAXIMUM RATE." He also requests additional fire from the division artillery commander, informing him of the situation and stating that he has called on the 3d Field Artillery Battalion to assist him.

The division artillery commander commits his other general support battalion (4th Field Artillery Battalion). He confers with the division commander and recommends the use of the other direct support battalion (1st Field Artillery Battalion). The division commander commits his first reserve, ordering the division artillery commander to use all battalions on this mission.

The division artillery commander sends orders to the 1st and 4th Field Artillery Battalions as follows: "NEUTRALIZE KM 6349 FROM 0837 TO 0840 IN PREPARATION FOR ATTACK OF 2d INFANTRY. MAXIMUM RATE."

The order sent by the division artillery commander in this case is the same as that sent by the battalion commander of the 2d Field Artillery Battalion to the 3d Field Artillery Battalion. The division artillery commander can, of course, order fire for a longer period or a shorter period, depending on his conception of the importance of the target.

The battalion commander 2d Field Artillery Battalion, is informed that all battalions of the division artillery will fire on the mission. The infantry is informed through the liaison officer.

Example Two

A forward observer, 1st Field Artillery Battalion, discovers a counterattack which threatens the 1st Infantry. He cannot determine the chart location of the target so he sends approximate data to start an adjustment: "CHECK POINT 2 IS 300 LEFT, 500 SHORT. COUNTERATTACK. WILL ADJUST. REQUEST ALL POSSIBLE ADDITIONAL FIRE."

The target is plotted in the battalion fire direction center of the 1st Field Artillery Battalion. The battalion commander examines the location of the target and orders: "BATTALION, 12 VOLLEYS." He then requests additional fire from the division artillery commander: "1st FIELD ARTILLERY BATTALION NOW ADJUSTING ON COUNTERATTACK. APPROXIMATE COORDINATES LN 4080. REQUEST ADDITIONAL FIRE. EXACT COORDINATES LATER."

The adjusting battalion (1st Field Artillery Battalion) has reported the approximate coordinates to the division artillery commander as LN 4080. This is for the division artillery commander's information so that he can determine from his chart of fire possibilities what battalions can fire in that area. In this case, both of the general support battalions can fire in this area. The approximate coordinates are not sent to the battalions because they may be confused with the exact co-ordinates determined by the adjustment.

The division artillery commander decides to employ both general support battalions on this mission. The other direct support battalion (2d Field Artillery Battalion) is busy supporting the 2d Infantry, which is closely engaged. He sends a warning order to the 3d and 4th Field Artillery Battalions, as follows: "COUNTERATTACK, 8 VOLLEYS, FIRE AT ONCE. COORDINATES IN A FEW MINUTES. STAND BY."

The 1st Field Artillery Battalion is notified that the 3d and 4th Field Artillery Battalions will fire. The battalion fire direction center notifies the forward observer. When the adjustment is completed, the 1st Field Artillery Battalion sends the exact coordinates (LN 5472) to the division artillery, which immediately relays them to the 3d and 4th Field Artillery Battalions. The battalions fire as soon as ready.

This method is applicable for adjustments by battery commanders and air observers, as well as by forward observers.

Fast, accurate shooting is doubly necessary in situations requiring use of our mobile M-7.

ARTILLERY HIP SHOOTING

By Col. R. A. Ellsworth, FA

Quick, accurate fire delivered on the most important targets in an effective and timely manner has long been the prime mission of all Field Artillerymen. Now, more than ever, our only excuse for existence is to give battle *support*. We must approach infallibility, with rapid and errorless firing, before we can expect complete confidence and absolute reliance from the supported troops. Any time that we give cause for doubt and mistrust, or create any impression that we are lacking, we are falling short of the correct standards.

Many factors of training enter into attaining this standard. Our Field Manuals cover practically all of the requirements and give ample solutions. It has long been the consensus of experienced Field Artillerymen that book rules are a good guide and essential, but that young officers should be taught to shoot from "what they see," as soon as possible. So, rather than repeating any of the instructions contained in the texts, this article will be confined to a discussion of rapid delivery of fire by so-called "hip-shooting" methods. [Our manuals grant full permission for the use of this method but do not go into detail as to what is meant by it, or how to do it.]

It has long been the custom of the Field Artillery to shroud the simplest operation in a veil of mystery. It is a condition that has continued to exist in spite of much effort to completely eradicate this hindering complex. At present such an attitude has proven outmoded, obsolete, antiquated and not in line with present progressive thinking and doing, which are so essential for accomplishing positive results with the least possible delay. Any short cuts and simplified procedure which are based on sound methods and have been found practical and workable are in keeping with the present instructional trend.

"Hip shooting" is merely shooting by common sense and good judgment, regardless of the book rules. Accurate and effective fire is thereby obtained with the least possible expenditure of ammunition and time. First get the fire quickly in the target area, then make refinements by deflection or range changes or a combination of both, according to where the shot is with respect to the target—in other words, make the logical shifts as called for from what you see. In the final analysis it is liaison methods adapted to meet the old "Conduct-of-Fire" methods.

Field Artillery firing is simple; it is easy; there is nothing complicated or difficult about it. At no time should a student be made to fear it, or be permitted to entertain any doubt as to his ability to become a master of the art. Essentially and fundamentally, artillery firing is the same as shooting a rifle or trying to hit a target by throwing a rock; if the shot is to the right, left, over, or short, we correct our sights or aim by the proper amount in the opposite direction. We must adopt methods that will

build confidence quickly, rather than instilling any fear or doubt toward the subject on the part of the student. It doesn't take a master mind or a genius to become a good artillery shot. It has been thoroughly demonstrated, tried, and proven that a good corporal, with a meagre amount of education, can be readily trained to shoot forward observation methods to the point of complete reliability and dependability. In most cases this has been done by example, demonstration, application, and repetition without ever "cracking" the book. Simplicity is the secret of all good instruction—the easier a subject is made to understand, the quicker the comprehension on the part of the student.

Visualizing the G-T line is the crux of all observation which is off that line. Ladder fire in the middle of the sector or for marking the base point is the quickest and simplest method of determining this line on the ground and is always in order for any type of fire. Two shots at the extreme deflection limits are also very helpful in calibrating the target area. From then on the novice can start shooting with ease and dexterity without fear of being far wrong.

There is no good reason for continuing to practice the old fashioned French method of sensing deflections as short and over. This is a perfect example of doing it the hard way and has served only to complicate the simple picture. The general rule should be, "make all sensings with respect to the G-T line"—this would hold for all types of fire and make for uniformity and simplification of the whole theory of observed fires. Getting on, keeping on, and figuring to the O-T line has been the big stumbling block for presenting gunnery in a simple and direct way. After all, the G-T line is all-important even after we use the O-T line for computations in our present methods.

Let us take a concrete example. The guns are on our left; large-T precision methods will be used (this being the most difficult set-up for proving the point). A shot lands to the left with deflection doubtful. You then merely estimate the number of *c*'s by which you will increase the range so as to locate the direction of the line-of-fire, and determine whether this line-of-fire is left or right of the G-T line. Next, you estimate the number of yards the line-of-fire is away from the G-T line and make a bold deflection change in the opposite direction, in mils, in order to place the line-of-fire on the other side of the G-T line. At the same time an estimated range change is included so that the shot will be within the sensing area for deflection. The target area is now calibrated with respect to the G-T line and lines-of-fire and you continue to bracket until within the limits of fire for effect. It is all quite simple and it works—no factors, no rules—merely shoot from what you *see*.

The acid test of any idea or suggestion is, does it work and does it get results? The answer in this case is definitely in the affirmative, and the method has the advantage of being sensible and easy to teach and still easier to shoot. It puts gunnery in the A, B, C category where it rightly belongs. No one is a good Field Artillery shot until he has the picture of firing indelibly impressed on his mind—"hip shooting" is strictly "picture shooting," and is taught by "picture" methods of instruction with rules as incidental guides. A student can have the book "specked blind," but if he can't visualize the set-up with respect to the G-T line he is still a poor shot. The ability to visualize quickly angles, distances, and shifts on the ground is the secret of a good shot. Proficiency in this respect cannot be obtained in the classrooms but must be practiced on the ground, and it is surprising how much can be accomplished by spending a day on a hill making estimates of shifts and distances.

A point in this regard not covered in the books, but most practical and useful, is briefly explained as follows: First visualize the perpendicular to the T-BP line; then explain and demonstrate that as the line of metal of the gun approaches this perpendicular, the maximum shift is obtained. Any movement of the line of metal off this line decreases the shift. The measured angle at the OP and the line of metal at the guns can be compared as to their relative position with respect to this perpendicular. A quick estimate of the necessary addition to or subtraction from the measured angle then gives a fairly accurate shift for the guns. This method can be quickly explained by diagrams or by using a string with the ends at the target and base point and the vertex at the end of the perpendicular on the G-OP line. Movement of the string off the perpendicular quickly demonstrates the increase or decrease of the shift, which can be quickly compared with the measured angle at the OP. Such a demonstration is a quick revelation of the simplicity of estimating shifts without computation or use of offsets. However, it takes practice on the ground to guarantee a firm grasp and the proper "eye" training.

This method is quick and effective and fits hand-in-glove with the "hip shooting" principles. It is a simple application of the every-day knowledge that if you look at two objects from an oblique, the angle subtended between the two objects decreases from the straight-on perspective. It also emphasizes the simple truth that as you move away from two objects the angle between them decreases, and the closer you are to an object the bigger it looks.

It is surprising how far we have wandered from these simple principles in the process of refining and complicating our gunnery. We might consider the feasibility of reverting to these simple methods and finally wean ourselves from the complications of gunnery instruction in the last war. This article is an urge to revert to the fundamentals of "keeping it simple and learning by doing and seeing." We have gone a long way in this respect since the Phi and Omega and 430-85 days, and our "G" series have greatly simplified procedure. It is believed that still further progress along these lines is needed and can be accomplished.

BUGS and BONERS

By Col. Christiancy Pickett, FA

At the gun position before Fredericksburg the handsome officer pushed back his yellow locks under the jaunty gray felt hat, drew his saber, and cried, "Now, men, when the Yankees come up out of the river, let them have it. I don't want to see anyone stopping to swab, but don't forget to thumb the groove. Send for the teams and fix the prolongs to fire retiring!" This dashing fellow knew nothing of logarithms; he did not lie awake at night haunted by hundred-mil errors, deflection correction changes, and gross errors in the measured adjusted base angle. When not raiding hen houses to feed his hungry men he had time to think of his girl back home.

If he were to come to life today he would find many of his concepts still alive at Ye Olde Schoole at Fort Sylle, but among the units of artillery throughout the land he would be bewildered to find us introducing PFCs to the mysteries of survey, meteorology, asimtotes (?), and celestial navigation. To his amazement he would find in FM 6-40 a chapter on astronomy! He would find all the men receiving a liberal arts education (during drill hours) in such subjects as American History, Problems of Democracy, and Geopolitical Doctrine. But upon visiting a gun position he would at once recognize with horror that guns were pointed out of their sheaf in all sorts of directions—and nobody the wiser.

They would tell him it *couldn't* be wrong with transits reading down to 20 seconds, and corrections for photomap distortion, weather, materiel, and VE all applied. They would introduce him to the Message Center—which he would soon discover is an agency for suppressing, garbling, and delaying military messages; and to a bewildering succession of codes and radio language, all changed every few days to develop the faculty of memory. In the FDC they would show him five bright soldiers who just replaced five a little brighter who left yesterday for OCS after replacing five others who left last week for OCS after replacing five others who left for OCS last month—etc., etc. They would show him a range-deflection fan and a graphical firing table—instruments with which it is impossible to make a mistake (except as herein described).

They would show him how the modern executive lays parallel two or three (and sometimes even all four) of the pieces, using an aiming circle whose needle used to work before the Instrument Corporal went to the FAS and became a Captain in the Gunnery Dept. After toying with this rugged but not indestructible tool, he would discover that it is possible to make a large error in any of the following commonly-used ways:

a. Failing to look back at the azimuth circle reading after setting a number such as 5441, and as a result setting 5341 or 5541.

b. Setting 3597 and thinking he has set 3697 because the arrow points "near 36" on the azimuth circle.

c. Making a mistake of 100 in subtraction before setting anything at all.

d. Making the same 100-mil error in reading the scale after turning to a gun. (A nice 200-mil error can be made by a combination of any two of the foregoing!)

e. Fumbling around for the right knob while squinting through the magnifier and turning the upper motion instead of the lower (or vice versa in some cases).

f. Using the upper knob to set the vertical hair on a point, thus moving scale off zero.

g. Failing to clamp the key on the extension bar.

h. Failing to clamp the lower wing nut.

i. Failing to clamp the ball-socket joint tight.

j. Kicking the tripod.

k. Failing to take off GI spectacles (GI means "Galvanized Iron") when centering needle.

In addition, certain smaller errors can be made in any of the following approved and oft-practiced ways:

a. Failing to look both sides of the index while reading the micrometer scale, thus reading 2373 instead of 2367.

b. Centering the needle with an automatic pencil (containing iron) in your shirt pocket only 2 inches from the needle.

c. Not leveling the bubble.

The author does not claim that these are the only ways of making mistakes. A young man with a bright mind can always devise new and original errors. These are merely the more common ones, and there are 14 of them. Five can be made on his sight by a gunner, who can also misunderstand a number, get on the wrong aiming point or fail to get on any at all, or add instead of subtract. This business of misunderstanding numbers is most interesting, also applies to radio and phone operators, and will be discussed when we get to the FDC.

So the gunner can find nine ways of making a mistake and there are four gunners. So that makes—wait'll I get my slide rule, lemme see—that makes 36 plus 14

Being a compendium of the latest approved methods of making whopping big errors

aiming circle errors, or 50. We're getting along fine, but we've merely begun.

Each No. 1 can make an error in any one of five mutually exclusive ways:

a. Fail to set elevation change.

b. Fail to set angle of site.

c. Set wrong elevation.

d. Set wrong site.

e. Fail to level bubbles.

Four No. 1's times 5 mistakes is 20 (plus 50 subtotal equals 70).

Now any of four sections can load the wrong charge. Total 74.

There are three batteries in the battalion. Three times 74 is 222 (approximately).

But there is a wealth of wonderful opportunities to ball things up that we haven't even discussed yet. Let's go up to the FDC and see what could be jazzed up in that brain-trust center.

a. Tricks with a Protractor.

1. The vertex of an angle is usually located at the intersection of its sides, but it is not at all hard to put the protractor's peep-hole over some other place. A grid line is one of the favorites.

2. Measuring from the 1600 graduation instead of zero and adding or subtracting to get the difference, introduces a lively chance for an arithmetic error. (Note: Many computers understand calculus but cannot add or subtract in their heads.)

b. Plotting Scale Calisthenics.

1. Many prefer to use the 1/21,120 scale on the triangular boxwood plotting scale, but the results obtained therefrom on a 1/20,000 map are only approximate! Some cover the 1/21,120 graduations with crinkly adhesive tape to prevent this.

2. Error of 1000 yards measuring a range is easy to make on the triangular scale by assuming that the subdivided space is included in the readings of the other 1000 yard graduations. It isn't.

3. Frequently people read or plot a coordinate such as 23.085 as if it were 23.85, and vice versa. There is, however, a slight difference. (About 765 yards.)

4. The L-shaped zinc scale is handy and fast for putting pins in targets. But HCO's have been caught plotting the coordinates (68.35-41.91) at the point (68.91-41.35). When batteries are at the north end of the chart firing south, HCO stands at the north side of the board. But if he doesn't go around on the south side to read and plot coordinates, he may plot them upside down.

c. Fan Fantastics.

1. Some fans measure ranges 25-30 yards long due to worn vertex hole. This is a small error, but it can do some things to K.

2. If fitting the fan vertex on the gun pin with the right edge of the fan against the target pin puts the base point extension on the fan's outer arc, the shift ought to be "Base Df Right something"—but HCO *can* count from the right edge of the are *left* to the base line, and get the idea in his head that it is "Base Df Left something." Somehow or other the S-3 may be checking somebody else or answering a phone, and so doesn't catch the error.

d. Speech Slips.

1. Did you ever get the wrong number when calling 2359? This is because 2 and 3 sound much alike on the phone, and so do 5 and 9. Phone operators garble commands this way.

2. Another wrong number comes from calling 23323 and getting 32322 or 22332. This isn't phonetics, but rather a peculiar mental trick that inverts similar numbers or puts them out of sequence. R 32, 234 may get to the guns as R 23, 324. Something of this sort makes an HCO read right off his fan "R 30-3700" when the range is 3070.

3. On hearing an adjusted elevation announced an S-3 may command "3230 over 233" and one of the computers may set "2320 over 233"—thus causing all his battery concentrations to fall 1000 yards over. S-3 has two ways of catching this: the computer's slide will stick way out and should catch his eye, but good procedure also demands that all computers read their K off the scale aloud to the S-3 as soon as they have set their sticks up. This will at once reveal if anyone has set it wrong.

e. An HCO had occasion to measure a compass and a range from a photomap. He measured Compass 3050 Range 3500 and wrote them on a slip of paper—but failed to label them. Then he announced them as Compass 3500 Range 3050.

f. Everyone knows that plus and minus signs get mixed up in metro messages, as do decimal points, which drop into the strangest places.

A large percentage of these FDC errors occur because we have been urged to produce speed, speed, speed—with inexperienced operators and inadequate methods of apprehending or preventing their errors. But dizzy, groggy, sleepless officers can make mistakes, too. A couple of samples:

a. Survey section reported the coordinates of the three batteries to FDC but neglected to state that they were in order (from right to left) B, C, A, assuming that S-3 knew this. But S-3 had not been on the reconnaissance and was accustomed to the S.O.P. that places A on the right, B in the center, and C on the left. Accordingly he set them up this way on the chart and the score for that day was no runs, no hits, nine errors—big ones.

b. After a registration by center battery the adjusted base angle to a common orienting line was reported. S-3 applied the offsets for the right and left batteries in the wrong sense so that A and C Batteries' base deflections were crossed up by 50-100 mils and the only battery yielding any effect on concentrations was the registering battery. This happens oftener than you'd think.

Another way of kidding yourself is to ask the executive to *report* the adjusted base angle or adjusted compass,

instead of requiring him to measure it. There are three things wrong with this procedure:

1. It throws computation on the executive that could be done in the FDC,
2. It runs the risk of his making an error, and
3. Most important of all, it gives you what the adjusted compass *should* be providing no errors were made at the gun, *not* what the adjusted direction actually is. Upon the result rests the accuracy of future firing of the entire battalion, and don't you believe that it has never caused errors.

Well, these are 15 ways of making a mistake in the FDC, bringing our grand total up to 237, and we haven't yet touched on the survey section or the communication people.

The only correct survey data the author has seen since plane tables were thrown overboard in favor of theodolites was once where all units were required to go through various stations and report their coordinates and elevations for these points to the Division Artillery CP. There were large mistakes in this instance, too, but they showed up in the comparison and the units who made them gladly took the average of the results turned in by the units whose answers were approximately the same. What are some of the ways of tying up a survey?

a. Chain man picks up 7 arrows and says to himself "Seven times 100 feet is 700 feet; then I have to add another 100 feet for the distance from me to the first arrow; that makes 800 feet!" The result is an error of 33 1/3 yards in this leg of the traverse.

b. Chain men measure the last fraction of a tape from the wrong end, getting 33 feet instead of 67.

c. The old familiar trick of forgetting to convert feet into yards.

If we could only eliminate these bugs from the chain crews we could afford to forget the minor errors resulting from not chaining straight, failing to stretch tape taut, and even those resulting from failing to correct for slope. The best way of preventing gross chaining errors is for the Chief of Party to pace the distances and make a rough comparison with the chained distance to detect a gross error.

ANGLE ERRORS

a. On the computed traverse one can easily get a plus sign on a small dx although the dx is actually minus. Two people working together have been known to make this identical mistake and agree on the same wrong result: only one of them kept a diagram and both used it when computing. This illustrates the necessity for duplication and check operations that are *entirely* independent of each other.

b. The transit operator can note the complement of an angle instead of the angle.

c. Errors in converting degrees and minutes to mils are frequent.

d. Any of the errors numerated earlier in this article for the executive using an aiming circle can also be made by the instrument man on a traverse. There were 14 of them, remember?

SHORT BASE

We have always had a short paragraph in our gunnery text explaining in simple language how to locate a distant, inaccessible point (in the target area, for example) by carefully chaining a base, measuring the angles to the point from each end of the base, and computing the long, skinny triangle. It has its use and its place. Of late, however, it has been set up as the universal, super-versatile, invariable method of locating anything from everywhere. One is laughed to scorn for suggesting use of that old-fashioned, outmoded long base intersection which we used to think was so reliable when the ends of such a base were known or could be determined. As for resection, tsk! tsk! That is terrible! No, short base, like iodine and magnesium sulphate in the Medical Corps, fulfills and satisfies every need. The author has seen officers just home from BOC using a short base to determine the location of their base piece from a place mark only 300 yards away! They use it on a photomap when there are two well defined locations, identifiable on the photo, that can be reached in 5 minutes in a car and used for long base. Then they wonder why their K doesn't work when applied to ranges between photomap locations!

Little incidents like these occur when everybody in the Field Artillery is expected to be an Engineer. A lieutenant, sent to get the length of a short base, determined it by the mil relation using a 6-foot soldier as "w" in the formula $\frac{w}{R}$ = w/R! Another officer paced the distance! Then there is the almost incredible story of the Division Artillery Survey Officer who carefully chained the distance to a telephone pole about 100 yards away, found that he could not take the pole down to set his transit over it, and so measured 1 yard over from the pole and from the stake at the other end of his base; from this alleged short base, another point was located by computation; this point became one end of another short base, and so on, all through the position area; fortunately not a single battery fired—the safety officers wouldn't permit it!

So we add 23 more ways that Survey Sections can make a big mistake, and if you will take the author's word for it there are 12 ways in which communications personnel can throw a wrench into the works. This makes a grand total of 272 possibilities for a nice big error in the data for firing. If we cared to introduce a high burst registration we could add quite a few more corpulent likelihoods, but 272 is a nice figure to work with.

We are not talking about 272 mistakes that might occur in rare instances. All the errors enumerated and described above have been seen to occur during the past two years in four different units, one of them regular army. The people who made them ranged all the way from a colored private in the instrument section to an ex-gunnery instructor from Sill, and even included the

author of this article who knows a lot about mistakes through having made them. Many of the mistakes described have occurred repeatedly. The champion of them all is the 100-mil error that never appears to mock its maker until the rounds burst.

It is futile to claim that these errors will not occur in a well-trained outfit. As training progresses they occur less often. Then a large number of key men may disappear on their way to OCS and a couple of cadres, and the "well-trained outfit" that had every important job filled three deep finds itself with green gunners and computers, green executives and green surveyors, and a few weary, discouraged old timers who watch the same gross errors being made all over again in the same way.

But there is the way out of the trouble. By this time the old timers should know what is likely to happen, what causes it, and how to prevent it. In general there are a few principles:

a. Don't be in too dam big a hurry. Many "short cuts" won't work out of sight of Signal Mountain; they save only a few seconds and result in a multiplicity of errors when adopted by inexperienced units. In important matters, be deliberate.

b. Try to adopt the simplest way of doing any job and teach people to visualize what they are doing as they go along. Many of the latest survey methods ignore this principle with the result that the errant party has no idea that he has made a whopping big error.

c. *Check and double check*. This principle is by far the most important of all. A profound appreciation of the law of errors will help anyone to realize this. The probability that at least one of a large number of individuals or groups composing a Field Artillery battalion will make one of the 272-odd errors heretofore discussed is variable according to the training and experience of the unit, but it is a considerable probability and in any case a risk that we ought not to be taking. Just one big mistake, undetected and uncorrected, is all you need to nullify all the careful work that everyone else has done, and cause the fire of one or all the batteries to be completely ineffective, if not actually dangerous to friendly troops.

But now consider the probability that two people, *working absolutely independently* on the same problem, will make the same identical error and get the same result. This probability is so small as to be negligible. For example, if there is one chance in a hundred that a computer will get a minus sign instead of a plus sign for his wind effect, the chance that another computer working beside him (but entirely independent of him) will make the identical error is only one in 10,000. If three of them work it, the chance of an undetected error is even less, and in addition the agreement of any two of them points to the probability that the third made the error, so it can quickly be found and proved.

To sum it up, if you don't require an independent duplicate solution of every problem it is only a question of time till a costly error is made, and in the long run a considerable number will be made. But if you do make this check-and-double-check it is almost impossible to make errors without discovering and correcting them before they can hurt you.

Specifically, the following operations are recommended for the use of all those who believe that it is human to *err*:

a. When approaching an aiming circle, take off your specs; go through your pockets for anything that might attract a needle; set the instrument up firmly with a broad base as in Fig. 1, not like a giraffe on a tight rope as in Fig.

Figure 1

Figure 2

2; tighten all the keys; and then try to twist the head to see if it will slip. Look at the numbers on the scale on *both* sides of the index on *both* the azimuth circle and the micrometer scale *after* setting a reading (or before reading it), and be sure it's right.

b. Whenever a new deflection has been set on guns or a big change has been made, require the Chief of Section (not the gunner) to read it aloud. This catches 100-mil errors. It takes 10-15 seconds and it is worth it, even in a bracket problem, for the transient enemy target is still unaware that you are going to adjust on him and will probably stay put till you begin firing. Executives and assistant executives should also look over the metal at points on the crest to catch pieces out of the sheaf at this important time, and assistant executives should go to one flank of the position and see if any piece is sticking up appreciably higher or lower than the others. (Some people will holler with pain at this suggestion. Let 'em holler.)

c. Add an officer to the FDC to check HCO. Give him his own chart and tools. Make the enlisted HCO call off shifts and ranges while the officer checks or corrects him.

d. Add a fourth computer. Assign an officer for this job. Let him compute commands for the first battery announced, then listen to the other computers—saying

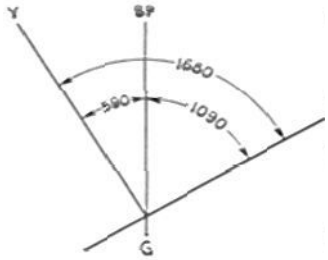
nothing if the battery he is checking is correct and the other two reasonably close.

e. When a metro message is received make everybody in the FDC figure it unless otherwise occupied; forbid them to consult; wait till all are through before taking anybody's results.

f. In survey operations require the determination of every critical point to be checked by an independent, duplicate operation—preferably by a different method and at least by a different person with different instruments. Example: Two instrument crews, one with a transit and one with an aiming circle, made a four-legged traverse 1,200 yards long from the OP area to the position area. The transit crew computed the intermediate station by short base; the aiming circle crew chained and computed. They disagreed by over 200 yards. Meanwhile a crew with the despised and old-fashioned plane table went back by a different route and finished ahead of them. The instrument crews did not finish the argument till the next day, when they found they had both made gross errors. They finally agreed on a location 25 yards from that determined by the plane table crew. (Names and places furnished on request.)

Yes, this is actually a suggestion that plane table work be used as a check on computed traverses because it is not too slow and its results are usually approximate.

g. When one battery of the battalion is registering, at the conclusion of the registration require the executive to *measure both* the adjusted compass *and* the adjusted base angle. If the initial laying was by compass, the FDC figures what the adjusted compass should be from the changes made during the adjustment and compares this with the executive's report. If an orienting line was put in by the survey section and its Y-azimuth has been determined, you subtract the adjusted compass from the Y-azimuth of the orienting line and should get the adjusted base angle. Or you can subtract the adjusted base angle from Y-azimuth of the orienting line and get the adjusted compass. If this does not check within 5 mils there must be something wrong with either the survey or the executive's measurements.



Y-Az OL — Adj Ca = Adj Base ∠

1680 — 590 = 1090

Y-Az OL — Adj Base ∠ = Adj Ca

1680 — 1090 = 590

h. Make two different people compute base angles for non-registering batteries. Do not let them consult.

i. After giving computers the map range and adjusted elevation, have them hold up their sticks and read off the K they get. Meanwhile require S-3 to compute the K and see if they agree. This may save the whole battalion from firing into the next county.

j. Don't put the batteries too far apart if you can help it; this complicates the orienting line problem and invites additional chances of error. Moreover, the HCO's cheerful chirp "Corrections all batteries L3" is a sadly erratic statement when gun positions get around 500-600 yards apart. If more than one orienting line has to be used, select as the registering battery the one whose orienting line was established by the direction traverse. This checks the direction traverse and prevents firing from an incorrect orienting line direction.

k. Make everyone put the word "Elevation" in front of the elevation command. This is not according to the book but it will save endless confusion and gross errors in transmission.

The Field Artillery is a noble science of approximation. We were raised to a fine disregard of small errors and a holy horror of large ones. Look out for people who want us to dash into every computation like Ty Cobb sliding into second base, and look out also for the gremlins who love to hide in long formulas and 6-place decimals. Between the two of them they're apt to ruin us and forfeit the respect of the infantryman we support. The doughboy knows what dispersion means, but he is apt to regard shells falling behind him with a faint touch of irritation and impatience. He is apt to think we have been flying in an academic stratosphere before we learned to walk on the ground.

Let's get back to principles and fundamentals. Let's stop denying that attempts at exactitudes, carried out in mad haste, under high pressure with inexperienced men, will cause large errors. Let's catch the errors.

There was once a lieutenant who, being called upon to explain how he tied up the problem, responded by quoting from that venerable hip-pocket compendium of wisdom. *The Provisional Regulations for Field Artillery, 1916:* "It must be borne in mind that men are apt to make mistakes and due provision should be made therefor."

More power to him!

FLASH!

As we go to press, the War Department announces that "it no longer will be necessary for a soldier serving overseas to obtain the approval of his commanding officer in order to receive a package from home."

This change of course applies to book orders sent to your Association.

MILITARY CENSORSHIP

A Guide to Sensible Censoring

By Maj. Bryan C. Arnold, AC

When the order comes through making you a censor, don't take either of two extreme attitudes: (1) that it's all nonsense anyway and a useless task you're not going to let interfere with "more important" duties; (2) that you are going to chop up every letter so it looks like a player piano roll just to show 'em you mean business. Your proper code will be a sensible compromise between the two.

No officer should begin his job of censoring until he has read Section IX of FM 30-25 (February 15, 1940), which outlines the basic principles and procedures for doing his job. The suggestions made here are in no way contrary to the rules found there. They are merely added as a practical interpretation of and as a supplement to them. They are the result of the experiences that the Theater Censor and other officers have had under war conditions in one of our earliest overseas censorship stations.

Realize that censoring is an important job. It is possible for persons in the military service to reveal through the mails such vital information as the location and strength of our forces, details of our military equipment, the state of our morale, or rumors that would injure morale. Any of this information would be extremely valuable to the top Axis leaders or any of their agents.

The soldiers' attitude, and too often the officers' also, is "What's it going to hurt if my mother or my wife or my sweetheart, whom I trust implicitly, knows where my company or regiment is located? I know she won't tell!" This confidence is commendable; but unfortunately experience has shown that once information gets out, no matter to whom, it tours the country. Then, too, there's always a possibility of interception of mail by the enemy. The best system for controlling the spread of information is to plug it up at its source. That is your job as a censor.

You have an additional duty in this respect. As an officer you should *by example* discourage your men from writing taboo information. It has been the outstanding observation of censorship that officers have broken the rules of censorship more frequently than enlisted men. You censor your men's mail after they write it; censor your own *before* you write it.

The purpose of censorship, stated generally, is to prevent passage of information which would be of aid to the enemy or of harm to us. There are two ways by which information of value to the enemy might be conveyed through the mails. One is through enemy agents, who may resort to all the tricks of espionage (such as the use of secret inks, code and cipher, or microfilm) to get their information through. These cases, we hope, will be rare. The other means, which will be the concern

In the French army excision was done with scissors. Here a soldier in the Maginot Line witnesses the fate of his letter.

of you as a censor in 999 cases out of 1,000, will be the thoughtless giving away of information by your own loyal American soldiers.

A word about catching spies within the armed forces may be in order. The chances are that there are no spies in your battery, or even in your whole division, but there is always the possibility that there may be one. Remember that in the last war the Germans planned to have one spy in every American regiment that went overseas. If you have to read one million letters in order to catch one spy, the time and effort are still well spent because one enemy agent within the armed forces may cost the lives of thousands of men, and thousands of dollars' worth of equipment. The information which he might send to his head G-2 could even cost you your own life. So as you read, keep this thought always in the back of your mind: "That suspicious one may be for the Axis." Those who wish to go more deeply into the cryptology phases of censorship may consult the bibliography at the end of this article.

Assuming that by reading the listed works and using your own ingenuity you will be able to spot the spy letters, we will proceed to the handling of that class of correspondence that will occupy you most of the time—the writings of your ordinary soldiers.

According to FM 30-25 certain items are prohibited entirely from passing through the mail. These are:

(1) Diaries
(2) Official documents
(3) Captured documents
(4) Press releases
(5) An advertisement inviting correspondence with a stranger
(6) Letters to enemy prisoners of war

Experience has shown, however, that hard and fast rules are difficult to apply in censorship. In some cases, in the interest of expediency, exceptions to the above prohibitions may be made. For instance, if a diary concerned only the individual routine life of a soldier, without mentioning military information or telling of the battles or campaigns in which he was involved, it is conceivable that his diary could be allowed to go forward. Certain official documents, also, in which an order or a citation is published, mentioning the man only as an individual, might be allowed to go through. Each case must be judged on its own merits, always keeping in mind that your purpose is to prevent information of value from reaching the enemy and to prevent false stories from reaching home. The action to be taken in these cases is either to return the letters or documents to their senders or (if the prohibited document is of value as evidence, history, or intelligence) turn it over to S-2 for disposition.

Other items such as personal mail, newspaper clippings, and snapshots, though not ordinarily so objectionable as to warrant return to sender in toto or transfer to S-2, may still be partially objectionable and require withdrawal of enclosure for return to sender or excision of parts of the letter before releasing. Excision is best done with a sharp knife or razor-blade instead of scissors. In V-mail do not excise, but delete by inking out so the writing will not show through. India ink works best for this.

The most numerous excision cases will probably be APO violations. What is an APO violation? It is the coupling of an APO number with a geographic location. The term "geographic location" may receive a broad or narrow interpretation depending upon the area involved. Here again common sense must be used. The point is that we don't want the enemy to know how many troops, or what type, we have at any certain strategic point. For example, in the Hawaiian area at present, the local rules are that an APO may be connected with the Territory of Hawaii, but not with any definite point within that territory. Specifically, if Private Russell Rowe has as his return address "APO 1,000, Lihue, Kauai, c/o Postmaster, San Francisco," it is an APO violation and the words "Lihue, Kauai" must be excised.

Similarly, the mention of the location, strength, movement, equipment, morale, or additions to or the organization of our own troops must be excised. Pictures of vital installations or topographical features which would interest the enemy must be withdrawn and returned to sender. Any rumors or false accounts are also objectionable, for should they reach the hands of the enemy they might form the basis for propaganda which would tend to break down our unity. And lastly, any discussion of the results of a battle and the number of losses, either in materiel or in personnel, are prohibited before they are officially announced by the War or Navy Departments.

The terms which I have used are capable of very broad or very narrow interpretation, and it is only after thought and experience that the censor will be able to determine whether what the writer has said is truly objectionable or not. The censor must be able to differentiate between fine shades of meaning, for sometimes the dividing line between objectionable and non-objectionable material rests merely upon one word. A censor told me once that in case of doubt, he cut the material out. My reaction to this is, "Okay, but don't be in doubt." And in applying these rules it is well to remember the motto of the Office of Censorship: "That which does not concern the war is of no concern to Censorship."

The following letter, properly censored, serves to illustrate some of the foregoing principles:

Battery D, 621st FA Bn.
APO 201, *Hilo, Hawaii*.[1]
c/o Postmaster,
San Francisco,
Nov. 3, 1942.

Dear Folks,

How's everything at home? Haven't heard from anyone in so long I decided I'd write one regular letter and one V-mail just to make sure you get one.

As for me I'm feeling fine and liking the Army more all the time. I'm stationed near *Hilo. Hawaii*[1] and it's kinds hot where we are, but I don't mind that. We heard we might move up to the mountains but nothing definite yet. The 52d Coast Arty. moved in at *Kalapana, 30 miles away*,[2] a few weeks ago. I'm going down to see their place soon.

We had practice firing with the 75's last week and my section was really good. It was fun, too.

The people here are very friendly and I hope they stay that way. I went into town last Sunday and really had a swell time. Saw a good movie and had a big steak. Not many girls here is the only trouble.

Well that's all now. Wish I could be taking the *Lurline*[3] back to the good ole U.S. to see you. She was in port *Sunday*[3] and leaves *tomorrow*[3] I think.

Well, so long for now,

Love,
Bob.

Excisions:

1. APO violation revealing geographic location of APO 201.
2. Gives definite location of a regiment of Coast Artillery.
3. Gives definite location and movements of a ship.

If more excisions than these are necessary for this length letter it is best to return it to sender for rewriting. Even in this case it might have been properly done as a reminder to the man that he should not reveal such vital information. Notice, however, that information must usually be definite before it is objectionable. Yet accurate information could be given under the guise of hearsay. Careful reading of every sentence is necessary before a decision is made. Mention of the "75" in the model letter is not objectionable. Neither would be the mention of any other well-known equipment. But the description or even mention of new types might be objectionable and therefore call for excision.

The first censoring is that done by the battery censor, who confines himself to enlisted men's mail (except that which requires special treatment). Mail which may require special treatment is that suspected of containing a code, cipher, or secret-ink message, that written in a foreign language or in shorthand, and that which the writer requests be sent to the theater or similar censor. The latter we generally call "blue envelope mail"; this process is designed to enable a man to keep certain matters private from his immediate superior. Letters in a foreign language should have the name of the language written at the top center front of the envelope. The battery censor, who receives the letters unsealed, must be very careful when examining them to replace all contents in the right envelope and to censor every letter. He should open only one letter at a time to avoid mixing the contents.

The hierarchy of censorship at present follows different forms in each locality. Organization above the battery censor is and will be predicated on local conditions, but the principles of operation will to a large extent remain the same. The form of organization as outlined in the manual, though not strictly applicable in your locality, may still help to emphasize these principles. The battalion or regimental censor's principal duty is to check the censorship stamp of the battery censor, and to censor unsigned officers' mail. Officers' mail not signed on the envelope goes direct to the censor who censors, stamps, and releases it. The last step in censorship is done by the theater censor. He censors officers' mail signed by the writer on the envelope, and the blue envelope mail forwarded directly up from the battery and those letters which require special treatment. The theater censor has a laboratory for the discovery of secret ink and for the deciphering of code and cipher, and a translation staff to translate foreign languages and shorthand. Any mail which you suspect is from an enemy agent, or which may have a concealed message in it, should be forwarded to the theater censor without delay. The above is "according to the book." Actually, however, in many places division, base, or post censors have been appointed to perform duties of the regimental or theater censor or of both.

In addition to the strictly prohibitive side of censorship, there is also the constructive side. From your men's letters you will learn much about them—their native intelligence, education, and interests. This information will aid you in sizing up your men. But remember the motto: "That which does not concern the war is of no concern to Censorship." Unless the information helps you to classify your men, and thus concerns the war, it is of no interest to you. Understand that all information that comes to you via censorship is classified as "Confidential." It would be highly unethical and unbecoming to you as an officer and a gentleman to discuss with another, except officially, any matters which may come to your attention in your censorship duties. If you do remember what you read, don't discuss it except in line of duty. Further instruction on the treatment of confidential matter is contained in AR 380-5, *Safeguarding Military Information*.

Lastly, don't overdo censoring. Censoring is not designed to "heckle" the enlisted man or the officer. It has one primary specific purpose, which was stated at the outset of this article: to prevent the spread of information which would be of aid or comfort to the enemy or otherwise injure the war effort of the United Nations. Any needless or stupid censorship is an unwarranted intrusion into the private affairs of your fellow Americans and is antithetical to our conception of democratic society.

Owen Tweed has said a censor needs "The eye of a hawk, the memory of an elephant, the nose of a bloodhound, the heart of a lamb, the vigilance of an owl, the sagacity of Solomon, the patience of Job, and the imperturbability of a sphinx." Or, in less figurative language, censoring is to be done with both eyes open, with your mind alert, with a care for you men and a care for your country.

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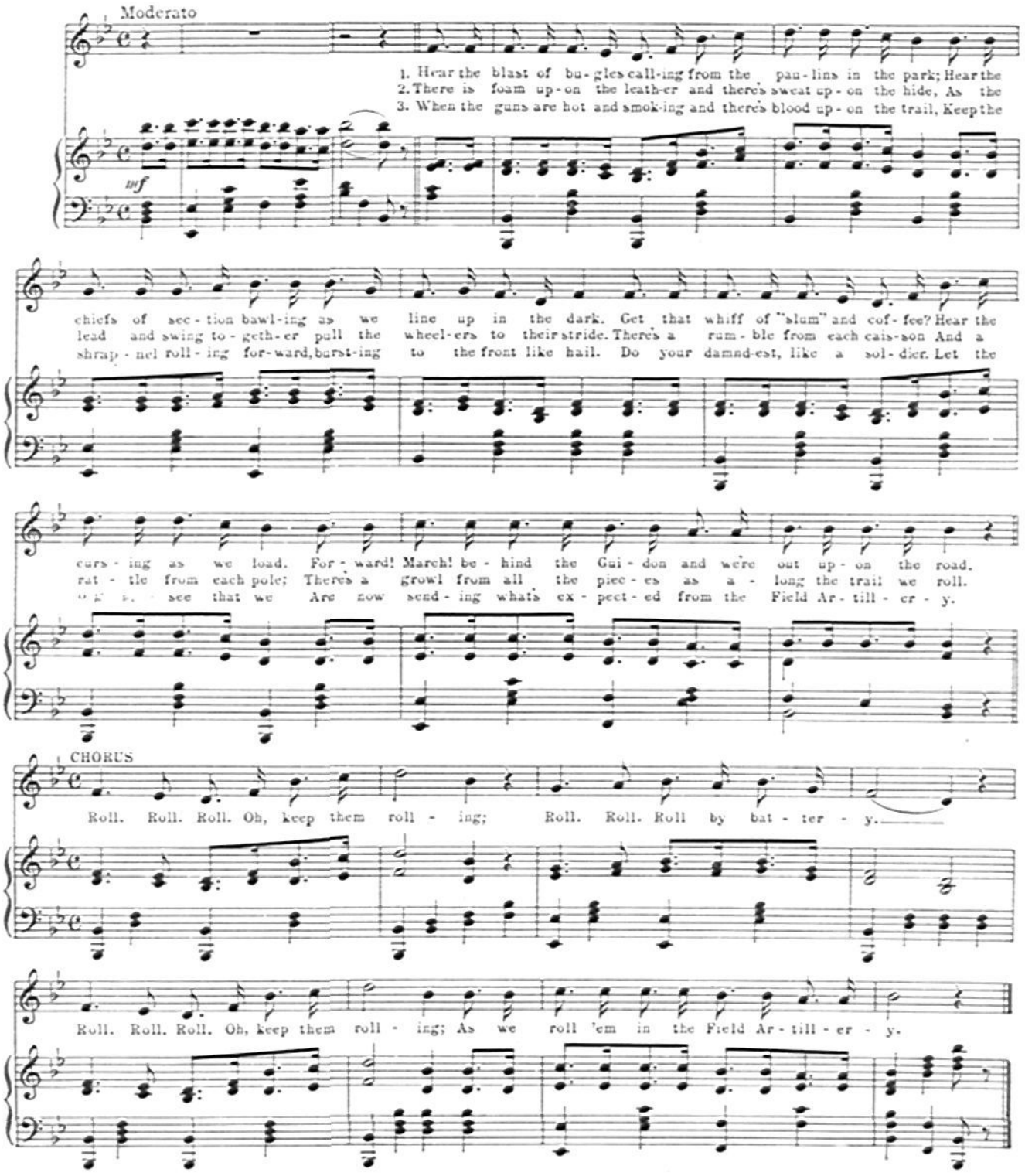
Above is "The Field Artillery Song" as translated into Chinese and taught to Chinese artillerymen at a training center in India. Maj. H. F. Ames was largely responsible for this project. Lt. Col. William E. Roberts states that "the Chinese are quite enthusiastic about their singing, and "The Field Artillery Song' particularly appeals to them."

KEEP THEM ROLLING

By COL. GERALD E. GRIFFIN



PERIMETERS in PARAGRAPHS

(Based upon latest information available at date of writing, and subject to correction as more complete reports are received.)

By Col. Conrad H. Lanza

TUNISIA (March 20 to April 19, 1943)

At the beginning of this period Allied forces held the front as follows:

British First Army (Lieut. Gen. K. A. N. Anderson): from the Mediterranean coast near Cape Serrat, around Medjez-el-Bab, to the vicinity of Bou Arada.

French XIX Corps (Maj. Gen. Koeltz) [a part of the army of Gen. Giraud]: the mountainous sector south from Bou Arada to the vicinity of Faid.

U. S. II Corps (Lieut. Gen. George S. Patton, Jr.): south to Gafsa, inclusive.

French Desert Corps (Gen. Edouard R. N. de Larminat) [a part of the army of Gen. de Gaulle]: through the desert from Gafsa, across Chott el Djerid, via Kebili and Douz to south of Toujane.

British Eighth Army (Gen. Sir Bernard L. Montgomery): a short sector facing west from near Toujane northward to the Mediterranean, just east of Mareth.

The foregoing troops were a single command under the British General Sir Harold R. L. G. Alexander. Opposed to them the Axis had

Main force estimated at about 120,000 men under Col. Gen. von Arnim, holding the fortress of Bizerte, Tunis, and the Cape Bon peninsula.

Secondary force estimated at 80,000, holding the south Tunisia quadrilateral Mareth—Matmata—El Hamma—Gabes. This was Marshal Rommel's original army which had retreated from Egypt.

Connecting force estimated at 50,000 men, holding a line facing west and connecting the foregoing two principal forces.

The Allies greatly outnumbered the enemy, and had superiority in the air and in artillery. Their mission was to force the Axis out of Africa, which called for an offensive. Gen. Alexander had already decided upon a plan of attack. This was to destroy the enemy's secondary force in the Mareth Quadrilateral by a direct attack by the Eighth Army, and a secondary attack by the U. S. II Corps eastward from the vicinity of Gafsa to cut off the enemy from his main body to the north. The French XIX Corps would cover the left of the advancing Americans.

South from the Mediterranean near the village of Mareth the enemy held the Mareth Line, which faced eastward. It was an old French line, provided with concrete emplacements for batteries and machine gun posts, deep dugouts, and permanent CPs and OPs. After the armistice of June, 1940, the French had dismantled the line and withdrawn its garrisons. Thereupon the natives seized everything that was removable, including the barbed wire, which was excellent for farms. Nothing remained except the concrete works.

The enemy did not reoccupy the concrete works. He prepared a series of strong points, emplaced his batteries and other weapons in the open, and prepared to offer a strong opposition. The entire line was about 24 miles long, from the sea to Toujane. The front was covered by the Wadi Zigzau—a small stream line, usually dry. At this season of the year it was not dry, and although the water was not deep the stream was full of quicksand and swamp. It was difficult for infantry to cross it and impracticable for trucks or tractors to do so. It was a first rate obstacle.

The enemy had foreseen that the Eighth Army would try to envelop his position by a turning movement to the south. He had therefore provided a second line, back-to-back with the Mareth Line and facing west. Still another line extended from Mount Tebaga (at the east extremity of Chott el Djerid) toward Gabes, closing the gap between the lake and the sea. This line was nearly at right angles to the Mareth Line.

To protect his communications to his base in north Tunisia, the enemy's connecting force held a line of hills through Pichon and Faid to Mezzouna and El Maizila. At least one armored division was with this force for counterattack missions. This line was well entrenched and camouflaged. Full advantage had been taken of mines, which were plentifully planted on likely routes of approach, and there was a fairly strong force of artillery.

Gen. Montgomery decided to make two attacks on the Mareth Quadrilateral. The main attack would be made on a selected sector on the north end, near the coast road, with a mission of punching a hole through the enemy's lines. Through this armored divisions would dash, to mushroom out in the enemy's rear areas. A secondary attack would be made by motorized troops passing around the south flank, thence proceeding north to attack the Mount Tebaga—Gabes position. It was hoped

the U. S. II Corps would arrive north of Gabes in time to complete the encirclement of the enemy.

The first movement was the despatch of the turning column. It had some 90 miles to go, which for a motorized column might seem to be not much. But it was desired to make this move secretly. The force included 50 tanks and 2,000 other motor vehicles, carrying the equivalent of two divisions of infantry. It started on the night of 18/19 March, and marched only at night. Since it was about full moon and enemy planes reconnoitered carefully at night, movements were made only when the moon was low. During the day no movements were allowed: vehicles were camouflaged and parked over a considerable area. Care was taken about fires, smoking, and raising dust. As there was no water in the desert, provision was made to furnish it. The column was preceded by Fighting French troops of Gen. de Larminat, with the latest American types of tanks, guns, and planes. Most of these troops were native Africans from Somali, Senegambia, and Arab tribes.

The main attack was ordered for the night 20/21 March, starting before daylight with a violent artillery preparation. In the early part of the night, enemy air forces raided the Eighth Army's rear areas and discovered large numbers of vehicles moving into position. These were bombed, and it was apparent that the enemy knew of the impending attack. Then it rained very heavily; the Wadi Zigzau filled with water and became an even worse obstacle.

The British 50th Division led the attack, which was limited to a six-mile front in the vicinity of the small village of Zarat. This division had a terrible job in crossing the Wadi Zigzau, but its men got across and advanced into the enemy's area. At first they were unable to capture the hostile strong points. By infiltrating between them they attacked from the rear and succeeded in occupying two of them. Engineer troops early started to construct feasible crossings over the Wadi Zigzau for the armored troops, parked a few miles to the rear and waiting for the gap to be opened for them. From the beginning the engineers worked under enemy fire. The construction of a causeway was started. Using condemned canvas to make bags, filling them with stones picked up in the desert, and supplementing these with fascines made of desert brush, the crossing very, very slowly made progress.

About 1400 the enemy's batteries started what appeared to be an artillery preparation. There was no end to it. It just kept right on, and on into the night after the sun set. It greatly interfered with the attack. And then later in the afternoon, without any intermission in the enemy's artillery fire, a counterattack came. This was delivered by the German 21st Panzer Division, which struck the 50th Division in front and on its right. This forced the British back, and when night fell only a small bridgehead remained on the west side of the Wadi Zigzau; it was only 3 miles wide and of variable depth.

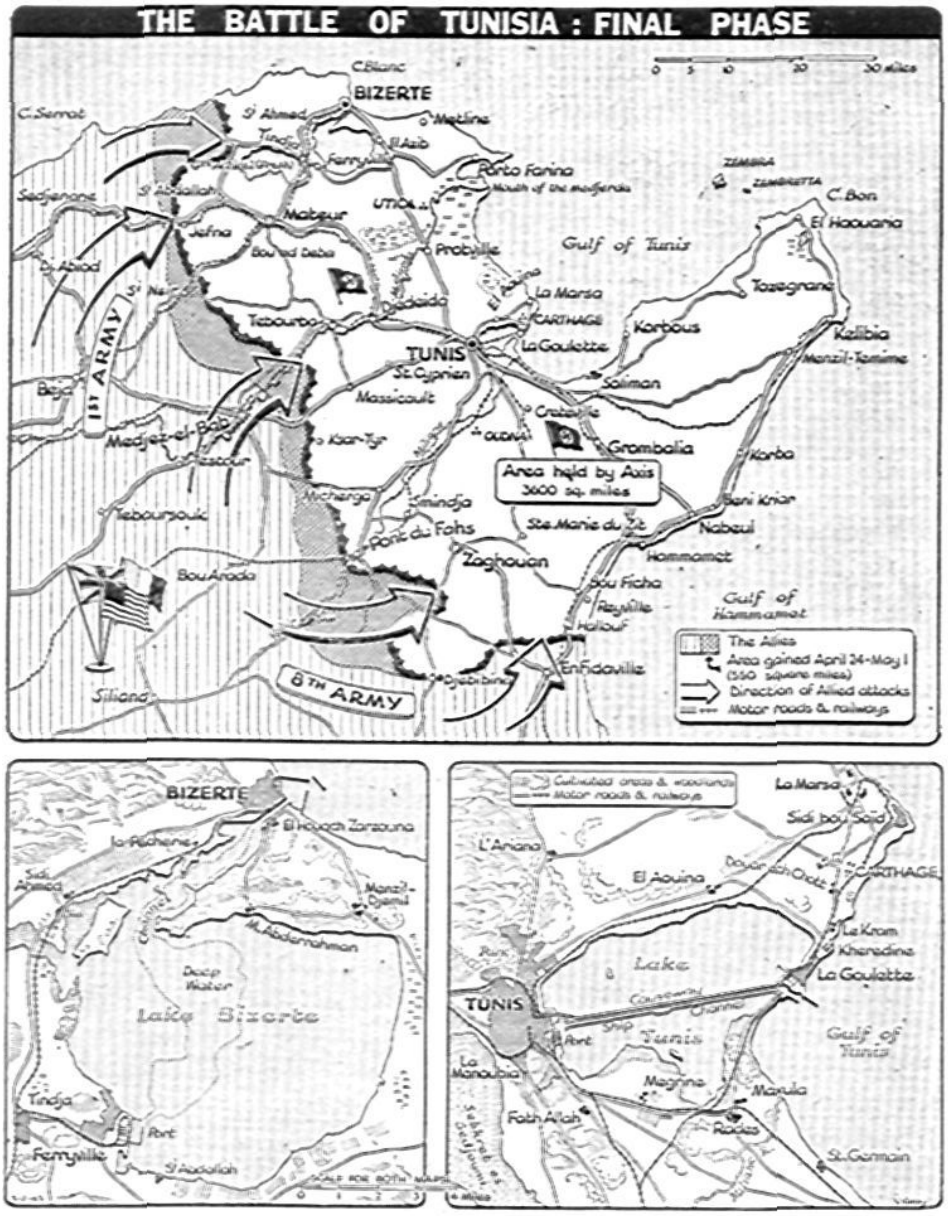
Although the British artillery were superior in numbers to the Axis artillery, the latter had concealed positions and the British counterbattery was not effective. The enemy's positions were on higher ground, so his OPs saw more.

Wadi Zigzau, well defended, was a formidable obstacle, as can be seen from this re-enactment of its sealing.

There was more maneuvering within the British lines and so more targets to be seen than occurred within the Axis lines. So the German artillery caused serious casualties.

On the morning of this day the enemy's reconnaissance planes located the turning movement and accurately reported its strength, position, and course. The turning column knew they had been discovered, so disregarding past precautions they advanced boldly and soon encountered hostile armored patrols. They had no serious engagement on this day.

All night of March 21/22 the engineers struggled in water two feet deep to construct a crossing over that Wadi Zigzau. They got a few tanks across, and when the sun came up in the hot African desert fierce fighting broke out in the bridgehead. The Eighth Army's artillery concentrated its fire in front of the 50th Division in an endeavor to open a passage. The enemy had numerous machine guns and infantry mortars in positions built into the rocks, well camouflaged, and difficult to neutralize.



German artillery fire continued on as heavily as ever, and the engineers found it impracticable to maintain a crossing over the Wadi Zigzau. The 21st Panzer Division renewed its attack; the few British tanks over the Wadi were no match for the larger and more numerous enemy tanks. Slowly the British were driven out, and by evening the last of the British abandoned the west side of the Wadi Zigzau and went back to the east side. After two days of most severe fighting the line was substantially unchanged, although the British had captured about 2,000 prisoners.

On the 23rd the fighting continued along the Mareth Line without either side accomplishing anything important. Hope was placed in the turning column. This had now arrived in rear of the Mareth Line, which was on its right, while to the front the enemy held the line through Mount Tebaga. Mine fields had delayed the advance. A hostile armored division, believed to be stronger than the 50 tanks present, had been discovered. The column did not feel sufficiently strong to attack. It was now about 8 miles south of El Hamma.

General Montgomery decided to abandon the frontal attack and concentrate on the turning movement, already in the enemy's rear. He ordered his armored troops and others to proceed south that night, pass around the end of the Mareth Line, join the turning column, and then attack toward the coast near Gabes, thereby encircling the enemy within the Mareth Line.

During the morning of the 24th the enemy discovered the new addition en route to the turning column. He seems to have accurately determined its strength. The Axis commander decided to commence a withdrawal from the Mareth Line, moving supply trains northward but continuing to hold his positions.

The U. S. II Corps attacked this day in the vicinity of Maknassy; it met strong resistance from a hill position and from armored troops and so made little progress.

These additional troops for the turning column did not arrive until morning of the 26th. To comply with Gen. Montgomery's orders the main attack was to be directed against the northwest interior sector of the Mareth Line. It would be afternoon before the new troops could be in place. All artillery arrangements had been made for firing a preparation from the map. The combined air forces of the British, American, and French were to take part.

Fighting French troops were detailed to cover the north toward Mount Tebaga, while the main body attacked eastward against the rear of the Mareth Line. A savage sand storm reduced visibility to less than a mile. At 1500 the Allied combined air forces commenced to bomb the enemy's positions. It was the largest concentration of bombing forces which Africa had seen. The Allies suffered heavily in planes, as the enemy was able to turn all of his AA guns upward.

After the air preparation had been completed, the intense artillery preparation started at 1600. Under cover

of the sand storm and with the sun in the enemy's faces, the armored troops lined up three miles from their objective without attracting enemy fire. At 1700 the rolling barrage came down in front of the tanks and preceded them into the enemy's positions. Severe fighting lasted until 1930, when darkness ended the battle. The enemy's positions had not been penetrated, but his situation was not good. The Axis commander expedited the evacuation of the Mareth Line while still temporarily holding his lines.

During this day the U. S. II Corps renewed its attack eastward from Maknassy. It found the enemy alert, with numerous machine gun posts encased in concrete. It also met enemy armor counterattacking. Its attack failed again.

On March 27th the British turning column, not having broken through into the interior of the Mareth Line, turned its attention to the Mount Tebaga—Gabes line. The enemy artillery from positions on Mount Tebaga enfiladed the British who had advanced into the Mareth position, and further progress was considered impracticable until these hostile batteries were neutralized. The Fighting French (who already had a foothold on Mount Tebaga) were ordered to suppress the enemy artillery fire from this area. From the flat desert in front of Mount Tebaga the French batteries were not only fully exposed to enemy observation but could not clear the crest and reach the enemy's artillery. They had to move up into the mountains.

The Tebaga range is not over 1,500 feet high, but it is very rough, with extremely steep slopes and deep canyons. The French worked to the flanks to find suitable positions on high ground for their own batteries from which they would be able to take enemy artillery under effective fire. French guns with all the ammunition had to be pulled by drag ropes up the mountainside and across the canyons. It was a tedious job which took two full days. Not until evening of March 28/29 were the French batteries ready to fire. It was then found that the enemy had abandoned the Mareth Line and had passed Gabes on his way to the north.

The new enemy line ran from Mount Tebaga down the north side of the Wadi el Akarit to the sea. The lower part of this wadi is low and swampy—difficult for motor vehicles to cross. The British commander therefore decided to attack the new line by making his main effort on his left (against Mount Tebaga, where the Fighting French were). It took nearly a week to displace the artillery forward and bring up sufficient ammunition for another artillery preparation. The enemy appears to have used these days to evacuate northward a considerable part of his supplies and trains. He also had to meet new attempts by the U. S. II Corps to break through on the right rear of his south front.

On April 2nd the Americans made a serious attempt to advance eastward from the vicinity of El Guettar. Under cover of artillery fire, engineers opened a gap through the enemy's mine field through which the armored troops (1st Armd Div) proceeded in column formation with intent to deploy after the mine field had been crossed. Upon arriving near the exit the head of the column was attacked by enemy armored units. Enemy tanks took positions behind hills with sight defilade, and with the assistance of their batteries placed a concentrated fire on the head of the American column. It was found impracticable to advance and the attempt to do so was discontinued until such time as a wider gap was made through the mine field.

One day later the French XIX Corps also attacked eastward from the vicinity of Pichon. As in the case of the Americans further south, they found the enemy strongly entrenched, with troops available for counterattacking. Severe fighting caused no appreciable change in positions.

In the meantime the British First Army had commenced a series of attacks having limited objectives near the coast between Cape Serrat and Sedjenane. These began in the last days of March and continued almost daily thereafter into April. They were also gradually extended southward almost to Medjez-el-Bab. French troops, mostly from Morocco, were used in part. They are excellent fighters, accustomed to the climate and to the terrain, and can be counted upon for most difficult missions. In this area there are a considerable number of farms. Strange to relate, the natives continued to work on their farms within a mile of the firing lines, paying apparently but little attention to desperate fighting only a little way off.

On April 4th the U. S. II Corps made a new attempt to advance toward the coast from near El Guettar. By now the engineers had opened wider passages for the tanks; this time they got through and launched an assault against the enemy's trenches. Both tanks and following infantry reached the enemy's lines, and some prisoners were taken, but the general result was not important. The enemy's connecting force continued to hold substantially his line of defense covering the proposed future retreat of the Axis troops on the south front.

Gen. Montgomery was by now ready to attack. The British Eighth Army started a violent artillery preparation against the Wadi el Akarit positions at 0430 on April 6th. The main attack was delivered against the east end of Mount Tebaga and Djebel el Romana, two hills about 2 miles apart forming the enemy's extreme right flank. The rolling barrage started at 0600 (when the tanks and infantry jumped off), and by 0630 the British troops were within the enemy's front line. This attack was highly successful, about 5,000 prisoners (mostly Italians) being taken. However, the enemy's local reserves counterattacked with great determination a short time later and held the British to their original gains. In the afternoon more serious counterattacks were made, and it seemed that the enemy would make a hard fight to hold the narrow gap between the Chott Djerid and Gabes.

The Axis commander decided, though, that he had already

secured sufficient time and during the night 6/7 April he evacuated the Wadi el Akarit line and retired rapidly to the north. This withdrawal was to north of Sousse, more than 150 miles in rear of Wadi el Akarit. This intention was of course unknown to the Allies at the time. They found their pursuit obstructed by numerous mine fields and rear guards who, taking positions along favorable lines, caused the pursuers to lose time deploying and attacking, only to then find that the enemy had mounted on his motor vehicles and dashed off.

The Eighth Army promptly initiated a pursuit by motorized troops, and both the U. S. II Corps and the French XIX Corps were instructed to attack strongly eastward along the front south from Pichon. British troops were detached and sent to reinforce the Americans. These all got under way on the 7th. To sustain the common effort, the British First Army had intensified its limited objective attacks on the 6th by a new attack along the front Munchar—Medjez-el-Bab. In this area ran a road connecting the two points named, which lay partly in No Man's Land. British troops attacked across this road and in a northeastwardly direction. This attack made gains from the beginning, and by the 9th had advanced 10 miles and taken about 1,000 prisoners.

During this period neither the French XIX nor the U. S. II Corps had succeeded in advancing. Minor gains were made, but in general the enemy held his lines. The Eighth Army continued to advance northward and on the 9th was approaching Sfax without encountering any resistance other than from weak rear guards. On April 10th Sfax was occupied without opposition. Strong attacks were made on this day by the French and Americans from the vicinity of Pichon toward Kairouan; according to Axis accounts these were beaten off with an Allied loss of 60 tanks, but according to Allied accounts gains were made in spite of stiff resistance. Both statements may be correct. A considerable number of enemy stragglers and separated detachments were captured in these days, the total amounting to 4,500 since the capture of the Wadi el Akarit position.

For April 11th the capture of Kairouan was ordered. British troops which had entered the line between the French XIX Corps and the American II Corps were ordered to advance north of the road from Fondouk to Kairouan and drive the enemy from the hill on the north side of Fondouk Pass. The U. S. II Corps was given a similar mission on the south side of the road. After having secured the Pass by driving the enemy back on both sides, the Allies were to push on into Kairouan.

The British attack against the north hill succeeded. They drove the enemy off their hill. As the American attack failed, the British found the enemy still in the Pass and the enemy-occupied hill on their right flank. Under these circumstances they considered it unwise to advance toward Kairouan. After waiting for what appeared to be a reasonable time for the Americans to seize their hill, the British faced to the right and attacked it themselves by a flank attack. This was entirely successful and the hill was taken. It was now so late in the day that the advance to Kairouan was postponed until the following morning.

Two explanations have been made as to why the II Corps failed in its attack. One explanation by a correspondent at Allied GHQ was that the attack met too strong a resistance. Another correspondent with the troops stated that it was because of a misundersanding as to what was H-hour.

It now is known that the enemy abandoned Kairouan this date, retiring northward. How much of the south hill, if any, had been abandoned by the enemy before the British attack was delivered is not yet known. At least one Allied motorized patrol was reported in Kairouan late in the evening, no enemy being found. The official occupation of this town did not occur until the next morning, the 11th. On April 12th Sousse was found abandoned and was occupied by the Eighth Army.

On April 13th the enemy's retreat seemed to come to an end, no further withdrawal occurring up to the 20th. Another stage in the North African War, which had commenced with the attack on the Mareth Line, ended. During this period he had been driven back about 180 miles. His other losses are unknown, but probably amounted to at least 20,000 killed and wounded. The enemy did not abandon much materiel: he succeeded in evacuating this to within his present position. Assuming he had commenced this campaign with about 250,000 men (which is the British estimate), he had 200,000 left at its completion, no allowance being made for replacements received, as to which there is a conflict of testimony. Some reports state the enemy has been evacuating troops from Tunisia, others claim that he has received strong reinforcements. An examination of these reports and their sources indicates that both statements are correct. There have been changes in the enemy's order of battle. In general, the German contingents have been increased and Italian contingents decreased. The net change is yet unknown.

The only report on Allied losses comes from the American II Corps, which had a casualty list of 5,372 killed, wounded and missing. This corps had three divisions, so this list represents roughly 10% of its strength as against an enemy loss of 20%.

As this is written the enemy is holding the fortress of Bizerte, the city of Tunis, and the Cape Bon peninsula, with the front line approximately as follows:

Starting on the Mediterranean at a point about 25 miles west from Bizerte, south 30 miles to Oum Guerinat; thence east 7 miles to Djebel Elang; thence southeast 8 miles via Heidous to Foum St. Eloi, which is 4 miles northeast from Medjez-el-Bab; thence south 18 miles to a point north of Bou Arada; thence southeast 16 miles to Djebel Mansour (to Allies); thence southeast 10 miles to Djebel Chirich; thence east 33 miles through Djebibina (in No Man's Land) and Enfidaville (to Axis) to the sea.

This makes a total front of 122 miles, for which the Axis has less than 2,000 men per mile.

According to a report by Admiral Musselier, recent French commandant of Bizerte, a series of underground

depots and quarters, having at least 60 feet of overhead rock cover, was completed there in 1937. These provide power plants, water supply, and an oil storage of 200,000 tons. The gun emplacements were not completed until 1939. The batteries covering the sea approaches center around two batteries of two guns each in turrets, having a range of 40,000 meters. These are probably late models of the French 340-mm. gun, as the original models had a maximum range of only 31,000 meters. Land batteries and machine guns are heavily protected and camouflaged. There is as yet no reliable report as to whether the French armament fell intact into Axis hands or has been supplemented and possibly increased.

COMMENTS

1. In five and a half months Marshal Rommel completed one of the longest retreats in history. The distance he covered from Egypt in air lines is around 1,400 miles and about 200 miles more by the marching route. All attempts to intercept this retreat and capture his army failed. He also succeeded in withdrawing nearly all his materiel.

By laying mine fields he caused the pursuing British Eighth Army serious delays, during which he was able to move by bounds to some good defensive position. While the British were bringing forward artillery and ammunition to drive him out, or envelop his lines, he prepared new mine fields. At the last moment he abandoned his defensive position and bounded off to a new one. The Mareth Line was his latest important line of defense, with a minor one-night stand at Wadi el Akarit (which was really a part of the Mareth system). As on previous occasions he escaped being encircled.

2. Air bombing is important in driving an enemy out of a prepared defense. At Mareth it preceded the artillery preparation. The modern tendency is to provide all-purpose batteries. If the air preparation is a separate phase of an attack, enemy batteries will concentrate against the planes. It is not surprising that the Allies lost heavily, as the artillery preparation did not start until the air preparation was over.

An invariable rule can not be laid down. But it would seem desirable that by day in most cases all kinds of attacks on the enemy be as nearly simultaneous as possible, so as to divide and distract his attention as much as possible.

3. The estimated Axis strength of 200,000 troops is low for a 122-mile front. It may therefore be possible that this front will be further reduced, or else that the enemy will bring in reinforcements to strengthen his present line.

RUSSIA (March 16 to April 20, 1943)

As this period opened the long winter campaign was just about ended. It had started in mid-November with a Russian offensive on a large scale. This had captured Stalingrad and its garrison and forced the enemy back from the Volga River and the banks of the Don westward to across the Donets. This had incidentally resulted in the enemy withdrawing from Caucasia (less a bridgehead in the province of Kuban which included the naval base at Novorossisk). These successes had cost the enemy at least half a million men in prisoners and killed and the loss of large quantities of materiel.

The Russians had also opened a ten-mile strip into besieged Leningrad, just south of Lake Ladoga. To shorten his lines, the enemy had abandoned a zone 50 to 75 miles deep west and northwest of Moscow. Against these very large gains, the Russian attacks on Orel had definitely failed. And the Axis had (commencing in mid-February) made a counteroffensive in south Ukraine which had stopped the Russian advance and driven the Russian armies back to the Donets River line. On the whole the winter war had brought most substantial gains to Russia.

The large area recovered between the Donets and the Don Rivers, and in Caucasia, is fertile farm country. Its produce will be much needed by the Russians, who had lost nearly two-thirds of the food producing sections of European Russia. The Axis retains nearly all the Ukraine with its important mineral and industrial areas, and a very large agricultural area. The territory abandoned by the Axis east from Moscow is not of special economic value.

* * * * *

During the latter part of March, the active campaign in south Russia gradually died down. After the recapture of Kharkov the Axis moved eastward toward the upper Donets. Its first mission was to encircle Russian forces retreating in the vicinity of Chuguev, where a considerable body had been cornered. The Axis encircled these troops, but could not keep them enclosed. They fought hard, had serious losses, and had to abandon much materiel, but the main body escaped. This fighting ended on March 20th.

Further north Belgorod fell to the German Gross Deutschland Division on November 18th, and on March 20th the Axis troops reached the line of the upper Donets. No attempt has been made to advance further in this sector.

In the vicinity of Orel, the Russians renewed their attack against that city by assaulting northward from the line Dmitrovsk—Malo Arkhangelsk. This failed. According to German accounts the Russians lost 116 tanks.

It is now known that after the Russian capture of Kursk in February, which involved the destruction of nine Axis divisions, the Axis had so few troops in this sector that the continuity of the Axis front was broken. Incidentally the Axis lost its line of communications to Orel, to which there are both road and railroad from Bryansk. In places these routes are so close to the front that they can not be used for supply purposes. The main line of supply was the road from Orel to Yakovka, Kromi, Dmitrovsk, and Sievsk. The last two places fell into Russian hands, leaving to the Germans only minor farm roads and trails for a precarious communication with the Orel sector, which now formed a great salient into Russian territory.

The Axis made special efforts to reestablish their front

and close the gap, the first they have had since the war in Russia started. After their attack on Orel on March 17th the Russians exposed themselves to an attack which the Germans promptly delivered on their left flank and which moved eastward against the Russians facing north. This attack made substantial progress for several days. On March 20th the Axis closed the gap and by the 27th they had recaptured Sievsk and Dmitrovsk and thereby reopened the line of supply to Orel. This ended the German offensive in this area.

Further north there has been fighting, but without change in the situation. Russian attacks to widen the gap south of Lake Ladoga have failed. Due to swamps this gap (which is close to the front) is too narrow to be a good line of supply, and the main line of communications into Leningrad has continued to be over the ice of Lake Ladoga by a truly remarkable winter road. So far it has not been possible to open a good land route into Leningrad.

Numerous attacks have been made by the Russians north and south of Lake Ilmen and near Vyazma. The Axis lines have held and the only result has been to determine just where the enemy's main line of resistance is. It now seems clear that no further Axis withdrawals in Russia are intended.

South of Kharkov the Russians retain two bridgeheads on the west side of the Donets, near Balakleya and around Izyum. At both places the Axis has been making a series of limited attacks, to reduce these positions. Both are still holding out.

In Kuban, where the weather is good and the ground dry except for year-around swamps near the Kuban River, on March 26th the Russians commenced a series of attacks (which are still continuing) to capture this important German bridgehead. It would be of considerable value to Russia, as they need a naval base. It would also be a stepping stone for an operation for the recapture of the Crimea. These Russian attacks have met most determined resistance; although they have made progress, the ultimate outcome is in doubt.

Except for the Kuban, present indications are that due to thaws, major operations may not be undertaken by either side until the end of May or even later.

In the Russo-German war each side normally reports its own gains and the enemy's losses, the latter being summarized from time to time. No such reports have been issued by Russia during this period. Germany has announced the following Russian losses for the sectors indicated:

South Ukraine campaign, for the period February 13 to March 20:

Prisoners	*Killed*	*Guns*	*Tanks*	*Vehicles, motor*
19,594	over 50,000	3,772	1,410	1,846

In Orel campaign, for the period January 24 to March 22:

Prisoners	*Killed and Wounded*	*Guns*	*Tanks*
10,594	over 150,000	485	1,061

It is now known that the Axis commander who directed the south Ukraine campaign, which was described in the preceding number of this JOURNAL (p. 371), was Field Marshal Fritz Erich von Mannstein. This officer

conducted the unsuccessful attempt to relieve Stalingrad last December by an advance northward on the east side of the Don River. He had previously conducted the campaign in Crimea which ended with the fall of Sevastopol. He appears to be in command of a group of armies in south Russia. The air commander for this same area is Field Marshal von Richthofen.

On April 20th the front line in Russia south of Lake Ladoga was:

Starting on the Gulf of Finland, near Leninsk (Axis)—Tosno—Soltsi (to Russia, but Axis holds the RR Leningrad-Yaroslavl just east of this town)—Volkhovo (Russia)—Novgorod (Axis, with an Axis bridgehead east of the Volkhovo River)—Lake Ilmen—Lovat River—Kholm (Axis strong point)—Velikie Luki (Russia)—Velizh (Axis)—Yartsevo (Axis)—Dorogobuzh (Russia)—Spas Demensk (Axis) — Bryansk (Axis strong point)—Karachev (?) — Mtsensk (Axis) — Verkhove (Axis) — Malo Arkhangelsk (Russia) — Dmitriev (Russia) — Rylsk (?) — Sumy (Axis) — Gotnya (Axis) — Belgorod (Axis)—Chuguev (Axis)—Balakleya (Russia, with bridgehead on south side of the Donets)—Izyum (Russia, with bridgehead on south side of the Donets) — Kremenna (Russia, with bridgehead at RR bridge southeast of this city)—Slavyanoserbsk (Axis)—Voroshilovgrad (Russia)—Mius River to Sea of Azov.

Germany had enough of this last year. She is quiescent during this spring's muddy thaws.

COMMENTS

Russian reports frequently recount the exploits of guerrillas in enemy occupied territory. Their mission appears to be wrecking railroad trains and attacking isolated enemy parties. German reports for their period have not mentioned guerrillas, although in the past Germany has occasionally reported roundups in rear areas leading to the suppression of what to them must be pests. It is impossible to determine how much real success the guerrillas have had and whether the number of men on this duty warrants their absence from line duty.

The Russian army is increasing the number of women in the ranks. They are now employed in the Air Force as combat pilots and are stated to be quite expert, several having been cited in orders for gallant conduct. Other women are in line as snipers, a Russian specialty to which they attribute gratifying results.

Special measures have been taken by Russia to increase food production. This is a serious matter, as the enemy still holds the great agricultural region in Ukraine. New farm areas have been opened in Siberia and the areas recaptured in the winter campaign are being sown with a view of gathering a crop this year. With the help of lend-lease shipments it is expected that these measures will suffice.

Losses of Russian materiel during the winter campaign have been considerable, not only from losses to the enemy but to fair wear and tear during arduous and continuous fighting over a period of four months. Considerable materiel has been captured from the enemy, but this can not all be used due to lack of spare parts as items become worn. New Russian factories have been established in the Ural Mountain region to replace the large industrial area in Ukraine held by the enemy, and that in Leningrad and Moscow which on account of nearness to the front are no longer suitable as large production centers. Much lend-lease materiel is arriving in Russia, but an effort is being made to make the country self-supporting and independent of foreign assistance. This vast country has nearly every kind of resource needed, and, given time, development to any extent desired is possible.

THE WAR WITH JAPAN (March 15 to April 20, 1943)

The Burma-India Frontier

Early in March a British-Indian force started a series of limited attacks on the sea coast area in the general vicinity of the Mayu River. The British held Rathedaung and, north of this town, the territory east of the river to include the ridge line five to seven miles away. South of Rathedaung the river divided the two hostile forces. According to Japanese acounts American troops were included with the British command.

On March 15th the Japanese commander, Lieut. Gen. Matakatsu Kamada, started a counteroffensive by attacking with his right wing in an effort to envelop the British left. Very hard fighting occurred for three days. The enemy infiltrated through jungle country to the rear of the British lines, and it was necessary to withdraw the left and establish a new line which in places was 13 miles in rear of the original line. The enemy therefore succeeded in advancing his right, and is in a position to continue his operation should he desire to do so. Up to April 20th he appeared content to rest on his accomplishment to date.

There are no British reports as to losses. Japanese

Just south of Mandalay, all rail and vehicular traffic from central and southern Burma to Mandalay, Lashio, and Myitkyina must pass over this bridge at Myitnge. This point has therefore been under steady air attack. Here we see a span knocked out by our Tenth Air Force last January. Since then the bridge has been rebuilt and demolished at least twice. This photo gives a good idea of the open countryside of central Burma, with its meandering Daktawaddi.

accounts are that the British and Americans, including Indian troops, lost in this short campaign 4,200 killed (including 2,000 white troops) counted on the field, 516 prisoners, 156 guns, 50 tanks, and 77 motor vehicles. Jap losses are alleged to have been only 422 killed.

In north Burma a minor campaign ended on April 12th after two months' operations. This was between small forces, in very rough country. British and Japanese accounts agree in general. The British employed only native troops, who retreated before the enemy. When the campaign ended the British state these troops were as ready as before to follow the withdrawing enemy and reengage in their main mission of maintaining partisan warfare within Burma. The Japanese report that the British here lost 900 killed (counted on the field), 200 prisoners, and 7 guns, against a Japanese loss of 85 killed.

There has been great air activity over Burma. American and British air forces have been raiding daily. Until recently these raids were directed principally against railroads, with occasional bombings of refineries and other plants. Since the Japanese counteroffensive of 15-17 March, more attention has been given to bombing and attacking enemy front line positions. The Japanese air force has been concentrating its attacks mainly against the British sea base at Cox's Bazar (about 70 miles back of the front) and at the railhead at Chittagong (about 60 miles further to the rear).

The slight gain of ground made by the enemy is not important from either a military or an economic standpoint. It is a setback from the announced intention of recapturing Burma and reopening the Burma road.

The rainy season usually starts in this part of the world about May 1st and continues until November. It is generally considered impracticable to conduct major military operations during their period. But if desired, military operations can be conducted, subject to appropriate modifications of transportation and equipment. It would be dangerous to assume that vigilance could be safely relaxed until next winter. An enterprising general might prefer the rainy season for a surprise attack.

Japanese propaganda has been active in India, in an attempt to incite the native population to revolt against the British. So far there are no indications that this effort has had any success. Still, as the Japanese have some sympathizers in India they probably receive valuable information as to allied strengths and positions. The same is true as to British information from Burma, where there are many British friends. Both sides may therefore be considered as reasonably well informed as to the opponent's order of battle.

The air line from India to Chungking continues to operate. It has only a limited capacity.

South Pacific Islands

There has been considerable air activity by both sides. From American and Australian intelligence reports, the enemy has been materially increasing his air forces and supplementing them by opening numerous new airfields and making important accretions to his ground forces.

The allied air force of American and Australian planes operate in a semi-circle whose center is in north Australia. Daily expeditions are made for reconnaissance purposes, and daily and nightly to bomb enemy air naval bases. Principal targets are Timor Island, Tenimber Islands, Aroe Islands, north shore of New Guinea, New Britain, New Ireland, and the north and central Solomons. Reconnaissance regularly includes Amboina Island.

The enemy's main naval and air bases appear to be in New Britain and in New Ireland, where great activity has been reported. The most important American attack

was made on Kavieng on New Ireland on April 2, 3, and 4, by flights of 10, 8, and 8 bombers respectively. They report the destruction of 7 Japanese cruisers (or destroyers) and 5 cargo transports, besides the damage of some 4 other ships. No American planes were reported lost. The bombers were covered by separate attacks on adjacent enemy airfields to neutralize these during the bombers' operations.

American ground operations have been limited to advances in north Papua, northwest from Buna. In a series of minor engagements in which the enemy is reported as having lost about 700 killed and 100 prisoners, the front line was pushed forward to the vicinity of the Manbare River.

Large scale Japanese air activities first appeared on March 28th, in a raid on American transports in Oro Bay. The Japs claim to have sunk two ships; our reports are that one ship was sunk and another damaged; both ships are stated to have been small ones. The Japs also claim the sinking of an American destroyer, as to which no information has yet been given out by our Navy Department. The Japanese admit the loss of but 3 of their planes, while our reports show that 25 were downed.

On April 1st an air fight occurred near Guadalcanal, in which 18 out of 30 Japanese planes are reported downed as against an American loss of 6 planes. In this same area, on April 7th a large Japanese air force attacked American transports and their naval and air escorts. In the ensuing battle we lost a destroyer, a tanker, two small craft, and 7 planes, as against 37 enemy planes reported as downed.

April 11th enemy air forces raided Oro Bay and damaged a small transport. Our reports show 23 out of 45 Japanese planes as downed, against an unstated American loss. The Japs admitted the loss of but 6 planes, and claim to have also sunk a destroyer out of the naval escort.

On April 12th about 100 enemy planes raided Port Moresby and vicinity, of which 41 are reported as having been downed. No ship losses have been reported by us. The Japs claim to have sunk 1 transport, destroyed 10 planes found on the ground, and destroyed the barracks. On April 14th between 75 and 100 Japanese planes raided Milne Bay and damaged 3 transports, one of which had to be beached. 30 enemy planes were reported as downed. Our own loss is unstated, other than that it was moderate.

From an interview given by the commanding general of the 5th Air Force on April 15th, and newspaper despatches of the 17th from Australia, it is claimed that although enemy plane losses are 4 to 5 to our 1, he is yet able to obtain air superiority and can assemble a large number of planes as and where desired. No new enemy types of planes have appeared, but old and obsolescent types have nearly disappeared, nearly all planes now in line being of recent models. Japanese air performance is reported as materially better than a year ago, and constantly improving. Japanese bombers carrying medium loads are reported as having a range of 2,000 miles.

Enemy reconnaissance by plane and submarine includes the west coast of Australia (at least as far south as Port Holland) the north shore of Australia, the entire east coast, and our bases in New Caledonia and the New Hebrides.

Central Pacific Islands

There is a dearth of information as to what is happening in the Caroline, Marshall, and Marianas Islands. The Gilbert Islands are occupied by the enemy, and he seems to have established new air bases there. From either these groups, or the Marshall Islands, Japanese planes thrice raided our Canton Island between March 19th and 27th. No particular damage was done, and the raids may have been made for photographic and reconnaissance purposes. They evidence the limit of the enemy's activity in this sector.

Aleutian Islands

On March 11th, reconnaissance of Kiska Island disclosed that the Japanese were constructing a long airfield suitable for fighter planes. Due to continuous fogs over this area reconnaissance is difficult, and it is not certain how long this field has been under way. Another Japanese airfield is being built on Attu Island, this one being suitable for large bombing planes. Work has been proceeding on Attu at least since last December.

Both Kiska and Attu are mountainous and rough. Assumptions had been made that for practical purposes airfields could not be built on these islands. It now appears that they can be. In addition to the airfield Kiska has an excellent harbor. The work at these enemy bases is being done with power-driven excavating machinery. Shelters are underground, and presumably supplies are or will be. Up to the present time Japanese planes in the Aleutians have been sea planes, which are manifestly inferior to land-based planes. Consequently our air force from fields on neighboring islands has had almost no opposition in the air. If the Japanese succeed in completing the fields serious opposition may be expected. It will be possible for Japanese planes to fly all the way from Japan to Kiska by using fields in the Kurile Islands.

In the meantime our air forces are bombing Kiska not only every day, but several times a day—sometimes up to fifteen raids are made within 24 hours, most of which hours now are daylight.

One inconclusive naval encounter occurred west from Attu Island on March 26th. An American force (reported by the Japanese as 2 cruisers plus destroyers) met a Japanese fleet (reported by us as 4 cruisers, 4 destroyers, and 2 cargo transports). The battle was limited to long range fire, neither side suffering any noticeable casualties. The Americans report the enemy fled to the west; the Japs state the Americans fled to the east.

Japan's Central Area

The best information as to what Japan is doing in home areas comes from Chinese sources. These are supplemented by occasional Japanese radio speeches.

As early as last December the Japanese Prime Minister had stated that he was aware of the American intention of bombing Japanese cities, and was taking appropriate measures—which he did not describe at the time—to avoid this peril. Some information is now available.

The great Chinese iron and steel works at Hanyang, China, which are across the river from Hankow, are back again on a production basis. When China lost this important works in 1938 the machinery was removed or destroyed. The mines, adjacent to the works, are open pit mines and consequently could not be destroyed or materially injured.

A second large steel works has been opened at Tayeh, in Hupeh Province. Shipment from this plant, as well as from the one at Hanyang, is presumably made by water from Hankow. Nearly 900 miles from the sea, this port is accessible to ocean-going vessels on an average of 9 months per annum. The tonnage production from these two plants is not yet known.

Still another steel plant is operating near Peiping, utilizing ores from Chahar. This plant was reported on by our consular service before we entered the war. As early as 1940 it was producing about 90,000 tons of finished products per month.

The textile mills at Shanghai have been scrapped and their machinery sent away. The explanation given was lack of raw materials. Cotton comes largely from Shantung, which is in occupied China, and although the crop last year was reported as only 50% of normal, what there was went to the Japanese. The machinery from Shanghai may have been moved to that area.

Japan is receiving some raw material from free China through a black market arrangement. In some provinces the Chinese are approaching starvation, and in nearly all of free China there is an extraordinary lack of textile and metal goods. The Japanese allow a small quantity to trickle in in return for certain articles—such as tung oil—which they need. Japanese-manufactured articles are reported on sale at Chungking and other cities of free China.

New Japanese or Japanese-controlled industries are going up fast within occupied China, Korea, and Manchukuo. For Korea industry is something completely new. Through the distribution of plants through the enormous territory now occupied by its forces Japan is endeavoring to minimize possible losses from bombing of plants in centralized manufacturing areas of Japan.

Japan, by cruelly executing American officer pilots and boldly announcing her intention to continue this practice, indicates that she is reasonably certain that the United States can do nothing about it and that her plan for the progress of the war is proceeding without expectation of interference.

COMMENTS

Great military activity has been reported on all of the new frontiers of Japan, with the exception of the Marshall Islands. Consistency would point to the probability that the Japanese have not overlooked these islands, and although we may not know what is going on it is probable that bases have been established there.

Japanese military establishments have been strengthened facing India, facing Australia, facing our line of supply past Canton Islands, and facing Alaska. One year has elapsed since Japan completed the conquest of southeast Asia and the south Pacific Islands. This year has been spent in an intensive development of new bases. These have now been completed or are approaching completion.

It is possible that these new bases are for defensive purposes, to meet the American intention of a march on Tokio, whenever it starts. But the Japanese character is not such as to make it probable that they will lie calmly within their ring of new bases. Their past history and the pronouncements of their leaders point to offensive intentions. As to what manner of operation they will undertake, and when, there is at present no information. It is possible that they will prepare campaigns for several possible eventualities and not decide until the last moment which one to launch.

All the evidence indicates that Japan is preparing a long war, will be aggressive, and will retain the initiative as long as she can.

DEVELOPING ANTITANK

By A British Army Artillery Officer

AUTHOR'S NOTE

The problem of meeting armor on the battlefield confronts every commander today. The Afrika Corps by the use of tanks and towed antitank guns in close cooperation, obtained a very real measure of success in fighting in Libya. With its tanks were usually S.P. Artillery equipments as well. Recently in Tunisia the enemy has exploited his stratagem of withdrawing his armor in face of the opposing tanks, in such a way as to draw them on to the 88-mm. guns sited in a wide semicircle round the edge of an open plain where it ran into a pass in the hills. Marshal Rommel used the Afrika Corps as a team and all arms in combination. The 8th Army not only learned these lessons but improved on them, and their striking victories have been the result of powerful coordinated blows. Out of this war one weapon stands out in performance—*the gun*, whether on ship, land, vehicle, or airplane. It is to try and answer the question as to how the enemy armor should be met and defeated that this article has been written.

A particular gun can always be produced for a definite object, such as the defeat of armor. The specification and final design of that gun, however, are a compromise of such factors as maneuverability and weight in action, size and inconspicuousness, and ballistic performance. Existing weapons (for defeat of armor) naturally fall into three categories.

A. Low velocity weapons with high weight projectiles, such as A.P. shot or hollow charge shell.
B. High velocity weapons with medium weight projectiles, such as A.P. shot or A.P. H.E. shell.
C. Hyper velocity weapons firing a low weight A.P. projectile, e.g., the tapered bore gun.

The higher the velocity the flatter the trajectory, and hence the easier it is to score hits on moving targets. In categories "A" and "B" a weapon of medium caliber firing a heavy shell with large H.E. content will, if a hit is obtained on a tank, destroy or badly damage it. This is not the primary role of such weapons (medium or A.A.). Prudence dictates that every weapon should be able to defend itself at close quarters; it is therefore necessary to ensure that such weapons have the sights and stability to fire point blank at moving targets.

Field artillery are not by nature good antitank weapons, but since their positions are as a rule a primary objective of enemy tanks, they must be able to give a good account of themselves. They are considered later in this article.

Providing the ammunition supply is adequate, use of the massed fire of field (and medium weapons) against enemy tank formations has proved successful. The fire of sixteen 25-Pdrs. was sufficient to turn back 2 enemy tank groups of approximately 40 tanks each advancing against B.P. 39 (a gap in the wire south of Capuzzo) in the battle of June, 1941. At El Alamein during the enemy attack in 1942, heavy concentrations from a much greater number of weapons were used with considerable effect, causing casualties to tanks and halting attacks which were getting under way. The ammunition available is the limiting factor and may prevent such use except when occupying defensive positions.

THE NATURE OF ANTITANK GUNS

It is useful here to consider tanks and their role, the primary object of which is to destroy the enemy's soft-skinned personnel and equipment, including artillery, infantry, and vehicles. For this a hard hitting weapon like the long 75-mm. firing H.E. combined with M.G. fire is adequate. This does not, however, take care of the occasions when enemy armor is met, and a proportion of antitank tanks is, therefore, necessary to deal with his armor — armed with the most powerful A.P. weapon available. In the same way for A/Tk purposes other than within armored units, the right proportion of weapons must be struck. There is a need for the comparatively light, towed, hard-hitting equipment such as the 57-mm. (6-Pdr.), because being towed it is more inconspicuous in action, an overriding factor in close defense against tank attack. There is also a need for heavier A/Tk equipment to defeat the heaviest armor the enemy can put into the field, but in smaller numbers. With Division (other than armored) in the attack, A/Tk equipments must accompany the forward troops and be in position on the objective in time to withstand counterattack by enemy armor. Where this is not brought about, the forward troops are over-run or forced to withdraw—as in the Battle of Sollum, May, 1941, when the D.L.I. were counterattacked by tanks in and about Capuzzo; or El Alamein, 1942, when the Free French were forced to withdraw after a successful attack, by the lack of A/Tk guns to hold off enemy counterattacks with tanks.

It would seem that in order to ensure the presence of A/Tk guns on the objective in time, a proportion of A/Tk equipments should be S.P. (Self-Propelled as well as Splinter-Proof), thus giving the crews protection denied to the towed gun and detachments. But the S.P. gun is conspicuous, and its best use may be from under covered positions to take up previously reconnoitered hull-down positions, only after the enemy tank attack has been launched and the tanks are within fighting range.

The 6-Pdr. has proved itself in Middle East and North Africa as a first class A/Tk weapon. The 57-mm. is, except in one or two items of equipment and weight of shell, the exact counterpart of the 6-Pdr. which recently accounted for two German Pz Kw VIs in

Tunisia. These equipments then can form the main portion of the A/Tk defenses available within divisions (other than armored) whether the crews are infantry or artillerymen. From the 6-Pdr. a jump must be made to the 3-inch category to find a gun with adequate A/Tk performance (that is, velocity and weight of shell) to ensure the mastery of any armor likely to be met with in mobile operations. The 17-Pdr. has a higher M.V. and fires a heavier shell than the U.S. 3-inch or 76.2-mm. gun. It has, therefore, the advantage conferred by these two facts in performance against armor. Both, however, are formidable weapons, and entirely adequate to deal with existing enemy armor—including the Pz Kw VI.

Without going still further into the question of heavier types of A/Tk weapons, there is a body of experience available now as the result of our knowledge of enemy weapons and tactics and 3 years' experience in Middle East and more recently in North Africa. The writer sums them up as follows:

(a) The necessity for a high proportion of towed antitank guns.
(b) The necessity for a small proportion of S.P. antitank guns.
(c) A proportion of heavier antitank equipments, of the order of 1 to 3.

A/Tk Laying

In common with tank guns and towed A/Tk guns, the best results are obtained by a one-man lay assisted by the observation and control of fire by the Commander or No. 1 (U.S. Chief of Section). It is a combination of accurate round-to-round laying by the layer and observation of fall of shot by the controller which kills tanks. According to circumstances the observation may be at the gun or to a flank (in case vision is obscured behind the gun). Here another gun number (No. 4) must take No. 1's place behind the layer, and apply the ranges, etc. (6-Pdr., 57-mm. Drill.)

A/Tk guns require for ranges up to 2500 yards a telescope of 3-power magnification and a good open sight as alternative. Field artillery already possesses in their dial (panoramic) sights an accurate high-magnification sight for use at long ranges with direct laying. A telescope of lower magnification and wider field with the addition of open sights gives them, therefore, adequate sighting arrangements. Field artillery should adhere closely to the drill outlined above, since it has proved the best tank-killing device in battle, requires the minimum numbers in a gun crew, and can be usefully operated by 2 men in emergencies.

Tracking the tank can be done by F.A. with a one-man lay by using a foot-firing or elbow-firing attachment, which enables the layer with practice to continue using his gears at the moment he fires. On the other hand, equally good results may be obtained by using the 6-Pdr. (57-mm.) drill, which directs the gun ahead of the target, the gun being fired when the target coincides with the "lead" graticule ordered.

Point of Aim

Formerly with British equipments the point of aim was the "bow water line," changing to the center of the visible mass at ranges under 400 yards against a tank advancing directly at the gun. Sights and bote being parallel, the point of strike on the target did not coincide with the point of aim. It has been found in practice that better results are obtained by zeroing equipments at a fighting range. The object is to ensure that at this range the point of strike coincides with the point of aim, which is always the center of the visible target. The procedure of zeroing equipment, which is carried out by actual firing at the fighting range selected, must include a means of re-establishing the relationship between bore and sights laid down for sight-testing that equipment, and a means of recording the new relationship consequent on the displacement of the sights.

Training

Sufficient details of British methods have been given so as to stress the thought which has been devoted to A/Tk shooting and its deadly seriousness. The standard required can best be compared to L.A.A.* versus low flying attack when constant practice, good teamwork, and alertness are necessary to score hits. This especially applies to Field Artillery, in order that they may attain the same standard as the A/Tk Regiment proper. The standard may be set at 80% hits in practice, 100% hits in action. This standard will not be attained without systematic training and tests of individual gun crews against moving tank targets to gain battle experience and confidence. The more important training points are summarized:

(a) Judging distances—Mock-up enemy tank types at varying ranges.
(b) Tank recognition—A-T - A-A-T. Appearance—Turret—Aerial—Armament—Tracks.
(c) Concealment — Defilade — blast marks — use of gun-net—type of gun pit—mutual support.
(d) Tactics—Tank versus gun in the field.
(e) Inter-Section Gun competition.
(f) Sub-Caliber shooting and laying tests (standardized).

Training cannot be judged complete unless it has covered laying, tracking targets, and firing under the actual conditions that enemy tanks are likely to be met with. Many attacks by tanks have been carried out at dusk, in the half light preceding dawn, and during moonlight. The final stages of battle training must include firing exercises at such times, although laying drill under these conditions (and when looking into the setting sun) should be introduced earlier in the syllabus, together with tank recognition. Telescopic sights should be bloomed to aid night vision. Throughout training the importance of bore-sighting the equipment, daily when

*Light Anti-Aircraft.

in action or after cross-country movement, should be instilled into all ranks.

A Possible Solution of the Artillery A/Tk Problem

Success in antitank work comes from team-work, and this applies to tactical doctrine within formations and between the U. S. and British Armies. In Tunisia units were interspersed, fighting side by side. This will and should happen again. There seem strong reasons, therefore, since equipment is interchangeable, for a standardization of methods and training.

Based on these assumptions each division should have its antitank unit. This unit could well be common to all divisions once its armament and proportions were agreed. Taking existing establishments, the common denominator might be:

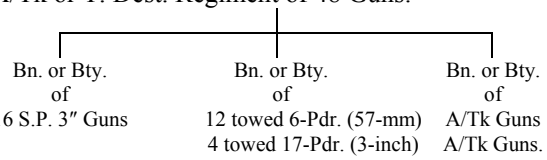
British: A/Tk Regt. of 3 Btys. each of 4 Troops (4-gun Troop): total 48 guns.

U. S.: Tk. Dest. Regt. of 3 Bns. each of 4 Btys. (4-gun Bty.): total 48 guns.

In both, one Battery (Battalion) would be S.P., the remaining two Batteries (Battalions) each having one Troop (Battery) of heavy A/Tk Guns.

The lay-out would then be:

A/Tk or T. Dest. Regiment of 48 Guns.



The advantages are:

1. It makes use of existing equipments.
2. Establishments of battalions (or batteries) will be fixed, so that a regiment can be increased by adding additional battalions (or btys.) as and when required. By adding to each regiment some light A.A. vehicle, a homogeneous unit will be produced basically common to all divisions and both armies. Separate demands made by terrain or tactics can be met by varying the type and number of Bns. (Btys.) in the Regiment.
3. It gives a commander greater flexibility of maneuver by the use of towed and S.P. equipments in combination.
4. The presence of a heavy A/Tk Gun S.P. in the forward areas gives the opportunity to engage enemy tank patrols at long range from temporary under cover positions by means of observed fire, enabling the towed A/Tk Gun to remain concealed and withhold their fire.
5. Accepting the fact that infantry without the means to stop tanks are a liability on the modern battlefield, the allotment of one Infantry A/Tk Regt. per Infantry Brigade (Regiment) (on the basis of one Battery (Battalion) of towed 6-pdrs. [57-mm.] per Infantry Bn.) will give them considerable stopping power.
6. The Divisional A/Tk (T.D.) Regiment will be superimposed when necessary on the infantry A/Tk framework, will act as a mobile reserve to meet a threatened attack by enemy tanks, and will be the means of extending and co-ordinating the antitank defense of the whole divisional area. This will fit the picture of the attack by large numbers of enemy tanks (two or three groups of 40 tanks apiece), which the enemy has used in Africa, and which can only be dealt with by a combination of a strong antitank defense, the massed fires of the reinforced Divisional Artillery, and Air Support. Since the enemy at all times will be able to gain *local* air superiority for a definite time, the tank-killing power of Allied aircraft has to be discounted to some extent in this particular case.

Conclusion

The 8th Army provides today the best example of successful work and of a closely coordinated striking force. Here antitank regiments form an integral part of each formation. Only by such means can a divisional commander train and coordinate his team. This is perhaps the greatest weakness of the Tank Destroyer organization at present. The solution given above would retain the Tank Destroyer conception as basically sound, and make full use of training facilities to form and train the units required initially, after which each unit would complete its training with its division or higher formation in the field. In the open plains of Tunisia anything but a towed form of antitank weapon stands out. This is not the case in the north, or on the continent. But both forms can be used in combination with other arms, not only in Tunisia and Libya as the Afrika Corps have proved, but on the continent as the Allied Armies will undoubtedly prove.

The proposed Antitank Regiment has been suggested as suitable as a whole for all types of divisions. This applies to infantry divisions as well, where (in the writer's opinion) a proportion of the artillery of all types should be S.P. to enable close support to be given to forward troops and infantry tanks at will, in the attack as well as during a withdrawal.

THE *JOURNAL* OVERSEAS

"What pleases me more than anything else is that the JOURNAL is being received on time and read by both officers and enlisted men—they look forward to its receipt. It is doing a world of good in the Field Artillery and I just want you to know personally how at least one officer regards it."—BRIG. GEN., USA

These four German tanks are part of a group of 18 caught by British 25-pdrs. near Bou Arada, when they attempted to cross the plain from positions in the background hills.

TD FUNDAMENTALS

By Col. J. M. Colbuck

Tank destroyer battalions furnish commanders of divisions and higher units with a mass of mobile firepower with which to counter mechanized attacks. BUT—we must remember that *TD vehicles are not armored like a tank*, and can not "shoot it out" with tanks in the open. Concealment and defilade are essential, yet are not inconsistent with either the characteristics or the role of TD vehicles or units.

Tanks have relatively heavy armor. Even so the Germans, at least, seldom employ them except under the covering protection of artillery and antitank guns. TD vehicles, with their tank-high silhouette and light armor, must be employed with these facts in mind, and in such manner as to exploit to the utmost their own mobility and high rate of fire.

TACTICS

Since TD vehicles can not roam afield at will, searching out enemy tanks ahead of our other ground forces, they must manifestly be reserved for countering hostile thrusts which have penetrated or outflanked our forward antitank defenses. The point of such enemy success can rarely be predicted accurately. TD units must, therefore, be held as a *mobile* reserve. Their role can be static only in the practically unique case where enemy tank attacks are definitely (certainly) canalized into only a very few avenues of approach.

All possible routes of enemy tank approach must therefore be carefully studied. The TD battalion must reconnoiter and select positions from which these thrusts can be met. It must be placed as a mobile reserve, in a central location from which any of these positions can be readily reached. *And it must be ready to move instantly into these selected positions, occupying them before hostile tanks actually reach the scene.*

INFORMATION

This requires an adequate warning system. Warning systems demand reconnaissance. TD battalions are fortunate in having two barrels for these purposes.

One of course is its own organic reconnaissance element. This acts aggressively and continuously, in all directions from which hostile tank attacks *might* come. Contact must be made early, and never lost. And *information must stream steadily* into headquarters.

The other is the availability of information from other units. Units on the front, units on the flank, neighboring units, air forces, artillery OPs—all these can and should be exploited to the full.

POSITION SELECTION

Concealment is paramount. Remember, silhouettes are not low and skins are thin. Hull-down positions are therefore essential. These can be had behind crests, in ditches or ravines, or perhaps at the edge of a woods (although this last gives concealment only, without protection). It may often be necessary to dig-in the vehicles; we can profit from British experience in the Libyan desert where this was practically S.O.P. *All* positions must be thus prepared, including all those which are selected for only possible later use; when vehicles are going into actual action to meet a thrust there is no time for digging which should have been completed long before. And the same is true of alternate and supplementary positions.

We mentioned the possibility of a static defense. If enemy routes are so canalized that a TD battalion occupies its positions before a thrust develops, it must conceal and camouflage itself as completely as does more conventional artillery. Camouflage discipline must be *complete*. True enough, firing will quickly disclose positions—but

there is no point in showing ourselves too soon, letting the enemy neutralize us before he, protected by his thick hide, is within our effective range.

And this brings us back to those alternate positions. We must expect to have to take new positions, and routes to them should be defiladed if at all possible. In fact, these routes may have considerable bearing on the selection of exact positions. Besides defilade, we must think of mutual support—units and individual guns in forward positions should be protected by those to the rear and flank while displacing. If covered routes are not to be had, smoke must be provided so that displacements can be screened. It isn't just the move itself that must be concealed—its destination is even more important; what is gained if the enemy, having located a position, can see the precise point to which our gun has displaced and so neutralize it again before it can fire a shot?

TDs, like conventional artillery, are most vulnerable when on the road. It is thus doubly necessary to *cling tenaciously to initial positions* just as long as effective fire can be delivered from them.

OPENING FIRE

Fire must not be opened prematurely.* Again we say, remember the enemy's thick hide! Yes, he will do everything he can to persuade us to open fire early and so expose our positions; if he succeeds, he's the only one to gain: protected by his armor, he can stand beyond our effective range and either knock us out himself or direct the fire of his own artillery upon us.

So wait until he is surely within effective range, and also (preferably) until the bulk of his tanks are on the scene. Quantities of ammunition should be fired in training, not in battle; hours are available on the range, as against seconds during the attack—and ammunition is more plentiful at home, too, and its supply infinitely more simple. In combat the aim is ONE SHOT, ONE TANK. Wait till the tanks are close enough for hits to count, and until enough tanks are present for them to be popped off promptly before they can withdraw from range. Our antitank guns, whether on ground mounts or on TD vehicles, *are* effective against all German armor—but that armor must be within effective range. And that range is great enough that a well-trained crew has ample time for several shots against several tanks before it can possibly be over-run.

See Antitank Thoughts, page 198 of the JOURNAL for March. 1943.

THE OFFENSIVE

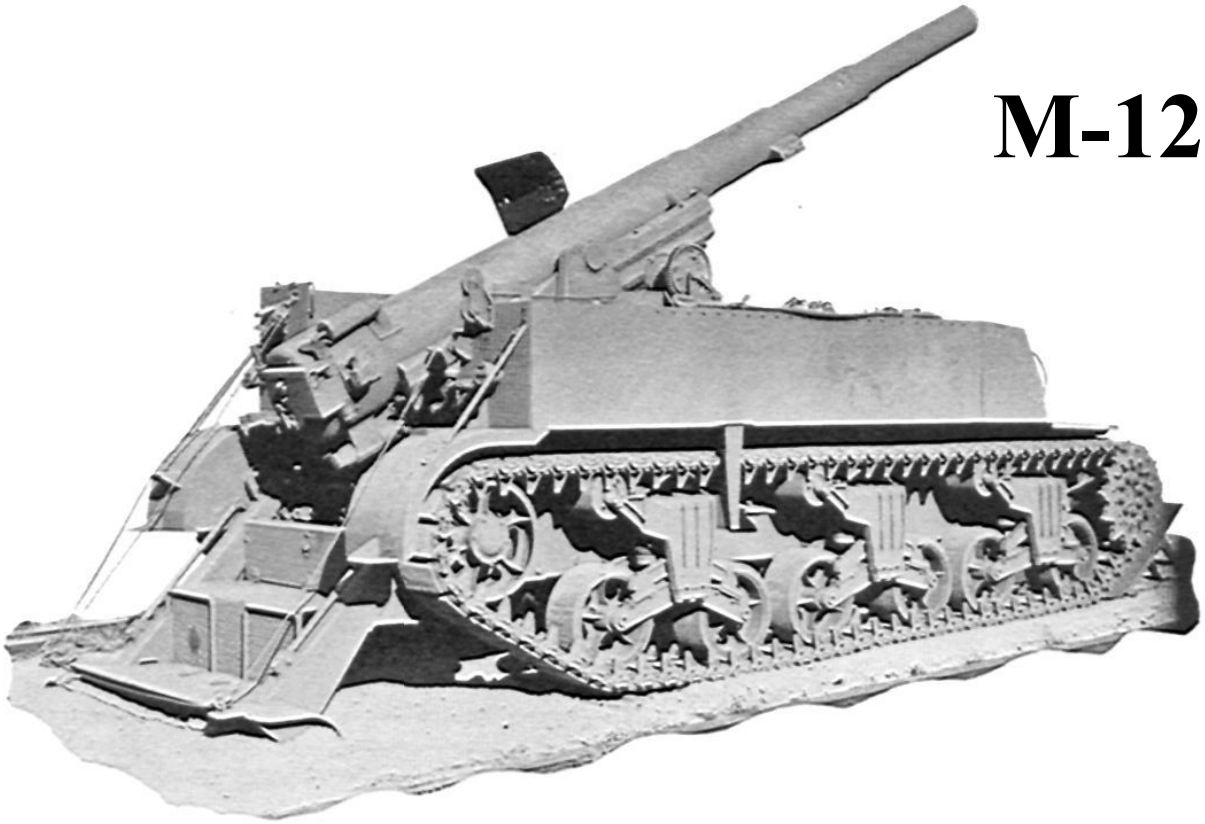
Above we emphasized the use of TD vehicles on the offensive-defensive. Precisely the same principles, however, apply when our ground forces are on the tactical offensive. In that case TD units must be alert for and operate against armored counterattacks. If we are making a frontal attack, these units must advance by bounds behind the attacking troops, ready for instant entry into action. If we are enveloping, "the situation" (including size of our force, terrain, enemy strength and dispositions) will determine whether TD units remain in reserve, are attached to the main attack force, or operate on the exposed flank.

TD units can be particularly valuable in the pursuit. Their mobility especially fits them for attachment to the encircling force. By getting ahead of the retiring enemy, they can lay ambushes to raise havoc with the withdrawing force as well as protect the principal encircling force from the hostile armor.

PERSONNEL CHANGES

After a distinguished career in the Field Artillery, Col. Roger S. Parrott has just been retired upon reaching the mandatory retirement age. He is replaced as President of the Field Artillery Board by Col. Alan L. Campbell, who has been head of the Field Artillery Branch, Development Division, Requirements Section, Headquarters Army Ground Forces. Col. Malcolm R. Cox has come down from Aberdeen Proving Grounds to succeed Col. Campbell. Lt. Col. Frederick B. Porter is the new AGF liaison officer at Aberdeen, going up from the Board to take Col. Cox's former place.

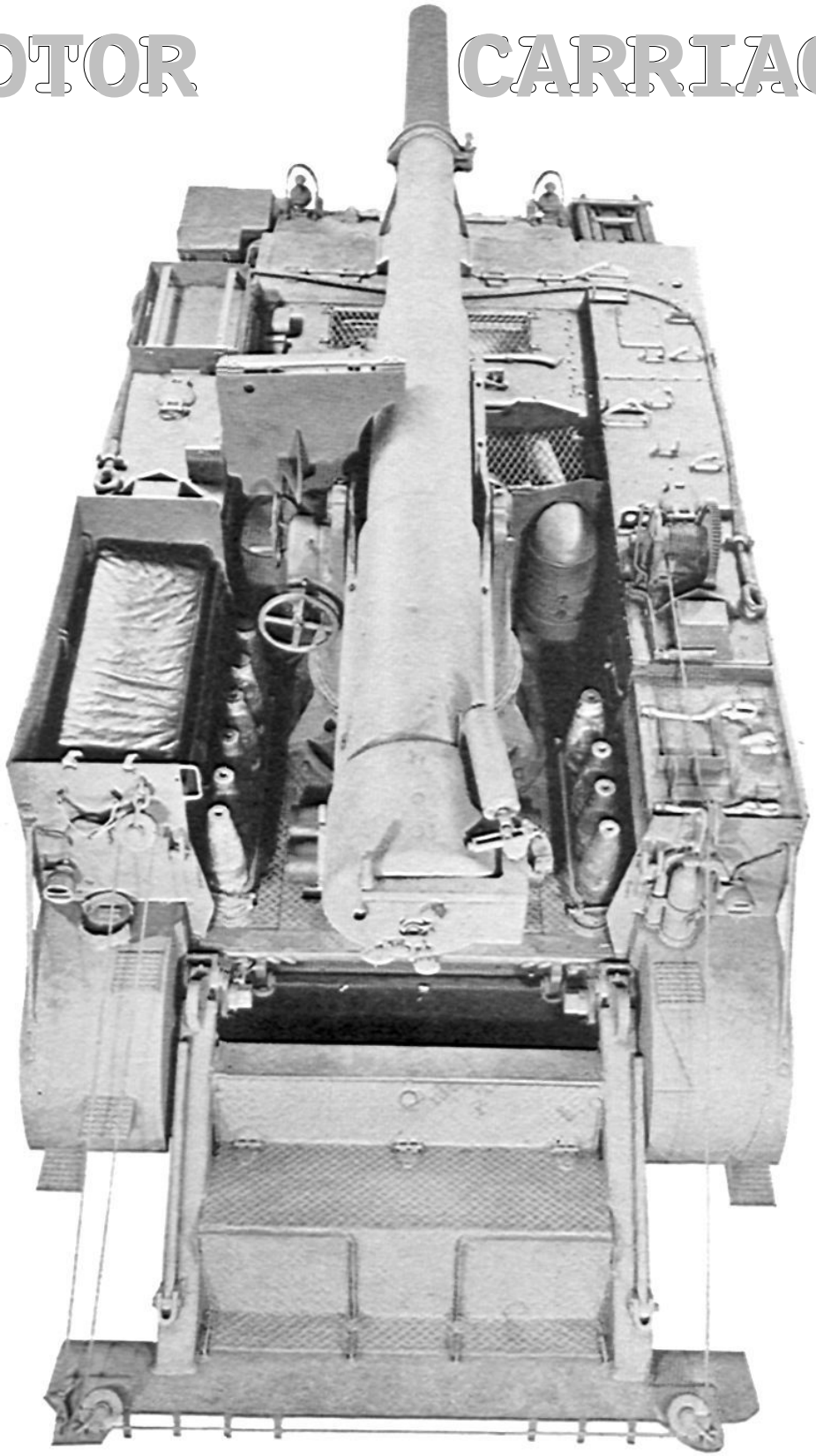
M-12



Good use is now being made of old 155-mm. guns, by mounting them on the M-12 Motor Carriage. Its full-width spade gives great firing stability and also contains steps to facilitate service of the piece. Shield adds to the gunner's protection against splinters when he raises up to use the sight.

Each section is completed by a "Cargo Carrier T-14" (caisson), built on the same type of medium tank chassis. Carrying additional ammunition and the remainder of the gun crew, it provides good close-in protection with its .50-cal, machine gun on a ring mount.

MOTOR CARRIAGE



When in travelling position the G.P.F.'s tube is held rigid by clamp near its muzzle. M-12 carriage has space for part of the crew and a limited amount of ammunition. When the spade is raised (by hand-operated windlass on the right), camouflage net is strapped to its underside.

Desert "As Is"

By Lt. G. S. Galligan, FA

Most articles on desert training seem to be misleading both as to the conditions encountered and the effectiveness of the training received. Perhaps this feeling on my part is due to two things: our unit was maneuvering during the cooler months of the year, and it is a motorized rather than an armored organization.

To the desk desert strategist, intense heat during the day and extreme cold at night are to be expected even in the winter months, whereas this is not the usual case. From November to February the diurnal temperature range is not extreme—there is a quite rapid dropping as the sun sinks until the temperature averages around 40-50 F. and a gradual rise in the morning to a midday peak of around 75-80 F. Of course this is not invariable and an occasional night may be so cold as to cause water to freeze in the canteens, but that is the exception rather than the rule. Most soldiers consider the climate ideal.

It is a curious fact, however, that even during the comparative heat of the day one becomes quite chilly riding at moderate speeds while exposed to the wind; therefore it is a wise soldier who prepares for such a trip by putting on a field jacket while still almost hot in just a shirt. The wind also dries the skin. After suffering with cracked lips for a week or two, most men finally purchase some type of grease for protection, not only for the lips but for other parts of the face which become dried out in the desiccating desert wind.

Woolen clothing is worn during this season and a fire is a comfort as night approaches. Those not familiar with the desert might wonder about fuel difficulties, visualizing nothing but pure sand stretching off into infinity when this region is mentioned. But the area is dotted with many types of vegetation—the most popular being a variety of sagebrush which puts out a surprisingly hot flame when a match is tossed into it. Thus it is not at all unusual (in non-tactical situations) to see a myriad of little fires spring forth when a column is halted at night. These are perfect five-minute fires but when supported by dead sticks (which seem to be scattered almost anywhere at random) a large number of fatigue-suit seats can be scorched for an extended period of time. By this I do not mean that there are no such areas of pure sand, but that they make up only one type of desert terrain—and are best avoided.

About four general types of topography appear to be dominant in the Colorado desert; geographers might claim there are many more. To avoid Latin names we can safely say that the main landforms are: (1) boulder-strewn, (2) rocky or mountainous, (3) sandy, and (4) pebble-surfaced. The latter are by far the most suitable for movement of a motorized unit, appearing (in non-professional terms) much like a parking lot. However, when disturbed by a few vehicles the coating or crust of pebbles breaks through and disappears, and a fine, deep, floury dust results. It is here and in the sandy areas that the cannoneers develop their back muscles. Boulder-strewn areas seem to crop up almost anywhere and are preferably avoided, while the rocky surfaces merely make you wince and feel thankful that those are not your tires. The biggest destroyer of beautiful paper formations is the wadi, which turns the theorist's table-top into a maze of twisting channels. Manuals may prescribe the lateral distances between columns, but it is the landforms themselves that actually control the movement. Each piece of terrain will prescribe its own formation.

Another false idea is that even the plains of Kansas offer more concealment from any type of observation than does the desert. Vegetation is maximum in the winter season and is comparatively prolific in the wadis. It amounts to more than a few blades of grass and a bit of sagebrush, but includes much taller bushes—up to 30 or 40 feet in height. These areas provide a much greater amount of camouflage from both ground and air observation than appears possible to those who have not visited them. The greater difficulty of going into position must be mentioned, but the concealment is there; admittedly, it is far from perfect against air observation, but it is quite good against ground observation. As you

move further into the heart of the desert, vegetation does become more sparse, but the statement that there is *no* opportunity for concealment in the desert is *not* exactly true.

"Sandstorms" are actually dust storms. The fine, powdery dust is everywhere in the fairly strong wind and makes observation almost impossible. After trying the issue dust respirators, most soldiers put them aside and breathe the dust without them; probable reasons for this are that the respirator is difficult to talk through as well as awkward to put on and off. Perhaps the biggest problem in concealment is the dust raised by the vehicles as they move the guns into position. Outside of the strategem of dragging decoy dust-raisers past the true position, the best thing to do is to move slowly in different tracks than those the preceding vehicle made.

It is not unusual for the air to be so laden with dust that it is impossible to see more than ten yards away, and only then at the risk of getting an eyeful of dirt. Goggles are a great protection for the eyes and are a necessity if one attempts to operate in a sandstorm, for without them it is actually possible to remove mud from the corners of the eyes during the duller moments of the storm.

Of course, I must make the usual statement that water is a problem in the desert. But during the cool season, no one feels stinted by his water supply of 1 1/5 gallons per day, so this is probably a good season in which to become acclimated to desert conditions. Water in canteens remains quite cool, and the water problem would not be much thought of except that it is *said* that soldiers have a hard time satisfying their thirst. Naturally the water must be carried out to the desert, but water demands are not excessive in winter. Although desert water bags may be useful during the hot season they have little value during the cooler part of the year.

To some the present period of three months seems too long to spend on desert maneuvers. Perhaps a month could be cut off this time, since the big job is to become acclimated to this type of life and to train drivers to operate over the various types of terrain encountered. A good deal of time is spent merely driving in various formations, attempting to keep proper intervals yet at the same time keep contact with and control of the column or unit as a whole. I do not mean that this can be accomplished in a few days even though it appears quite simple when it has been mastered, but in three or four weeks' time the drivers become quite proficient at maintaining an even speed and proper intervals and distances. This training might be integrated in a whole tactical problem of moving up and preparing for an attack, without being segregated and undertaken by itself. After this comparatively short period of adjustment, training of drivers, and keeping the S-4 on the job pushing out supply trains every night, the main features peculiar to desert warfare have been encountered and a pretty good picture obtained as to what might be expected in desert terrain.

ASSOCIATED ARMS

"We find THE FIELD ARTILLERY JOURNAL an indispensable aid in providing training hints as well as being a distinct addition to our battery library."—LT., USMC

"My sincere thanks for the new subscription to THE FIELD ARTILLERY JOURNAL. Also please permit me to say that I hardly expected such quick action on my request from an office as busy as yours must be these days. I guess it's the same old story of the Field Artillery giving what is asked for when it's asked for. Also as usual, the Infantry is doing the asking.

"It also might be mentioned that I expect THE FIELD ARTILLERY JOURNAL to be of real value to me as an Infantry Officer. This should be particularly true since I have just completed the Infantry Officers' Cannon Course and expect to continue in this line of work."—1ST LT., INF.

"As an ex-artilleryman, I am very interested to keep up with artillery in this war and I find the JOURNAL an excellent means of keeping abreast with the latest methods and developments."—T/SGT., AAF (in the Middle East)

Artillery at El Alamein*

By "Battery Captain"

My regiment was a part of an Armored Division, which was in turn part of the X Corps. For several weeks before the battle we trained in the Delta area in the desert, and just two days before the offensive started we moved up to within ten miles of the coast road. On the night of October 23rd the whole of my corps moved through our own minefields in the old no-man's land; I say "old no-man's-land" because our artillery had been putting in some extremely good work on the night of October 23-24. Our observation post officers were travelling with the tanks that night, some two miles in front of the guns, and their movements were limited — or rather, we had to conform with the movement of the tank regiment we were supporting. Some OPs found themselves on extremely good ground next morning and had some good shooting.

OPs were so arranged that with each armored regiment there was at least one OP officer, so that if any one OP during the battle saw a target worthy of the whole division's artillery he was able (within a very few minutes) to concentrate all the guns on this one target. This is an arrangement we had never tried before in the desert, and a part of the new order of things out in the Middle East—this business of concentrating one's guns and the fact that one OP can fire all the guns in his division if need be.

When our infantry advanced and the targets threatened to become out of range, naturally the guns had to move forward. This was facilitated by forward reconnaissance parties with a survey party. They would go on about two hours ahead, and while the survey officers were surveying the new gun positions the batteries in the regiment would be coming up one by one. The whole movement would take up to two hours. We only lost the firing power of eight guns at any one time during the whole move.

We had excellent maps. The R.A.F. Survey put in marvellous photographic work during the months before the battle started. Our chief work in this battle was to support the tanks during the day, and by night we would be asked to help out with the —— corps. On an average we fired four hundred rounds a gun a day in the regiment, so one way or another the guns were not silent during those days.

*Republished, with permission, from *The Gunner*.

Many of our field artillerymen are armed with the British 25-pounder—and our contributions to the Royal Artillery clearly appear from this description of gunnery at El Alamein. This interchange of equipment and ideas is wholesome for all concerned. Its effectiveness will be revealed more and more.

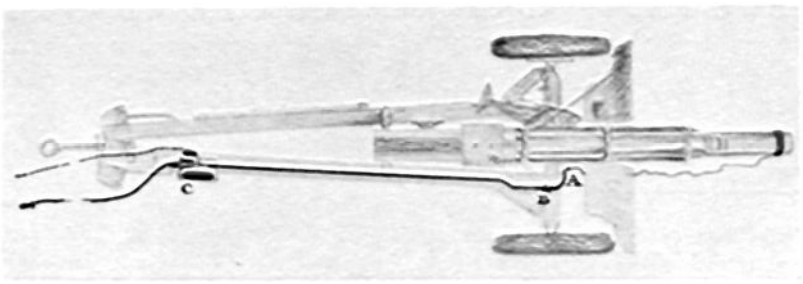
The ammunition supply was absolutely wonderful. I think the R.A.S.C. must have been preparing dumps probably two months beforehand. They were extremely well hidden, so well hidden that sometimes we could not find the stuff ourselves.

At night, if we were not supporting infantry attacks, we used to have some time off. It did not happen very often. On those occasions our OPs were able to come in and have a night's sleep near the guns. It was a difficult business trying to find somewhere where you could sleep. You thought you had found a lovely spot—a deep slit trench—and had just dozed off to sleep when suddenly there would be a mighty crack close to you. You were near a gun position so well camouflaged that you had not noticed it!

Our artillery barrages were usually worked out as follows:

A divisional commander and his C.R.A. work out from a map exactly in what sort of area the gunners are required to put down their barrage. How long it is to last, the intensity and so on, are discussed between the C.R.A. and the infantry commander. When the C.R.A. has all his information he gets his staff, who allocate regimental lanes to the various regiments in the division. These lanes are really sent down to the regiment in the form of three-map references. The timing of the barrage, of course, is also on the trace—the piece of paper that is sent down with the usual intricate details. When regiments receive their traces they in turn divide the regiment lanes into battery lanes. That is the job of the adjutant.

The hardest work of all is done by the simple troop officer, who probably ten minutes before zero hour is given his trace and has to get out very complicated gun program forms. The wretched sergeant in charge of the gun has probably two minutes to lay his gun, by the light of a torch or a guttering candle. He is lucky if he does. In fact, it is usually a very tough job for the sergeant in charge of the gun. However, I do not think we were late on any occasion.



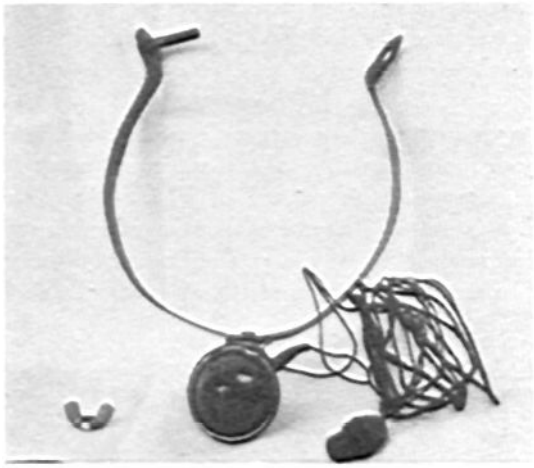
TAIL LIGHTS—105-HOWITZER

By Lt. William R. Kimball, Jr., FA

Illumination of the muzzle of a 105-mm. howitzer for night marches is somewhat of a problem. As "G.I." tail lights for this weapon *seem* practically non-existent, it is normally up to the individual organization to provide a substitute. Flashlights have proved inadequate, so it is necessary to use the current of the battery in the prime mover. The method described below has proven satisfactory in two of our batteries, and might be helpful to others.

Materials needed:

4 red truck clearance lights.
A bit of black paint.
About 50′ of W-110 ("combat") telephone wire.
4 electric sewing-machine (or any other small) connecting plugs.
4 ⅛″ bolts and wing nuts.
A 10′ length of steel wire.
Some odd pieces of strap iron.



At "A" disconnect the flexible conduit from the axle. Straighten the conduit so it is in prolongation of the right trail, then disconnect the steel grommet or bushing that connects it to the front of the trail at "B." A solid piece of conduit runs through the trail from "B" to the battery box "C"; the brake wires are in this conduit, but there is enough room for the tail-light wire. Therefore, starting at the flexible conduit end at "B," force a length of small gauge steel wire through the conduit as a guide for the insulated pair of wires—but be careful not to damage other wires in the conduit. When this insulated wire has been secured at "C," remove the guide wire and repeat the same process from "B" to "A." (Note: this is easier than starting at "A" and forcing the wire on through to "C" in one operation.)

After reassembling the conduit, connect the wire at "A" to the female section of the sewing-machine plug. The plug can then be taped in a convenient spot on the front of the axle where it will be protected from weather and damage.

The jumper cable coupling socket which is in the battery box at "C" has four binding posts marked *Tail Light, Brake, Stop Light,* and *Ground*. Connect the wire ends at "C" to the posts marked *Tail Light* and *Ground*. When this is done, the permanent part of the installation is complete.

Using a few feet more of "combat" wire, connect the clearance light to the male section of the plug—forming an extension cord. The light can be fastened to the muzzle with tape or by any other suitable means. If, however, your battery mechanic is still in a good mood, you might have him make a clamp with a piece of strap iron and a wing nut and bolt (see cut). This clamp should be made large enough to fit over the muzzle cover to prevent slippage. Be certain that it is mounted with the light *under* the tube, to give better protection from aerial observation. A little black paint on the glass to diminish the brilliance, and the job is complete.

The light can now be quickly clamped on the tube, and the socket connected to complete the circuit. This provides a tail-light for the howitzer that will remain burning whether the vehicle's light switch is in the "black-out" or the "full light" position.

CAUTION: While the above is useful during training and for non-tactical night movements, *only issue lights* should ever be used in tactical situations, either actual or assumed.

RAPID COMPUTATIONS

By Capt. Alfred W. DeQuoy, FA

A quick method for Battery Executives and Forward Observers to determine charges, elevations and *c* for 105-mm. and 155-mm. Howitzers.

Suppose you are observing for a howitzer battery and have no firing tables available:

What charge will you use?

What elevation?

What *c*?

PART I—105-MM. HOW.

SOLUTION

Memorize this table:

Elevation 300			
Charge	3	5	7
Range	3200	5100	7800
c	12	8	6
Charge 5: 4200-6200			

Table A

As an aid in memorizing this table, note that the first digit of the ranges at elevation 300 corresponds to the number of the charge to be used.

What Charge?

Charge 3 for any range up to 4200 yds.
Charge 5 from 4200 to 6200 yds.
Charge 7 from 6200 yds.

What Elevation?

Determine range to target, e.g. 9200 (this calls for Charge 7).

Determine difference in hundreds of yards between this range and range under appropriate charge in Table A: 9200 — 7800 = 14.

Multiply this figure by the *c* under appropriate charge: 14 × 6 = 84.

This product is added to or subtracted from elevation 300 (in Table A) depending on whether range to target is greater or less than range in Table A. Here 9200 is greater than 7800, therefore 300 + 84 = 384. Firing Tables 105-H-3 gives the elevation for Charge 7 at 9200 yds. as 384.2.

What c?

Table A gives the *c* for each charge at elevation 300. For every 100-mil increase or major portion thereof, add 2 *mils* to the *c*; subtract 2 *mils* if elevation decreases; at elevation 200, *c* for charge 7 is 4, at 300 it is 6, at 400 it is 8. Since the elevation was computed to be 384, two mils is added to the *c* in Table A, making *c* = 8 (it is 6.8 in firing tables).

A "canned" problem, you say? OK, compare Firing Table values against the computed values in the following table. Note also the small variations.

FOR COMPARISON

		Elevation		*Variation*		*c*	
Charge	Range	Firing Tables	Computed	Mils	Yards	Firing Tables	Computed
	2000	172.2	156	16	160	9.8	10
	2500	222.6	216	7	70	10.4	10
3	3000	276.4	276	0	0	11.2	12
	3500	335.4	336	1	8	12.4	12
	4000	402.8	396	7	49	14.6	14
	4200	433.4	420	13	78	15.8	14
	4200	233.0	228	5	75	6.6	6
	4700	267.6	268	0	0	7.2	8
5	5200	304.4	308	4	52	7.6	8
	5700	344.0	348	4	48	8.2	8
	6200	387.4	388	1	11	9.2	10
	6200	212.4	204	8	160	4.8	4
	6700	237.4	234	3	57	5.2	4
	7200	263.6	264	0	0	5.4	6
	7700	291.2	294	3	54	5.6	6
7	8200	320.4	324	4	68	6.0	6
	8700	351.2	354	3	48	6.4	8
	9200	384.2	384	0	0	6.8	8
	9700	420.0	414	6	78	7.6	8
	10,200	459.2	444	15	180	8.4	10
	10,400	474.2	456	20	240	8.6	10

Table B

DISCUSSION

Bear in mind that this method is for a particular situation: one in which no firing tables are available. It therefore cannot be expected that elevations or *c*'s will exactly correspond with the firing tables, nor can it be expected that a selection of a charge will be the most desirable one (see par. 139, FM 6-40, *Firing*), but it is satisfactory and will work.

Charge

It is desired that the target's range be not less than 50% nor more than 75% of the maximum range for the charge selected. On page 5 of FM 6-130, *Reference Data,* it is stated that the maximum effective range is approximately 85% of the extreme range of the projectile. In terms of even hundreds of yards, Table C was established.

EFFECTIVE RANGE PERCENTAGE

Charge	Maximum Range	85%	75%	50%
3	5300	4500	4000	2600
5	8300	7100	6200	4200
7	12,200	10,400	9200	6100

Table C

Now refer to Table B.

If you fire indirect fire at 2000 yards, using Charge 3, you will be firing at 33% of its maximum range; at 4200, you are at 80%. The upper limit for Charge 3 is placed

at 4200 in Table A instead of 4000 in order to tie it in with Charge 5 and make it easier to memorize.

The limits for Charge 5 are between 50% and 75% of its maximum range.

Charge 7's limit is 51% of its maximum range. Since 85% is the maximum effective range, all ranges above that figure are omitted.

Elevation

Even though you use a range finder and consult the firing tables, it is quite probable that the first round will be a little over or short; with this in mind, look at Table B and observe how small the variation is in yards.

c

Even (rather than odd) *c*'s are used for ease in handling in the conduct of fire, and for simplicity in memorizing.

PART II—155-MM. HOW.

SOLUTION

Memorize this table:

Elevation 300			
Charge	3	5	7
Range	3700	5800	8100
c	10	7	6
Charge 5: 4700-7400			

Table D

In determining proper charge and elevation, follow the same procedure as is outlined above for the 105-mm. howitzer, *c* will be the one given in Table D under the appropriate charge.

Proof of accuracy in computation as compared to firing tables (F.T. 155-V-I) is contained in the following Table E:

		Elevation		*Variation*		*c*	
Charge	Range	Firing Tables	Computed	Mils	Yards	Firing Tables	Computed
	2500	185.8	180	6	72	8.4	10
	3000	229.4	230	1	11	9.0	10
3	3500	276.2	280	4	40	9.6	10
	4000	326.8	330	3	27	10.6	10
	4500	383.0	380	3	24	12.0	10
	4700	407.8	400	8	64	12.8	10
	4700	229.6	223	7	119	6.0	7
	5000	248.0	244	4	64	6.2	7
	5500	279.8	279	1	15	6.6	7
5	6000	313.4	314	1	14	7.0	7
	6500	349.6	349	1	13	7.4	7
	7000	388.8	384	5	60	8.2	7
	7400	423.0	412	11	121	9.0	7
	7400	265.0	258	7	140	5.2	6
	8000	296.8	294	3	57	5.4	6
	8500	324.6	324	1	18	5.6	6
7	9000	354.0	354	0	0	6.0	6
	9500	385.2	384	1	16	6.4	6
	10,000	418.8	414	5	75	6.8	6
	10,500	455.0	444	11	154	7.4	6
	10,800	478.6	462	17	221	8.0	6

Table E

EFFECTIVE RANGE PERCENTAGE

Charge	Maximum Range	85%	75%	50%
3	6100	5200	4600	3000
5	9400	8000	7000	4700
7	12,700	10,800	9500	6300

Table F

TEAMWORK

"Since being in Africa I have seen little of the artillery, personally, but have heard much of its prowess, particularly of the British artillery of the Eighth Army and, more recently, of the American artillery at the Kasserine Pass. I do not believe that there is anyone left who thinks that the airplane will every replace artillery. On the other hand, there is an ever increasing group of officers, including air corps, who see the necessity for adopting many artillery principles in the employment of aircraft as air support. World War I brought to full development the infantry-artillery team. World War II will do the same for the infantry-artillery-air and the armored-artillery-air teams. Properly coordinated and properly used, they can be defeated only by a better team of like kind."—LT. COL., AC (formerly FA)

FIELD ARTILLERY GUIDE—*What they say about it:*

"I have seen the book previously and therefore already know of its usefulness. The *Field Artillery Guide* is a fine piece of work and especially helpful for our battery officers."—BRIG. GEN., USA

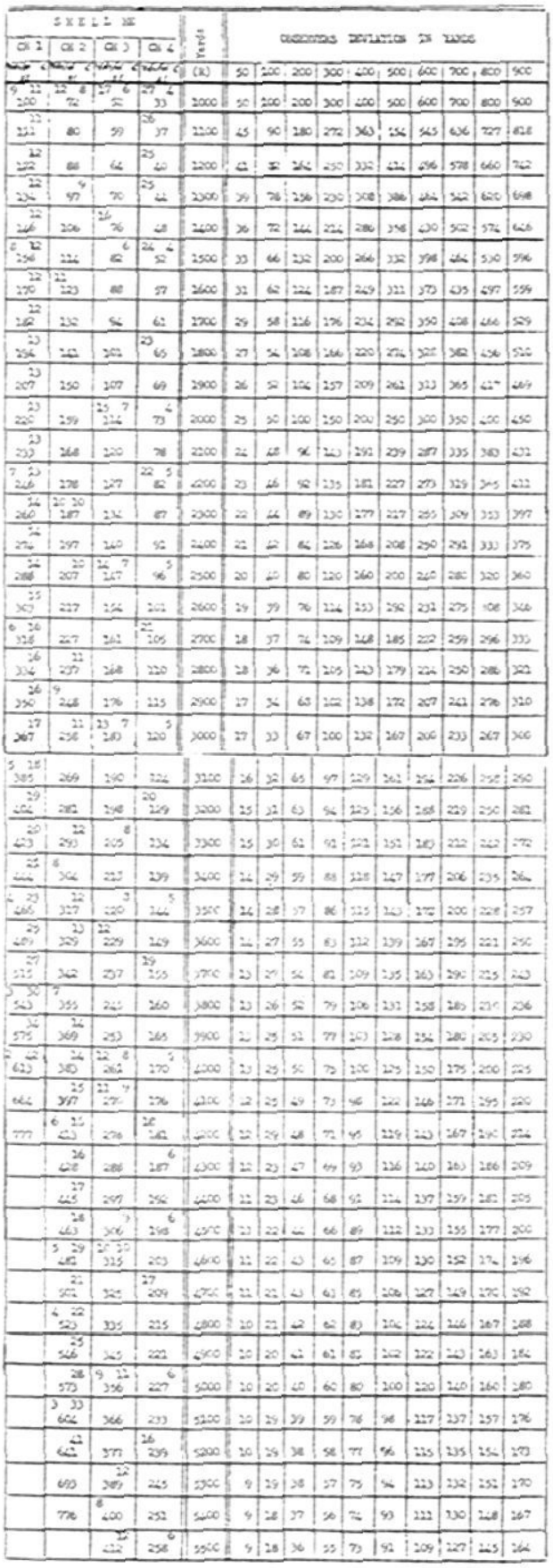
Computers' Table for the 75-How.

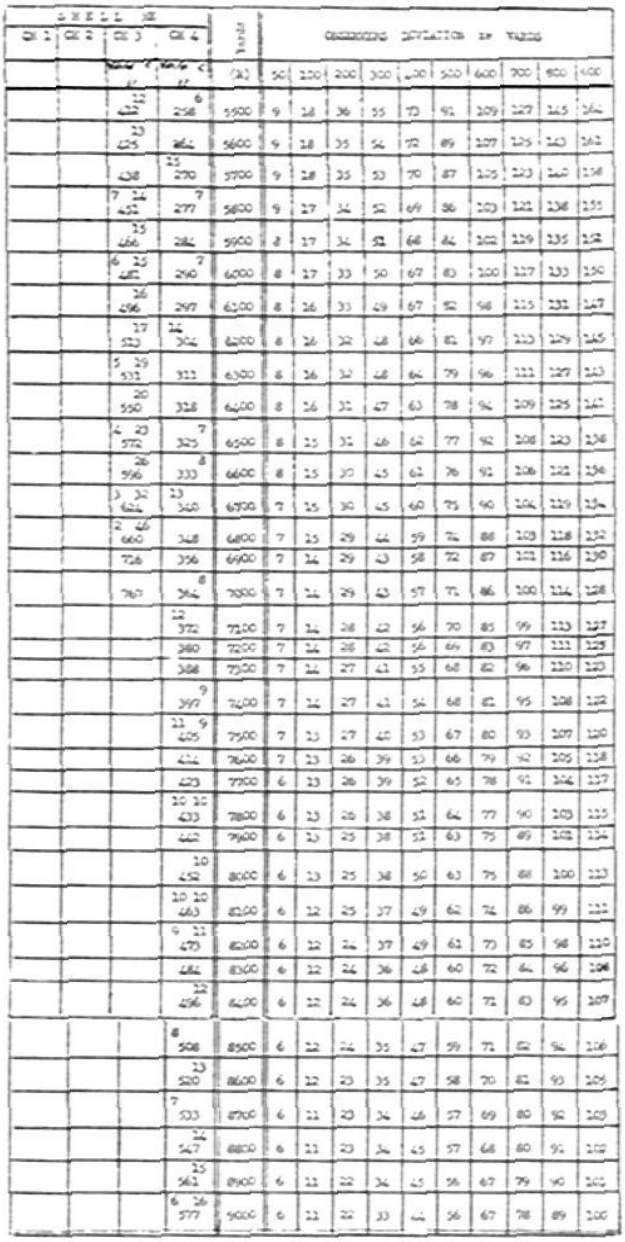
By Capt. Robert W. Hildebrand, FA

Something had to be done to speed up conduct of fire by our forward observers, since graphical firing tables are not yet available for our 75-mm. howitzers. The accompanying charts, prepared by Capt. Henry L. Lee, have worked well for us.

At the FDC, the battery computer concerned obtains his shift directly from the deviation column, on the line corresponding to the range last fired. Elevation is obtained by modifying that of the last round by its *c* x (range error reported).

All concerned have found this method fast and convenient.





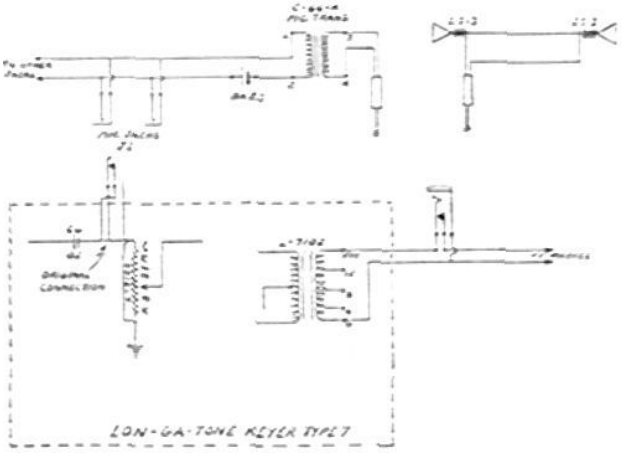
Not in the BOOK

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.*

VOICE PROCEDURE WITH LON-GA-TONE KEYER NO. 7

1. Connect a closed circuit jack into the grid circuit of Tube V5 as follows:

Open connection between capacitor C6 and volume control R8 and insert closed contacts of jack as shown in diagram. The sleeve of the jack is grounded. These are the only internal connections in the Keyer.



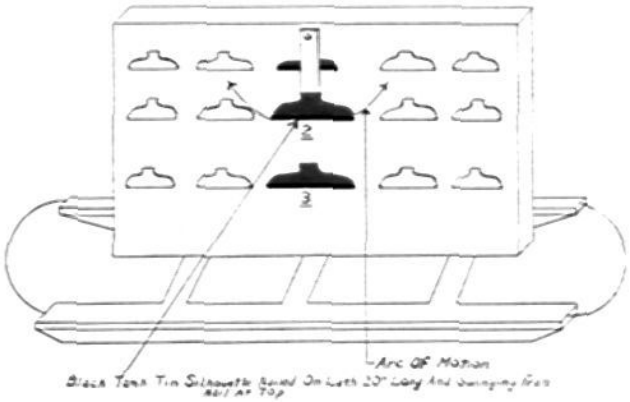
2. The plug to be used in conjunction with the preceding jack is connected to the secondary of microphone transformer C-66-A. This is the same transformer as is used in the SCR 610A radio. The primary is connected in series with a 15V cell, BA-23 to microphone jack J1. Other jacks may be added in parallel with J1 as desired.

3. The line from the Keyer to the phones should be opened as shown, and a closed circuit jack inserted. The plug used with this jack is connected to the voice coil of a speaker. If more than one speaker is used they should be connected in series. The output transformer should not be used, as it will decrease the volume and fidelity.

LT. COL. PAUL B. BELL, FA

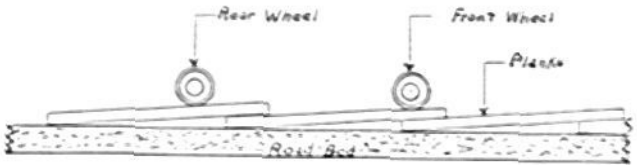
TRAINING TANK-TRACKING

An effective training aid in tank-tracking is obtained by mounting a 1000-inch paper tank silhouette target (of the type used on MG ranges) on a frame so constructed that it can be lifted out of its brackets on the sled mount when the paper needs replacing. It was designed principally for use in such limited areas as battery streets.



The tank silhouette is made by constructing from tin or any light metal a facsimile of the No. 2 black tank silhouette in the center of the paper target. Paint it black and nail it on a lath of such length that the facsimile silhouette will exactly cover the original silhouette on the target. The lath should be fastened at the top of the target so as to swing freely like a pendulum. As the sled is dragged across the terrain, the lath with its silhouette swings back and forth, and at a distance of 90 feet it gives an excellent picture of a tank bouncing along on rough terrain. Several facsimiles could be suspended in like manner, thus giving the picture of a column of tanks bouncing along.

LT. JOHN A. LANE, FA



FISH SCALES

Frequently a bit of soft ground must be planked before vehicles can cross it. This is especially true with some of our new heavy loads, such as the battery crane (for 8″ gun and old and new 240s) with its trailer; the latter carries the clamshell bucket, planks for this very purpose, etc.

In using planks, remember that an overlap is required. The effect is that of shingles on the roof, or scales on a fish.

But in using lengthwise planks, be sure your overlap is in the right direction! Each rearward plank must project *on top of the one in front* of it. Thus when front wheels move to the front of a plank, the plank's rear end is held down by pressure of the rear wheels on the preceding plank; it is practically impossible for the rear of any plank to pop up to break rear tires or damage the chassis.

LT. COL. F. A. OBARD

Diary of War Events

(As Reported in the American Press)

APRIL, 1943

1st 100 Flying Fortresses bomb shipping and airfields in Cagliari area of Sardinia.
Heavy fighting continues in Tunisia with Rommel in retreat.
Chinese drive Japs from Yunnan back into Burma.

2nd British First Army attacks near Mateur, the Eighth opens assault north of Gabes.
War Department reports army planes have destroyed 384 Jap planes this year; ratio is 7:1 in our favor.
Allies shoot down 10 Jap planes over Guadalcanal.

3rd R.A.F. raids France.
U.S. subs sink 4 Jap ships, including a destroyer.

4th British and Canadians bomb Essen (site of the Krupp plant), lose 21 bombers.
U.S. troops move forward in El Guettar sector.

5th 100 Flying Fortresses bomb Naples and damage shipping, drydocks, and 27 Axis planes.

6th Russians drive Germans from key position on the Donets.

7th British Eighth Army and U.S. Army Corps join forces 15 miles southeast of El Guettar. Heavy fighting continues.
Bolivia declares war upon the Axis.

8th Allied planes bomb Naples, Messina, and Palermo; shoot down 14 planes, lose only one.
Japs raid Guadalcanal with 95 planes. U.S. planes shoot down 37 and lose 7.

9th Germans evcacuate Mahares and hasten their retreat.

10th Largest force of Flying Fortresses ever used attacks Italian naval base at La Maddalena, Sardinia.
R.A.F. bombs Ruhr.
Russians throw Germans back at the Donets line.

11th British Eighth Army advances through La Hencha, 27 miles beyond Sfax on the road to Sousse.
Allied planes shoot down 85 planes in 2 days, mostly Junkers-52.

12th Allies capture Sousse and Kairouan, take 30,000 prisoners.
41 Axis planes shot down and 50 vehicles destroyed in one raid.
Russians continue to repel forward attempts of Germans.

13th Japan masses 200,000 troops north of Australia.

14th Allies destroy 79 Axis planes on airfields of Castelvetrano and Milo, lose only 3.
Japs lose 30 of 80 planes that attack Milne Bay (New Guinea).

16th R.A.F. bombers raid Skoda and Ludwigshafen, lose 37. Russian planes raid Danzig.

17th U.S. bombers make daylight raid on the Focke-Wulf aircraft plant in Bremen; lose 16.
Gen. Eisenhower reports that American losses in Tunisia total 5,372, including 908 killed and 859 missing.

18th Lt. Gen. Spaatz says United Nations have air superiority in Northwest Africa. Since March 20, 519 Axis planes have been shot down and approximately 1,000 destroyed on the ground at a cost of 175 of our own.

19th Allied fighters win greatest air battle off Cape Bon, Tunisia: shoot down 74 planes, damage 34, lose only 11.

20th Allies celebrate Hitler's birthday with mass bombing raids over Germany and advances in Tunisia.
The President reports that carrier *Hornet* was the Shangri-La from which 16 B-25 bombers raided Japan under Maj. Gen. Doolittle, a year ago.

21st Japs admit executing some of the 8 captured fliers who raided Japan with Doolittle.
British Eighth Army captures Enfidaville.

23rd Allies continue Tunisian advances.
Allied planes shoot down 20 Merseburg-323 transports plus 10 escorting fighters.
U.S. forces occupy island of Funafuti, 450 miles south of the Gilbert group.

24th Americans advance 4 to 5 miles in northern Tunisia.

25th Lieut. Gen. McNair wounded in action while inspecting Tunisian front.
United Nations' sub flotilla has sunk 85 Axis ships in Mediterranean since Nov. 8, 1942.

26th Bitter fighting brings Allies near Tunis.
Gen. Eisenhower's HQ reports 66,000 Axis killed, wounded, or captured; 250 tanks, 3,000 vehicles, and 425 guns destroyed or captured; and a total of 2,618 planes put out of action from Jan. 1 to Apr. 15.
British and Canadian airmen raid Duisberg, in Ruhr.

27th French and British close in on Pont du Fahs. Americans advance 14 miles toward Mateur.

28th Allies continue advances toward Tunis, now only 21 miles away.
British destroyers sink 5 ships of Nazi convoy off Brittany.
Canadian and U.S. fliers raid Kiska.

29th Americans advance while British fall back in bitter fighting in Tunisia.
Secretary Stimson reports United Nations shot down 1,004 enemy planes in Tunisian operations from Mar. 29 to Apr. 24, against 270 losses: a superiority of 4 to 1.

30th French Africa Corps patrols reach Lake Achtel (on coast road 17 miles west of Bizerte), then retire 3 miles to hill positions.
Red Army attacks Nazis at Kuban bridgehead.

For Heroism and Service

DISTINGUISHED SERVICE CROSS
(Posthumously)

CAPT. ELWOOD J. EUART, who lost his own life after helping to save a number of others on October 26, 1942, at the time of the sinking of the U. S. Army Transport *President Coolidge*. Learning of a group trapped in the hold, he went to their assistance. By lashing himself to the lower end of a rope he was able to hold it tight enough for men to climb to safety, even though the ship was listing badly. When he finally attempted to climb the rope himself, assisted by a few men at the top, it was hanging almost vertically. As he climbed, the ship careened and sank.

DISTINGUISHED SERVICE CROSS

COL. DAVID LARR, for extraordinary heroism in action on a low level reconnaissance mission over the eastern part of New Guinea on September 16, 1942. The plane was forced to make an emergency landing for repairs and finally took off just in time to keep from being captured by the Japanese. The next day, Colonel Larr acted as a gunner in an aerial attack upon Japanese columns. Address, Mrs. David Larr, 4910 North 11th Street, Arlington, Virginia.

LT. COL. MELVIN L. McCREARY, for extraordinary heroism in action near Buna, New Guinea, on December 24, 1942. While directing mortar fire from observation posts in the front lines, Lt. Col. McCreary entered and remained at these posts, which were under direct enemy fire, with complete disregard for his personal safety. When wounded by a fragment from an enemy mortar shell, Lt. Col. McCreary returned to his observation post after having the wound bandaged and remained there for about six hours until his evacuation was ordered. Home address, 914 Belmont Avenue, Youngstown. Ohio.

BRIG. GEN. ALBERT W. WALDRON, for extraordinary heroism in action near Buna Village, New Guinea, on December 5, 1942. During an attack on the enemy position near Buna Village, many leaders of small infantry units became casualties and the units became disorganized. Brig. Gen. Waldron, with complete disregard for his own safety, moved along the line of the assault platoons under heavy fire from enemy snipers, machine guns, grenades and mortars. By his personal example, calm bearing and utter fearlessness, he inspired the men to greater effort. Home address, 209 Hempstead Avenue, Rockville Center, New York.

DISTINGUISHED SERVICE MEDAL

COL. LOUIS R. DOUGHERTY, for exceptionally meritorious service to the Government in a duty of great responsibility at Fort Stotsenburg, Philippine Islands, from February 1, 1941, to December 7, 1941. As commander of the Provisional Field Artillery Brigade, Philippine Division, he planned the details incident to the considerable expansion of artillery units which took place as a result of an increase in the Philippine Scouts. The effectiveness of his organization was convincingly demonstrated by the outstanding performance of these units in battle.

COL. ALEXANDER S. QUINTARD, for exceptionally meritorious service to the Government in a duty of great responsibility in the Philippine Islands from December 8, 1941, to March 11, 1942. His ability and leadership were demonstrated by the efficient performance of the 301st Field Artillery when employed in combat on the Bataan Peninsula less than three weeks after its organization was initiated. Address, Mrs. Jean J. Quintard, Sewanee, Tennessee.

MAJ. GEN. WILLIAM F. SHARP, for exceptionally meritorious service to the Government in a duty of great responsibility in the Philippine Islands from September 1, 1941, to March 17, 1942. Assigned to command the Visayan-Mindanao Force, Major General Sharp supervised the mobilization and training of elements of the Philippine Army in the Visayan group and on Mindanao. Under his general supervision a comprehensive system of airfields capable of accommodating all types of aircraft was prepared. Address, Mrs. Kathryn Sharp, Maple Meadows, Monkton, Maryland.

Oak Leaf Cluster, Distinguished Service Medal

MAJ. GEN. EDWARD P. KING, JR., for exceptionally meritorious service to the Government in a duty of great responsibility in the Philippine Islands from December 1, 1941, to March 11, 1942. He coordinated the employment of all field artillery units in the defense of the Bataan Peninsula, and the allocation of available munitions. The effectiveness of his planning and supervision was demonstrated by the superior performance of the artillery units throughout the operations. Address, Mrs. Elizabeth M. King, 736 Piedmont Avenue, Atlanta, Georgia.

SILVER STAR

1ST LT. NORMAN H. DAVIS, for conducting the fire of his armored Field Artillery Battalion in a superior manner, causing destructive blows against enemy materiel and personnel to such an extent that it is believed that much of the withdrawal of the enemy forces was due to his ability to place fire on essential enemy installations. Home address, 1118 Birch Avenue, Lawton, Oklahoma.

2ND LT. ROBERT A. DIX, for gallantry in action near Buna Village, New Guinea, November 26, 1942. His home address, Milwaukee, Wisconsin.

BRIG. GEN. HUGH J. GAFFEY, for gallantry in action in North Africa. Address, Mrs. Eleanor S. Gaffey, wife, 1605 Watch Hill Road, Austin, Texas.

SGT. THOMAS R. HEIGHT, for gallantry in action under heavy and almost continuous enemy artillery fire. He assumed the responsibility of the battalion forward observer, who had left the immediate area in an effort to locate the source of artillery fire observed in the vicinity. Sgt. Height continued to adjust the fire of the battalion and brought the fire of the entire battalion upon an important enemy assembly area, dispersing personnel and vehicles, and causing an undetermined amount of damage to materiel, whereupon the enemy was forced to evacuate the position. Home address, 36 Marcellus Avenue, Mosquan, New Jersey.

1ST LT. CHARLES A. HUNT, for conducting the fire of his armored Field Artillery Battalion in a superior manner, causing destructive blows against enemy materiel and personnel to such an extent that it is believed that much of the withdrawal of the enemy forces was due to his ability to place fire on essential enemy installations. Home address, 718 W. Washington, Jackson, Michigan.

CAPT. ROBERT B. LIVESAY, for gallantry in action in North Africa. Address, Mrs. Robert B. Livesay, wife, c/o D. H. Oswald, Marianna, Florida.

T/5 CHARLES J. MORRIS, for gallantry in action on December 19, 1942, on Guadalcanal, Solomon Islands. He with a Lieutenant and an enlisted man went forward with the commander of an infantry battalion making an attack on Grassy Knoll. When the battalion commander was wounded, he and companions administered first aid to him in the face of a heavy concentration of enemy fire and remained with the commander until his death three hours later, at which time they withdrew to their own lines. They brought back the body under cover of fire from the patrol. They then went back for another soldier who was wounded. Home address, Teaneck, New Jersey.

PVT. PRESTON M. ROBERTS, for gallantry in action on December 19, 1942, on Guadalcanal, Solomon Islands. He with a Lieutenant and a Sergeant went forward with the commander of an infantry battalion making an attack on Grassy Knoll. When the battalion commander was wounded, he and companions ordered first aid to him in the face of a heavy concentration of enemy fire and remained with the commander until his death three hours later, at which time they withdrew to their own lines. They brought back the body under cover of fire from the patrol. They then went back for another soldier who was wounded. Home address, Bessemer City, North Carolina.

1ST LT. RALPH E. SLANE, for gallantry in action in North Africa. Address, Mrs. Esther Slane, wife, 1231 Fifth Avenue, Columbus, Ohio.

CAPT. CHARLES W. WALTER, for gallantry in action in North Africa. Address, Mr. G. C. Walter, father, 58 South-wood Road, Mount Brook, Birmingham, Alabama.

PURPLE HEART

CAPT. FRED H. ALLCORN, for heroism in the Fedala area, North Africa. Home address, Boonville, Missouri.

S/SGT. EDWARD H. CARLSON, for heroism in the Casablanca area, North Africa. Home address, Seattle, Washington.

CPL. LAWRENCE J. GABRIEL, for heroism in the Casablanca area, North Africa. Home address, Snohomish, Washington.

CPL. SYLVESTER C. IFFORD, for heroism in the Casablanca area, North Africa. Home address, Delhi, Minnesota.

CPL. HARRY R. LAROCHELLE, for heroism in the Safi area, North African campaign. Home address, Hartford, Connecticut.

2ND LT. EUGENE ST. MARIE, for heroism in the Fedala area, North Africa. Home address, Newport, Vermont.

MAJ. GEORGE A. WHITELY, for wounds received in action at Port Darwin, Northern Territory, Australia, on February 19, 1942. Address, Mrs. Eugene A. Whitely, wife, 1307 Sherman Avenue, Coeur d'Alene, Idaho.

SOLDIER'S MEDAL

CAPT. WARREN K. COVILL, for heroism at sea on October 26, 1942, at the time of the sinking of the U. S. Army Transport *President Coolidge*. When the ship started to settle he issued instructions to his battery and took station on "C" deck forward to help clear that area. As the ship listed more and more to port, and shipped water from that side, he and another officer with a rope assisted men up the ladder and through the starboard gangway. He was trying to pull up the last officer remaining below when swept into the water as the ship went under. Home address, Providence, Rhode Island.

PVT. JOHN F. HIGGINS, for heroism at sea on October 26, 1942, at the time of the sinking of the U. S. Army Transport President Coolidge. He and an officer with a rope assisted men up the ladder and through the starboard gangway. While trying to help pull up the last officer remaining below he was swept into the water as the ship went down. Emergency address, Mrs. Nora Higgins, mother, 594 Undercliff, Chicago, Illinois.

SGT. WILLIAM M. HOPE, for heroism during grass fire on Hunter Liggett Military Reservation, California, on July 2, 1942. With another Sergeant he drove a light motor truck through a gap in the flames of a severe grass and forest fire to evacuate a fellow soldier. Address, Mrs. Mildred T. Hope, mother, 811 Union Street, Shelbyville, Tennessee.

PVT. LEO C. LAUSTRA, for heroism at Jackson Heights, New York, on December 29, 1941. He used his overcoat to smother the blazing clothing of a civilian. Emergency address, Mr. John Laustra, father, 19-26 77th Street, Jackson Heights, New York.

SGT. CLARENCE D. LEACH, for heroism at Camp Adair, Oregon, on September 2, 1941. He saved valuable Government property from destruction by an accidental oil fire. Address, Mrs. Margaret Leach, mother, R.F.D. 3, Hamilton, Texs.

SGT. ELMER E. McCAULEY, for heroism during July, in the vicinity of the Solomon Islands. He volunteered to organize and operate an advanced teleradio observation post and in the performance of duty contracted a tropical disease and pneumonia necessitating his evacuation. Emergency address, Albert M. McCauley, 31 Harden Street, Graham, North Carolina.

2ND LT. WARD D. McDONALD, for heroism at sea on October 26, 1942, at the time of the sinking of the U. S. Transport *President Coolidge*. He and another officer with a rope assisted men up the ladder and through the starboard gangway. Home address, Fremont, Michigan.

CPL. EDGAR H. METCALFE, for heroism during July, 1942, in the vicinity of the Solomon Islands. After four of their party were evacuated for illness, from which two died, he continued to hold an advanced teleradio observation post close to the enemy lines. Emergency address, Charlotte, North Carolina.

W. O. ROBERT H. MOSHIMER, for heroism at sea on October 26, 1942, at the time of the sinking of the U. S. Army Transport *President Coolidge*. When the ship started to settle, Mr. Moshimer helped his own men to safety and then remained at the starboard gangway to assist others through the opening.

PVT. GRAHAM MURPHY, for heroism at Hunter Liggett Military Reservation, California, on July 2, 1942. Address, Nashville, Tennessee.

CAPT. CHARLES NELSON, JR., for heroism at Hunter Liggett Reservation, California, on July 2, 1942. Address, Nashville, Tennessee.

CAPT. SAMUEL M. PATTEN, for heroism during July and August, 1942, in the vicinity of the Solomon Islands. He organized and established advanced teleradio observation posts on islands near those occupied by the enemy, maintaining them by frequent trips through waters infested by enemy submarines. Home address, 14 Park Avenue, Derry, New Hampshire.

S/SGT. DAVID E. ROGERS, for heroism during grass fire on Hunter Liggett Military Reservation, California, on July 2, 1942. He with another Sergeant drove a light motor truck through a gap in the flames of a severe grass and forest fire to evacuate a fellow soldier. Address, Mr. J. Claude Rogers, father, R.F.D. 2, Prospect, Tennessee.

PVT. JAMES K. WILHELM, for heroism at Hunter Liggett Reservation, California, on July 2, 1942. Address, Clarksdale, Missouri.

CPL. BOYD W. WILLIAMS, for heroism at Hunter Liggett Reservation, California, on July 2, 1942. Address, R R 1, Winchester, Tennessee.

LEGION OF MERIT

COL. RAY W. BARKER, for exceptionally meritorious conduct in the performance of outstanding services. As Chief of the planning section of the European theater of operations, he carried extraordinary burdens of responsibility cheerfully, tirelessly and effectively. He has established admirable relationships with the various sections of the British planning staffs, and has exhibited constantly a keen insight of the many complexities of organizing joint operations.

CITATIONS IN GENERAL ORDERS

1ST LT. EDWARD L. BEATTIE, for gallantry in action. Lieutenant Beattie repeatedly reconnoitered positions for his battery, both by day and night, at times under enemy fire. His battery laid down destructive artillery fire throughout the operation in a superior manner. Emergency address, c/o Marvin E. Moss, Ontario, Oregon.

CAPT. GEORGE J. EARL, for gallantry in action. Captain Earl repeatedly reconnoitered positions for his battery, both by day and night, at times under enemy fire. His battery laid down destructive artillery fire throughout the operation in a superior manner. Home address, 1261 East 141st Street, Cleveland, Ohio.

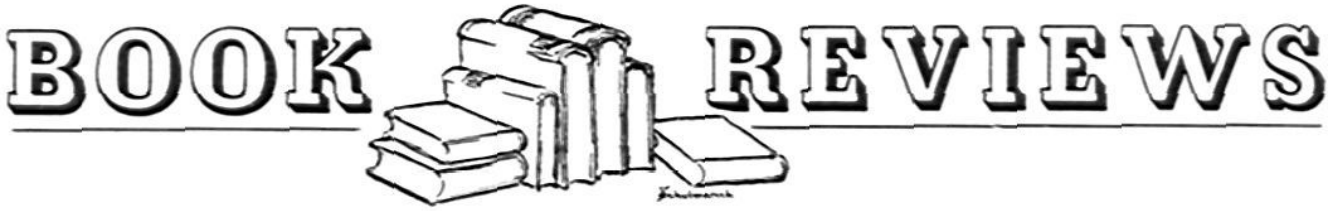
CAPT. RICHARD D. HILLIARD, for gallantry in action. Captain Hilliard repeatedly reconnoitered positions for his battery, both by day and night, at times under enemy fire. His battery laid down destructive artillery fire throughout the operation in a superior manner. Home address, 419 West Jefferson Street, Louisville, Kentucky.

Field Artillery Guide—Strictly in Style

In preparing the *Field Artillery Guide*, every effort was made to eliminate verbosity, repetitions, and unnecessary material of all kinds, yet retain all the essentials. Recently the following directive was published:

"Many of the existing training publications could be reduced one-half to two-thirds in volume and increased in value if written carefully, tersely, kept strictly to the subject, without duplications, illustrated more profusely, kept to basic principles, and with special cases and adaptations eliminated. Training literature will be prepared in the future with these principles in mind. Manuscripts will be reviewed for brevity by personnel other than preparing personnel and forwarded with a statement that maximum practicable brevity and conciseness have been obtained."

Field Artillery Guide fully meets these specifications. It is direct and to the point. Perhaps we may therefore be pardoned for our glow of pride in believing our *Guide* is at least partly responsible for this new trend in official literature.



LEADERS OF THE CONFEDERATE ARMIES†

By H. I. Brock

In this war of machines it's still the men behind them who win—and lose—battles. In this second volume* of the monumental work in which Dr. Freeman is following up his monumental biography of Robert E. Lee—there is yet another volume to come—we have a study of a group of men who, in a war which came very close to many Americans, helped to win and lose a large number of battles. It is the story in great detail of what happened and how, in the Army of Northern Virginia, between July, 1862 and the Sunday in May, 1863 when Stonewall Jackson died after the Battle of Chancellorsville.

It takes in all the bloody fighting on that front through the campaign which stopped Pope, the first invasion of the country north of the Potomac, and the desperate struggles with Burnside and Hooker on the line of the Rappahannock. There was never a clean-cut major victory for either side in all that time, but there was plenty of action in which to observe the conduct of Lee's lieutenants—and Dr. Freeman transports himself to the scene and observes them all, closely and critically.

In spite of the overwhelming detail, it is a magnificent job in which men whose names and deeds are now legendary come and go in their habit as they lived. If the mistakes of even the best of them seem more conspicuous than their successes, the reader, under Dr. Freeman's guidance, finds himself in their immediate company and a sharer in the situation which produced or allowed the mistakes. They are very human, these men. They have temperaments, jealousies, scanty information, all the disadvantages of an army hastily put together of civilian material and very incompletely equipped.

We see them off duty and on duty. We see them performing prodigies of valor on the field, we see them on long marches, we see them getting lost in a strange country and arriving with too little and too late—all the things that are happening in this war. But we see that it is the men that count—the leadership that tells, even when that leadership is mainly concerned with retrieving mistakes.

As Stephen Vincent Benet, writing of the first volume, said—he would have reviewed this one but for his untimely death—with all their faults "what men they were!" As Benet said also, Dr. Freeman does not make all Confederate general officers heroes *ipso facto*. Far from it. But when it comes to heroic actions, he paints a glowing picture. Jackson's bickerings with subordinates are set out in the record. But this volume, which traces his career as Lee's "right hand," assembles a portrait of that stiff Presbyterian soldier which will not easily be forgotten. It is a portrait of the man in all his human phases, with the climax that extraordinary death-bed scene—done with dramatic fervor. As the author says, Jackson's "features, his peculiarities, his subtle characteristics must be developed slowly, shade after shade, by verbal color printing." And so it has been done.

The other lieutenants have been done in the same fashion: Longstreet, A. P. Hill, J. E. B. Stuart, J. B. Hood, Jubal A. Early—a long list of them, including gallant John Pelham, "magnificent young leader of Stuart's Horse Artillery."

This is a military history. The military matter is unsparingly presented and formidably documented. But, as in the first volume, the method is not to do separate sketches of the persons of the drama. They are taken as they come and go on the stage—and as they come and go you learn to know them. Now it's on the battlefield; now it may be Jackson lapped in luxury at Moss Neck, the Corbin home near Guiney's Station; now Stuart riding aside from his raiding column in Maryland to pay a midnight visit (with his staff) to "the New York rebel," a young lady remembered from a ball at Urbana.

Since it is the men that count—no less in war than in peace—Dr. Freeman has given us the men as he finds them.

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†Republished by courtesy of the *New York Times*.

**Lee's Lieutenants: A Study in Command*. By Douglas Southall Freeman. Volume Two: Cedar Mountain to Chancellorsville. 760 pp. Charles Scribner's Sons. $5.00.

THE AIR OFFENSIVE AGAINST GERMANY. By Allen A. Michie. Henry Holt and Co., 1943. 152 pages; photographs. $2.00.

The title of this book is indicative of the contents. Mr. Michie presents a well-rounded picture of the part air power is to play in the assault on Germany. He explains what must be done, what has been done and the means by which more is yet to be accomplished.

It must be noted, however, that Mr. Michie, as he admits in his book, is presenting the British viewpoint. This argument is that through three years of actual combat the British have learned how to inflict the most effective damage upon the enemy at the least operational cost to themselves.

The author states that the American strategy—which is to complement the British night bombing by daylight attacks upon the Reich—is excellent in theory only. According to him, American production should shift from present emphasis on daylight planes to planes adaptable for night work in conjunction with the British.

This book is certain to add more vehemence to the argument already raging around the Army Air Force. Insofar as it is constructively critical this debate is of advantage to the United Nations, and books of the nature of *The Air Offensive Against Germany* may facilitate the making of sound decisions.

A. G.

LISTEN, HANS. By Dorothy Thompson. 292 pages. Houghton Mifflin Co. $2.50.

This book is "different," but its difference is not a labored quality injected merely for diversion. The main part of it is a spontaneous and earnest message, orginally in the form of a series of weekly short-wave broadcasts from the author to Hans, a German friend.

Not only is the reader permitted to listen in but he is given some preparation for what he is about to hear. The first part of the book is devoted to an examination of the German mind and of how it has been influenced by history, geography, and science; revelations of German culture; notes on the social structure of Germany; the strong desire for peace; and the need for principles. This part of the book is a compact, thoughtful introduction to the German common man, to Hans, achieved through interpretation of the social, economic, and political factors that have combined to make him what he is. Fundamentally he is a man of ideals, integrity, and social vision. Multiplied by millions he is the hope of Germany's full and open participation, eventually, in the "commonality of mankind" which the author sees emerging from conditions of today.

In the course of her introductory remarks the author formulates the basic issue of this war as a question of "whether the world shall be governed by one or two nations, exploiting it in their own interests, or mutually governed by all for the welfare of all."

Then follow the broadcasts, trenchant messages strategically "invading" the German mind by clear analyses of political developments. The Fuehrer's cowardly attempts to put the war guilt first upon the democracies and then upon the German people is held up to scorn. His blundering miscalculations turning the course of the war toward acquisitions "not for Germany . . . but for the Japanese" are recounted in instance after instance.

In the broadcast of May 1, 1942, comes a quotation from the speech in which Hitler coolly announced abrogation of the body of "duly acquired rights" and of legal protection of the people: ". . . from now on I will interpose in the legal procedure and demand from the judges to acknowledge as law whatever

I recommend as such." It is brought sharply to Hans' attention that "Hitler, the foreigner . . . apparently is so unfamiliar with German tradition that he unceremoniously destroys the foundation of German life, and he is not even conscious of it."

Hans is reminded that the war guilt is imputed to Nazi leadership rather than to the German people; that he as an intelligent patriot has a duty to align himself on the side of the "commonality" committed to a new birth of freedom. "And," concludes the author, "I promise you that I will fight on, for a new and better world system."

F. E. J.

PORTRAITS OF OUR PRESIDENTS: THE PACH COLLECTION. By Alfred Pach. 68 pages. Hastings House, 1943. $1.50.

The Pach Collection of portraits of the Presidents of the United States is famed for the excellence of the likenesses. Many were selected by the Presidents as their preferred portraits, and the reason is evident. Our earlier executives are of course represented by paintings, but Lincoln marks the beginning of photographic presentations.

For the first time this collection is presented in book form, with thumb-nail biographical sketches on the facing pages. The author takes pardonable pride in the craftsmanship of his firm, which produced fourteen of the portraits presented. The result is a fine gift volume, for children as well as adults.

WE CAN WIN THIS WAR. By Col. W. F. Kernan. Little, Brown & Co. 176 pages. $1.50.

Opposing forces generally reach equilibrium only after extremist, pendulum-like swings. This is especially true when one of them has gained undue preponderance. A glance at historical struggles between legislative and executive branches of our government discloses this fact.

Col. Kernan's initial thesis is that formalized administration, divorced from realities and unresponsive to changing conditions, is the incubus of our army. He argues well from both history and current events that victory will come only if we refuse to wage war as the Axis would like. His language is direct, strong, at times almost violent—a symptom of the swinging pendulum. It is well to have this "other" extremist view so well stated, both as an antidote to certain too-publicized views on aerial warfare and to point toward the place of proper balance between conflicting views on how to get the job done.

This reviewer agrees thoroughly with the castigation Col. Kernan gives to some rationalizers of "global war." At the same time, however, our North African invasion is not merely the futile nibbling he suggests: daring strategy must be backed up by firm bases, but his implication is that Britain is all the base we really need to tilt the Axis from its balanced axis, or that Mediterranean forces could perhaps have been concentrated otherwise (presumably via Cairo).

Col. Kernan's forthright expression of his beliefs is refreshing. *We Can Win This War* should be read also because of its magnificent chapter on "War and Democracy"; much of it has been said elsewhere (as what hasn't?), but seldom have basic truths been stated so well.

BEHIND THE JAPANESE MASK. By Jesse F. Steiner. The Macmillan Co., 1943. 156 pages; index. $2.00.

'Most everyone who has spent much time in Japan has wanted to give the public his analysis of the whys and wherefores of our pre-Pearl Harbor misconceptions. A good many

of these people have done so, regardless of the relative freshness of their personal knowledge of the subject. Dr. Steiner, for example, taught in Japan for 7 years and later revisited the country on a sociological trip—but those years were 1905-1912, and the visit was back in '35. This is not to say that spot news is too important when one is examining the background of a people, but it is still true that time can dull memories in some cases, at least.

Nonetheless, *Behind the Japanese Mask* is a quiet, dispassionate review of the history, manners, and *mores* of the Japanese. Dr. Steiner's summary of the Japanese character is one of the best we have seen. It is undoubtedly all quite true—the rest of the book surely is, for others have reviewed the same history, manners, and *mores* so recently that this volume does seem awfully familiar.

A LAYMAN'S GUIDE TO NAVAL STRATEGY. By Bernard Brodie. 291 pages; index; illustrations. Princeton University Press. $2.50.

Bernard Brodie and his *Layman's Guide to Naval Strategy* will startle you with his concrete comparisons concerning the relative powers of Aircraft Carriers, Bombers, Destroyers, Cruisers, and Battleships. He tells you how fast a 2,000-pound bomb is falling when it strikes its target after being dropped from 20,000 feet. Then, by comparison, he shows the speed of a 2,000-pound shell from a gun of a battleship fired at 10 miles. Too, he offers a bit on the relative accuracy of planes and guns—again you are amazed. It gives you another slant on Naval Warfare.

Brodie is an experienced writer. His book is logically organized, smoothly written.

For the layman, his book gives a sensible, clear description of a navy, how it operates and fights, the materiel composing it, and the men behind the guns.

A. V. R.

THE WORLD OF GENERAL HAUSHOFER, By Andreas Dorpalen. Farrar and Rinchart. 329 pages; index. $3.50.

This, one of the latest of the flood of books on geopolitics, is chiefly of value because it is the first to assign Japan an influential place in the practice of geopolitics; and because it carries extensive examples of the writings of the chief geopoliticians.

We are accustomed to think of geopolitics as a German monopoly, founded on the writings of the British pioneer, Halford J. Mackinder, who started the ball rolling with his short pamphlet *The Geographical Pivot of History,* issued in 1904. Mr. Dorpalen, however, places as much emphasis on the influence of Japan on German geopolitical beginnings as he does on Mackinder's writings.

Haushofer was sent to Japan in 1908 by the Bavarian General Staff to study the Japanese army. He found that Japan had doubled its empire in the forty years from 1870 to 1910 without opposition from the rest of the world, while Germany in the same time had been constantly thwarted by various rival powers. Haushofer decided to find out how Japan had succeeded where Germany had failed. The "how" did not make a pretty story (the United States, Great Britain and China are just learning it), but it suited Haushofer's tastes. He returned to Germany to formulate his theories, but was too late to put them into use for World War I. At the end of the war Haushofer was "more concerned with the reasons for Germany's defeat than the defeat itself" and he put his geopolitical theories to work to prevent another German defeat.

How Haushofer, with Japan's example and his own elaboration

of it, formulated his theories and put them to work for the Nazis, is the subject of Mr. Dorpalen's book. The story of General Haushofer's world is competently and clearly told. However, except for disproving many of the methods and conclusions of the Geopolitical Institute, it adds little to the already published facts about Haushofer and his disciples. If geopolitics is new to you, this book is an excellent one to start with.

For those who know something about geopolitics, the most interesting parts of the book are the appendices to each chapter; these contain extracts from the works of Haushofer and his disciples documenting the conclusions drawn by Mr. Dorpalen. The samples, mercifully, are short, for geopolitical writings are generally couched in such mysterious language (and so fuzzily written) that the average reader is stupefied rather than enlightened when he tries to read them. More than anything, the extracts will prove that geopolitics is a science better studied from commentaries such as this book than from the originals.

R. G. M.

WARTIME REFRESHER IN FUNDAMENTAL MATHEMATICS. By Eddy, Brolly, Pulliam, Upton, and Thomas. Prentice-Hall, Inc. 248 pages; glossary. $1.40.

These authors organized, wrote, and taught a course on this subject at the U. S. Naval Training School at Chicago. They have drawn on that experience to prepare a thoroughly practical self-help refresher book.

Subject matter, logically progressive, has been divided into units so that an hour a day for 24 days will carry you from arithmetic fundamentals through specialized algebraic factoring. Each day's problems are preceded by a glossary and textual explanation, along with suggestions as to the proper approach. Answers are worked out step-by-step so the student can check both his work and his method.

Frankly a guide rather than a complete text, this book well fulfills its function.

NORTH AFRICA. By Alan H. Brodrick. Oxford University Press, 1943. 98 pages; illustrated; maps. $1.25.

Out of his intimate personal knowledge of North Africa, Mr. Brodrick has put together a highly interesting little book that will answer many of your questions of this area. Emphasis is on historical and geographical background, social and economic conditions, and strategical significance. This is a large order for a small book, but the job is well done within space limitations.

DRESS REHEARSAL. By Quentin Reynolds. Random House, 1943. 278 pages; illustrated. $2.00.

WE LANDED AT DAWN. By A. B. Austin. Harcourt, Brace & Co., 1943. 217 pages; end paper map. $2.00.

These two books have the same general theme, the raid at Dieppe. Both were written by war correspondents who were favored by circumstance with close range views of the tense military drama of the occasion. The authors are sensitive to the significance of the history unfolding before their eyes and each in his own individual way conveys to his readers the spirit of high adventure and the superb courage with which the daring undertaking was planned and executed.

Quentin Reynolds makes some pardonable digressions from the main thread of history to dwell a bit on the personalities that contributed largely to the remarkable events at Dieppe. His tribute to the quiet earnestness and calm assurance of Chief of Combined Operations, Vice-Admiral Lord Louis Mountbatten, lends a quality of coherence to the details of the

raid. Here was fearless leadership setting a standard of performance and appealing on a high level to the dauntless courage of the fighters in the different branches of the service. The risks were taken for granted and even accepted rather jauntily in the tense pre-raid period of preparation.

The first objective of the raid was stated as "the testing, by an offensive on a larger scale than previously, of the defenses of what is known to be a heavily defended section of the coast." Mr. Reynolds fittingly calls the raid a dress rehearsal, making this the title of his thrilling account of the event.

Mr. Austin conveys somewhat the same idea in his statement, "Dieppe was only a beginning, a pioneer raid, a 'reconnaissance in force.'"

With objective realism Mr. Austin takes stock of the allied losses at Dieppe. "Nearly half the total force were casualties." Well over half of the valiant Canadians were killed, wounded, or missing.

Appalling as the casualties were, Dieppe advanced the allied cause in a number of ways. The Germans suffered dangerous losses. In the words of Mr. Austin, "The man who died at Dieppe . . . was doing as great a thing as if he had blown up an enemy battery or captured a general . . . he was making the fighting easier and the victory surer for the next force to land on the shores of Hitler's Europe."

Another advance which Mr. Austin sees in Dieppe is the feeling of closer unity between the soldier and the RAF. The turn of events in the "pioneer raid" demonstrated how interdependent are the Army and the RAF.

F. E. J.

IT'S 'ARD TO GO WRONG IN THE CACTUS. By Kay Grant. William Morrow & Co., 1943. 64 pages. $1.00.

Hilarious and ribald, cock-eyed and gay are these swinging, lilting verses from "down under" in Australia. They're about diggers and doughboys; Helen of Troy, alcohol, and love; air-raid shelters and suburbs. Homely, everyday things. But put together in a style that combines Ogden Nash and Dorothy Parker along with an extra-special flavor all its own. Piquant sketches by Jean Cullen and Anne Drew are something more than mere illustrations, too.

This little book is a thorough mind-taker-offer-from-troubles, and happily comes just within the 8-oz. "free" limit for first class parcelettes overseas. Frankly, I'm sending a dozen copies to friends—that's how much I enjoyed *It's 'Ard to Go Wrong in the Cactus!*

SHORTAGE OF VICTORY: CAUSE AND CURE. By Gabriel Javsicas. D. Appleton-Century Co., 1943. 362 pages; index. $3.00.

An excellent book, despite its perhaps too-ambitious title. Mr. Javsicas has the firm and well founded belief that by adopting a totalitarian form of government, a nation *ipso facto* commits an act of aggression against its neighbors. Certainly history contains abundant confirmation that totalitarian states always increase their armaments and reduce their peoples' standard of living.

From many angles and approaches, Mr. Javsicas examines recent history. He presents few new facts, but his observations are sharp and his conclusions shrewd. His discussion of psychological warfare is particularly sound; it is most timely now, when so many misconceptions exist—one might say when so much sheer tripe is seriously discussed in its name. The discussion *What of the Future?* is also firmly grounded, without

flights of fancy or wishful, highly theoretical, and impractical thinking.

The author has a good background for preparing his book. Born in (Russian) Lithuania, he was educated in Germany during and after the last war. Social sciences he studied in London; on a French vacation he met at the Sorbonne an American girl whom he married in 1928. For two years he pursued post-graduate studies at Columbia University, then returned to France to live. Regular visits to his parents in Lithuania took him through Germany for first-hand experience to supplement his reading, studies, and conversations.

End result is a fine analysis of the broader aspects of the present war, with logical and stimulating conclusions concerning the factors which produce a "shortage of victory" for both Axis and United Nations.

NATIONAL SOCIALISM. Department of State Publication No. 1864. Government Printing Office, 1943. 504 pages; index. $1.00.

This treatise was prepared by competent officials of the Department of State from studies of German literature, philosophy, and official records; of writings and statements of Nazi leaders; and of confidential reports. In most cases the source of material is identified—in itself it reflects the authoritative basis of the book.

The three parts deal with the Nazi party, German citizenship laws, and Nazi work outside Germany. Appendices, however, form the largest part of the book and contain much of its "meat." German documents are reproduced photographically and their English translations given; the same is true of organization charts of the Nazi state and party. The glossary of German terms is quite useful in following these through.

ANOTHER SECRET DIARY OF WILLIAM BYRD WESTOVER, 1739-1741; WITH LETTERS AND LITERARY EXERCISES, 1696-1741. Edited by Maude H. Woodfin; translated and collated by Marion Tinling. The Dietz Press, Inc. 475 pages; illustrated; indexes. $5.00.

Some two years ago the Dietz Press performed a notable service to historians by publishing the 1709-1712 portion of William Byrd's journal. A tremendous amount of work was entailed, as the diary was originally jotted down in a variety of shorthand. It made available, however, an unexcelled portrait of the late-youthful or early middle-aged years of an American colonial of high position and education, whose time was divided between Virginia and Old England.

Now we can obtain a more rounded view of colonial life, from this portion of the diary which covers more mature years in a period when colonial leisureliness was at its height, without even rumblings to foreshadow the events of the Revolution. Byrd's life was tranquil. In fact, many entries in his journal are monotonously similar. One interested in "The Peninsula" or colonial America will, however, find keen delight in this well prepared volume.

The book's second part, covering letters and literary exercises in the period 1696-1726, broadens the scene to England. They are keen, piercing, frequently witty, and show Byrd's skill in using the style of the period.

In view of the family's importance in the American scene through many generations, the volumes of this diary are of unusual interest. It is hoped that all years will eventually be published.

AS YOU WERE. Edited by Alexander Woollcott. The Viking Press, 1943. 655 pages. $2.50.

One of the last things done by the late Mr. Woollcott was the selection of this anthology of American fiction, fact, and verse. Described as a "portable library" for members of the armed forces and the merchant marine, it is a fitting valedictory from a sometime staff member of the *Stars and Stripes* of 25 years ago.

In every way it thoroughly fills the bill. Small and compact, it is literally of pocket size despite its large number of pages. From his experience with both soldiers and anthologies, Mr. Woollcott assembled a splendid content, with authors ranging from Poe and Bret Harte to Ogden Nash, Hemingway, and Guiterman. There is something for every taste. In short, a swell thing to have in your musette bag.

THE MAN BEHIND THE FLIGHT. By Assen Jordanoff. 308 pages; illustrated. Harper & Bros. $3.50.

Jordanoff has an uncanny ability to simplify and make understandable the most complex and difficult subjects. The result here is a thoroughly readable and enjoyable book, useful for general background or for direct study by prospective ground crewmen or even interested youngsters. A wealth of material is presented in an essay style; 300 drawings and over 30 photographs help a lot, too—especially since many drawings are among the most graphic yet to appear.

Mechanical drawing is introduced. Elementary electricity is well covered, as are introductory hydraulics. In the chapter on "Mechanics for Mechanics" Jordanoff really cuts loose with sketches that make you laugh while you learn—at least I did. Physics is more than just mentioned, and finally the development of flight is given an interesting historic review. Photos cover the history of aviation—from the Wright brothers' plane to the ships now in the news.

THE LIFE OF JOHNNY REB: The Common Soldier of the Confederacy. By Bell Irvin Wiley. The Bobbs-Merrill Co., 1943. 417 pages; illustrated; index. $3.75.

In the last 80 years much has been written about the leaders of the Confederacy. Common soldiers have been well ignored, however, except for mawkish or otherwise distorted accounts. To many "professional Southerners" all wearers of the gray were refined gentlemen, of a breed without normal human foibles, vices, or even feelings.

Now, however, we have a top-notch study of that composite soldier, sympathetically but accurately written by the head of the History Department of the University of Mississippi. His research among original letters and other source material was tremendous, but it doesn't weight down his account. Indeed, *The Life of Johnny Reb* is on a par with Dr. Freeman's works on Lee and his lieutenants, and is a "must" to round out one's understanding of the period. Amusements, vices, courage and cowardice, disease, uniforms, weapons, winter quarters—these things and more are covered to give an over-all picture of the southern soldier.

BETWEEN THE THUNDER AND THE SUN. By Vincent Sheean. Random House, 1943. 422 pages; name index. $3.00.

If inconsistency is a human failing, then Mr. Sheean is very human, indeed. He is so full of sympathy for the so-called underdog that at times it appears nothing has been contributed to mankind by the educated, the provident, the inventive- or merchant-minded—in short, by the "haves." Yet he cannot

bring himself to share the lot of the "have-nots," thoroughly enjoys the hospitality of wealthy and/or titled friends and takes the keenest delight in constantly referring to the great and near-great by their first or even nicknames. His personality seems so split, and is self-described so violently at times, that a reader wonders if Mr. Sheean is Janus or merely Donald-Duck-in-a-rage.

Strangely enough, however, these oddments add up to a glistening facet of recent years that is quite readable. It runs from the down-hill period of '38-'39, through the crushing of France and the Battle of Britain, to a swing through the Far East late in '41—so late, in fact, that Mr. Sheean reached home just six days before Pear! Harbor. The final chapter gives his views on what we are fighting for, and the American effort as he saw it up to a quite short time ago.

The author is now a lieutenant colonel in the Army Air Forces.

PRISONERS OF WAR. By William E. S. Flory. American Council on Public Affairs. 161 pages; bibliography; index. Cloth edition: $3.25; paper edition: $2.75.

This is a most timely study, and well up to the high standards of the publications of the American Council on Public Affairs. It develops the concepts of international law, examining the status of prisoners from ancient times down to the present. Prisoners' categories, status and maintenance, activities, and compensation are well explored. So too are police power limitations and release by consent and by other means. It is a thoroughly documented and well annotated book, as might be expected in view of the intensive research devoted to the subject.

TRAVELS IN AFGHANISTAN, 1937-1938. By Ernest F. Fox. The Macmillan Co., 1943. 280 pages; photographs; endpaper map; geographical directory. $4.00.

Before this war is over we may well be interested in India's frontiers and the buffer states between her and other Asiatic countries. Mr. Fox is well qualified to describe the land to the northwest: in searching for oil and minerals he crossed and recrossed Afghanistan by car, flew over it by plane, and in the interior mountains traveled around 1,700 miles a-foot and on horseback.

He combines the geologist's eye for terrain with an appreciation of beauty and grandeur. In easy style he describes the country and its people, their nature and their ups and downs. Result: a critical, sympathetic, and human report on a people of mixed cultures.

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(If not listed, unsigned illustrations are from authors, by the *Journal* staff, or from special sources. References are to pages.)

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NEW BOOKS

With a view to providing our members with a convenient guide relative to the latest books available on military and related subjects, we are publishing a partial list of books reviewed in recent issues of The Field Artillery Journal. Not only these books but any book on any subject may be ordered from our Book Department. See our discount offer on the first page of Book Reviews.

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