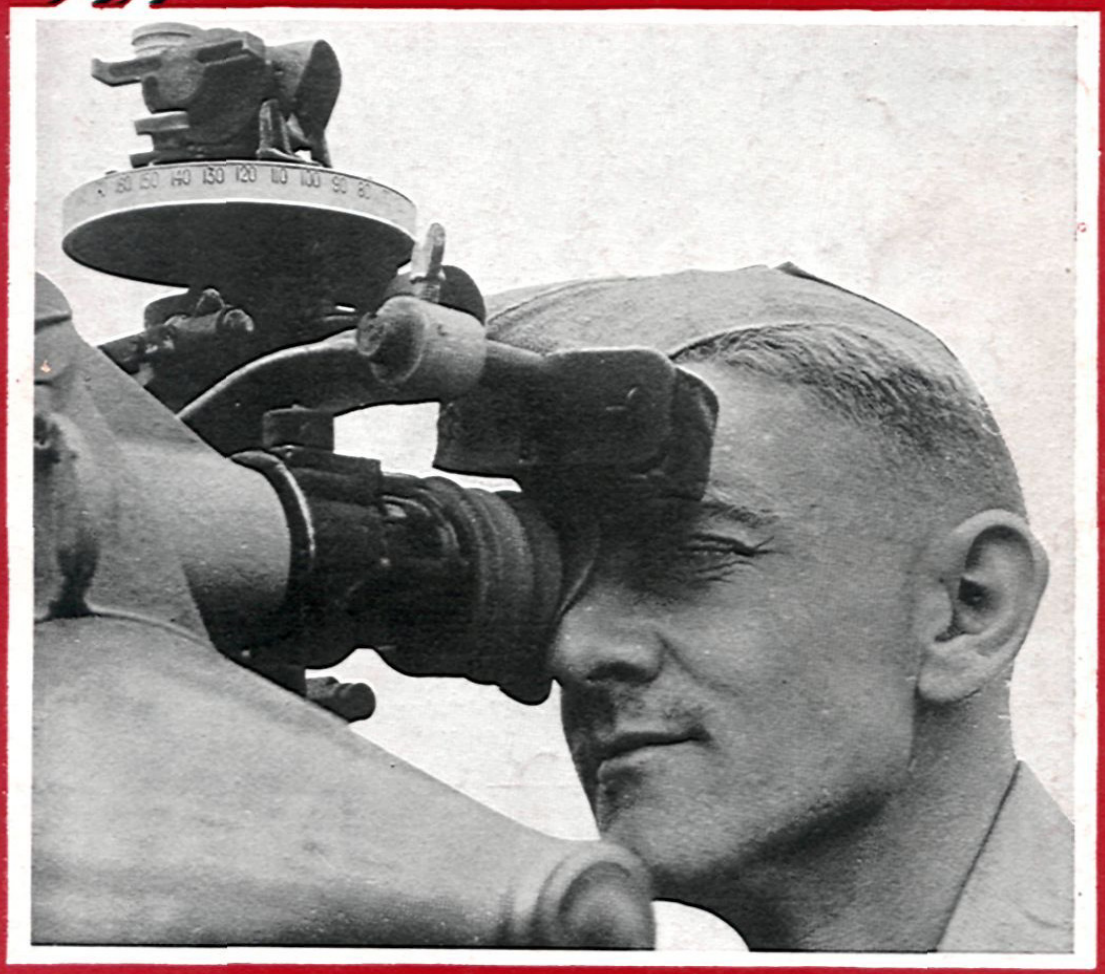
The FIELD ARTILLERY Journal



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25-Pounder

FEBRUARY, 1943

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OUR COVER shows the antitank telescope of the British 25-pounder in use. The headrest is essential, to prevent injury to head or 'scope; its position is adjustable via bracket and wingnut. Behind that nut can be seen a knurled knob, turned in setting off deflections; it also contains a quick-release device so that the sight itself can be turned or spun rapidly when large shifts are called for.

MANY UNITS have developed devices of one kind or another to simplify various technical, tactical, or administrative jobs. Frequently their construction requires so much work as to make them of questionable value. On the other hand, following through with their original design often instills thoroughly the principles of the operations it is hoped to simplify. Some non-standard instruments approach the "gadget" stage, in which event they become a distinct danger to those who try to use them automatically or by rote, without completely understanding the basic principles.

The JOURNAL welcomes the submission of such material, however, as an expression of the ingenious thoughts and efforts of those concerned. It is from such experimentation that invaluable developments occur. We shall continue to publish them from time to time, but always trying to strike some proper balance between ingenuity and practicality.

RECORD for speed in attaining 100% membership is held to date by the 382d Field Artillery Battalion, Camp Claiborne. Congratulations!

AN ARTILLERY SONG series is fittingly inaugurated in this issue, with the words and music of THE Field Artillery Song by the late, beloved Brig. Gen. Edmund L. Gruber. More will follow monthly.

The Field Artillery Journal

"Today's Field Artillery Journal is tomorrow's training regulations."

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Comparison of Artillery Terms as Used in British and American Armies

Prepared by Lt. Col. A. C. Cole. R.A., with the cooperation of Lt. Cols. Ralph M. Osborne and C. Bryan Conrad, FA

BRITISH	AMERICAN
Adjutant	Adjutant or Operations Officer
Aiming posts	Aiming stakes
Angle of sight	Site
Apex angle	Big or little T
Bearing	Azimuth
Bearing picket	Orienting line
Buffer system	Recoil system
Clinometer	Gunner's quadrant
Concentrate x on No. 1	On No. 1 close x mils
Control chamber and plunger	Counterrecoil buffer
Correct	Adjust
Crest clearance	Mask
Cut off gear	Variable recoil mechanism
Degrees 360º	6400 mils
1º	17.78 mils
Dial sight	Panoramic telescope or panoramic sight
Director	Aiming circle
Distribute x from No. 1	On No. 1 open x mils
Error for line	Deviation
Field clinometer	Gunner's quadrant
Fire by order	At my command
Gear	Mechanism (such as elevating mechanism)
Grid bearing	Y azimuth
Gun position officer (G.P.O.)	Battery executive
Gun fire	Volley fire
Individual angles	Reciprocal laying
Intention	Mission
Limber	Caisson
Line	Base deflection
Lines of fire (of a troop)	Sheaf
Line O.T.	Observing line
Map code	X-Y template
Minute—3.375′	1 mil
Morse	C.W.
0 (nought)	Zero
Open sights or dial sight direct or telescope	Direct laying
Orders	Commands
Paraffin	Kerosene, coal oil
Petrol	Gasoline
Perch	Drawbar
Piasaba	Bore brush or "sponge"
Pin point target	Precision fire
Pivot gun	Base piece
Predictor	Director (A.A.)
Ranging	Adjusting
Record zero lines	Record base deflection
Recuperator	Counterrecoil system
Regimental Command Post	Fire direction center
Role	Assignment
R/T	Voice, radio telephone
Run-out	Counterrecoil
Saddle	Top carriage
Salvo	Volley fire
Section	Platoon
Sight clinometer	Angle of site level
Signals	Communications
Spot (observe)	Sense
Stop	Cease fire
Subtension of troop at target	Width of sheaf
Switch	Shift
Telescope stereoscope	B.C. Telescope
Telescopic sight	Antitank telescopic sight on 2-pr., 6-pr., and 25-pr.
Test sights	Boresight
Theodolite	Instrument azimuth
Towing hook	Pintle
Towing eye	Lunette
Tractor	Prime mover
Trailer, artillery	Caisson
Troop	Battery
Troop fire 2 secs.	Salvo fire
Troop stand easy	Mission accomplished
Unobserved	Lost
Witness point	Check point
Zero line	Base line
Zero point or reference point	Base point
Zero . . . more (or less)	Base deflection . . .
M.P.I.	C.I. (Center of Impact)
Troop, in Field Artillery commanded by a Captain, in A.A. by a Lieutenant	A 4-gun battery (Artillery)
Squadron, commanded by a Major, with Captain 2nd in command	Cavalry Troop or Tank Company
Battery	Battalion, a command of 2 or more batteries of 4 guns each

25-POUNDER

GENERAL DUTIES OF THE GUN SQUAD

(Presented from the latest British manuals, for the benefit of our many units now or soon to be armed with this New weapon.)

The detachment is composed of six men. The service of the gun is divided among them as follows:

1	In command.
2	The breech.
3	The sights.
4	Loading.
5 and 6	The ammunition.

DUTIES OF 1

1. He COMMANDS and is responsible for the entire service of his gun. On the order "Gun control" he becomes responsible for the fire control of his gun.

2. He is responsible that the

a. BUFFER is properly filled, and that the STOP, RUNNING BACK is removed before firing;

b. RECUPERATOR is correctly filled and charged with liquid and air. He sees that the tail rod is flush with the end of the slot nearest the train in the projection of the cradle cap, or is not in advance of this position by more than one inch.

c. GLANDS, NUTS SECURING PISTON RODS, and the CUT-OFF GEAR are correct;

d. EQUIPMENT is clean and correctly LUBRICATED;

e. PROTRUSION of the STRIKER is correct;

f. SIGHTS are tested and adjusted;

g. M.V. correctors of the range gear and fuze indicators are correctly set for the MUZZLE VELOCITY of his gun;

h. GUN is NEVER LOADED when LIMBERED UP.

3. He selects the actual GUN PLATFORM unless it has already been chosen by the G.P.O.[1] and marked with a flag.

The BRAKE will not normally be kept on in action after the spade is embedded. Should the carriage, however, move to the front when the gun is running out, he may order 2 to put on the brake to prevent the spade from being pulled out of the ground.

4. He watches the action of the SPADE on recoil and adjusts its supports if necessary.

5. He ACKNOWLEDGES ALL ORDERS by raising his hand.

If visual acknowledgment of orders is not possible, he acknowledges by REPORTING *"No . . . —through"* in succession from the gun nearest the G.P.O.

He assists in PASSING ORDERS when necessary.

He gives the WORDS OF COMMAND detailed for him and repeats ORDERS affecting his detachment if they have not been heard by the men concerned. He gives his orders clearly, but not louder than is necessary to enable his detachment to hear.

6. He selects GUN AIMING POINTS No. 1 and No. 2 on coming into action.

7. He CHECKS the ZERO LINE RECORDS on the recording plate after they have been entered by 3.

8. He is responsible that at all time his gun is laid on the CORRECT LINE.[2]

9. He will select an object, preferably in front of his gun, and will use it to measure angles right or left of the ZERO LINE.[3]

If Aiming Posts[4] cannot be planted "front" a small flag may be put out in front of the gun for this purpose.

When a fresh angle is ordered, either from the zero line or from the line to the present target, he gauges the line by means of his hand extended at arm's length, so that, when the gun is laid, he can be certain it is pointing in the DIRECTION ORDERED.

All ranks should know what ANGLES are subtended by various parts of their hands when extended at arm's length. Thus: THUMB AND FINGERS EXTENDED (about 19º), FIST CLENCHED (about 8º), FIRST AND SECOND KNUCKLES (about 3º).

10. If a change of target is ordered when the carriage is not on its platform, he should ascertain if the new line is within the scope of the traversing gear before clearing the spade.

11. In traversing the gun by means of the trail, the width of the spade corresponds to approximately 18 degrees of traverse.

[1]Gun Position Officer, counterpart of our Executive.—Ed.

[2]Deflection.

[3]Base line.

[4]Aiming stakes.

12. When pieces have small pneumatic-tired wheels, manhandling is difficult unless an intelligent use is made of handspikes and dragropes. The spade can be cleared by:

a. Attaching dragropes to the wheels and using a wheel purchase. (*"Wheel purchase—run up."*)

b. Using one handspike as a lever under the trail and a second handspike as a lever and scotch under the wheel on the opposite side of the carriage. (*"Handspikes—trail right or left."*)

c. Using the handspikes as in *b* with the addition of a dragrope hooked to the trail. (*"Slew—trail right or left."*)

Nos. 2 and 4 man the handspikes in *b* and *c*.

d. Using a dragrope hooked to the trail. (*"With dragrope trail right or left."*)

13. He occasionally examines the settings of the RANGE SCALE, DIAL SIGHT, SIGHT CLINOMETER, and FUZE BAR INDICATOR, and checks the setting of the sight clinometer, drift scale plates, and the telescope (when used) at the beginning of each series.

On a change of charge being ordered he checks the setting of the range scale reader.

14. He supervises the preparation and supply of AMMUNITION. As time fuzes deteriorate rapidly if unprotected from damp, only such as are required for immediate use will be uncovered.

15. He supervises LOADING.

He is responsible that

a. Instructions regarding ammunition and fuzes are complied with by his detachment;

b. Setting of time fuzes is correct;

c. Correct shell and fuze is loaded;

d. Correct CHARGE is loaded.

16. He rams the shell home except when engaging tanks and similar targets and during program shoots[5] when 6 rams.

17. He gives the order to FIRE. *The gun will on no account be fired without his order, except when engaging tanks and similar targets with telescope sights*. Before giving this order, he must see that the gun is in all respects ready and that all numbers[6] are safe from the recoil. It is important that the gun should be fully run out. If the run-out is incorrect, he will ascertain the cause and take the necessary action to remedy it.

When the gun is fired from its platform he is responsible that the connecting links of the platform stays are locked.

18. In these circumstances:

a. at salvo;

b. at fire by order;

c. when his gun is a ranging gun or when a shoot is to open with fire for effect, but the order to fire has not been received; he reports his gun *"Ready"* by extending an arm above his head as soon as his gun is ready to fire.

19. He is responsible that the INTERVAL between rounds is properly kept, so far as his gun is concerned; if no interval has been ordered, it will be taken as five seconds.

20. *a*. He applies

(1) the POSITION CORRECTION (if required); this is ordered in the form *"Position Correction, No. . . . plus* (or *minus*) . . . (yards)" and is applied to all elevations ordered, but is cancelled by a fresh target being ordered;

(2) corrections during FIRE FOR EFFECT, which are ordered in the form: *"No. . . . add* (or *drop*) . . . (yards)." These are cancelled when a fresh elevation is ordered.

b. He orders the necessary DEFLECTION for CONCENTRATION or DISTRIBUTION[7] to his own gun in the form: *"More* (or *less*) . . . *degs*. . . . *mins*."

c. When laying by field clinometer, he applies the correction required for the INDEX ERROR (if any) of his clinometer to the angle ordered, sets the clinometer, and hands it to 2, who checks and calls out the setting.

d. When time fuzes are issued for which there is no fuze indicator, 1 will be provided with a fuze correction board on which are shown corrections to fuze lengths required for gain or loss of the M.V. of the gun.

21. He is responsible that the M.V. corrector readers are set to the appropriate M.V. for each charge. To set the M.V. corrector he uses the key, adjusting.

22. He is responsible that the TRAJECTORY of his piece, when laid, is CLEAR of any CREST or OBSTACLE, such as a tree, which may be situated within close proximity to the gun. He will satisfy himself as to this, as regards elevation, by looking along the bottom of the bore or along the guide rib, and as regards line, by looking along the piece.

23. When in action he sees that, as far as is consistent with the working of the gun, protection is afforded to the detachment by filling in the gap between shield and ground with earth or sandbags.

24. If after the gun is warmed up the run-out is either sluggish or violent during the *last few inches*, he adjusts the VALVE, ADJUSTING RUN-OUT. It should be noted that this valve is set as the result of proof, and that under normal conditions this setting should suffice for a considerable time. Frequent recourse to adjustment of the valve is unnecessary and is to be avoided. The valve is provided with an indicator marked 0-7 to enable the setting to be checked and readily adjusted, but in general it will be found preferable to leave the resetting to skilled ordnance personnel.

He will occasionally elevate the gun and operate the SNIFTING VALVE of the buffer cylinder to remove any accumulation of air in the cylinder, having first released plug A.

25. At intervals, he compares the length of recoil indicated by the RECOIL INDICATOR with that indicated on the SCALE on the FRONT CAP. If the length of the recoil is incorrect, he ascertains the cause and takes the necessary action to remedy it.

When firing at high angles of elevation, he sees that there is nothing to foul the RECOILING PARTS on recoil. If the ground is likely to be struck, he will order a hole to be dug to prevent this.

26. If the CUT OFF GEAR is damaged, he will disconnect and lock segment on buffer rod at 20 inches recoil.

27. DURING FIRING, he takes every opportunity of attending to his equipment. Should the gun become hot, the bore should be cooled with water as soon as *"Rest"* or *"Stand easy"* is ordered. This is best done by placing an empty cartridge case in the breech and pouring cold water in the bore from the muzzle.

28. He makes such changes amongst his DETACHMENT, particularly the layer and the loading numbers, as may become necessary, owing to the fatigue consequent on long periods of firing.

DUTIES OF 2

1. *a*. Together with 3, he UNLIMBERS and LIMBERS UP the gun.

b. He attends to the SHIELD, FIELD CLINOMETER,[8] BREECH MECHANISM, breech and muzzle COVERS, BRAKE, PLATFORM RIGHT LEVER CLAMP, and assists 3 with the CRADLE CLAMPING GEAR.

c. He mans the RIGHT GUN WHEEL dragrope or handspike in action.

d. He LUBRICATES the gun and carriage.

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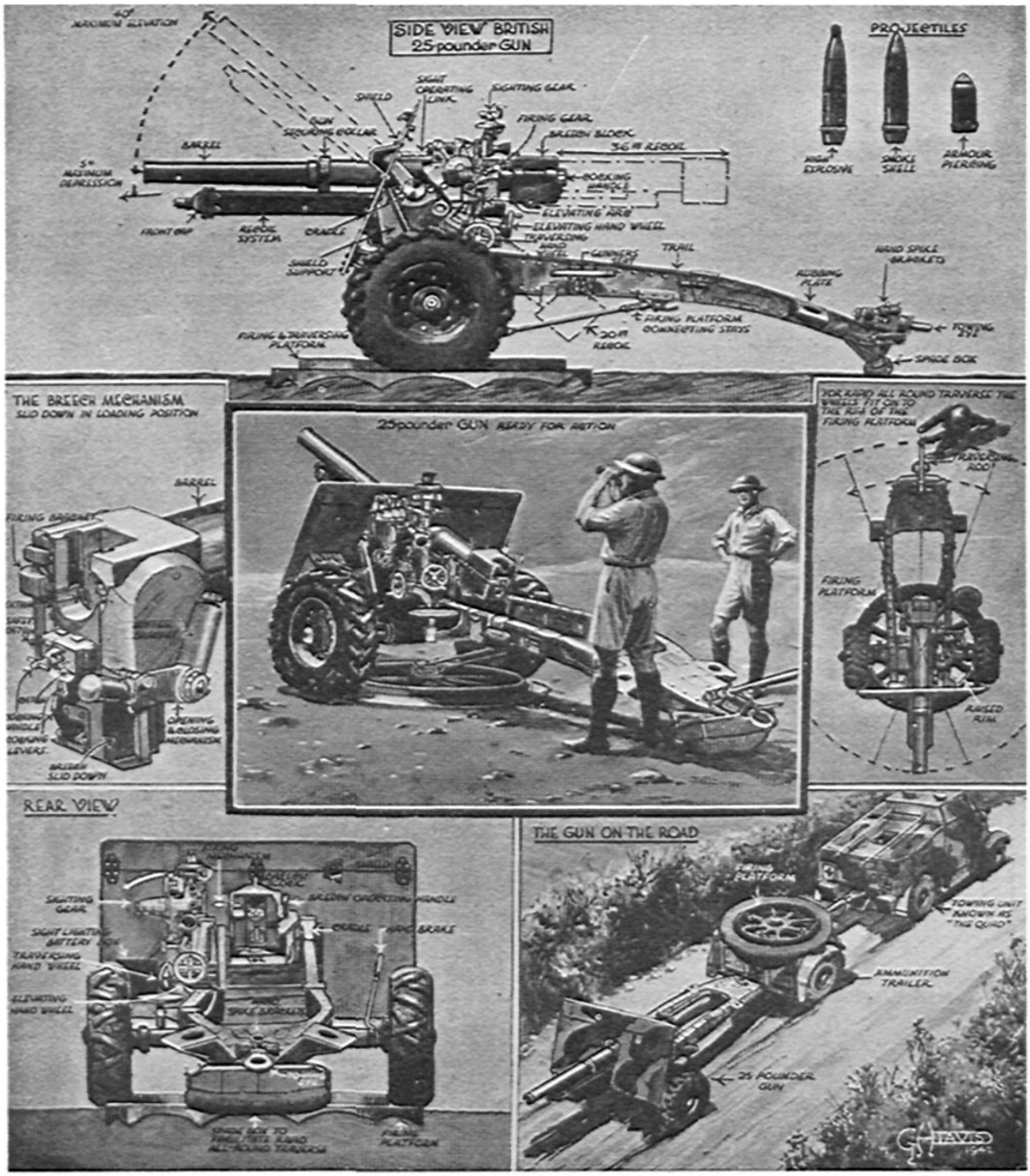
[5]Schedule fires.

[6]Cannoneers.

[7]Deflection difference.

[8]Gunner's quadrant.—Ed.



This versatile weapon is used throughout the Empire, and by our own troops in several theaters. Its wheel-like firing platform permits 6400-mil traverse, and its three projectiles (and several different charges) give it a range of 17,000 yards as a gun, or of 10,000 yards with high-angle fire. When the platform is used, the spade is "boxed" to facilitate traverse and to prevent its being embedded; in this case platform stays must be used so that all force of recoil will be taken up by the recoil mechanism. Caliber is 3.45" (87.6-mm.) and the tapered barrel is 92.51" long. The breech is of the vertical sliding block type, with provision to keep the projectile from slipping backward when loaded at a high angle of elevation.

e. If the cartridges have been prepared and placed on the right of the gun, e.g., when firing from a gun pit, he will load the cartridge. On such occasions 6 works on the right of the gun and hands the cartridges to him.

2. When the trail is being moved in action and the aiming point is to the left or rear, he assists 1 to traverse the gun in the direction ordered by laying on to the aiming point over the FINDER of the DIAL SIGHT and directing the movement of the trail or trails by signalling with the palm of the hand. (See para. 10, Duties of 3.)

3. When LAYING by FIELD CLINOMETER, he checks and calls out the setting, sees that the clinometer plane and the base of the clinometer are free from grit or dirt, and that the clinometer is placed along the positioning marks of the plane for each lay.

4. TO OPEN THE BREECH. He grasps the lever breech mechanism with his right hand, presses down the catch retaining with his thumb, and pushes the lever to the rear and downward, thus opening the breech and ejecting the cartridge case. The breech is held in the open position by means of the extractor levers, the lugs of which engage recesses in the breech block.

5. TO CLOSE THE BREECH. The first movement of closing the breech is caused by the rim of the cartridge when loaded, forcing the extractors forward and allowing the buffer spring to raise the block partially. While this movement is taking place he holds the lever breech mechanism lightly with his right hand. He then completes the closing of the breech by pulling the lever upward and forward. If there is difficulty in closing the breech, he sees that the primer is screwed home and is flush with the face of the cartridge case. He then endeavors to press the round home by grasping the lever with both hands and exerting the whole weight of his body upon it. Other numbers in the detachment should assist if necessary.

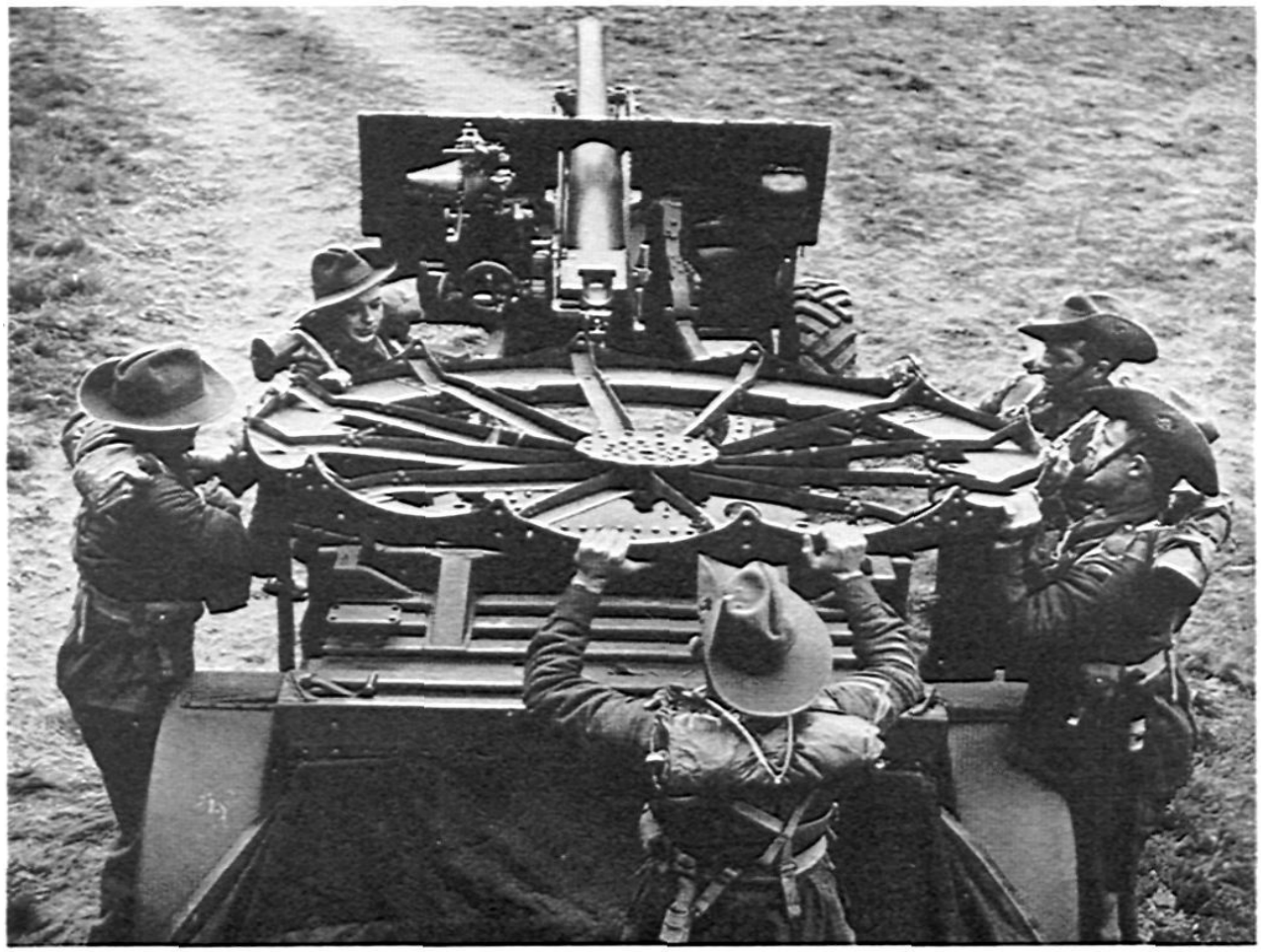
On no account will the rammer or other implement be used to drive the cartridge home with the primer in position.

6. When it is desired to close the breech without loading a cartridge, he will first take the weight of the buffer spring by pressing down the lever breech mechanism, then push forward the extractors with the thumb and forefinger of the left hand, at the same time pulling the lever breech mechanism upward with the right hand, thus freeing the block. The closing of the breech is then completed.

He mans the handspike on his side of the carriage, when handspikes are being used, to clear the spade or to run-up.

During firing, as opportunities offer, he cleans and oils the BREECH AND BREECH MECHANISM.

7. 2 and 3 release the CRADLE CLAMPING GEAR as follows:



These Aussies are unloading their firing platform from the ammunition trailer. Optical portion of dial sight is carried in leather case, visible low-down on right side of shield.

2 gives the RELEASE LEVER of the LOCKING PLUNGER a sharp pull to the left and swings the stay toward the housing bracket on the inside of the left side trail bracket.

3 secures the STAY in the HOUSING BRACKET.

At *"Cease fire"* 2 ensures that the LOCKING PLUNGER is fully engaged in the bracket on the inside of the right trail.

He is responsible for the NO. 4 COCKING LANYARD. In the event of a missfire he will re-cock the firing mechanism, by attaching the cocking lanyard to the cocking handle of the firing mechanism and pulling it to the rear.

He assists 4 to set up the PARALLELOSCOPE by moving round to the front of the shield in line with the dial sight and directing the movement of the paralleloscope until 3 can see the reflection of the cowl in the mirror, when looking through the dial sight.

He secures the RIGHT LOCKING LEVER of the PLATFORM LINK LOCKING PAWL.

8. Unless otherwise ordered, he takes off the BRAKE after the first round has been fired or when the spade is embedded.

DUTIES OF 3

1. *a*. With 2, he UNLIMBERS and LIMBERS the gun.

b. He attends to the SHIELD, SIGHT PORT COVER, SIGHTS, SIGHT COVER, APPARATUS ILLUMINATING SIGHTS, RANGE, ELEVATING, TRAVERSING, and FIRING GEARS, PLATFORM LEFT LEVER CLAMP, and assists 2 with the CRADLE CLAMPING GEAR. He mans the LEFT HANDSPIKE when coming into or out of action.

c. He LAYS for line and elevation.

d. He FIRES the gun.

e. He is responsible for SETTING the SIGHTS as ordered and the entire operation of LAYING the gun.

Whenever a charge, or change of charge, is ordered, he sets the READER of the Range Scale Plate and reports *"Charge . . . set"* loud enough for 1 to hear.

f. He reports the reading of the RECOIL INDICATOR to 1 when ordered.

g. He SWITCHES on the APPARATUS ILLUMINATING SIGHTS when it becomes necessary for the sights to be illuminated and switches it off as soon as the gun is laid.

2. *a*. At INDIRECT LAYING he lays for LINE:

(1) when using an aiming point, on the left edge unless otherwise ordered;

(2) when using the paralleloscope, on the reflection of the center of the laying mark on the lamp-holder attached to the dial sight;

(3) when using aiming posts, on the posts so long as they appear in line through the sight. If, owing to movement of the carriage, they do not appear in line, he lays on those corresponding numbers on the crossheads which are in line.

b. At DIRECT LAYING:

He lays on the ground line of his portion of the target.

When using the telescope he lays as follows:

(1) For elevation.

The horizontal graticule is laid on the center of the target visible.

(2) For line.

The graticule ordered will be laid on the center of this visible part of the target.

c. At DIRECT for LINE (when no dial sight is available).

He lays for LINE by means of the open sight or telescope and for ELEVATION by the sight clinometer and range gear.

3. He ENTERS on the recording plate the ZERO LINE RECORDS.

4. *Sequence of laying*.

a. At INDIRECT LAYING with SIGHT CLINOMETER, he sets the dial sight, the sight clinometer, and range scale at the angles ordered, reporting *"Elevation—set"* loud enough for 1 to hear; he then:

(1) elevates until the bubble of the sight clinometer runs to the front and depresses by at least two complete turns of the handwheel until it is nearly in the center of its run,

(2) lays roughly for line,

(3) cross-levels the sight,

(4) lays accurately for line,

(5) depresses until the bubble of the sight clinometer is in the center of its run, places his hand on the hand lever of the firing gear, and reports *"Ready."*

b. At INDIRECT LAYING with FIELD CLINOMETER he sets the dial sight and the sight clinometer at the angles ordered; he then:

(1) elevates until the bubble of the field clinometer runs to the front and depresses by at least two complete turns of the hand wheel until it is nearly in the center of its run,

(2) brings the bubble of the sight clinometer to the center of its run by means of the range gear handwheel,

(3) lays roughly for line,

(4) cross-levels the sight,

(5) lays accurately for line,

(6) depresses until the bubble of the field clinometer is in the center of its run, places his hand on the firing lever, and reports *"Ready."*

c. At DIRECT LAYING.

(1) With DIAL SIGHT. He (*a*) sets the cowl and all scales of the dial sight to zero; (*b*) sets the dial sight and range scale as ordered, reporting "(*Elevation*) . . . *set*," loud enough for 1 to hear; (*c*) lays roughly on the target; (*d*) cross-levels the sight; (*e*) lays accurately for line and elevation on his portion of the target and reports *"Ready."*

If ordered to measure the angle of sight, he checks his lay to ground line of target, brings the bubble of the sight clinometer to the center of its run by means of the micrometer heads, and reports to 1 the angle measured. He then relays on his proper portion of the target.

(2) With SIGHTING TELESCOPE.

He sets the telescope as ordered and lays, using the graticule ordered, reporting "(*Elevation*) . . . *set*" and repeating the deflection ordered loud enough for 1 to hear.

When engaging tanks and similar targets:

The initial range is set on the outer scale of the telescope by 1.

The sight is not cross-leveled after the first round.

The deflections are ordered in the form "Rt. (or left) 1 or 1½, etc."

1, 2, and 3 refer to the larger graticule, while ½, 1½ and 2½ refer to the smaller. (Each large graticule equals 30 mins.)

5. When CLICKERS are fitted to the dial sight the angular movement between clicks equals one degree.

6. *a*. After setting the dial sight by means of the QUICK RELEASE, he moves the micrometer head through one complete turn to ensure that the teeth have re-engaged correctly.

b. When SETTING a *"more"* deflection on the DIAL SIGHT, he turns the right micrometer head away from him with his right hand; when setting a *"less"* deflection, he turns the left micrometer head toward himself with his left hand.

c. When READING on the DIAL SIGHT: (1) the MAIN SCALE, he reads the minutes off the LEFT micrometer scale; (2) the SLIPPING SCALE, he reads the minutes off the RIGHT micrometer scale.

d. When SETTING the SIGHT CLINOMETER, he turns the top of the micrometer head to the *left last*, to take up backlash.

e. When SETTING the RANGE SCALE the last motion should be such as to depress the sight, that is giving extra elevation on the cone.

f. When SETTING the COWL of the dial sight at zero, he makes the index marks of the milled head and the finder coincide.

g. When LAYING for ELEVATION, he depresses last with at least two complete turns of the handwheel. If the bubble of the clinometer overruns the center, he gives the elevating handwheel at least two complete turns of elevation and then depresses until the lay is completed.

h. When LAYING for LINE the final motion of the traversing handwheel should be counter-clockwise.

i. When LAYING with TELESCOPE: (1) for line: Right (or left) 1, 2, and 3 refer to the larger graticule, while Right (or left) ½, 1½, 2½ refer to the smaller (each large graticule equals 30 minutes). (2) for elevation. A clicker is provided which indicates each 100 yard setting. To depress the gun: the elevating handwheel should be turned anti-clockwise.

j. The normal position of his HANDS is as follows: Left hand on the traversing handwheel. Right hand on the elevating handwheel.

k. When the PARALLELOSCOPE is being used, he fixes the DIAL SIGHT LAMP-HOLDER in position on the cowl of the dial sight.

7. Before the first round has been fired, the pointer of the TRAVERSING GEAR must be within 30 minutes of the "center" or the "zero" mark, when the lay is completed, except when GF[9] targets are being engaged or the spade is already embedded.

8. At an ALTERATION IN LINE, if the angle is given

a. As *"More* (or *less*) . . . *degs*. . . . *mins*.," he turns the micrometer head of the dial sight through the angle ordered;

b. As "ZERO . . . *degs*. . . . *mins*.," he sets the dial sight at the angle ordered.

9. He FIRES the gun. As soon as the gun is laid, he places his right hand on the hand lever of the firing gear and reports

[9]"Gun Fire," a *rapid* fire for effect against a target of such extent and/or importance that speed is more important than the utmost precision.—Ed.

Trailer carries 32 rounds of separate-loading ammunition, with two complete rounds per tray. On end of the metal cartridges can be seen handle of plug which is pulled out for removal of undesired powder increments, then replaced. Spare parts are carried in the central space; below pintle for towing the piece is a spare tray, also filled with spare parts. AP projectiles are carried separately, and are in addition to the regular complement of complete rounds as the same cartridges can be used for them; usually they are strapped on top of the trailer.

"Ready." At the order *"Fire,"* he pulls the lever smartly, releases it at once, and replaces his hand on the handwheel.

The gun will on no account be fired without the order from 1, except when engaging tanks and similar targets with telescope sight.

10. The following are the SIGNALS to be used by 1, 2 or 3 when directing the movement of the TRAIL (or TRAILS):

ORDER	SIGNAL
TRAIL (OR TRAILS) RIGHT (OR LEFT).	Palm of hand in the required direction.
STOP TRAVERSING	Fist clenched.
TAKE POST	Smart tap on the buttock with the palm of the hand.

11. He LOCKS the CRADLE by traversing the gun to approximately 3 degrees right traverse and elevating until the "U" piece of the bracket on the underside of the cradle bears on the clamp. The gun is then traversed to zero, when the catch retaining pawl automatically locks the cradle in the travelling position.

DUTIES OF 4

1. *a*. He assists to UNLIMBER and LIMBER UP.

b. He assists, when possible, in the preparation of ammunition.

c. He attends to the GUN TRAILER, HANDSPIKES, AIMING POSTS, PARALLELOSCOPE, DRAGROPES, APPARATUS ILLUMINATING AIMING POINT, and SPADE BOX.

d. He (1) plants aiming posts; (2) sets up apparatus illuminating aiming point; (3) sets up the paralleloscope; (4) loads; (5) mans the left gun wheel in action; (6) mans a handspike on his side of the carriage when handspikes are being used.

2. When the gun is in action, unless he is employed on some specific task, he will at all times be in possession of a shell (H.E. 117, unless otherwise ordered). If necessary he prepares this shell for loading and holds it by supporting the base on his left knee and placing his left hand at the shoulder of the shell. Should his other duties prevent his obtaining and preparing this shell himself he receives it from 5 immediately on completing such duties.

3. When planting AIMING POSTS, he holds the post in his hand with the arm bent. He stands facing the aiming post, taking the signals from 3 by looking over his left shoulder. He moves as directed by 3 until signalled to "Plant," when he allows the post to slip through his fingers until the point touches the ground. He then presses the point firmly into the ground by placing his foot on the step, stands clear of the post, and watches for futher signals from 3.

In hard ground, it may be necessary to hammer in the post.

When planting the near post, he places the other one on the ground.

When the APPARATUS ILLUMINATING AIMING POINT is used in conjunction with aiming posts it will be fixed to the near post.

4. When ordered, he sets up the PARALLELOSCOPE in such a position as not to interfere with the service of the gun. The best position is about five yards to the rear right of the center of the carriage.

He levels the stand and rotates the mirror in the horizontal plane so that it is approximately at right angles to a line from

Piece loaded, ready to fire, with crew ready for the next round. Note spade box in place, to prevent spade from digging in; this is a necessary precaution if maximum use is to be made of the rapid traverse afforded by the platform.

the center of the dial sight. He clamps the paralleloscope to the stand. He tilts the mirror as required by 3 so that the reflection of the laying mark on the lamp-holder attached to the cowl of the dial sight is visible in the eyepiece.

If the paralleloscope is provided with sighting mirrors, 4 adjusts the paralleloscope by rotating and tilting it until the reflection of the pupil of his eye in the sighting mirror is brought on to the bottom of the laying mark on the lamp-holder attached to the cowl of the dial sight. The sighting mirror to be selected will depend upon the position of the paralleloscope and the amount the carriage is likely to recoil. If the carriage is on a steady platform, the center mirror will normally be used.

These troops of ours, bound for New Caledonia, are becoming familiar with the 25-pounder. Notice how the flat portion of the trail furnishes an alternative place in which to carry the firing platform; this is what causes the arched appearance of the trail.

5. *a. To load*. 4 receives the shell from 5 on his right-hand side, fuze leading. He places the shell in the breech and retains it there with his left hand placed under the shell behind the driving band. 1 (or 6) rams the shell from 4's hand; the sound of the driving band engaging should be clearly heard. After the shell has been rammed home, 4 turns (from the hips) and faces the rear; he receives the cartridge from 5 in his left hand, holding it at the point of balance with the base toward his body. He receives the cardboard cup in his right hand. 4 shows the cartridge to 1, who says *"Correct;"* 4 places the cardboard cup in position in the cartridge case. He centers the cartridge in the breech with his left hand, supporting it at the base with his clenched right hand; and pushes the cartridge home with his clenched right hand and reports *"In."*

5 and 6 when preparing cartridges will always remove the cardboard cup or cups so that 1 can check the charge. Except when engaging tanks and similar targets or firing specially prepared cartridges, one cup must be replaced by 4 after 1 has checked the charge.

b. If a change of charge is ordered, he returns the cartridge to 5 and obtains a fresh one.

c. If a change of fuze length is ordered before the gun is loaded, he re-sets the fuze or returns the round to 5 and obtains another (see Duties of 5 and 6, para. 6).

d. He complies with the instructions regarding AMMUNITION and FUZES.

DUTIES OF 5 AND 6

1. *a*. They assist in unlimbering and limbering up.

b. They prepare and supply AMMUNITION. When ordered to do so, they prepare cartridges in advance.

c. 5 mans a handspike on his side of the carriage when coming into or going out of action.

d. (1) 6 works the FUZE INDICATOR.

(2) When engaging tanks and similar targets or during a program shoot, 6 rams the shell.

(3) When the cartridges are being loaded from the right side of the gun, 6 places the base of the cartridge in 2's left hand.

2. *Trailer brakes*. — Trailers No. 27 are fitted with overrun type of brakes; No. 6 will ensure that the backing stop is lowered during manhandling and "released" when travelling; it is released for travelling when in the "UP" position.

The locking device is operated by a hand lever on the perch.

The parking brake, operated by a hand lever on the left side of the trailer, is applied by No. 6 in action. When travelling the hand lever of the parking brake should be in the fully "off" position. This is important, as the overrun action of the brake system does not take off the brake when travelling, after it has been applied through the parking brake gear.

3. They prepare charges as ordered (see Duties of No. 4 "to load") and see that all ammunition is:

a. CLEAN, especially the driving bands, and that the PRIMERS are correctly screwed home;

b. SORTED into groups by nature, weight, and fuze;

c. PROTECTED from extremes of temperature and from damp;

d. ISSUED from the group ordered.

They put on one side any round which is not correct in all respects, reporting the particulars to 1.

4. They comply with the instructions regarding AMMUNITION and FUZES.

When preparing time fuzes they remove the fuze covers.

When preparing H.E. 117 they remove the steel safety caps.

When preparing H.E. 119 they remove the steel safety caps unless the G.P.O. has ordered "H.E. 119 CAP ON."

Objective lens of the dial (*our "panoramic"*) *sight tilts so that aiming point will remain in the field of vision. Spirals on the cone of dial sight mark the range setting; different spirals* (*running at different angles*) *take care of the several charges; indicator can be seen on the layer's side of the cone. Beneath cone can be seen are and bubble of the site clinometer, for setting off angle-of-site on this independent line of sighting weapon in a manner similar to that employed on the French 75. As telescopic* (*antitank*) *sight is not in use, its bracket* (*above cone*) *is empty and block-shaped headrest in front of layer's forehead is pushed forward, out of his way*.

Time fuzes are examined to see that they are set at safety. The setting for safety on 220 and 221 fuzes is:

———————
|
———————
+
———————

Fuzes 220 or 221 set at "O" will burst the shell immediately in front of the muzzle.

The setting for safety on 210 fuzes is at zero, i.e., "0." This fuze will not function at a setting of less than approximately 1¼ seconds; thus there is no danger of its bursting immediately in front of the muzzle. The lower edge is numbered in SECONDS from 0-9, each second being further divided into TENTHS. Above the zero mark is cut a vertical slot in which slides a brass index peg which indicates the TENS of seconds up to 60. The vertical graduations are filled in with red paint. No fuze covers are provided with this fuze.

H.E., fuzed 117 or 119, will be examined as uncapped to see that the brass striker cover is in position and intact.

5. 6 follows up all orders for corrector and elevation on the FUZE INDICATOR, if in use, and calls out the fuze length loud enough for 1 to hear. (Fuze lengths are called out as follows: 1.9 as *"One point nine,"* 10.2 as *"Ten point two,"* and 12.0 as *"Fuze twelve."*) He always uses the reader for following up the elevation, and calls out the highest fuze length visible to the left edge of the reader.

6. 4, 5, and 6 set time fuzes by means of the FUZE KEYS to the length called by 6, 4 and 5 follow up the lengths as they are called, so that there are never less than two rounds ready to be fired. 6 assists in SETTING the FUZES when he is not setting the fuze indicator. At least SIX rounds will be set at the correct fuze length as early as possible.

Time fuzes should be set in a clockwise direction, i.e., tending to tighten the fuze in the shell.

It is FORBIDDEN to turn fuzes 210 counter-clockwise BEYOND ZERO SETTING, as this will damage the fuze and render it useless. Within the range 0-60 seconds, the setting may be increased or decreased as desired.

5 and 6 re-set fuze accurately at "Safety" before replacing it in an ammunition box or vehicle. Rounds with the time rings re-set should be fired as soon as possible.

H.E., fuzed 117 or 119, may be recapped and replaced in the vehicles if they fulfill the safety conditions.

7. 5 SUPPLIES AMMUNITION to 4, passing the shell between 4's right arm and body with the fuze leading, and subsequently passes him the cartridge and cup, except when cartridges are being loaded from the right of the gun. (See par. 1 *d* (3).)

8. When one group of ammunition is nearly expended, 6 REPORTS this fact to 1.

9. In action they will always have six rounds prepared and ready for loading.

10. At *"Stand easy"* and *"Cease firing."* before replacing cartridges which have been prepared for loading, 6 will see that they are correctly made up by replacing any charge or charges which may have been removed.

TO EXAMINE EQUIPMENT

Examination of equipment will be carried out before leaving the gun park. When in action, if the tactical situation permits, this procedure should be carried out at least once in every 24 hours, and advantage should be taken of any interval to examine and test equipment.

C.P.O.[10] or B.L.[11]:

"Examine—equipment."

The C.P.O. and G.P.O. are responsible that the instruments used by the various members of the battery and troops staffs are tested and in adjustment.

Each G.P.O. supervises the testing and adjustment of the sights[12] and the grouping of ammunition in his own troop. He satisfies himself that his equipments are clean and correctly lubricated and in all respects ready for action.

The detachment removes the carriage cover, if it is in position, 2 and 3 working at the breech and 4, 5, and 6 at the muzzle.

1 sees that the bore is clear and that the gun, buffer, and recuperator are properly connected up, that the STOP RUNNING BACK has been REMOVED, and that the cut-off gear is correct. He sees that the buffer and recuperator are correctly filled and charged and that there is no leakage from the glands.

He tests and adjusts the sights and sees that the range scale gear and fuze indicators are set at the M.V. of the gun.

He tests the protrusion of the striker.

He supervises generally the work of the remainder of the detachment, satisfying himself that spare parts are interchangeable, small stores are complete, and the equipment clean, correctly lubricated, and in all respects ready for action.

2 removes the breech and muzzle covers and (with 3) examines and releases the cradle clamping gear, breech mechanism, field clinometer, shield, brake, platform right lever clamps, and cocking lanyard.

He closes the breech after 1 has examined the bore.

He lubricates the gun and carriage.

He replaces the breech and muzzle covers after the sights have been tested.

He assists 3 to lock the cradle clamp.

3 removes the sight cover and (with 2) examines the cradle clamping gear, sights, sighting and range scale gears, shield, sight port cover, elevating and traversing gears, and (after 1 has seen that the bore is clear and 2 has closed the breech) tests the firing gear. He examines the platform left lever clamps and the apparatus illuminating sights.

He assists 1 to test and adjust the sights.

He replaces the sight cover and locks the cradle clamp (see Duties of 3, par. 11.)

4 examines the spade box, aiming posts, paralleloscope, dragropes, handspikes, and apparatus illuminating A.P.

4, 5, and 6 examine the trailers and see that the small stores are complete; they examine the ammunition and group it as ordered.

6 examines the fuze indicator.

As soon as the examination is completed, the detachment, if ordered, replace the carriage cover and then form detachment rear.

1 collects reports, and reports to his G.P.O. *"No. . . . ready for action,"* or otherwise.

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[10]Command Post Officer, counterpart of our Bn. S-3.—Ed.

[11]Battery Leader, counterpart of our Bn. Ex.—Ed.

[12]The G.P.O. must keep a permanent record of such of the following as are necessary for all the guns in his troop, M.V., Droop, Jump, Gun Corrections, and Fuze Corrections.

CANDIDATE SELECTION AT BRAGG

By Sgt. Gerald Rosenbaum

In the early stages of the national emergency, enlisted men of the FARTC at Fort Bragg were chosen for officer candidate schools not only with extreme care, but in a leisurely way. A trainee who in the course of time distinguished himself by his education and ability to lead, was eventually sent before an Officer Candidate Board. Ultimately he re-appeared on the military scene considerably improved sartorially and wearing the gold bars of a second lieutenant.

Times have changed, as a minimum of investigation behind the scenes will convince you. The selection of officers is no longer a chance, if perfectionist, process. The need for officers is felt keenly and candidates are no longer chosen as if they were to receive the Nobel Prize or the Academy Award.

The Officer Candidate Board operates with system, speed, and efficiency to choose officer candidate material from the word "Go"—that is, from the moment potential candidates enter the Field Artillery Replacement Training Center. Within a few hours of the arrival of new men, prospective officers among them are interviewed and those who pass are listed as possible candidates for a class in the Field Artillery Replacement Training Center School. Of the men so listed, about 75% actually get to the Field Artillery Replacement Training Center School, and of these another 75% or so get through this preparatory school and go to the Field Artillery Officer Candidates School at Fort Sill. Approximately 94% of these graduate from Sill as officers.

Shortly after new soldiers arrive in the Replacement Center, the qualification cards of those who have attained a grade of 110 or over on their Army General Classification Test are sent to the office of the Officer Candidate Board. These men are then assembled in one of the battalion recreation halls, where Lt. George Sold of the Prospect Section of the Officer Candidate Board tells them why they are there.

"You men have been asked here because we think you may have the stuff—if you use it—to become officers in the Army of the United States." After giving them some idea of what the field artillery is about, Lt. Sold continues with "You must take your basic training. Take your lessons in the guns, chemical warfare, and first aid. Take the K.P. and the ditch-digging and whatever else there is in soldiering. You've got to be a good private before you can be anything else. You've got to be a good soldier above all.

"In the tenth week of your training—I can assure you it will be during the tenth week, so have a pressed uniform ready—you will be asked to appear before a board of officers. They will try to find out how much of your basic training you have absorbed and they will give you examinations. An officer must know what's going on in the world. We want you to know where Casablanca and Toulon are. Where are Guadalcanal and Vladivostok and what is their significance? You will be given a math test, more difficult than the one you will take this morning."

Before the proposed math test is given, Lt. Sold explains the importance of the Field Artillery School above any others as far as the Replacement Center is concerned. "You can apply for any school. But we are mainly interested in the field artillery, because we have the facilities here to teach you the field artillery. You may apply for the infantry or for ordnance or one of the other schools. But, for example, suppose you want to go to the engineering school. Now, we have small quotas for schools other than the field artillery and we will probably be able to send, at the most, only two men to the engineering school; although we think you are qualified for the engineering school and recommend you, you will have to wait until there's an opening. By that time you may no longer be in the Replacement Center. Your application will follow you wherever you go, but it may do you little good. But the Field Artillery School is another matter. We can guarantee you the chance to go to school, if you have the qualifications."

The preliminary math test is then given. There are usually 38 questions and there is no time limit. The test is not difficult and is designed more to give confidence to those men who have the requisite knowledge than it is to test them. At the end, examinations are graded rapidly by Lt. Clyde Warren or Lt. Paul Stone, the remaining members of the Prospect Section of the Officer Candidate Board. A chart of correct answers is used, so that by matching and then using a scale of grades all the tests can be marked in a few minutes. The questions are of the following type:

The letter of the correct answer is to be inserted at the left.

1. ..... 7×8 equals? (A) 17, (B) 76, (C) 56, (D) 81, (E) 90.

2. ..... $3/7 \times 2/3$ equals? (A) 2/7, (B) 5/24, (C) 5/11, (D) 7/24, (E) 1/2.

3. ..... 4/400 equals? (A) .01, (B) .004, (C) .04, (D) .001, (E) .4.

4. ..... If a equals 6 and b equals 10, then $b^2/10$ equals? (A) 50, (B) 5, (C) 4, (D) 20, (E) 10.

After the examinations have been corrected, the men are interviewed individually and asked whether they are seriously interested in becoming officers. Each man's qualification card is before the interviewer so the latter

can tell his educational background, former occupation, highest position of leadership, home town, aptitude examination results, interest in sports, general intelligence, and possible previous military training. Those men who are interested—and almost 100% are—are told their strong or weak points. They are advised as to what procedure to follow if they wish to become officers.

This is of utmost importance and is a significant change in the approach to officer candidate material. The idea of leadership is implanted early and a directive is issued as to how to proceed. Men are advised to send for their old math books. They are told where they may study and they get some idea of what is in store for them. The entire process has been activated. Ability is sought out, directed, and cultivated instead of being allowed to transpire by accident.

Before they leave the recreation hall, the men are cautioned. They are to return to their barracks to take up the duties of their basic training period. They are to bear in mind the high purpose it is hoped they will all pursue. But they are, above all, not to act like officers before they are so in fact. They must be good privates first of all. They must strive to be the best soldier in the platoon.

The names of those men who have been considered by the interviewer as possible officer material—and they are the bulk of this group—are listed as possible candidates for enrollment in a class thirteen weeks later in the Field Artillery Replacement Training Center School.

The men go back to their batteries and hear no more from the Officer Candidate Board for many weeks, but the Board's "offensive" has not rested. During their tenth week of training, these men are called before the Board and interviewed thoroughly, while their ability to lead is judged. They are given examinations of the following types in mathematics, current events, and character:

Match the following:

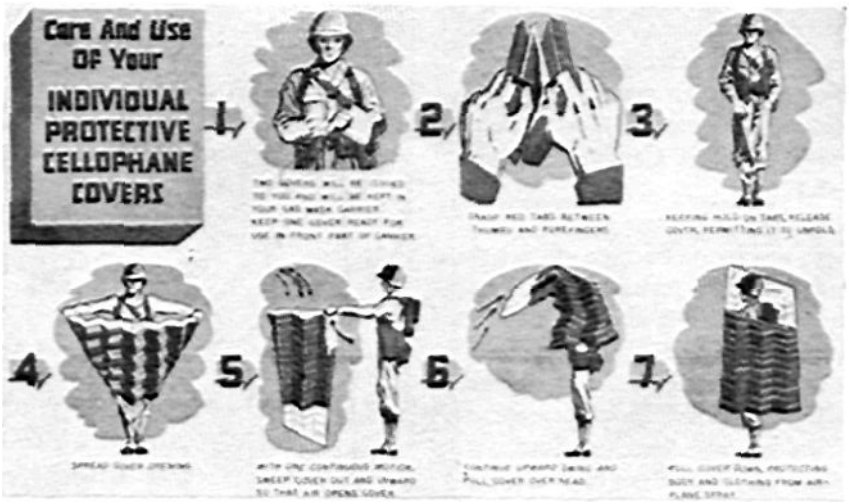
..... Anthony Eden	Marshall, Russian Forces
..... Semion Timoshenko	Director, Office of War Information
..... Pierre Laval	British Foreign Secretary
..... Elmer Davis	Premier of Vichy France

The list is much longer and there may be similar matching questions of a geographic nature.

The mathematics examination includes fractions, which count for 15%; decimals, also 15%; conversion of fractions to decimals, 10%; equations with one unknown, 20%; solving for the unknown in field artillery formulas, 5%; ratio questions, 15%; elementary trigonometry, 5%; and others, 15%.

The character or personality examination consists of four questions for each of which the applicant is expected to write a paragraph of about fifty words in answer. Questions cover education, experiences, leadership, and officer qualities.

If the prospective candidate passes these examinations and is acceptable to the board, during the next two weeks he takes his physical examination. By the end of his training cycle he has been fully tested, has been enrolled in a class in the Field Artillery Replacement Training Center School, and is embarked on a course that will lead him through Fort Sill to a commission in the Field Artillery.



Before taking your cover into the field, carefully unfold and refold it; this will soften the folds and shorten the time needed to don the cover. Whenever refolding, be sure to follow the original folds. Making final folds from the top down releases any air that may have been trapped.

CANDIDATE TO OFFICER (cont.)

By Maj. W. S. Jones, FA

HE danger of sacrificing quality to quantity in selection of Officer Candidates has become an actuality. Those charged with the approval of applications for officer training have, in some instances, been too much concerned with the filling of quotas to determine the candidate's fitness for a commission. Mental and basic backgrounds are, of course, important. Most of the selection boards, however, have accented the first to the virtual exclusion of the latter. At the present time the course at the Field Artillery School is not designed to supply basic training in artillery to candidates from other branches or from the more sedentary activities of the artillery.

Several projects have either been effected or are under advisement by the Replacement and School Command to bridge this gap. At Sill a "salvage school" has been initiated into which candidates of excellent type but relatively meagre artillery background are placed if the course proves too fast for them. These men—and they must have demonstrated their initiative and worth, together with their lack of basic artillery background—are withdrawn from the regular course and given a special three week course in artillery mathematics, terminology, and techniques. Those who develop at this retarded pace are then entered in the regular course.

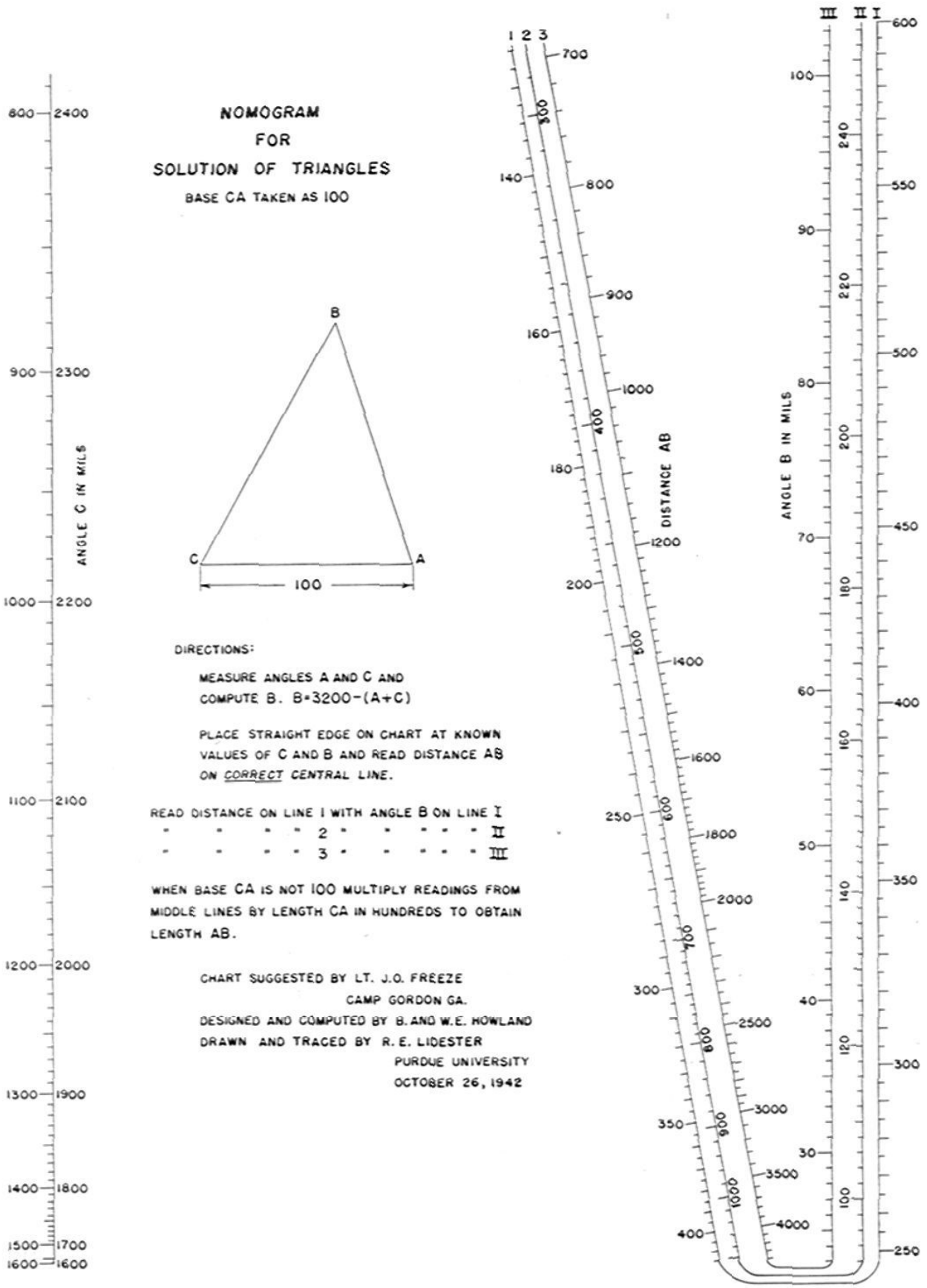
At the same time an effort to insure uniformity of preparation has resulted in a standard preparatory school schedule (including text assignments and instructors' notes) being prepared by the school. The course is of four weeks' duration, and it is expected that each of the Replacement Center schools—plus any post or unit schools—will adopt this standardized course. The recommendation has been made that every applicant for the Artillery Officer Candidate School must either (1) have a certificate from an accepted prep school before being admitted to the course, or (2) pass an examination which will indicate proficiency in the work given in these prep schools. Failure in the latter will result in the applicant being transferred to the Fort Sill Replacement Center preparatory school before commencing the course. So much for the basic qualifications.

The biggest weakness in the present selection of candidates seems to be that of leadership qualifications. The original classes were made up of men who had been carefully examined as to character, type, and actual demonstrations of leadership. This is no longer true. While every effort is made to eliminate obviously unfit candidates, regardless of marks, the truth remains that the Officer Candidate School is not designed to develop incipient leadership. It seems manifestly unfair for a boy just out of school—with no military or civilian background of command—to be sent back to his outfit after as much as ten weeks of the course because he was still too retiring or timid to accept responsibility—yet that is being done in ever-increasing numbers. The responsibility lies with those who sent the man there. This fault is particularly true of the Replacement Center schools. Most of these men are mentally and basically ready to complete the course, but too frequently they have no background of experience in command from which to draw. It is my firm conviction, based on contact with over ten thousand Officer Candidates, that no man should ever be certified for the Field Artillery School until he has actually been put in a position of responsibility and command and has therein indicated poise, self-control, levelheadedness, authority of manner, and military bearing.

General R. E. Lee, Commanding General of the 15th F. A. Brigade, has instituted a procedure which might well be emulated throughout the service. In brief, after a process of selection, any man who is selected as a potential officer candidate is given a distinctive white ribbon on his cap. He is required to demonstrate exemplary conduct during his apprenticeship, and he is, regardless of rank, assigned certain duties which require leadership. His performance as a non-commissioned officer—either regular or acting—is carefully watched, and it is only by measuring up to the highest standards that he is sent on to the Officer Candidate School examining board.

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

"In my opinion, THE FIELD ARTILLERY JOURNAL has accomplished a very fine piece of work in compiling, editing and publishing the *Field Artillery Guide*. The selection of material has been accomplished most skillfully. The printing and binding are the best we have seen in any book published for use by the military. I am urging all Field Artillery Officers of the ..... Corps to obtain copies without delay."—COLONEL, FA.


NOMOGRAM
FOR
SOLUTION OF TRIANGLES
BASE CA TAKEN AS 100
B
C
A
100
ANGLE C IN MILS
600 2400
900 2300
1000 2200
1100 2100
1200 2000
1300 1900
1400 1800
1500 1700
1600 1600
1 2 3
700
600
140
800
900
160
1000
400
180
1200
200
1400
600
1600
250
1800
2000
700
300
2500
600
3000
350
900
3500
1000
400
4000
DISTANCE AB
III II I
600
100
240
550
90
220
500
80
200
450
70
180
400
60
160
350
50
140
300
40
120
250
30
100
ANGLE B IN MILS
DIRECTIONS:
MEASURE ANGLES A AND C AND
COMPUTE B. B=3200-(A+C)
PLACE STRAIGHT EDGE ON CHART AT KNOWN
VALUES OF C AND B AND READ DISTANCE AB
ON CORRECT CENTRAL LINE.
READ DISTANCE ON LINE 1 WITH ANGLE B ON LINE I
" " " " 2 " " " " " II
" " " " 3 " " " " " III
WHEN BASE CA IS NOT 100 MULTIPLY READINGS FROM
MIDDLE LINES BY LENGTH CA IN HUNDREDS TO OBTAIN
LENGTH AB.
CHART SUGGESTED BY LT. J.O. FREEZE
CAMP GORDON GA.
DESIGNED AND COMPUTED BY B. AND W.E. HOWLAND
DRAWN AND TRACED BY R. E. LIDESTER
PURDUE UNIVERSITY
OCTOBER 26, 1942

Charts for Rapid Target Location

By W. E. Howland* and B. Howland

This nomogram is useful for rapid reading of the values of the range AB when the angles A and C are measured and angle B may, therefore, be found. The theory of this Z chart is that of similar triangles. Referring to the sketch and the nomogram, it is evident that

$\frac{\text{Sin C}}{\text{Sin B}} = \frac{\overline{\text{B A}}}{100}$. Let $\overline{\text{B A}} = \text{w}$. Then $\frac{\text{w}}{100} = \frac{\text{Sin C}}{\text{Sin B}}$.

But in the Z chart (see Fig. 1) $\frac{\text{x}}{\text{y}} = \frac{\text{D} - \text{z}}{\text{z}}$. Now if $\text{x} = \text{M}_1 \text{ Sin C}$ and $\text{y} = \text{M}_2 \text{ Sin B}$, then $\frac{\text{x}}{\text{y}} = \frac{\text{M}_1}{\text{M}_2} \frac{\text{Sin C}}{\text{Sin B}} = \frac{\text{M}_1}{\text{M}_2}$

$\frac{\text{w}}{100} = \frac{\text{D} - \text{z}}{\text{z}}$, and therefore $\text{z}\left(\frac{\text{M}_1}{\text{M}_2}\right) \frac{\text{w}}{100} = \text{D} - \text{z}$. $\text{z} = \frac{100\text{D}}{\left(\frac{\text{M}_1}{\text{M}_2}\right)\text{w} + 100}$.

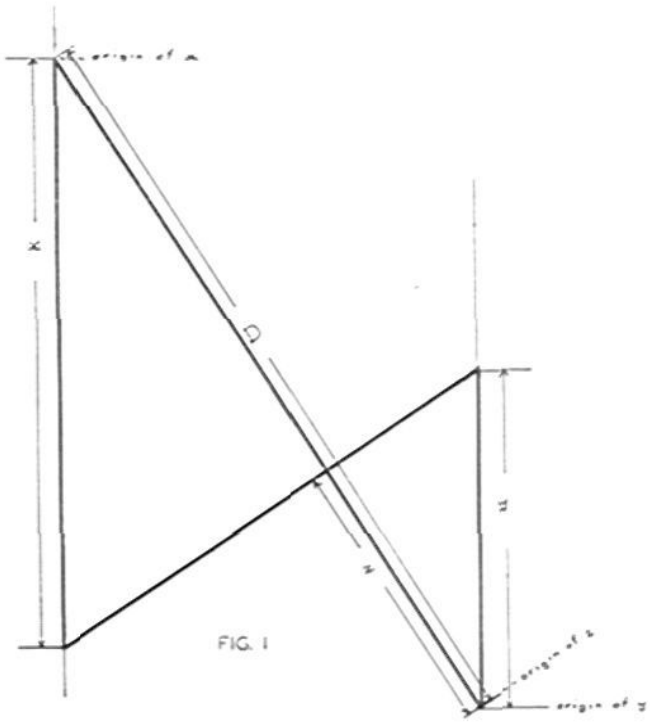
The difficulty in constructing this chart is to choose locations for the intersections of the lines (all of which are beyond the limits of the space for the chart itself) and values of M so as to cover the ranges of values of C and B and get good precision on w. A value of M = 33 1/3 in. was chosen for the original C line. The equation of the original scale was x = 33 1/3 Sin C and the intersection with all diagonal lines was 33 1/3 in. above the point marked 1600 mils, i.e., about 22 in. above the top of the chart as originally drawn.

The lines showing the values of angle B have been labelled I, II, and III. Each one is to be used with a particular diagonal line marked 1, 2, and 3, respectively. The geometric properties of these lines as originally drawn are as follows:

Line	Scale Modulus	Distance to lower intersection from bottom of chart	Perpendicular distances from Line C
I	33 1/3 in.	8 in.	7.00 in.
II	66 2/3 ″	6 ″	6.86 ″
III	133 1/3 ″	3 ″	6.60 ″

Line	Length of diagonal distance D	Equation (distance from lower intersection to points on the scale)
1	41.92 in.	100D/(w+100)= 4192/(w+100)=z in inches
2	39.93 ″	200D/(w+200)= 7990/(w+200)=z ″ ″
3	36.93 ″	400D/(w+400)= 14780/(w+400)=z ″ ″

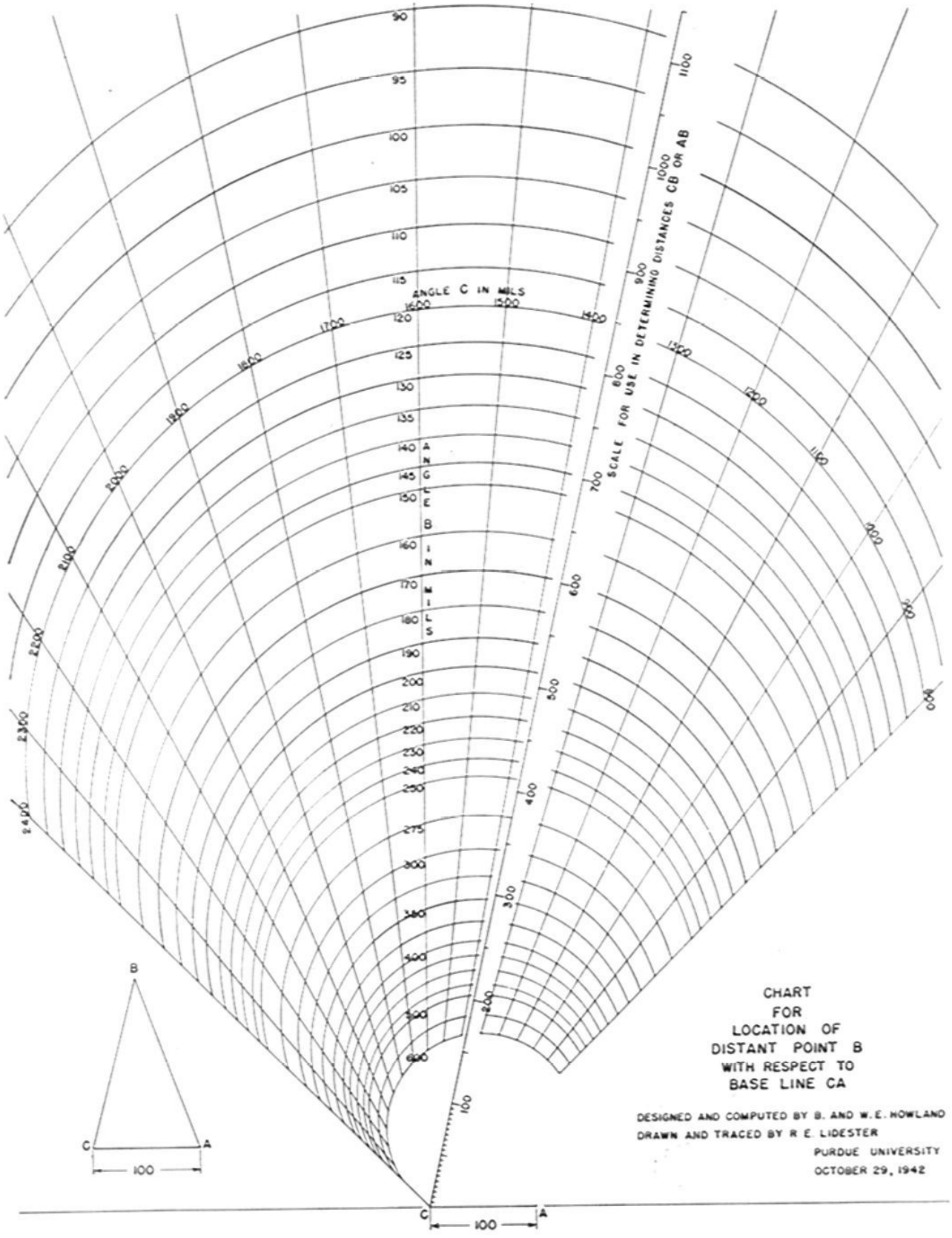
(w is the reading on the scale)



A number of additional lines could be added or substituted to improve precision. The errors resulting from the use of the nomogram shown are no more than 0.3% for values of range of less than 2500.

The "spider web" (page 98) shows how similar charts might be constructed for different ranges or scales of map to facilitate plotting of targets. Referring to the lower left hand sketch, this chart shows values of angles C on the radial lines and values of Angle B on the circular arcs. Distances from either A or C might be indicated by the construction of equally spaced concentric circles (not shown) about either or both of these points, if desired. A transparent chart of this type might be placed directly upon the map over the base CA and distances could then be pricked through to the map from readings of Angles C and B. Such a chart would of course be less expensive than two protractors reading angles C and A and would, we believe, give equally good precision since the use of circles for equal values of angle B gives excellent intersections with radial lines. The chart could be reversed and used as its mirror image. The centers of the circles shown are all located on the perpendicular bisector of the chord CA and each one has a radius equal to ½ CA ÷ sin B, where B is the angle in mils noted on the circle.

*Professor of Sanitary Engineering, Purdue University.


ANGLE C IN MILS
SCALE FOR USE IN DETERMINING DISTANCES CB OR AB
B
C
A
100
CHART
FOR
LOCATION OF
DISTANT POINT B
WITH RESPECT TO
BASE LINE CA
DESIGNED AND COMPUTED BY B. AND W.E. NOWLAND
DRAWN AND TRACED BY R E. LIDESTER
PURDUE UNIVERSITY
OCTOBER 29, 1942

Index of Field Artillery Training Literature

Which Is Published by the Field Artillery School

This index is an answer to artillerymen groping for the latest information in their field. We hope to list regularly the newest publications as they come off the press at the Field Artillery School. Address either (1) Book Department, Field Artillery School, Fort Sill, Oklahoma, or (2) Book Department, U. S. Field Artillery Assn., 1218 Connecticut Ave., Washington, D. C. Enclose remittance only by domestic check, express money order, or postal money order. Be sure to type or print clearly your exact address, name, and military title. Sale of this training literature is limited to persons coming within the meaning of the classification "Restricted." Prices are subject to change without notice. Many of the publications are instruction memorandums; these are designed for resident instruction at the School and (unless otherwise noted) come in printed booklet form, usually illustrated.

Animal Transport

AT 1—Care and Preservation of Leather. A mimeographed instruction memorandum. 5c.

Air Training

A 1—Organic Field Artillery Air Observation; November, 1942. 10c.

Communication

Instruction Memorandums:

C 1—Field Artillery Wire Communication; 1942. 10c.
C 3—Field Telephones, EE5 and EE8; 1942. 10c.
C 4—Trouble Shooting, EE8 Telephone; 1942. 5c.
C 5—BD-71 (72) Switchboards; 1942. 10c.

Field Artillery Books

FAB 20—Military Fundamentals; 1942. A basic manual, particularly for ROTC students. Covers a variety of fundamental subjects, ranging from national defense to military sanitation and field artillery drill. Approximately 485 pages with 120 illustrations. 75c.

FAB 30—Field Artillery Fundamentals; 1942. A new book which brings up to date older material. Devotes a section to the 105-mm. howitzer M2; illustrates each type of weapon used by field artillery. Covers materiel, ammunition, elementary gunnery, and other fundamentals. Over 350 pages with 163 illustrations. 50c.

FAB 120—Automotive Instruction; 1941. Published as a complete course in motor transportation for field artillery purposes. Covers theory, construction, and functioning of various parts and assemblies; fuel and lubricants; driver training; duties of personnel in servicing and maintenance. Approximately 500 pages with 220 illustrations. 75c.

FAB 140—Mounted Instruction; 1942. A complete manual of instruction for horse-drawn units. Takes up care, management, and training of animals; training of field artillery riders and drivers; field equipment; marches, and maneuvers. Approximately 340 pages with 110 illustrations. 55c.

FAB 200—The Battery Detail; 1942. Instructions in fire-control instruments; maps, air-photos, and grids; survey; signal communication; use of battery detail in reconnaissance, selection and occupation of position. Approximately 366 pages with 185 illustrations. 60c.

FAB 223—Elementary Tactics; 1942. Covers organization; combat orders; associated arms; field artillery tactics; signal communication, observation, positions; logistics; applicatory tactical exercises. Approximately 360 pages with 45 illustrations. 55c.

Gunnery

G 1—Time Fire Using Shell Fuzed with Fuze M54 or M55; 1942. An instruction memorandum. 5c.

Abbreviated Firing Tables; 1942. Contains extracts for the 75-mm. gun M1897, A1, A2, A3, A4, and M2; the 105-mm. howitzer M2 and M2A1; the 155-mm. howitzer M1917, M1917A1, M1918, and M1918A1. Has 89 pages. 20c.

Exercises in Gunnery Mathematics, 1942. 10c.

Logarithmic, Trigonometric, and Short Base Tables; 1942. 10c.

Materiel

Instruction Memorandums (all new 1942 editions)

Mat 1—Index to Publications on Field Artillery Materiel. 10c.
Mat 3—Construction of Field Artillery Materiel. 10c.
Mat 4—Sighting and Laying Equipment of Field Artillery Weapons. 10c.
Mat 5—Maintenance of Field Artillery Material. 10c.
Mat 6—General Characteristics of Field Artillery Ammunition. 10c.
Mat 7—Gun and Recoil Mechanism, 37-mm. M1916 (Subcaliber) and Subcaliber Mounts. 10c.
Mat 8—Loading of Field Artillery Materiel for Railway Transport. 10c.
Mat 9—Close Combat Firing with Field Artillery Small Arms. 5c.

Practical Work Sheets

These contain directions for disassembly, adjustment, and assembly of materiel indicated, together with questions

and solutions. Order by full title and number. 5c each.

WS No.	
3	Auto Rifle, Cal. .30, Browning, M1918.
9	37-mm. Subcaliber Equipment for FA Materiel.
10, 11, 12	37-mm. Gun M4 (AT).
17, 18, 19, 20	75-mm. Howitzer M1 (Pack).
22, 23, 24	75-mm. Howitzer M3A1 (Field).
25, 26, 27, 28	105-mm. Howitzer M2.
41	155-mm. Guns, M2 and M3 (Modified GPF).
65	Field Range, M1937.
45, 46, 47, 48	155-mm. Gun M1.
33, 34, 35, 36	155-mm. Howitzer M1917A4 and M1918A3.
57, 58, 59, 60	240-mm. Howitzer M1918.

Charts Sc each

Characteristics of Major Field Artillery Weapons, Small Arms and Machine Guns; November 1942.

Field Artillery Ammunition Chart; October 1942.

Lubrication Charts. Separate charts for the 75-mm. Howitzer M1 (Pack); 75-mm. Howitzer M3A1 (field); 105-mm. Howitzer M2; 155-mm. Howitzer M1918A3.

Questions and Answers, 105-mm. Howitzer M2; July 1942. 10c.

Notes on the 105-mm. Howitzer M2; April 1942. 5c.

MISCELLANEOUS

Battery Officer's Notebook; April 1942. 10c.

Field Officer's Notebook; May 1942. 10c.

Gouzeaucourt Sheet No. 100, France and Belgium, scale 1:50,000. This map is used by the School for instruction in the use of foreign maps. Priced 5c per copy with discount of 40% on orders exceeding 10 copies.

MOTOR TRANSPORT

Instruction Memorandums:

MT 1—Detailed Instructions for Motor Maintenance Services. Includes 1,000- and 6,000-mile service; new vehicle, submergence, and cold weather service; check sheet and record. 10c.

MT 2—The Automobile Driver; 1941. 10c.

MT 5—Check Sheet and Record; 1942. 1c.

TACTICS

Instruction Memorandums:

T 1—Organization of Field Artillery of the Infantry Division and Employment of the Field Artillery Battalion in Reconnaissance, Selection and Occupation of Position; November 1942. A new publication which brings up to date and coordinates material formerly in four memorandums. 79 pages and 17 illustrations. 15c.

T 7—Field Fortifications for Field Artillery; November 1942. 10c.

T 8—Employment of Armored Field Artillery; September 1942. 10c.

Post Office Department Order No. 19687 dated January 7, 1943, and effective January 15, 1943, provides:

"1. No parcel exceeding 5 pounds in weight, or 15 inches in length, or 36 inches in length and girth combined, shall be accepted for dispatch to A.P.O.'s overseas for individuals. (It is contemplated that there will be no exceptions to the weight and size limits for parcels to individuals.)

"2. Except as hereinafter provided, no parcels shall be accepted for dispatch to A.P.O.'s outside the continental United States unless they contain such articles only as are being sent at the specific written request of the addressee, approved by the battalion or similar unit commander of the addressee.

"3. Individual copies of newspapers or magazines shall be accepted for dispatch to A.P.O.'s outside the continental United States only where subscriptions are specifically requested in writing by the addressee or for which subscriptions are now in effect. Such copies to individuals shall be accepted only from publishers."

Referring to restriction 2 above, the War Department states that individuals serving overseas desiring to request the mailing of parcels to them will be required to include in their request the following:

1. A general description or name of article requested.

2. The grade or rating, the complete address, and the signature of the individual (addressee) making request.

The request will be presented to the battalion or similar unit commander, who will approve it when the circumstances justify. Requests of officers not assigned to organizations or separate units will be approved by the next higher or theater headquarters.

If you have a book order en route to us for shipment to an overseas address, delivery will be speeded if you will immediately forward via V-mail the necessary approval required under these new restrictions. We will continue to do everything possible to assure prompt and safe delivery of all items ordered through the Association.

THE SOLOMON ISLANDS

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

By Col. Conrad H. Lanza

The Solomon Islands extend about 1,800 miles, in a northwest and southeast direction, between South Latitudes 5º and 11º. They are some 1,700 miles northeast of Queensland, Australia. The islands are a British colony, and at the beginning of the war had their regular complement of British officials. The seniors were British but most of the subordinates were Australians, as were the majority of the 400 commercially engaged white people in the colony. There were also some 200 Chinese, mainly small business people. The big business was copra, which was controlled by two Australian companies who between them had 40 plantations. The overseers were whites, the labor native.

Natives of the islands are a mixture of Melanesians, Polynesians, and Maoris, numbering about 90,000. Of these 34,000 were reported as members of the Catholic Church, under the jurisdiction of two American bishops with nearly 100 American assistants, who had churches, schools, and hospitals on the principal islands.

Capital of the colony is Tulagi, near the center of the island group. Besides the administration buildings Tulagi had a hotel, club, and golf course for the white people. There is good anchorage near Tulagi; it is a convenient center for local business.

When in February and March, 1942, the Japanese wave of conquest engulfed the Netherland Indies, it was foreseen that Japanese forces might move into the Solomon Islands. Steps were promptly taken to evacuate both white and Chinese populations. However, some of the officials and most of the missionaries decided to remain. No defense measures were taken, as neither men nor materiel were available. During the first part of March, Japanese appeared in north New Guinea and (more threatening to the Solomons) in the Bismarck Archipelago, where they established a base at Rabaul. In an air line this is some 700 miles northwest of Tulagi.

About the same time American troops were arriving in the southwest Pacific in considerable numbers. From Australia they had by March 17th established themselves in the French colony of New Caledonia, where the local officials had welcomed them, and joined the cause of the United Nations; development of a sea and air base was begun. On the same date General Douglas MacArthur arrived in Australia. He had come from the Philippines in compliance with orders from the War Department to assume command in the southwest Pacific. By a directive dated April 15th, the east boundary of this command south of the Equator was fixed as East Longitude 160º. The wide area east of this boundary, with all the numerous islands therein, was assigned to the jurisdiction of the Navy, whose commander (Admiral Nimitz) had his headquarters in Honolulu.

THE CORAL SEA CAMPAIGN

The first appearance of Japanese forces in the Solomon Islands was on April 26th, when planes made a raid. On the 30th a severe air raid occurred over Tulagi. About this time naval reconnaissance discovered strong naval forces, including numerous transports, assembling around Truk and Jaluit. These activities led to the belief that the enemy probably intended to advance into the Solomons and/or the Louisiade Archipelago. Consequently an American naval Task Force consisting of two aircraft carriers (the *Lexington* and the *Yorktown*), escorted by cruisers and destroyers, was assembled south of the Solomons, under Rear Admiral Frank J. Fletcher, to attack the enemy should he proceed south as expected. The Task Force proceeded northward.

On May 3d a naval plane located about 15 enemy naval ships and transports in Tulagi harbor. The Japs on this day landed troops and occupied Tulagi and vicinity. Admiral Fletcher decided to make an air attack on this force early the next morning. At about 0615 4 May, being then about 120 miles south of Guadalcanal Island, the carriers launched 36 bombing and 18 torpedo planes. They had orders to pass over the Guadalcanal Mountains, swoop down on the far side, and attack the enemy in Tulagi harbor—which is about 15 miles beyond Guadalcanal. Apparently the attack was a complete surprise, for it met no resistance and the planes were able to return to the carriers, reload, refuel, and make a second attack. This did meet with antiaircraft fire, but the two attacks succeeded in hitting 14 out of 15 ships, some being sunk, others set ablaze, and still others being beached later by their crews. The best estimate is that the Japanese lost

sunk: 1 light cruiser, 2 destroyers, 4 gunboats, 1 transport, 1 cargo ship.
damaged: 1 transport, 1 cargo ship.

Six enemy planes were reported destroyed. Our entire losses were 3 planes.

After this victory the Task Force sailed away to the south and during the next two days refueled without stopping, by taking oil through hose from tankers. During the afternoon of the 6th scout planes reported that a hostile force, estimated as

2 aircraft carriers.
4 heavy cruisers, and
about 12 light cruisers and destroyers,

was 250 miles to the northwest, north of Misima (St. Aignan) Island, and moving south. Admiral Fletcher

turned the Task Force around and steamed hard toward the enemy—which apparently was a different force than that which had been attacked at Tulagi.

Again Admiral Fletcher decided on a dawn air attack. Off before dawn on May 7th, the air scouts located the enemy shortly after 0800. The enemy's force had divided during the night into about two equal parts, for now were found only

1 aircraft carrier (identified as the *Ryukaku*),
3 heavy cruisers, and
6 destroyers.

Our Task Force at this time was about 180 miles away, east of Tagula Island and about 180 miles southeast from the enemy. The air fleet flew away from the carriers and again the enemy was taken by surprise: only a few of his planes were in the air. Visibility was excellent. Our planes came over at about 12,000 feet, and the Japanese failed to see them until they were close to their targets. The air commander picked the *Ryukaku* as the principal target. As our planes turned to dive, enemy fighters which were in the air and which had just caught up turned and came on down with the American planes, in a grand indiscriminate air battle. The *Ryukaku* held a steady course, presumably to launch her planes, most of whom were still aboard; this made her easy to hit. The dive bombers came first, and about every other bomb was a hit—some 15 or 16 in all. Then came the torpedo planes, who made approximately 10 hits. The *Ryukaku* was torn in pieces by the successive explosions, and in a cloud of steam, smoke, and fires went down within a few minutes. This exploit was made by the planes from the *Lexington;* they were followed by planes of the *Yorktown*, who similarly attacked and sank an enemy cruiser, which went down in five minutes. In this fine air attack our losses were but 2 planes. It is estimated that the enemy lost over 20 planes.

During the late afternoon the Task Force noted hostile planes near them. This led to the conclusion that another enemy aircraft carrier was probably somewhere in the vicinity. A curious feature was that 9 Japanese planes approached the *Lexington* just as darkness settled on the tropical sea. They turned on their landing lights, took wide intervals, and were about to land on our carrier, which they had evidently erroneously taken as one of their own ships. Our fighters were in the air and shot down 7 of these planes, but the other two got away. It was therefore reasonably certain that the enemy now knew where our ships were.

Enemy planes also found during this afternoon a Navy tanker, the *Neosho*, escorted by the destroyer *Sims*. The enemy attacked and sank the *Sims*, and so badly damaged the *Neosho* that she sank later while en route to a port.

Early on May 8th scout planes from the Task Force went out to locate the enemy, whose presence somewhere in the Coral Sea was almost certain. At the same time enemy plans were out on the same mission. Each side located the other between 0800 and 0900. The Japanese were found to be 45 miles southeast of Tagula Island in the Louisiade Archipelago, moving southward about 185 miles northeast of the American ships. At 0930 an American air striking force of 89 planes started for the Japanese. They passed en route, but without making contact, a hostile air striking force of 108 planes headed for our ships.

Our planes found the enemy's fleet, which was a different one from that contacted the day before. It consisted of

2 aircraft carriers,
3 battleships (reported by only some scouts),
? heavy heavy cruisers (reported variously as "some and "many"), and
? destroyers (reported as "many").

About 1100 our planes arrived near the enemy and decided to attack an aircraft carrier identified as the *Shokaku*. Both dive bombers and torpedo planes made numerous hits. When the attack was over the *Shokaku* was aflame from stem to stern, and apparently settling fast.

While this attack was being made the enemy's planes arrived over our ships. A protecting force of planes was covering the ships, and the enemy's approach was signaled by scouts when he was 100 and again when he was 60 miles away. Consequently as soon as the enemy arrived he was received with a tremendous antiaircraft fire in addition to being attacked in the air by our fighters. The Japs too concentrated on an aircraft carrier, the *Lexington*, dropping 2 bombs and making 2 torpedo hits; some near-misses caused further damage. It is estimated that to obtain this result the enemy lost 40 planes out of his 108. The American loss of planes this day appears to have been about 25, exclusive of 60 planes on the *Lexington*. This ship was set afire by the enemy's attack. The fires spread into the gasoline and ammunition aboard, causing successive additional explosions which gradually wrecked the ship. In the late afternoon it was abandoned and soon after sank with a final detonation.

This day's fighting ended the Coral Sea campaign. Its result was that the Japanese fleet has not since ventured beyond the Solomon Island area, and not often even that far from its bases in Micronesia.

THE INTERMEDIATE PERIOD

For some time there was no interference by American forces with the Japanese occupation of the Solomon Islands. The enemy occupied Guadalcanal in part on the north side and (bringing in labor troops) proceeded to construct an airfield. Opposite Guadalcanal, in and around Tulagi, a seaplane and minor naval base was established. Further north an air and naval base was organized near Kieta on Bougainville Island, and beyond there at Rabaul and Kaving, on New Britain and New Ireland Islands, respectively. A little later Japanese appeared in northeast New Guinea.

American planes and ships scouted regularly and kept contact as to what the enemy was doing. Serious air raids by American forces occurred occasionally—Tulagi was attacked on May 29th and Rabaul on June 20th. During July American forces in the southwest Pacific had increased sufficiently to make it possible to pass to the offensive, and an expedition was prepared with the view of attacking the south Solomons and depriving the Japs of the air base on Guadalcanal, which was approaching completion. With this and the sea base at Tulagi the enemy would be in a good josition for a further offensive toward Australia or New Zealand should he care to do so. Or he might use the south Solomon Islands as a suitable base for raiding our sea lines of communication and supply to the southwest Pacific or to attack the American bases organized in New Caledonia and the New Hebrides and Fiji Islands.

Toward the end of July, an important war conference was held in London. The American delegation was headed by Mr. Harry Hopkins as personal representative of the President. Other members were General George C. Marshall, Chief of Staff, and Admiral Ernest J. King, Naval C-in-C. According to the communiqué issued at the time,

"Decisions of importance were taken affecting the entire future of the general conduct of the war operations, not only in Europe but throughout the world. These decisions were in accordance with the wishes of Mr. Roosevelt and they received his final approval. Thus, by the end of July, a complete agreement on war policy and war plans had been reached between Great Britain and the United States. This agreement covers the entire field of the war in every part of the world, and also deals as to necessary productive and administrative measures which are required to enforce the combined policy and the strategy which has been agreed upon."

It seems, from what has later occurred, that the London conference arranged for a major offensive on Europe and decided on minor operations in the Pacific. The special operation under this decision was submitted to the Combined Chiefs-of-Staff Committee in Washington. According to a statement made by Secretary of War Stimson,

"The decision to launch a Solomon Islands operation was made by the Joint Chiefs of Staff committee in accordance with an agreed-upon plan, and was not purely a naval decision."

The approved plan provided for capturing the enemy's key positions in the southeast Solomons, located at Tulagi and on Guadalcanal, and thereby block any hostile designs he might have for future offensives in this part of the Pacific. The plan did not provide for any attack on the enemy bases known to be in the north Solomons, at Kieta on Bougainville Island and on Buka Island. Incidentally the plan probably took into consideration much discontent being currently expressed in Australia, criticizing the non-action policy in the southwest Pacific.

THE RECAPTURE OF THE SOUTH SOLOMON ISLANDS

Vice Admiral Robert L. Ghormley, U.S.N., was in command of the southwest Pacific east of East Longitude 160. It will be remembered that west of this meridian General MacArthur had command. The meridian passes through Guadalcanal Island, the objective, thus placing the island in part in each of the commands. To correct this situation the boundary between the commands was now moved west sufficiently to place all of Guadalcanal within Vice Admiral Ghormley's sector. However, the north Solomon Islands, including the Japanese bases on Bougainville Island and the more important one at Rabaul, remained within General MacArthur's territory.

Admiral Ghormley assembled an expeditionary force of Marines under Major General A. A. Vandegrift, who were embarked on transports. A covering naval force under Rear Admiral R. K. Turner protected the convoy, while a Task Force under Vice Admiral Frank J. Fletcher was prepared to intercept any enemy naval attempts to attack at sea.

The approach to the islands was made from the south. August 6th was a day of overcast sky, which made air reconnaissance difficult and concealed the convoy from enemy scouts. During the night 6/7 the weather cleared. Aircraft carriers with the fleet furnished a protecting overhead umbrella for the expedition.

Dawn came about 0600. At this hour on August 7th the expedition arrived off its assigned objectives and the transports split, some going to the vicinity of Tulagi and others to Guadalcanal. The enemy failed to observe the arrival of our ships until too late, and he was practically completely surprised. Our naval vessels opened fire at 0615 to drive the Japs away from the selected landing points, and this fire was continued until the initial landings occurred at 0800 at Tulagi and at 1000 on Guadalcanal. The enemy on shore therefore had an appreciable time to occupy positions for defense. At Tulagi 18 seaplanes and one schooner were in the harbor; these were sunk during the preparatory firing.

Adjacent to Tulagi Island are two islets, Gavutu and Tanambogo; they are connected by a causeway. All three are of limestone formation and full of caves. The Japanese (to avoid the naval shelling) had withdrawn from the vicinity of the coast for some distance inland and posted themselves within the caves, which made excellent machine gun nests. In support were snipers appropriately hidden in the surrounding tropical vegetation. The initial landing on Tulagi met no opposition as the Japanese, having no artillery, did not care to expose themselves to the naval gunfire. Their total number was about 500, exclusive of around 1,000 unarmed labor troops.

After the third wave of Marines had landed, fighting commenced. The first waves had by then pushed inland and come in contact with the cave defense. These were attacked with infantry mortars, and in some cases with TNT charges which were rolled down or thrown at the mouths of the caves; by night many caves had been reduced. About the same conditions occurred on the two islets. When darkness fell the Marines had conquered

most, but not all, of the terrain. Then came a Japanese counterattack. Japs rushed out of the caves and assaulted the Marines all night long. Rocks, bayonets, knives, hands—any kind of weapon was used.

Early on the morning of the 8th the Marines went determinedly forward. Two tanks were landed on Gavutu Island. Hordes of Japs swarmed out of caves with gasoline flame-throwers. They destroyed one tank almost immediately. The other moved forward about 100 feet when a Jap threw a crow-bar into the tread, jamming it. The tank, although immobilized, fought back with machine gun fire; later 23 dead Japs were found around it.

During the day the Japanese opposition was completely overcome on Tulagi and its adjacent islets. Few Japanese were taken alive; on Tulagi not one out of some estimated 500 were captured. Gavutu was the seaplane base. It was estimated that there were 1,200 Japanese troops here, and yet none were captured alive. The last retreated to their caves and maintained a stubborn and continuous resistance until they were buried by successive explosions of TNT.

Meanwhile the main landing on Guadalcanal met surprisingly little opposition. This, as stated, commenced only at 1000 on the 7th, so the Japanese commander had nearly four hours to decide what to do. He elected to withdraw. Guadalcanal is a comparatively large island: over 80 miles long and about 30 miles wide, with an 8,000-foot mountain near the center. Our landing was in the center of the north side, opposite where the Japanese were constructing an air field. The enemy before our attack retreated westward and established himself some 7 miles beyond the lines which we established. The air field was found to be approximately 85% completed, but as it could be used at once the Marine fliers took immediate possession.

On the 8th the transports, having discharged their troops with combat equipment, were unloading stores when about noon enemy planes attacked them. An air fight developed. The Japs succeeded in hitting one transport but lost many of their own planes. Discharge of freight was expedited, as scouts reported an enemy fleet was approaching.

To protect the transports our naval covering Task Force took position north of Guadalcanal and around Savo Island (an islet just north of Guadalcanal). The ships patrolled back and forth over a fixed course. The night was rainy and dark, with visibility very bad. There was an inner naval guard close to the transports.

At about 0145 on August 9th the enemy's naval force, never well identified, arrived. It appears to have steamed in north of our ships, between Savo Island and our vessels, without being detected. Enemy planes then dropped flares on the south side of our ships. Due to low clouds the flares were not seen until they were low down; they outlined our ships to the enemy, who promptly opened fire. There was delay in our returning the fire, the attack being so unexpected. The enemy's force seemed to consist of cruisers and destroyers, which attacked with both guns and torpedoes southeast of Savo Island. In this encounter the Australian cruiser *Canberra* was so badly damaged that it sank later that morning.

After this engagement the Jap ships continued on around Savo Island; northeast of it they ran into other American ships. It is not known exactly what happened this time, but two American cruisers (*Quincy* and *Vincennes*) were sunk. The battle then continued off and on during the remainder of the night, and we suffered the additional loss of the cruiser *Astoria* which was so badly damaged that she too sank later that morning. All cruisers sunk were of about 10,000 tons each. What losses the enemy had is not known. In view of the results of this battle our transports were hurriedly sent southward.

A week later Japan issued an estimate of the situation. Its conclusion was that the United States was commencing a concentric attack on Japan, to consist of

a. **an attack north and northwest from the Solomon Islands;**

b. **another (from aircraft carriers and minor forces) westward from Hawaii;**

c. **another southwestward from the Aleutians;**

d. **another eastward and northeastward from China. Attention was invited to the increasing number of American planes, pilots, mechanics, and ground crews which had been arriving in Chinese bases via India;**

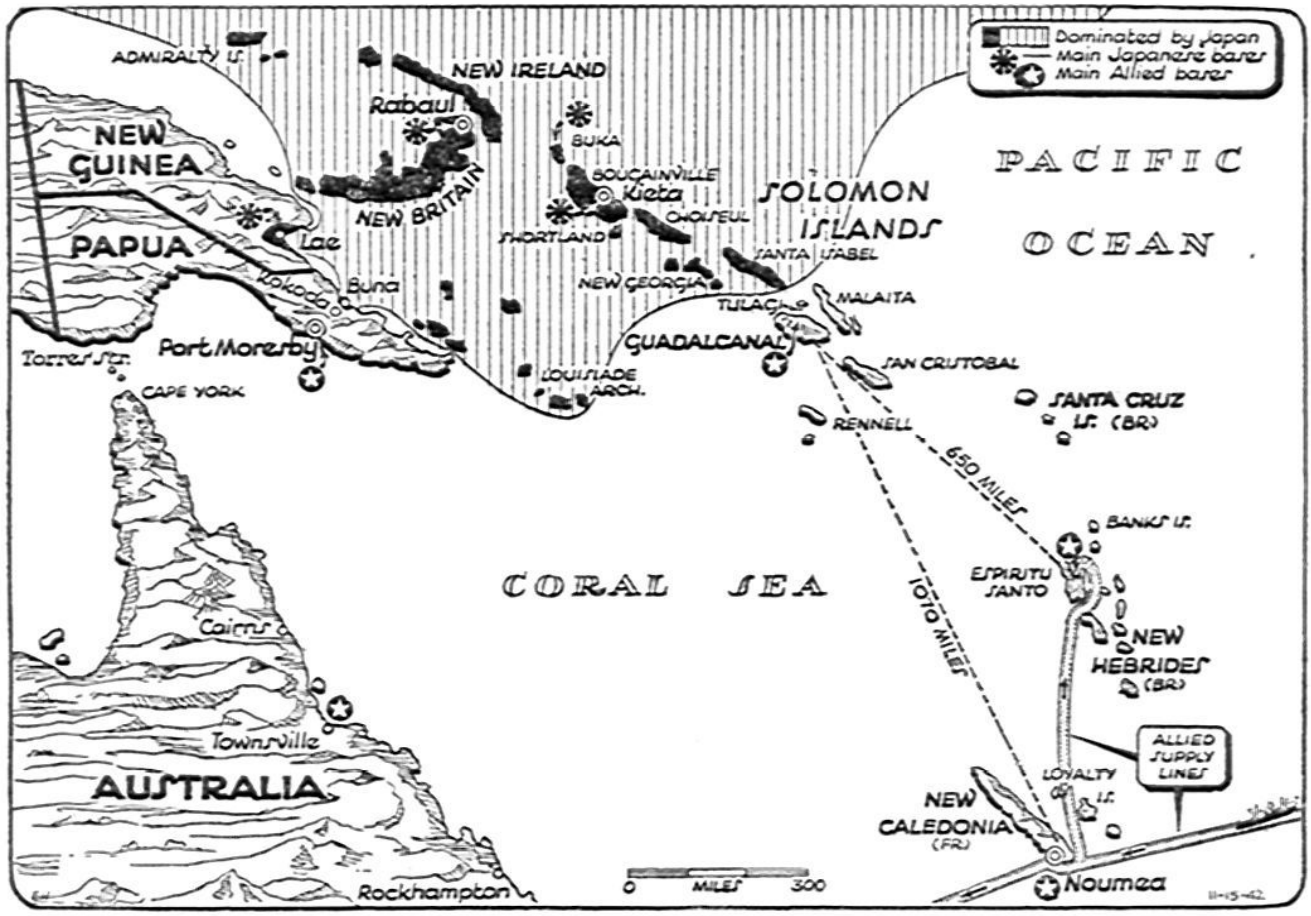
e. **another eastward from north India into Burma;**

f. **another northward from Australia toward the Netherland Indies and the Philippines.**

Regardless of the accuracy of this report, it should be considered as at least partially explaining Japanese tactical movements and the strategical deployment of their ground, air, and sea forces.

After the seizure of the southeast Solomons—which so far as the ground forces were concerned was rather easily and quickly accomplished—our Marines proceeded to consolidate their new possessions. Except on Guadalcanal there was no enemy opposition, and work proceeded rapidly in erecting batteries to cover the water front, improving the air field, and providing accommodations for the troops.

Commending about August 11th small enemy forces arrived on Guadalcanal to reinforce the troops already there. These were entirely infantry, without artillery or tanks. Jap landings were made at night, when apparently our planes were inactive. As enemy planes frequently bombed the newly seized field on Guadalcanal, the inference is that there were so many holes in the ground as to prevent planes taking off or landing after dark. The enemy landed to the west of our positions on Guadalcanal and within ten miles of them. Frequent patrol encounters between our Marines and the Japanese were uniformly successful for us. On August 19th a Jap detachment of 92 men was defeated, every man being killed as against a loss to us of only 6 killed and 13 wounded. On the 21st an enemy detachment of about 700 men, believed to have landed just the night preceding, was completely destroyed while our loss was but 28 killed and 72 wounded. The enemy was persistent, and



notwithstanding his losses continued to smuggle in more troops at night. His air force was also active and frequently bombed our positions.

During this period both sea forces kept away from each other but they both sailed around, the Americans basing themselves upon the New Caledonia and New Hebrides Islands. The two fleets made occasional air thrusts at each other, one of the most important occurring on August 24th and 25th to the northeast of our part of the Solomons. Neither fleet directly contacted the other, but each had aircraft carriers whose planes mutually attacked the ships of the other. Some American army planes also took part in the battle.

Air attacks were fast and furious. They started on a sunny afternoon and continued after sunset, under a brilliant moon. Our planes located an enemy fleet of about 3 carriers, 2 battleships, and some 20 cruisers and destroyers. As usual the air attacks concentrated around the carriers. The Americans sank a Japanese carrier of about 7,000 tons and damaged a much larger one, believed to be the *Suykaku* or *Ryuzyo*. Several enemy cruisers and destroyers were damaged besides. Attacks on our ships were aided by clouds which enabled their planes to approach under cover. Our loss is reported as the destroyer *Blue* sunk. About 50 Jap planes were shot down. Our plane loss has been announced as "a few" only. Japan admitted the loss of the carrier and of 1 destroyer.

Another encounter occurred close to Guadalcanal on the 24th, when our planes hit and damaged an enemy cruiser and a transport which had been landing troops on Guadalcanal during the preceding night. The enemy had covered this landing by having his destroyers violently shell the American positions during the night. This fire was of course unobserved and caused only minor damage or casualties.

On August 27th Navy planes from Guadalcanal sank 1 out of 3 enemy destroyers in the Solomon area. As the month of August closed, American possession of the south Solomon group of islands appeared secure.

THE JAPANESE COUNTERATTACK

September found the Marine garrison on Guadalcanal confident of their ability to maintain their positions. Some dysentery was present among the troops, but health in general was good. Food, while limited as to kinds, was ample.

Information arrived that the enemy had established bases at Rekata Bay and on Gizo Island, presumably for a future attack on Guadalcanal. Reketa Bay, 7 miles long and between 2 and 3 miles wide, is on the northwest coast of Santa Isabel Island. Gizo is one of the New

Georgia group; it is a small island about 5½ miles long and heavily wooded, affording good concealment for installations ashore.

Early on September 5th two converted American destroyers (*Gregory* and *Little*), assigned to transport duty, were on patrol off Guadalcanal. A hostile naval force, not identified but estimated as 3 to 5 cruisers or destroyers, approached unseen. As in the engagement of August 9th, the first knowledge of the enemy's presence came when his planes dropped flares which outlined our ships to his gunners. Due to this surprise the enemy secured an initial advantage. The commander of our two small ships was wounded at the start of the action, having a leg shot off. He kept his post on the bridge, however, and continued to direct his two ships. There was a rapid exchange of gunfire, but both our ships went down. Later the enemy found our destroyer *Calhoun*, a sister ship to the two others, and sank it also. The Jap loss, if any, is not known.

During the next week the enemy frequently bombed Guadalcanal and continued to land small forces at night, thus gradually building up a stronger force. On September 13th a strong Japanese air attack was made against our air field; it was supplemented after dark by enemy ships shelling our installations. The Marines returned the fire with a coast battery, hitting one hostile ship. Following this fire, which appears to have been intended as an artillery preparation, enemy land forces attacked Henderson Field. The fighting died down after daylight; the Japs withdrew temporarily. Our planes then took off, discovered an enemy naval force of battleships and cruisers northwest of Tulagi, and made on air attack which is believed to have secured hits on the battleships.

In view of the enemy's apparent intention to counterattack in an attempt to recover the southeast Solomons a new American expeditionary force was en route with reinforcements, supplies, and planes. The latter were badly needed. A supporting and covering naval force was provided, of which the aircraft carrier *Wasp* was flagship. On September 15th an enemy submarine fired 3 torpedoes into the *Wasp* near the magazine and gasoline tanks which were open during the issuing of bombs and fuel to planes about to take off. Almost immediately fires broke out, which were soon accompanied by violent explosions as the bombs and fixed ammunition went off. Twenty minutes after the ship was hit two 1,000-lb, bombs went off at once, engulfing the entire forward part of the ship in flames. It was necessary to abandon the ship, which was later sunk by one of our torpedoes. On this occasion the enemy also torpedoed and sank our destroyer *O'Brien*.

Notwithstanding these losses the expedition arrived at Guadalcanal and duly landed the reinforcements and supplies on September 18th, the task being completed within 14 hours. During the balance of September the enemy frequently bombed our positions on Guadalcanal, while our planes bombed Japanese bases, including especially those at Buin on Bougainville Island, Rekata Bay, and Rabaul. Most air attacks on Rabaul (which were made by General MacArthur's air force) were at night. Shipping activity in that harbor led to the impression that the Japs had by no means given up hopes of recapturing Guadalcanal, on which minor patrol engagements continued constantly. The enemy's ground forces on Guadalcanal were still without tanks or artillery, but they did have flame throwers and infantry mortars. The latter were reported as being very effective.

As October opened the enemy continued to land his small contingent of troops on Guadalcanal nearly every night. During the night 3/4 October our destroyers discovered a heavy enemy cruiser so engaged, and succeeded in hitting it. After daybreak torpedo planes flew off and twice secured further hits against the same ship. Whether it later sank or managed to escape is unreported.

On October 9th the Marines started an offensive westward. At that time the lines lay on opposite sides of the Matanikau River, which is a sluggish creek. The enemy, however, had a bridgehead on our side of the river near its mouth, held by about a company of infantry. Our Marines' plan was to make a holding attack against this bridgehead while the main force, moving south into the interior, turned west where the Matanikau is fordable. Our column would then execute on right into line and advance northward on the enemy's side of the river; it was hoped to take his positions in flank and roll them up. On the 9th the holding attack made no progress, while the turning column was delayed due to lack of water for the troops and so never got into action. The troops, about a regiment, had one water cart with one faucet per battalion, and it took about two hours to refill canteens.

On October 10th the holding attack made no further progress but the turning column crossed the river without opposition except from patrols and duly turned north as intended—then had hard fighting, and as day ended had not reached its objectives. In the ensuing night the commander of the holding attack got his men by infiltration in rear of the enemy's line and between the Japs and the river. The enemy thereupon counterattacked to his rear, resulting in a wild hand-to-hand fight with knives and bayonets. Our Marines appear to have been stronger physically than the Japs, and had much the best of the fight.

On the morning of the 11th it was found that the enemy had abandoned the Matanikau River position; our forces promptly occupied it.

On the following night began a series of important engagements. About midnight an American naval force encountered off Savo Island a hostile naval force which seemed to be convoying reinforcements to Jap troops on Guadalcanal. There followed a 30-minute battle with

guns and torpedoes. We did well this time: an enemy heavy cruiser of the *Nati* or *Akago* class, 4 destroyers, and a small transport were sunk. The enemy on his part sank the U. S. destroyer *Duncan*, while other of our ships suffered minor damage.

On the 13th more American reinforcements reached Guadalcanal. The transports were attacked by enemy bombers during the afternoon, but as the ships were well protected by overhead air cover and by naval vessels they had no losses, although there were some casualties among the troops—who were from the Army—while they were debarking on the beach. Our transports completed discharging their passengers and stores and withdrew.

During the ensuing night of October 13/14 a hostile naval force appeared off Guadalcanal. Although not identified, it was believed to contain battleships, cruisers, and destroyers. It shelled Henderson Field and other land targets in the heaviest bombardment the island had yet had. The explosion of the large shells was at times so violent and continuous that the ground shook like an earthquake. The Marine shore battery replied to this fire and secured three hits on a destroyer. The enemy withdrew before daybreak.

During the afternoon of the 14th two hostile air raids occurred over Guadalcanal. They had probably the dual mission of damaging Henderson Field and of securing photographs of American positions. Then in the following night the enemy naval force came back again and renewed its shelling of territory held by our troops. Planes dropped flares to illuminate targets and operated continuously to spot for the naval artillery. No American planes have been reported as in the air, presumably because Henderson Field still could not be used after dark. This night shelling resulted in the destruction of some of our planes (which were scattered around the flying field) at a time when there was already a shortage in planes. It also caused casualties among our personnel. The only unit which has announced its personnel losses for this night is the Naval Air Squadron, which suffered 11 killed and 11 wounded. Toward the end of the shelling Navy motor torpedo boats attacked the Japs; they believe they secured a hit on a cruiser just before the enemy withdrew.

While this night shelling was in progress, five enemy transports arrived off the Japanese end of Guadalcanal, some miles west of Matanikau River, and were run in as close to the beach as possible. Japanese engineers, using division bridge-train equipment, rapidly constructed pontoon piers between ship and shore to enable troops to march off and wheeled materiel to be rolled off. The latter included artillery and tanks, the first the Japanese had had in this area. With daylight the transports were discovered by our air scouts and two attacks were made on them. This resulted in three of the ships being set on fire, subsequently beached. The remaining two seem to have escaped and were later reported, and also attacked, en route to the north.

On October 16th air reconnaissance discovered a large number of enemy ships near Shortland Island, which lies at the south end of Bougainville—these were in addition to various naval and transport units in the southeast Solomons. In the following days there was considerable air activity by both sides. Our planes attacked numerous enemy ships throughout the Solomon group, while enemy planes regularly attacked Henderson Field and vicinity. One of our best successes was on the night of October 22/23, when General MacArthur's planes raided Rabaul and secured bomb hits on 8 transports, 1 cruiser, and 1 destroyer. On the same night planes from Guadalcanal attacked other enemy ships off Shortland Island and obtained bomb hits on a cruiser and on a destroyer.

The enemy troops who had been landed on Guadalcanal had by now been organized and were ready for attack. Our positions were about 6 to 7 miles long and some 3 miles deep. The west boundary was west of Matanikau River, and Henderson Field was near the east end. Both army troops and Marines were now present. They were expecting to be attacked, and were prepared for it.

The initial enemy attempt was on the night October 23/24. The Japs laid down an artillery preparation on our front line. Under cover of this fire a tank attack was launched; it was repulsed by the defenders, who in this sector were in part Marines and in part Army troops. Three later attacks had no better success. During the morning of the 24th the enemy made a last strong assault. American artillery, having now the benefit of observation, placed a heavy fire on the attacking Japanese. The Air Force also intervened and attacked the enemy by bombing and machine gunning his advance elements. Under this, coupled with the defense of the ground troops, the enemy's attack collapsed with the loss of 5 tanks abandoned in the foreground.

On October 25th an enemy destroyer raided the harbor of Tulagi. A Navy tug (the *Seminole*) which happened to be there was sunk, together with a small harbor boat. The Marine shore battery returned the enemy's fire and scored several hits on the attacking destroyer. This destroyer then withdrew, joined two other destroyers, and the three of them steamed over toward Guadalcanal. Here they got into a fight with two American mine sweepers. Planes from Guadalcanal noting this flew over and sank two out of the three enemy ships.

While this sea engagement was going on the Japanese delivered their main land attack. It came on the south side of our positions on Guadalcanal but made no progress against the defense of our troops. Enemy cruisers and destroyers arrived and commenced to shell our positions from the north. Japanese dive bombers attacked both our troops and Henderson Field. It was a well coordinated attack against our positions, and very heavy fighting continued throughout the day. Army, Marine Corps, and Navy planes in early afternoon joined in the general battle of sea, air, and ground forces. Our planes attacked the enemy's fighting ships, and when they withdrew followed them to north of Florida Island. Several

hits were reported as secured on one or more enemy cruisers.

When darkness came the land battle did not die down, but continued with increased intensity. Japanese artillery fired a strong preparation, and then in the night the enemy's tanks and infantry dashed forward. They came into our lines, in savage hand fighting broke through, and penetrated for some distance within our territory, where they stayed all night. During the morning of the 26th a strong counterattack drove the Jap out of our lines and back to his own. At the same time Marines attacked west of the Matanikau River; despite strong opposition they succeeded in advancing our line slightly. Fighting continued the rest of the day and into the 27th, when the enemy gave up the attempt to assault our troops.

Japanese naval forces engaged around Guadalcanal had been covered by a force of ships patrolling well to the northwest. An American naval force was in the same general area. Each side had aircraft carriers, and their planes mutually made contact with the other side commencing on the night October 24/25. This led to

THE BATTLE OF SANTA CRUZ ISLANDS

This occurred on October 26th, north of the Santa Cruz Islands. It was another one of those aerial-naval thrusts in which planes fought ships and other planes, and ships fought planes. After initial attacks planes returned, refueled, took on ammunition, and then made a second attack. The air fighting was continuous and severe. As usual the air attacks concentrated around the carriers, and for us against at least one Jap battleship also. The carriers, in addition to their own powerful antiaircraft defense, had overhead cover and a screen of destroyers and cruisers for protection against both submarine and air attacks.

Although the carriers had as good protection as could be expected, it was not sufficient on either side. Good weather favored air attacks; perhaps this had considerable to do with it. The main air fleets do not seem to have met; each main fleet met a secondary air force intended to hold the enemy in the air away from its own surface ships. Under these circumstances each air attack inflicted losses on its enemy.

American planes overcame the enemy's air defense and attacked two Japanese aircraft carriers. They bombed both of them—ships of the *Zuikaku* class. One was much more severely damaged than the other, but both were still afloat when last observed. One Jap cruiser was damaged. Japanese and American reports agree as to the foregoing losses. The Japanese have not admitted damage to other ships claimed by our pilots: 1 battleship and 2 cruisers.

The first Japanese attack against our ships resulted in heavy damage to one of our aircraft carriers, which was taken in tow. In the afternoon the enemy's second attack again concentrated against this ship, now nearly helpless, and caused further damage from which she later sank. The Japs also succeeded in sinking our destroyer *Porter*.

Plane losses are not yet known. The Japanese have admitted the loss of 40 of their own planes, but our reports claim that the Japs really lost between 100 and 150 planes. The Japanese claim to have downed 200 American planes; this is undoubtedly exaggerated, but no official report has been issued regarding our losses.

Darkness put an end to the battle of Santa Cruz Islands. Under cover of night the engagement was broken off, and the hostile fleets withdrew to their respective bases.

Until the end of October only minor air activities occurred in the southwest Pacific area.

COMMENTS

American intervention in the Solomon Islands is only a minor campaign within a total global war. It is not thereby unimportant. It must be judged in relation to other theaters of operation.

The mission of our intervention was to prevent the enemy—Japan—from advancing toward New Zealand or Australia, two great dominions occupied by white races. It was also to prevent Japan from completing the construction of an air base on Guadalcanal and a sea base at close-by Tulagi, from where raids could be made against our sea line of supply to the southwest Pacific. Whether Japan ever intended to attack Australia or New Zealand we do not know, but since our intervention she has not done so and it will hereafter be much more difficult for her to attack these dominions or interfere with our ships going there.

Whatever Japan's intentions were, she certainly considered the Solomon Islands as necessary for her purposes; otherwise she would not have made so many efforts to recapture them. The conflicts which have occurred have been costly to her and out of proportion to any direct benefit of being in the Solomons. But the Solomons are a stepping stone, a service station, along a long route which leads to more valuable goals. For Japan, this route leads south; for us it goes northward. It promises to be a hard way, but we must progress along it if we are to resume our previous position in the Far East. We must travel over it, whatever the opposition we may encounter. There are literally scores of millions of people in those populous eastern countries who are silently awaiting and hoping for our arrival.

From this point of view the Solomon Islands are important. They are the doorway to greater things to come.

In war men do the impossible. Great souls shine forth—sometimes as officers, sometimes as privates. Perhaps they are born so; perhaps they are made by self-training, by contemplating inwardly what lies ahead, by charting their course and storing up resolve. Great as is the influence of leadership, it alone is not enough. Soldiers—our kind of soldiers—must be right inside.

When soldiers are right and leaders lead, the combination is unbeatable, irresistible. Such troops can not be stopped; they never tire; they never turn back, but go forward always.

—LT. GEN. LESLEY J. MCNAIR

Employment of Tank Destroyer Units

By Lt. Col. G. S. Meloy, Jr., and Maj. Joseph Sill, Jr.*

NOTHING is new or untried about the basic American concept of Tank Destroyers, but its correct application on the modern battlefield may well mark a new swing in the eternal pendulum of warfare.

Tank Destroyer units were employed more than 500 years ago. Prior to the battle of Crecy, the spearhead of many French victories over their English foes had been the *massed employment of heavily armored forces*. The French "tank" of that period was the knight on horseback.

Ancient knights and modern tanks have many characteristics in common. Heavy armor protected the knight against virtually every weapon of his day. He had considerable cross-country mobility and tremendous shock power. But, like the tank, he had his weak points. "Buttoned up" with his visor closed and jogging across country, he could see about as much as you could if you tried to peek through the keyhole of a swinging door with someone kicking you in the pants. His means of propulsion, his horse, was as vulnerable as any set of tracks and bogies. And once immobilized, the knight was just a clumsy and unwieldy push-over.

Now what did the English do at Crecy to stop and destroy these armored monsters which had been dominating Europe? They did exactly what we are advocating and preparing to do today. They introduced a high velocity, rapid firing, *armor piercing* weapon, the famous English long bow. They gave this weapon great tactical mobility by placing it in the hands of sturdy English yeomen, unhampered by heavy armor and unrestricted of vision. Finally, they gave these archers the one and only primary mission of Tank Destroyers—to destroy tanks.

When the French armored force attacked at Crecy and as usual poured through the English infantry like water through a seive, the English Tank Destroyers counterattacked. From behind every fold in the ground, every bush, they loosed a mass of armor piercing fire against the flanks of the armored spearhead. Then, before the heavy French knights could swing to meet them, they shifted and pressed home their attack. Before nightfall the armored masters of Europe were crushed, never to rise again until the advent of the modern tank. Superior armor piercing fire power and superior maneuverability—fire and movement—had conquered, as they will conquer again when our own Tank Destroyers are properly employed against the armored forces of the Axis.

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MISSION

Our army has gone out wholeheartedly for this Tank Destroyer concept of killing the tank by employing units capable of great armor piercing fire power and bold, aggressive maneuver. To accomplish this it has created a specialist, the Tank Destroyer Battalion—a specialist with but one primary mission, to seek out and destroy tanks. Nothing must be allowed to divert the Tank Destroyer Battalion from its primary mission of destroying tanks. It cannot, was never intended to, and is not equipped to combat strong infantry, cavalry, or artillery forces. Its job is to fight tanks, and to do so successfully it must normally have the support of other arms to protect it from forces other than tanks.

With the mission of destroying tanks, not of gaining or occupying ground, primary objectives of Tank Destroyers will differ from those normally given to other arms. Tank Destroyer objectives should not be static terrain features. They should be enemy armored forces, the tanks themselves, not places where the tanks happen to be at one moment and not the next.

A suitable objective may be tanks in an assembly area or tanks on the march. To reach such objectives in enemy territory, Tank Destroyers will need the support of other arms to break a hole for them. The objective may be an armored attack or penetration. In fact, a proper objective for Tank Destroyers may be any hostile armored formation getting ready to attack, attacking, reorganizing after an attack, retreating, advancing to exploit a breakthrough, or supporting other enemy attacking units. Always, however, Tank Destroyer objectives should be *tanks*, moving objectives to be attacked with fire and movement.

TACTICS

Against such objectives the Tank Destroyer Battalion may be employed to attack the head, the flanks, and the rear. It may hit the head, then the flank, and then the rear of an armored force. It may hit these points successively, engaging one while hitting another. Or it may attack all three simultaneously. The method to be chosen may depend upon the relative size of the units involved. A Tank Destroyer Battalion should be able to attack a tank company from three points at once, or perhaps a tank battalion in particularly favorable terrain. A Tank Destroyer Group should be able to handle similarly a tank battalion, or even, under favorable conditions, a tank regiment.

To capitalize fully on their mobility, Tank Destroyer Battalions are initially held in concealed positions well to the rear where they can make the most efficient use of the road net, to be committed to action *in mass* anywhere

over a wide zone. As timely, accurate information develops and locates the hostile armored threat, they strike in mass with surprise, from an unexpected direction, at an unexpected time, with unexpected speed and power. The employment of a Tank Destroyer unit can be likened to the action of a good back in football: he stays well back of the line until he knows where the play is coming, then he hits it with everything he has.

Now let us consider the coordinated employment of the several major elements of the Tank Destroyer Battalion. First, consider the Reconnaissance Company. It is an organic intelligence agency within the battalion. Its primary mission is continuous, aggressive reconnaissance to find and maintain contact with the specific armored force which its own battalion has been assigned as a primary objective. Its big job is to keep the battalion commander informed about the location, composition, dispositions, and movement of this specific hostile force. In addition, it can provide the battalion commander with information regarding friendly troops and the terrain. It may have to fight to gain this information, but it should avoid serious involvement which might pin it to the ground. And obviously, in order to accomplish its mission, it must be left to operate under battalion control; if used for other missions by higher headquarters, it leaves the hard hitting, fast moving Tank Destroyer Battalion blind and useless.

During the approach, the Reconnaissance Company may be employed on a route, area, or zone reconnaissance. A zone reconnaissance will constitute its normal method of employment. On this type of mission it may be fanned out anywhere from 3 to 15 miles to the front and flanks — the maximum distance when the enemy threat is vague and distant, the minimum when the enemy has been definitely located and contact is imminent. At night, when mounted reconnaissance is more apt to give out information than to gain it, the Reconnaissance Company may be used to establish a line of dismounted listening posts; it may be pulled back to reinforce the close-in security of the battalion; or it may join with other elements of the battalion in raids on tank parks and assembly areas. But during daylight the Reconnaissance Company has a vital job of reconnaissance. A good horse can be worked to death, so this Company should be given all the rest possible at night.

During actual combat the Reconnaissance Company may be used as a decoy to lure hostile tanks into the battalion attack position; it may secure the flanks of the battalion; it may reconnoiter hostile flanks or routes that we anticipate using; it may establish road blocks to limit hostile maneuver; or it may assist in securing assembly areas, rallying positions, or the rear areas.

One of the most important elements of the Reconnaissance Company is the Pioneer Platoon. Its primary mission is to further the rapid movement of the battalion. It will repair roads, strengthen bridges, construct detours, reconnoiter routes—anything which will make it easier and quicker for the combat elements to move. On the other hand, by constructing road blocks, laying small mine fields, or performing demolitions on bridges, it can restrict hostile maneuver and thus further facilitate the rapid movement of the battalion. Good reconnaissance and good pioneer work, by helping to get the guns into the right place at the right time, greatly increase the battalion's ability to attack with fire and movement.

The Tank Destroyer Companies form the backbone of the Tank Destroyer Battalion. They provide the fire power. Their mission is to destroy tanks. All other elements of the battalion have but one mission—to further the employment of that fire power inherent in the Tank Destroyer Companies.

The basic unit of fire power in the Tank Destroyer Company is the Tank Destroyer Section team of two self-propelled 3-inch guns, one self-propelled AA gun, and a Security Group consisting of two armored quarter-ton vehicles. Rarely, if ever, will the elements of this basic team be employed individually. Only on the rare occasions when a company or battalion acting alone must pass through a defile will the AA guns be separated from their companion Tank Destroyers. When Tank Destroyers are properly employed in mass, by Groups and Brigades, higher units will call on Corps for AA defense of such defiles, leaving the organic AA weapons where they can perform their principal mission of protecting the two Destroyers of their own team.

Two such section teams, together with a small headquarters section, make up the Tank Destroyer Platoon. The Security Group (as its name implies) is employed to give each Tank Destroyer Section some security against small forces of hostile foot troops.

There are three platoons and a headquarters section in the Tank Destroyer Company. When the company is acting alone or has a special mission it is quite proper to attach to it one Reconnaissance Platoon. In the advance, this attached Reconnaissance Platoon will be teamed with one Tank Destroyer Platoon to form the advance guard for the battalion. Once contact is made with hostile armored units the Reconnaissance Platoon may be withdrawn to reserve; it may be employed to cover the Destroyer Platoons against lightly armored forces; it may be given a battle reconnaissance mission; or it may be used to harass the enemy's flanks or delay his attempts at withdrawal.

When the enemy is definitely contained and the situation crystalized, all three Destroyer Platoons will be engaged at once, to produce the surpirse effect of massed fire. Under such conditions the battalion might initially hold a company in reserve, but the companies engaged will not hold out any of the fire power of their heavy guns. On the other hand, in vague situations a company commander may hold one or two platoons initially in reserve until the situation develops. However, once the desired opening occurs, both company and battalion will employ all their guns to obtain decisive results.

In the employment of the Tank Destroyer Company, there is only one point to be stressed; it is the same point to be stressed in connection with the employment of all Tank Destroyer units, from sections to brigades. Tank Destroyers are not intended to fight a static battle, to slug it out with tanks. The Tank Destroyer Company is given great fire power and great mobility. *Both* must be used. The fight must be kept moving, destroyers shifting from position to position and continuously attacking with fire. Tank Destroyers do not use shock action but they always attack with fire and movement.

TERRAIN

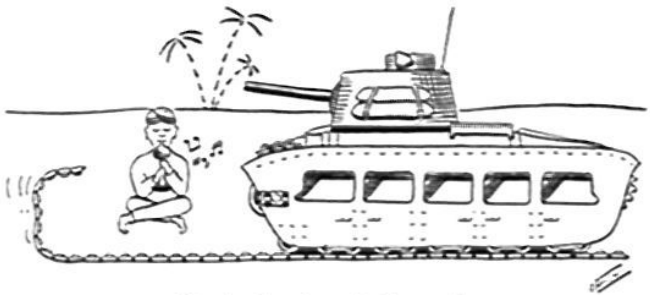
Tank Destroyer units, because of their great mobility, are particularly sensitive to the proper use of terrain. Depending upon how it is used, terrain can be friend or foe. Unfavorable, just as much as favorable, terrain must be used to advantage by making the tanks fight in unfavorable terrain while Tank Destroyers maneuver on favorable. That is where the mobility of Tank Destroyers comes in; they use that mobility to fight on ground of their own choosing, and they choose ground which makes the most of their mobility. Briefly, here is what Tank Destroyers look for in choosing terrain on which to fight: ample room for maneuver, freedom from obstacles which might restrict their maneuver, the possibility of blocking the maneuver of tanks, concealment, defilade, observation, fields of fire, and routes in and out of position. In a nutshell, Tank Destroyers use their mobility to fight on terrain which confines the enemy and at the same time increases their own power to attack with fire and movement.

Not only the terrain but also the air above that terrain greatly influence a Tank Destroyer unit's ability to move and shoot. Control of the air greatly facilitates Tank Destroyer employment. Movement is much faster and maneuver much freer when concealment from the air is not a primary consideration. Control of the air enlarges our ability to fight on ground of our own choosing. However, Tank Destroyers can operate without control of the air. It merely makes operations easier, more flexible, more efficient. Even without it, though, Tank Destroyers still have the edge on tanks in those twin factors of success on the battlefield—fire and movement.

Cooperation with other arms beside the air force is usually necessary to the successful employment of Tank Destroyer units. Large tank attacks almost invariably will be accompanied by strong forces of infantry and artillery. Tank Destroyer units, being streamlined for a streamlined job, are not equipped to fight large forces of anything but tanks. Consequently it goes without saying that Tank Destroyer units will almost always be employed in conjunction with other arms. Many missions for Tank Destroyer units will cause higher commanders to attach infantry, cavalry, artillery, or engineers to Tank Destroyer Groups. A deep incursion into enemy territory to strike a tank park or assembly area might cause the formation of a composite force, perhaps a small armored force built around Tank Destroyer Groups with the sole mission of getting Tank Destroyers through to their objective. Conversely, other arms need Tank Destroyer support in the accomplishment of their missions. In fact, it is hard to conceive of any Task Force, any balanced force from now on, which will not include Tank Destroyers. Again we go back to the basic principle. Successful Tank Destroyer employment hinges upon attack with fire and movement, and employment with other troops increases the Tank Destroyers' ability to move and concentrate their fire power on their sole objective—enemy tanks.

SUMMARY

The employment of Tank Destroyer units seems to cover a broad range of subjects: movement over great distances, operations over wide areas, the use of many different weapons, coordination with air forces and many other arms. But the fundamental principles are simple and clear. Tank Destroyer units exist for one purpose—to destroy tanks. To destroy tanks they must seek them out, act offensively, always attack, even when attached to larger units on the defensive. Because they do act offensively, take the initiative, they can and should fight on ground of their own choosing, where they can maneuver efficiently and mass the fire of all their weapons. All of which adds up to five words: *attack with fire and movement*.



Track changing—Indian style

By Lt. Col. Gerald N. Bench, FA

"One Picture . . . . . .

is worth 10,000 words," as any soldier will tell you with emphasis.[1]

These days a great deal is being done about putting this principle to work in the army's training program. Whenever a manufacturer wants John Q. Public to know about his favorite product he displays it in picture form. Sometimes on the billboards; sometimes on the screen; sometimes in the newspapers and magazines.[2]

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The army is no exception. Models, sandtables, terrain boards, posters, wall charts, demonstrations, film strips, and motion pictures play a part in bringing knowledge to the present day fighting man. These are, in the main, visual aids. Sight, most highly developed of man's senses, most relied upon, is not always exploited to the fullest measure in the learning process. The source of supply of some of these visual aids is limited by the means of production, but the army is fast removing this difficulty. Means are being suggested for local production of wall charts and working models. Plans are being made for mass production of

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charts for wide distribution. Each branch is producing film strips and training films. Informational bulletins, maps, pictures, and posters are being produced and distributed in ever increasing numbers to help inform and train the soldier for combat.

Every officer and enlisted man is an instructor in some degree in his army life.[3][4] The War Department has

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recognized this function from the beginning. Every officer is particularly charged to be thoroughly familiar with the contents of FM 21-5, *Military Training*, and FM 21-6, *List of Publications for Training, Including Training Films and Film Strips*. A high degree of training requires instruction of a high order, and this means that instructors must be well chosen and well prepared.

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The use of visual aids in the form of pictures, charts, models, film strips, or motion pictures does not by any means supplant the instructor. They are *aids*. Paramount in importance is thorough preparation by the instructor and a high degree of effectiveness in his manner of teaching. Preparation includes a thorough knowledge of the content and best means of employing any aid he chooses to use. It is particularly essential in the use of a training film or a film strip that the instructor review it before it is used, and that he plan *how* he will use it. A movie or a strip requires a good introduction, an adequate presentation, a clever "conduct of learning," a summary, and a testing program. Very frequently the testing will reveal the need of reteaching and retesting.

The Field Artillery School is contributing its share toward making training aids available to units in the field. Long used in quantity at the school, many visual aids are in process of conversion into a form usable by the field forces. In addition, new aids are being prepared. In connection with the use of aids, reference to FM 21-5 and

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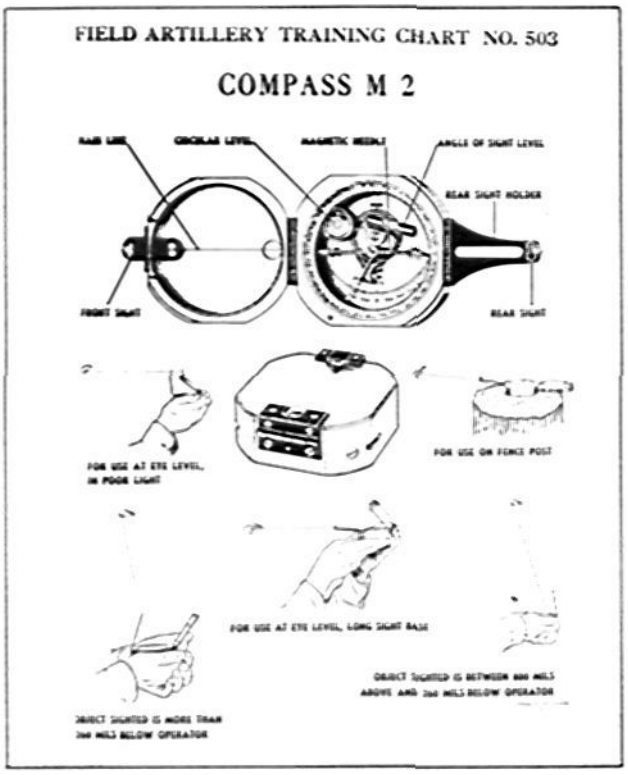
FM 21-6[5] (amended by TC 70 and 78) will prove of the greatest help. In the latter may be found a list of references, training films, and film strips, with suggestions as to the best means of employing these aids. The Field Artillery officer will find material prepared by other branches applicable to his needs. He must not confine his use of materials to those listed under the 6-series: many subjects treated by one branch are applicable to several or all services.[6]

Locally manufactured diagrams, charts, and cartoons are in wide use. Many of these are being made available to the field forces, along with newly prepared ones, through various agencies. A plan is under consideration to provide valuable charts, simple in form and composition, approximately 36 by 48 inches in size, to be produced in quantity at the Field Artillery School and made available to all interested parties.[7][8] Your suggestions as to subject and treatment will be most welcome.



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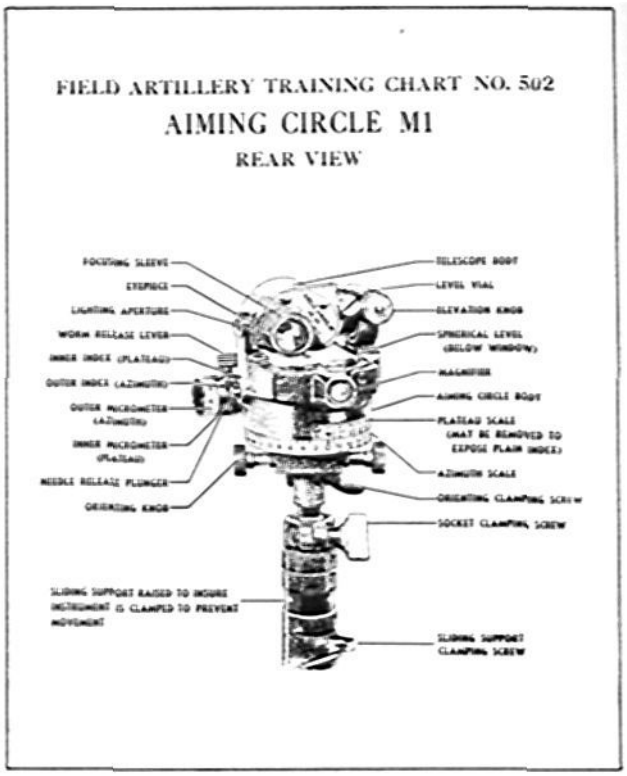

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Each branch of the army is engaged in preparing many new film strips and training films to help speed the program of training. The film strip consists of a series of transparencies in either black-and-white or color, printed on a strip of 35-mm. film.[9] Each picture or frame is projected singly on wall or screen by means of a small portable projector. Complete with explanatory remarks, labels, or directions, each strip is planned to present a complete teaching situation. Each frame presents a single thought, much in the same manner that a speaker presents his ideas in a series of sentences. The instructor remains in complete control all the time. He may allow a frame to remain on view as long as is necessary to insure complete understanding. His remarks are brought to life and made clear by means of the pictures he can show his audience. Thus sight and hearing complement each other. Large groups may be instructed identically; variation in instruction is held to a minimum.

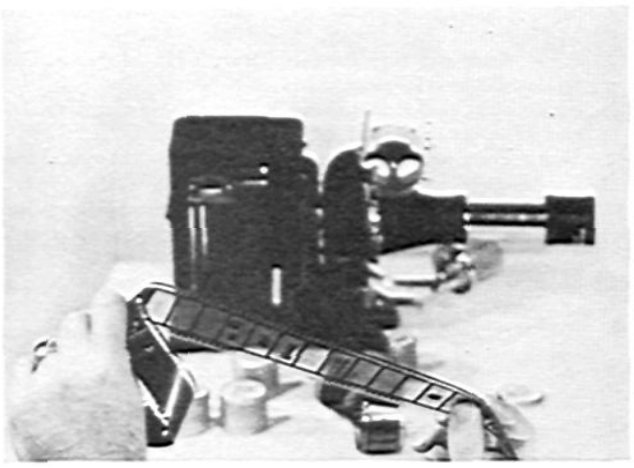
Many of the remarks applicable to the film strip are true of the training film.[10] It adds motion to the scene, and enables the presentation more nearly to approach reality. All training films are produced with accompanying sound. The value as a teaching medium is thereby immensely increased, both because of the increase in realism and because less reliance has to be placed on the background and training of the instructor. Nevertheless, the sound-on-film motion picture is an *aid*. It cannot and it does not supplant the instructor. Adequate explanation of the aim of the picture must precede its use. The showing must be followed by a discussion of the film and a testing for understanding.

Our job of training Field Artillerymen is tremendous. Time is short. Training aids help. Visual aids in the form of sound motion pictures offer certain unparalleled advantages. Film strips offer certain other advantages. So do charts. Some advantages and some disadvantages are common to all, while others are peculiar to each medium of instruction aid. Which you will use depends on the facilities available, the effectiveness of your planning, and your own resourcefulness and initiative.

TRAINING FILMS

There are a number of training films which have recently been released pertaining directly to the Field Artillery:

TF 6-183	155-mm. Gun M3, Service of the Piece Before and During Action.
TF 6-611	105-mm. Howitzer, Mechanical Functioning.
TF 6-612	105-mm. Howitzer, Service of the Piece.
TF 6-613	105-mm. Howitzer, The Firing Battery.
TF 6-684	105-mm. Howitzer Battalion in Reconnaissance and Occupation of Position Supporting an Attack.
TF 6-940	105-mm. Howitzer Battalion, Technique of Fire Direction, Part I—Observed Fire Chart.
TF 6-941	105-mm. Howitzer Battalion, Technique of Fire Direction, Part II—Surveyed Firing Chart, and Determination and Application of Corrections.
TF 6-942	105-mm. Howitzer Battalion, Technique of Fire Direction, Part III — Handling of Prearranged Fires and Use of Meteorological Data.



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TF 6-994 105-mm. Howitzer Battery, Organization of Position.
TF 6-1063 Signal Communications in a 105-mm. Howitzer Battalion, Part I—Occupation of Position; Part II—During a Displacement.
TF 6-1072 155-mm. Gun M1, Part I—Nomenclature of the Piece.
TF 6-1073 155-mm. Gun M1, Part II—Maintenance and Lubrication of the Piece.
TF 6-1074 155-mm. Gun M1, Part III—Bore Sighting, Panoramic Telescope, and Gunner's Quadrant.
TF 6-1075 155-mm. Gun M1, Part IV—Ammunition.
TF 6-1076 155-mm. Gun M1, Part V—Organization of Personnel and Duties in Firing.
TF 6-1077 155-mm. Gun M1, Part VI—March Order.

Subjects to be made into training films include:

1. Reconnaissance and Preparation of a Route for Motor Movement.
2. Movement of Vehicles Across Difficult Terrain.
3. Marching and March Maintenance.
6. Preparation of Field Artillery Weapons and Vehicles for Rail Transportation.
7. The 1000 Mile Maintenance Service of Field Artillery Vehicles.
8. The 6000 Mile Maintenance Service of Field Artillery Vehicles.
9. Local Security of Field Artillery Units—Two Parts.
10. Combat Intelligence.
11. The Liaison Section of a 105-mm. Howitzer Battalion.
12. The Forward Observer Detail of a 105-mm. Howitzer Battery.
13. Field Artillery Firing—Direct Laying.
14. Field Artillery Firing—Laying the Battery.
15. Field Artillery Survey.
16. The 155-mm. Howitzer M1918A3.
17. The 75-mm. Howitzer M1 (Pack).
18. The 75-mm. Howitzer M3A2 (Field).
19. Field Artillery Firing—Preparation of Firing Data.
20. Field Artillery Firing—Conduct of Fire.
21. The 4.5 Inch Gun.
22. The 155-mm. Howitzer M1.

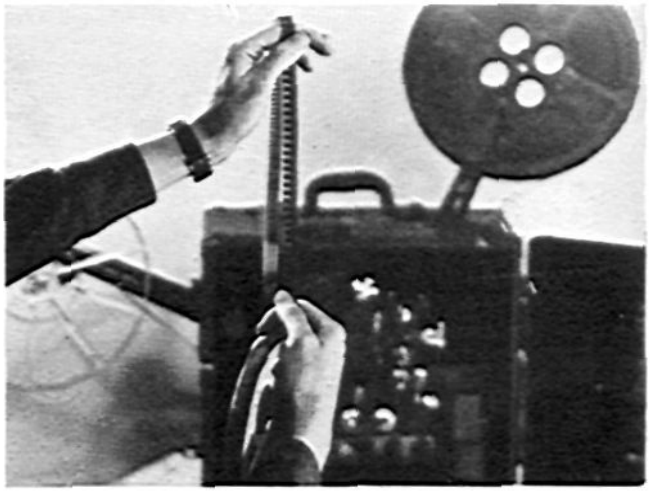
FILM STRIPS

Film strips recently completed are:

FS 6- First Echelon Maintenance—GMC 2½-ton Truck. Part I—Inspection Before Operation.
FS 6- First Echelon Maintenance—GMC 2½-ton Truck. Part II—Inspection During Operation.
FS 6- First Echelon Maintenance—GMC 2½-ton Truck. Part III—Inspection After Operation.
FS 6- First Echelon Maintenance—GMC 2½-ton Truck. Part IV—Emergency Roadside Repairs.
FS 6- Field Fortifications. Part I—Hasty Fortifications.
FS 6- Field Fortifications. Part II—Deliberate Fortifications.
FS 6- Field Fortifications. Part III—Defense Against Mechanized Attack.

Subjects to be produced as film strips, many of which are already in production, include:

1. The Graphical Firing Table. Description and employment.
2. The Transit. Use and operation.
3. Radios Used by the Field Artillery. SCR-284. Characteristics, installation, operation, and vehicular mounting.
4. Radios Used by the Field Artillery. SCR-608. Characteristics, installation, operation, and vehicular mounting.
5. Radios Used by the Field Artillery. SCR-610. Characteristics, installation, operation, and vehicular mounting.
6. The 1000-mile Maintenance Service, GMC 2½-ton, 6×6, Truck. Detailed operations.
7. The 6000-mile Maintenance Service, GMC 2½-ton, 6×6, Truck. Detailed operations.
8. Field Artillery Weapons. To present the field artillery weapons, give chief characteristics, capabilities, and use.
9. Rail Transportation of Field Artillery Weapons and Vehicles. Means and methods of loading and securing weapons and vehicles for railroad transport.
10. Field Artillery Ammunition. Part I—Marking and Packing.
11. Field Artillery Ammunition. Part II—Storage.
12. Field Artillery Ammunition. Part III—Transportation.
13. Field Artillery Ammunition. Part IV—Care and Handling.
14. Field Artillery Ammunition. Part V — Projectiles and Propellants.
15. Field Artillery Ammunition. Part VI—Fuzes and Boosters.
16. Field Artillery Subcaliber Equipment. Installation and operation of subcaliber equipment on standard field artillery weapons.
17. Field Artillery Firing—Sensing. Appearance of bursts, type sensings, rules for sensing.



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18. Field Artillery Firing—Conduct of Fire. Part I—Axial Precision. Means and methods. Made with the 105-mm. howitzer, but applicable to other weapons indicated.
19. Field Artillery Firing—Conduct of Fire. Part II—Axial Bracket.
20. Field Artillery Firing—Conduct of Fire. Part III—Lateral Precision, Small-T Methods.
21. Field Artillery Firing—Conduct of Fire. Part IV—Lateral Bracket, Small-T Methods.
22. Field Artillery Firing—Conduct of Fire. Part V—Lateral Precision, Large-T Methods.
23. Field Artillery Firing—Conduct of Fire. Part VI—Lateral Bracket, Large-T Methods.
24. Field Artillery Firing—Conduct of Fire. Part VII—Forward Observation and Air Observation Methods.
25. Field Artillery Firing—Direct Fire. Methods in use with the 105-mm. howitzer, and applicable to other weapons for stationary and moving targets.
26. Field Artillery Firing—Laying the Battery. Methods and procedure.
27. Field Artillery Firing—Preparation of Data. Means and procedure.
28. Local Security for Field Artillery Units. Part I—The Battery. Means available and methods used for security against infiltration, and attack by ground or air troops.
29. Local Security for Field Artillery Units. Part II—The Battalion. Means available and methods used for security of the battalion area.
30. Field Artillery Combat Intelligence. To show how the field artillery obtains information; the importance of alertness on the part of all personnel; how the observer reports the intelligence; and to whom he reports it.
31. Field Artillery Survey. The means and methods of field artillery survey; to illustrate the reason for survey and the way in which the personnel accomplish the task.
32. The Liaison Section of the 105-mm. Howitzer Battalion. Composition, equipment, personnel and duties.
33. The Forward Observation Detail of the 105-mm. Howitzer Battery. Composition, equipment, personnel, and duties.
34. Sight Tests and Adjustments. Part II—75-mm. Howitzer M1 (Pack).
35. Sight Tests and Adjustments. Part II—75-mm. Howitzer M3A2 (Field).
36. Sight Tests and Adjustments. Part IV—105-mm. Howitzer M2.
37. Sight Tests and Adjustments. Part V—155-mm. Howitzer M1918A3 and M1917A4.
38. Sight Tests and Adjustments. Part VI—4.5-inch Gun M1 and 155-mm. Howitzer M1.
39. Sight Tests and Adjustments. Part VII—155-mm. Gun M2 and M3.
40. Sight Tests and Adjustments. Part VIII—155-mm. Gun M1 and 8-inch Howitzer M1.
41. Sight Tests and Adjustments. Part IX—8-inch Gun M1 and 240-mm. Howitzer M1.
42. Sight Tests and Adjustments. Part X—240-mm. Howitzer M1918 and M1918A2.
43. Organization of the Field Artillery. Portrayal by photo, drawing, and diagram the organization of the field artillery.
44. 75-mm. Howitzer M1 (Pack). Part I—Description and characteristics.
45. 75-mm. Howitzer M1 (Pack). Part II — Anuthorized disassemblies and assemblies by the battery.
46. 75-mm. Howitzer M1 (Pack). Part III — Mechanical functioning.
47. 75-mm. Howitzer M1 (Pack). Part IV—Care, lubrication, and cleaning.
48. 75-mm. Howitzer M1 (Pack). Part V — Packing the howitzer for transport.
49. 105-mm. Howitzer M2. Part I—Characteristics and description.
50. 105-mm. Howitzer M2. Part II—Authorized disassemblies and assemblies by the battery.
51. 105-mm. Howitzer M2. Part III—Mechanical functioning.
52. 105-mm. Howitzer M2. Part IV—Care, lubrication, and cleaning.
53. 105-mm. Howitzer M1917A4 and M1918A3. Part I—Description and characteristics.
54. 155-mm. Howitzer M1917A4 and M1918A3. Part II—Authorized disassemblies and assemblies by the battery.
55. 155-mm. Howitzer M1917A4 and M1918A3. Part III—Mechanical functioning.
56. 155-mm. Howitzer M1917A4 and M1918A3. Part IV—Care, lubrication, and cleaning.
57. 155-mm. Gun M1. Part I—Description and characteristics.
58. 155-mm. Gun M1. Part II—Authorized disassemblies and assemblies by the battery.
59. 155-mm. Gun M1. Part III—Mechanical functioning.
60. 155-mm. Gun M1. Part IV — Care, lubrication, and cleaning.

Additional training films, film strips, and charts are to be planned for the training of the combat soldier. The help of every officer and soldier is earnestly desired in suggesting subjects needed by the field forces. Send your ideas to the Field Artillery School now.

Field Artillery Board members studying high angle fire

Fighting the Japanese

(CONCLUSION)

Hong Kong

By
Capt. Chang Ten Jen, Chinese Army

As Told to
Capt. Edward A. Raymond, FA

N OCTOBER 2, 1941, I arrived by air at Hong Kong from Chung-King, and took up my residence on Fou-Lou-Chuen Road, near the Kai-Teh airdrome, to await passage to America. The Crown Colony was composed of three places: Hong Kong proper, Kow - Loong, and New Leased Territory. Total population was in the neighborhood of 1,750,000. With the arrival of 2,000 or so Canadian soldiers, welcomed by bands and cheers, Sir Mark Aitchison Young, Governor of the Colony, thought that he could defend Hong Kong against all comers. He wanted to hold an anniversary of one hundred years of successful British rule on December 25, 1941. On that day Sir Mark Young, whose name written in Chinese means "hoist no flag," hoisted no British flag any more. Pleasure finding is the way to spoil your own body in peace, and your country in war; sweat shedding is the only way to build your body and your country. That was the reason why Hong Kong fell so fast, out of our expectation.

The Chinese Government was requested by the Hong Kong Government to help if the port were attacked. The Chinese High Command expressed its intention to cooperate, but asked that the British hold out for a minimum of three weeks or a maximum of one month. Within this time, Chinese soldiers, using what trucks were available, but mostly marching on foot or moving by river boats, could concentrate at Hwei-Yang, preparatory to attacking Kow-Loong. When the Japanese did attack, the Chinese concentration proceeded according to plan. On December 25th 20,000 men were assembled at Hwei-Yang and about to launch an attack on Kow-Loong the next morning (a week earlier than promised) but were stopped on hearing that the port had fallen.

The Japanese knew Hong Kong much better than the British. Before Japan attacked she withdrew many of her nationals who were residents of the city to Canton, and there enlisted them in the Imperial Army and worked out plans for the attack with their aid. It is hard to draw the line between civilians and soldiers in wartime. As a matter of fact, field works at Hong Kong—emplacements, gun positions, trenches, and wire entanglements—were built as much for Japanese as for English use. Japan concentrated two corps at Canton prior to the campaign, with attached cavalry, horse-drawn 75-mm. guns and howitzers, and motorized 105-mm. howitzers. Three columns were formed — one proceeded along the Canton—Kow-Loong Railway, another along the Ten Shin Road, and another along the Tung Kwan Road. British reconnaissance aviation was not active during this period, for the simple reason that there was none—so the actual attack came as a surprise.

At eight o'clock on December 8th, thirty-five Japanese dive bombers came to bomb Kai-Teh airdrome at Kow-Loong. I was taking breakfast, dressed in pajamas. I did not believe it was an air raid, since it came so suddenly that there was no time to sound the air raid siren. When I was dressed, I went out and saw refugees of all ages with mats, clothes, bags, and other belongings, their faces pale, their eyes streaming, trying to escape the danger. Twelve planes of China National Aviation Corporation were destroyed on the ground and a "Clipper," ready to fly for San Francisco at 8:30 that morning, was burned at the same time. More persons were killed from trampling in the resultant panic than from the bombing—they rushed here and there, unable to find dugouts or other prepared shelter.

From the beginning of the air attack, Japanese bombers came to bomb, batch after batch, without stopping day or night. We could see no air fighting because of the absence of British planes. Nor did we see any planes brought down by British anti-aircraft fire.

The defenders' plan was to have civilian volunteer corps and Indian soldiers in the lines, and better-equipped English and Canadians in the rear for a reserve. On December 11th, Japan bombed the Kow-Loong positions in the daytime, destroying all earthworks, and then launched a night attack. A large number of Japanese soldiers dressed in plain or civilian clothes approached the positions under cover of night and scattered here and there like mercury penetrating into the ground. The noise of firing and bombing mixed with shouting made everything such as shrubbery and woods become Japanese

soldiers. Because of the intricacy of defense works and because, in the main, the defenders had had no experience in fighting, some became disheartened and gave up their arms.

After Kow-Loong had fallen, Japan twice sent a European woman with a white flag in a motor boat as an emissary, and advised Sir Mark Young to give up resistance. This was turned down without reply. Japan was very angry. Until December 24th Japanese airplanes dropped thousands of leaflets for Chinese soldiers with the British forces, telling them that as captives they would be well treated and could celebrate Christmas Day with pleasure, and that this would be their lot, because Hong Kong would fall by twelve noon, December 25th. In this last thought they were correct, as on Christmas morning Sir Mark Young, accompanied by two staff officers, came to the Peninsula Hotel at Kow-Loong, the Japanese Headquarters, to surrender. The Crown Colony was all occupied by Japan within eighteen days of the start of the attack.

Then commenced a reign of terror. To intimidate the people, Japan first resorted to trickery. Japanese mobile troops, motorized artillery, and tanks moved along the roads, coming this way and going that. At first glance, their strength seemed very powerful. However, they always used the same cars, the same soldiers, without stopping day or night.

Captives were badly treated. Japan gave them no food or drink except a little whole rice and water. Those who knew how to prepare the rice could eat—those who did not went hungry all day.

The Japanese soldiers themselves were very poor. Their uniforms were filthy, their leather shoes were worn. Many wore rubber-soled canvas shoes. They had no undershirts to change, no sweaters to keep them warm. Every soldier was given twelve one-dollar military banknotes each week, of the sort used in occupied areas (worth about fifty cents apiece, U. S.), and two packages of cigarettes per week. Rear echelon troops—medical or ambulance corps, quartermaster troops, and the like—had no pure rice to eat, and only two bowls of rice mixed with corn and beans and sometimes a little fish and pickles. When Kow-Loong fell they started stealing everything they saw: automobiles, watches, gold rings, fountain pens, sweaters, shirts, shoes, or even spectacles. We saw many eye-glassed soldiers.

Although they were very short, yet they were very stout. In the morning they had to take exercises for one hour, and numbered off at the top of their voices. This they did at dawn, waking us up at that time. They were not dismissed until after they had sung their national anthem and yelled their slogans. In the evening, after roll call, they did the same thing without exercises. They were very strict in training; all free time was filled with cannoneers' instruction, motor driving, or horse driving. When they were on the drill field, every action must be done the same way at the same time. Nobody was allowed to laugh, to speak, to look here and there. From battery commander to private, when at cannoneer instruction if some were standing, all stood; if kneeling, all knelt, with bodies erect and their eyes looking forward. The more they sweated in peace time, the less they shed their blood. It had always been very difficult for us to capture a living Japanese from a battlefield when they retreated: before withdrawing, if a few were left they must kill each other.

Japanese fear large caliber guns. When Kow-Loong had fallen, a battalion of soldiers were quartered at the Police Station, a high building which presented a nice target to British artillery. An eight-inch coastal gun fired one round over this building. Nearby hills, buildings, the very ground shook. Window glass all around was being broken. People did not know where to go or what to do. All the Japanese soldiers, without hesitation and perhaps without orders, moved with all their equipment to the Wen Mein theater opposite. The next two rounds failed to hit or kill a single Japanese. The British then lifted their fire; they fired too little and too late.

In the night time, Japanese soldiers, orderlies, and grooms, two or three to a group and each man with a bayonet hung at his waist, would go from house to house at will. They would drive the men to the top floor and lock them there, then have their "sport" at will.

A Chinese uniform was found in a house by Japanese MP's. The occupants of the whole building were arrested and asked to hand over the owner. When they were unable to do so they were shot en masse.

A wealthy man employed private guards to protect his money and property. When the guards resisted looting, a Japanese soldier was killed. A company of Japanese came to this house, surrounded it, and rushed in to bayonet all within. They also bayonetted all women in the house to the right and all men in the house to the left.

One had to know how to salute a Japanese soldier or be bayonetted, whipped, or shot. A hat must be taken off, and then it was necessary to bow low to show respect for Japan. It was fatal to salute with the hand, or at attention, for that would arouse suspicion of being a military man and a spy. Then the head was shakeable on the neck.

With the aid of "fifth columns" the Japanese had prepared an extensive black-list of Chinese military officers and loyal officials in Hong Kong. Our four names were on this list; thus there were many Japanese coming to my house to search for me repeatedly. Day by day I changed my name, my residence, and my civilian or coolie disguise.

At three in the afternoon of December 12th, when Kow-Loong had fallen but Hong Kong was still in British hands, I narrowly escaped arrest. The Union Drug Company, established by the Chinese Government, was situated on the Kai-Teh Road. It was near the airdrome,

and barricaded and guarded closely; no one was permitted to go through. With that company I kept my uniforms, equipment, certificates, and other important papers. More vital still, General Lin kept there his secret books of Chinese war experience, together with other highly important military information destined for the United States General Staff. In my coolie disguise, I slipped through the Japanese sentries by stealth and stole in the back door of the drug depot. To remove the papers and equipment was clearly too dangerous; I determined to burn everything. For this it was necessary to use a lot of gasoline, wood, and paper in a large steel stove with a high chimney. This soon had volumes of black smoke pouring from it. Only this chimney, but none others near it. This might indicate a target to the British artillery. Before long I was told that there were three Japanese soldiers knocking at the front door. Then I crammed everything unburned inside the stove and ran out the rear door. A couple of minutes later I should have been seized without any doubt.

Knowing that the general situation was growing worse each day, I decided to escape in the disguise of a very low-caste coolie. I wore foul clothing, left my hair uncombed and my face unwashed. I stooped my body, dropped my head. Over my shoulder was a long bamboo pole with European clothing and a good blanket wrapped in a dirty, bad-smelling blanket at one end and at the other a basket filled with fried rice, cakes, and daoy beans. Valuables, including an American President Lines passage to the United States, I had coated with clay and rolled in fried rice. Five hundred dollars I had secreted inside the midle of the pole, in the rubber soles of my shoes, and in my worn-out torch hat. Parts of my all-important passport were pasted in a bandage on my hip and placed in waxed paper in my mouth.

On January 20th I set out on foot by way of Tah-Poo. There were three Japanese sentries with rifles at the first barricade. A young lady disguised as a country girl, with curled hair packed in a cloth, walked behind me, accompanied by some of her household. I was the first one to be examined, and opened my basket very slowly. One Japanese looked it over, took away my wool sweater, soap, and toothpaste, but returned my leather shoes because they were too large for him. He disliked to touch my basket and parcel because they were dirty in appearance and bad in odor, but he was very anxious to inspect that lady. So he went away and let me pass.

On the second day, when I came to Ling Kong, there were two sentries for the inspection of refugees. In front of me and behind me there was prosperous-looking luggage. They looked at my dirty face and worthless basket, and let me pass without looking at anything of mine. Next day at Hwang-Kong there were two sentries; I saw one holding a girl's hand and taking her away, disregarding her clamor and her kneeling on the ground. Her parents and brother were behind, entreating him to release her, but the other Japanese loaded bullets in his rifle and pointed it at them. Making use of this chance, I hurried by without examination. And so it went down the highway, with many Japanese orderlies, cooks, grooms, and other riff-raff in ones and twos, ready to "inspect" and rob at any time or any place. That was the way I escaped in order to return.

BURMA

By boat and on foot I proceeded to Shiu-Kwan, by train and bus reached Kunming, and from there I went to Lashio and flew to Bombay. It took four months.

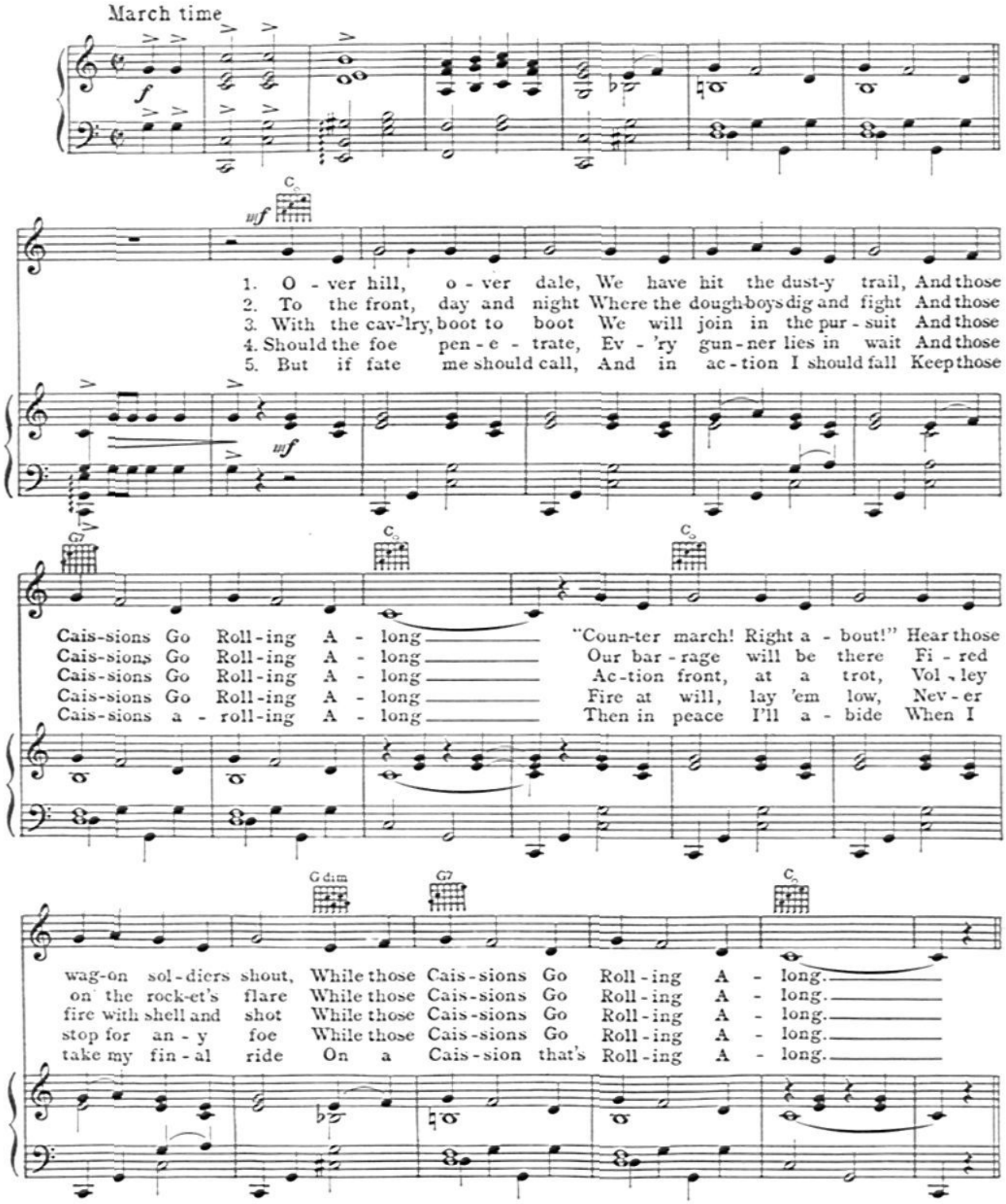
The Chinese were very chagrined that they had been unable to get to Hong Kong fast enough to help defend the British, and were determined to participate in the defense of Burma without counting any cost in men or money. Two of China's best armies, the Fifth and Sixth, were dispatched from the defense of the vital Burma Road down to the Burmese border. Not until the main Burmese port of Rangoon had fallen, that is to say not until the Japanese had opened up a free line of communications into Burma and had the situation well in hand, did the British decide to let the Chinese help them after all. It was then too late, but the Fifth and Sixth Route Armies moved into Burma and stayed there to the last man. Only the two replacement regiments in China remain of a fine, well-equipped fighting force. The army and divisional commanders and their staffs were definitely lost, together with most of the equipment. This caused bitter disappointment, for the loss now seems irreparable. Survivors of the Fifth and Sixth Armies, instead of straggling back to China, remain active in guerrilla warfare in Burma. They are abetted if not aided by the Burmese, who are not notable fighters and may have shown little grief at the passing of English rule, but who prefer the honesty of Chinese regular army troops to the rapacity and lawlessness of Japanese soldiers.

CONCLUSION

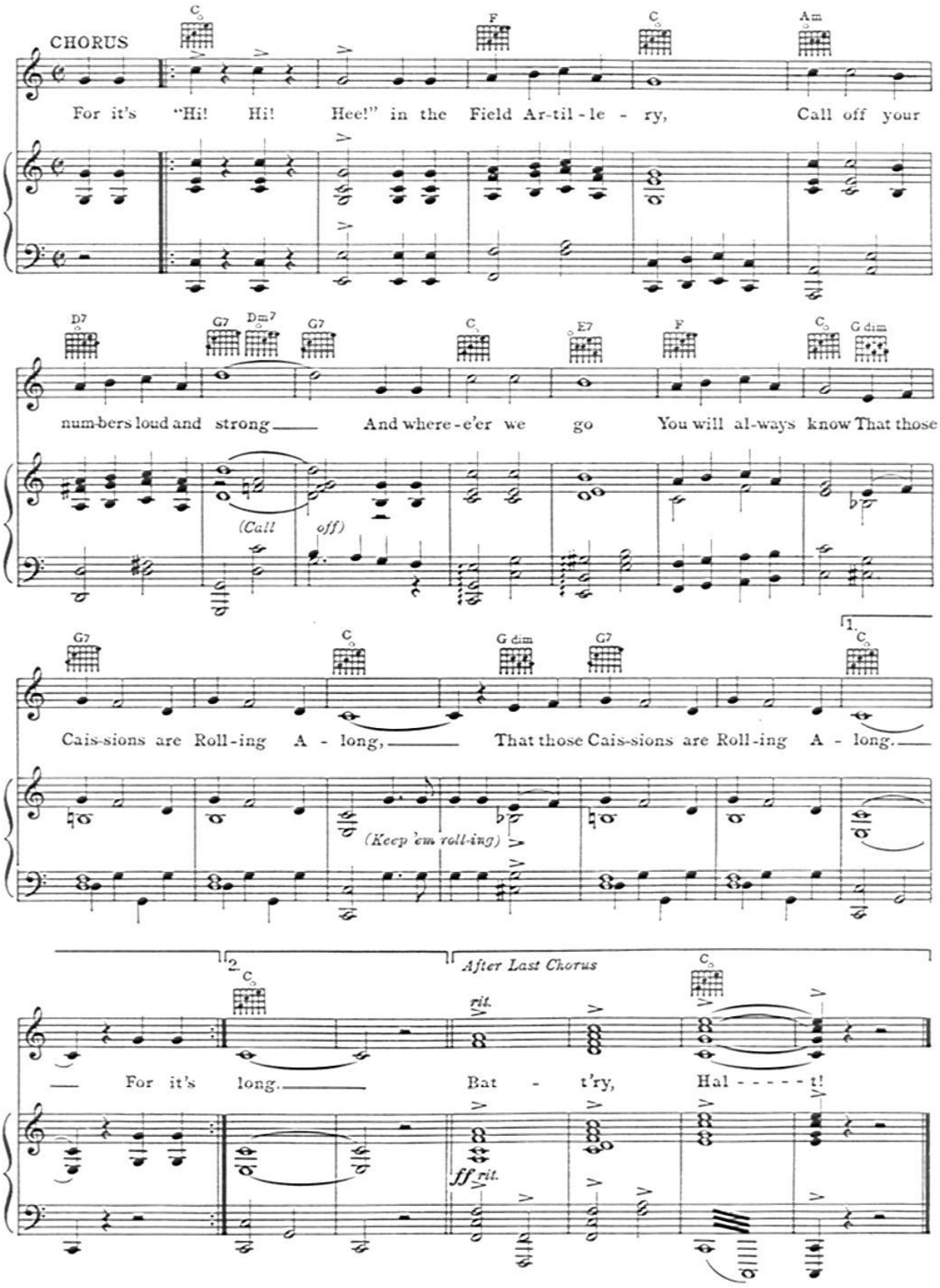
After I came to America, I looked with amazed eyes. Truly the United States is the arsenal of democracy, and a very great drill ground of democracy also. Each American says, "We'll beat the Japs," and I am glad to hear it said, for that is true, if "we" is considered to mean China and the United States. Outside of China, the United Nations will have to face but the smaller part of Japan's army. China is appallingly lacking in everything that is sometimes thought to be essential for the newest warfare. She lacks planes and tanks and guns and even trucks. She shows that, with very skilled leaders, she can win by her numerous heroic people. China is the First Front of this war. More and more Japan is bleeding here. With some munitions we could make Japan bleed faster.

THE CAISSONS GO ROLLING ALONG

By EDMUND L. GRUBER

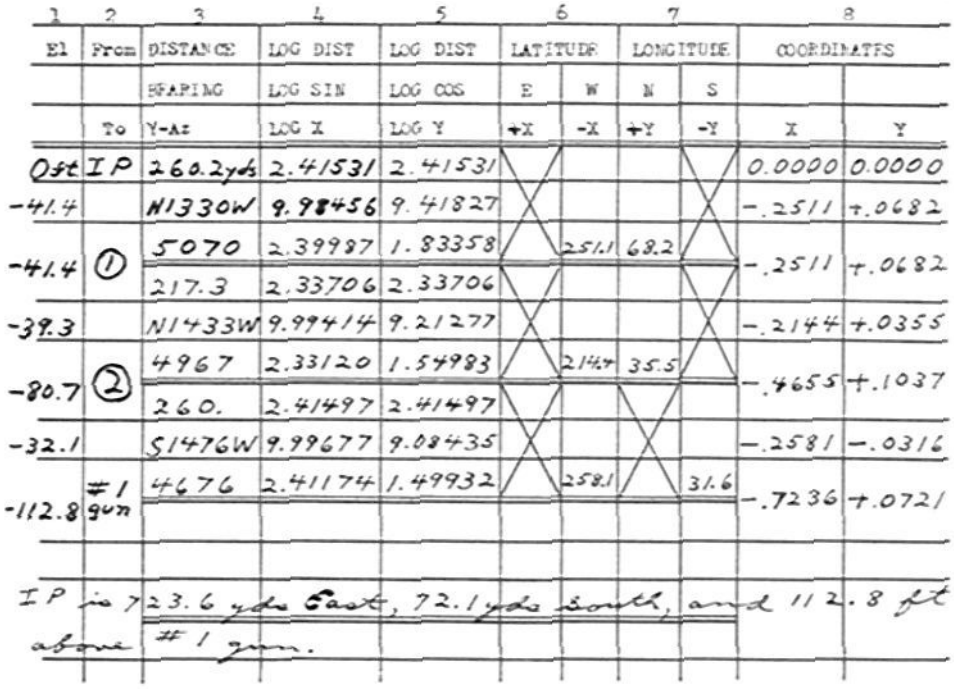


THE CAISSONS GO ROLLING ALONG



Survey Computation Form

By Lt. Lauren D. Lampert, FA



1	2	3	4	5	6		7		8	
El	From	DISTANCE	LOG DIST	LOG DIST	LATITUDE		LONGITUDE		COORDINATES	
		BEARING	LOG SIN	LOG COS	E	W	N	S		
	To	Y-Az	LOG X	LOG Y	+X	-X	+Y	-Y	X	Y
0ft	IP	260.2yds	2.41531	2.41531					0.0000	0.0000
-41.4		N1330W	9.98456	9.41827					-.2511	+.0682
-41.4	①	5070	2.39987	1.83358		251.1	68.2		-.2511	+.0682
		217.3	2.33706	2.33706						
-39.3		N1433W	9.99414	9.21277					-.2144	+.0355
-80.7	②	4967	2.33120	1.54983		214.7	35.5		-.4655	+.1037
		260.	2.41497	2.41497						
-32.1		S1476W	9.99677	9.08435					-.2581	-.0316
-112.8	#1 gun	4676	2.41174	1.49932		258.1		31.6	-.7236	+.0721
IP is 223.6 yds East, 72.1 yds South, and 112.8 ft above #1 gun.										

Use of this form presupposes that the computer is familiar with logarithms, but he need have no knowledge of trigonometric functions. He must be supplied with tables of logarithms and logarithms of trigonometric functions; the Field Artillery School publishes these in handy booklet form, at 10c.

Figures for each leg of the survey take up three lines of the form, indicated by double lines and hereafter called a "group." The heading of the form indicates what is to be entered in the corresponding blanks below.

Column 1: carries elevation from station to station.

1st line: elevation of station at beginning of survey (usually IP) is furnished by higher unit, ascertained by map or some other means, or is assumed to be zero in case the survey is merely to determine the elevation and coordinates of the IP in respect to some point, such as sight of No. 1 gun. At each station an angle of site is taken to the next station, multiplied by 3 to change yards to feet. The height of the head of the survey instrument (aiming circle) is subtracted from or added to this to correct for shooting from the head of the instrument at the old station to the ground at the new station.

2d line: this change in altitude is entered on the second line, with the proper sign, and by combining with the elevation of the original station, the elevation of the new station can be entered on the third line. This is the first line of the next group and the process is repeated.

Column 2: designates the leg.

1st line: number of old station.

3d line: number of new station.

Column 3: 1st line: distance of each leg in yards, as taped.

3d line: Y-azimuth of leg. Y-azimuth of original leg is given by higher unit, measured with aiming circle, measured from map, or given an arbitrary Y-azimuth. Y-azimuth of each leg thereafter is computed by combining the azimuth of the previous leg with the angle formed by the last leg and the new leg, as measured at the new station with the instrument. A simple procedure is to take the Y-azimuth of the last leg, add 3200, and add the clockwise angle from the last leg to the new leg, subtracting 6400 whenever possible.

2d line: bearing of the leg is found by dividing the points of the compass into four quadrants, formed by a N-S and an E-W line. The amount of the bearing is the smallest angle formed by the leg and the N-S line. For example, a leg whose Y-azimuth is 2000 falls in the SE quadrant of the compass and is 1200 away from the N-S line; therefore its bearing is S1200E.

Columns 4 and 5: begin the computation by logarithms. On the first line of both columns is entered the log of the distance. 2nd line of column 4: log sine of the bearing angle. 2d line of column 5: log cosine of the bearing angle. Both are taken from the tables at the same time. The sum of the log distance and the log sine/cosine gives the log of the X/Y change.

Columns 6 and 7: directions that do not appear in the bearing of the leg are crossed out. The antilogs of "log X" and "log Y" are entered in the X and Y columns that remain. These are the X and Y changes with their appropriate signs.

Column 8: 1st line: enter the coordinates of the IP, either as determined from a map or furnished by higher headquarters, or enter merely as zero in case rectangular coordinates of the IP in relation to some other point are required.

2d line: the X and Y changes are carried over to the second line of the COORDINATES column and, combined with the coordinates of the original station as given on the first line, give the coordinates of the new station, entered on the 3d line (which becomes the first line for the new station).

All computation should be carried to a hundredth of a yard, and entered on the form to the nearest tenth of a yard.

There are preferably six men to run a survey using this form, though fewer will suffice if speed is sacrificed. One man is the computer, entering the data obtained from the survey detail, and carrying on as much of the computation as possible while the detail is taping. The second man determines location of the stations, measures the horizontal and vertical angles, lines in the tapemen with the instrument if necessary, and keeps a rough sketch of the survey. The third and fourth men are tapers. The fifth and sixth men place the survey stakes. With this organization and an adept computer, the computer should be able to report the coordinates of the final station a few minutes after the mechanics of the survey are finished.

A rough sketch should be kept of the survey by the instrument man, so that any errors that occur in computation can be located without running the entire survey over. When time permits, this should be plotted to a scale of at least 1/2,000, as an additional check against errors. The usual scale of 1/20,000 is too small to accurately plot in the legs and angles of a survey.

A Rapid Computer for Survey Traverses

By Maj. H. E. Bisbort, FA

Survey has always been a necessary evil for unobserved fire. In these days of losses to O.C.S. and cadres, have you perspired over the instruction in logarithms and natural functions, or relapsed into the alternative of plotting?

A mechanical method of survey data computing can be taught to a recruit in fifteen minutes. It has survived a field test. The IV Corps has tested it and has turned it over to their Field Artillery units for study and use. It has turned in results comparing favorably with accurate logarithmic work for accuracy and speed. Every closed traverse on which the survey computer was used, transit or aiming circle, closed well within the limits of tolerance.

THEORY

First, it is necessary to understand the use of bearing angles. The bearing of a given line is the angle and direction which the line makes with respect to the north or south base direction line. Bearings are stated by quadrants and never exceed 90º or 1600 mils. Any azimuth can, therefore, be changed to a bearing by getting the angle between it and the north-south base line.

Figure 1 illustrates the expression of a typical direction in each quadrant both as an azimuth and as a bearing, showing the signs of the X and Y distances in each quadrant.

Considering that the sine of an angle is the opposite side over the hypothenuse and the cosine is the adjacent side over the hypothenuse, it can readily be seen from the figure that in every quadrant the X distance is always the sine of the bearing angle and the Y distance is always the cosine

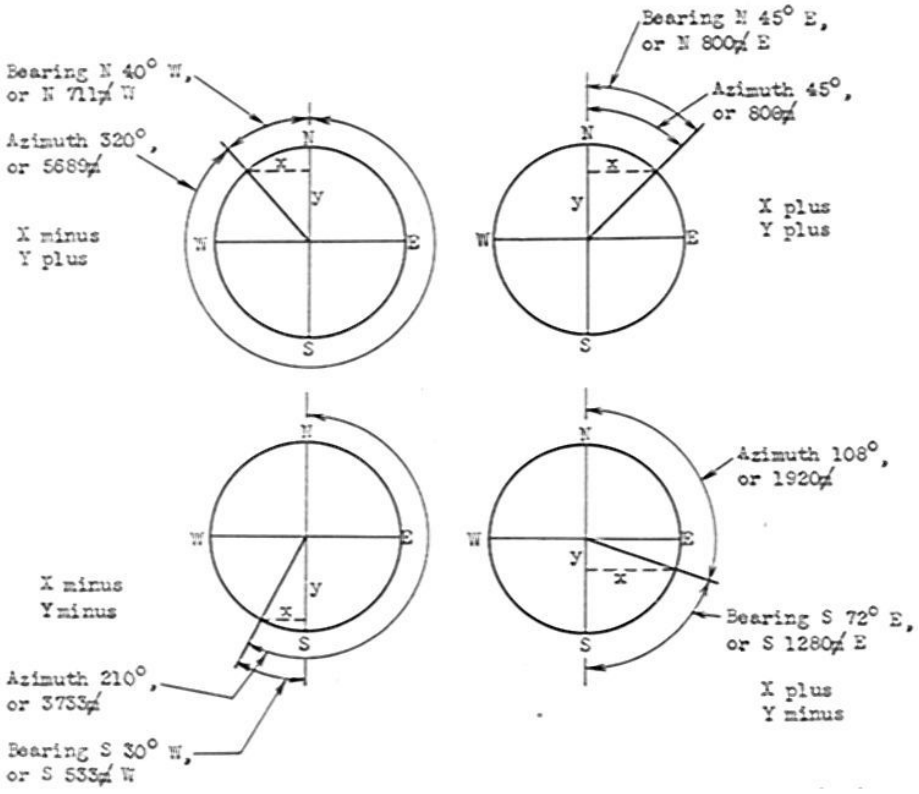


Figure 1—Typical directions expressed as azimuths and bearings, in degrees and mils.

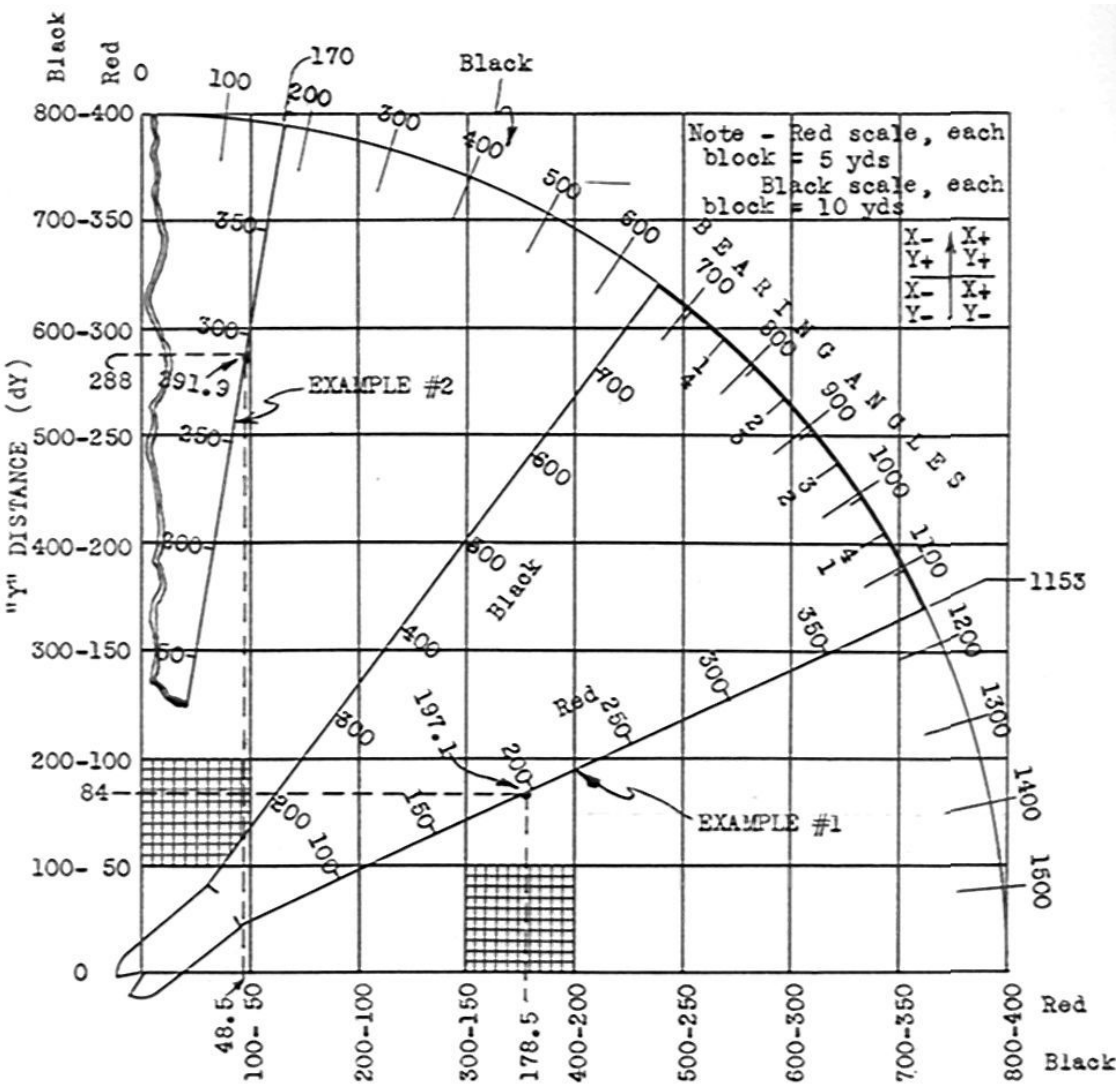


Figure 2

Example #1

Bearing: S 1153m E
Distance: 197.1 yds
X = plus 178.5 yds
Y = minus 84 yds

Example #2

Bearing: N 170m W
Distance: 291.9 yds
X = minus 48.5 yds
Y = plus 288 yds

of the bearing angle. The signs of the X and Y distances depend upon the bearing of the angle, which places it in a particular quadrant. The computer merely allows the operator to lay the hypothenuse off on the bearing angle and read directly the X distance (opposite side dX) which is always the sine, and the Y distance (adjacent side dY) which is always the cosine.

CONSTRUCTION

General

This mechanical computer is simple to make, from materials usually at hand: a grid sheet, range deflection fan, thumb tacks, a 17″ × 16″ piece of board or plywood, paper cement or glue, transparent scotch tape and some lacquer—and you have it. It can easily be replaced or made in numbers. It is made large enough (17″ × 16″) to lay off angles on it by utilizing a section of a 29-inch protractor, the well-known range deflection fan.

With a chisel-pointed 4H or 5H pencil, the grid sheet is ruled into squares by straight parallel lines one tenth of a grid square apart, shown only in the two divided grid squares in Figures 2 and 3 for the sake of clarity. In those figures only the grid squares are numbered, but intermediate subdivisions may be numbered to suit individual

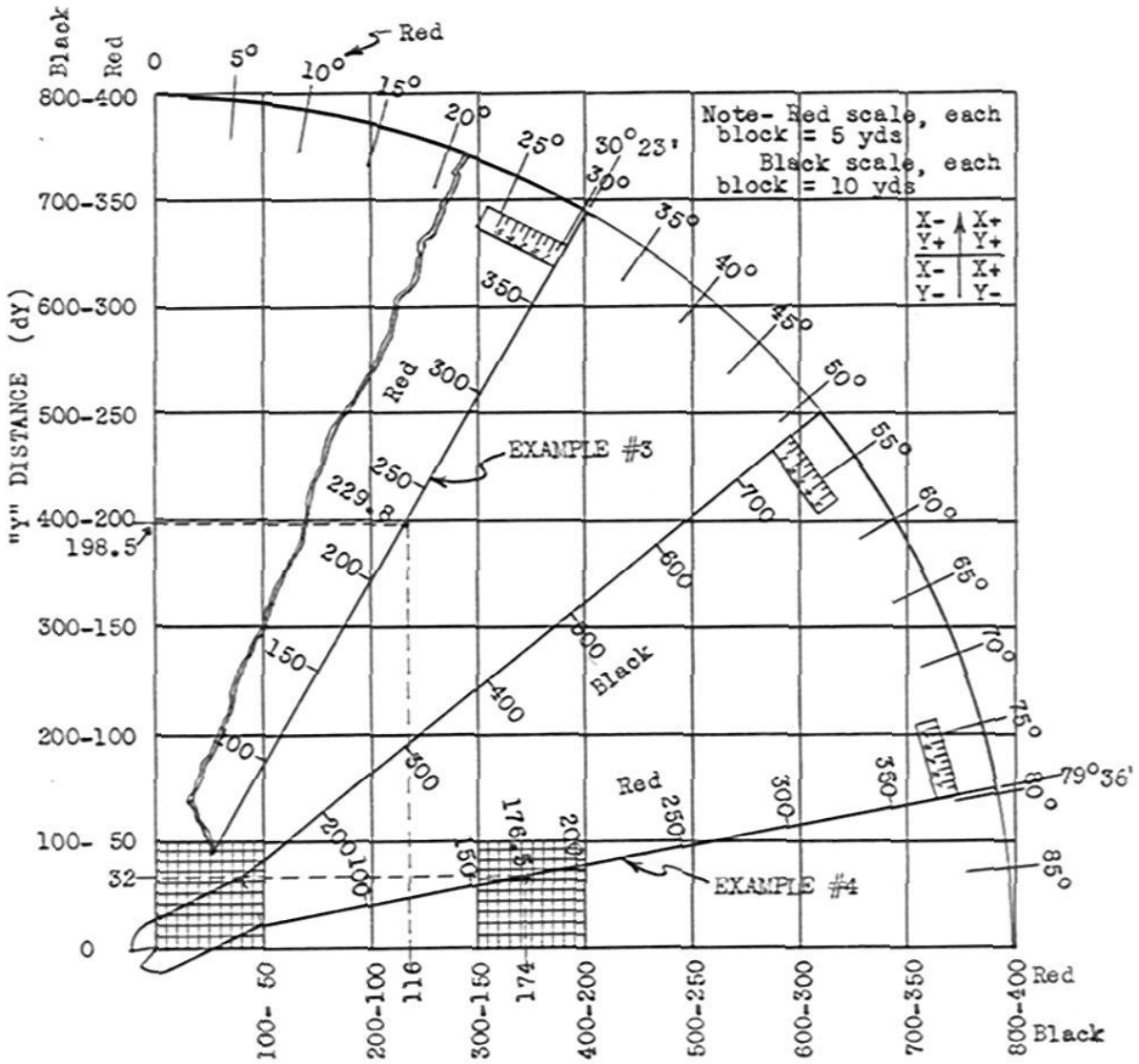


Figure 3

Example #3

Bearing: S 30º23′ E
Distance: 229.8 yds
X = plus 116 yds
Y = minus 198.5 yds

Example #4

Bearing: S 79º36′ W
Distance: 176.5 yds
X = minus 174 yds
Y = minus 32 yds

requirements, as shown in Figure 4. Every fifth graduation is lined with red ink to facilitate reading (Figure 4).

On the right edge of the fan is placed a scale so that the method can give the X and Y distances (dX and dY) between two points in a traverse to a scale of 1/1,000 (each block equals 5 yards). This scale often allows the determination of these X and Y distances to the nearest yard. (See Figures 2, 3, 4, and 5.)

If the leg of the traverse is 400 yards or less, the right edge of the fan (red figures) is used, each graduation on the fan and each block on the board being 5 yards, using red figures on both board and fan. If the leg of the traverse is over 400 yards, the left edge of the fan (black figures) is used, each graduation being 10 yards.

One quarter of a circle is drawn at a radius equal to the radius of the range deflection fan. On this arc are red and black graduations: black graduations appear every 100 mils for using the computer with the aiming circle, and red graduations are 5 degrees apart for the use with the transit. For clarity, Figure 2 shows only the black 100-mil graduations, and Figure 3 only the 5-degree graduations, which are red. Figure 5 shows both as the computer is made. This arc is drawn in

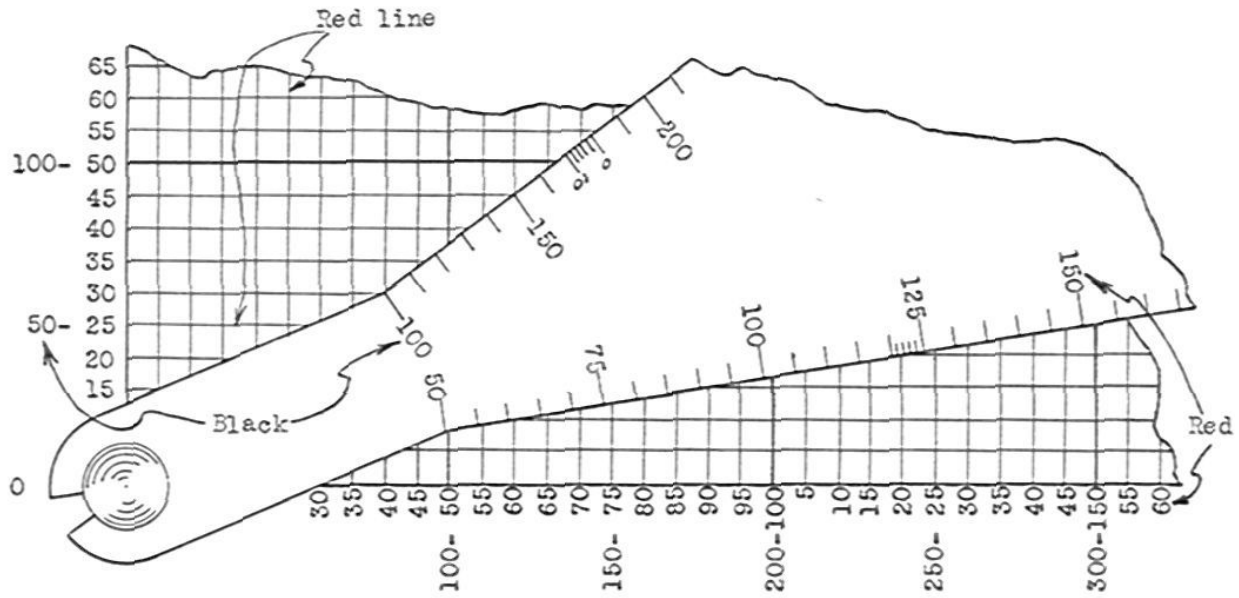


Figure 4—Subdivision of, and method of numbering, range deflection fan and grid sheet.

black India ink and divided into 16 equal parts (for mils), using a pair of dividers to insure that all spaces will be equal, and the 16 black graduation lines are drawn about an inch and a half long and are numbered in black. In the same manner are drawn and numbered in red the 18 equal spaces representing 5 degrees each; graduation lines are drawn a trifle shorter, however.

For anything between 100-mil graduations on the board, the first 100 mils on the range deflection fan are used. For anything between a five degree graduation, the first 5 degrees shown on the fan are used, giving graduations up to 10 minutes (Figure 5). Any smaller reading is obtained by interpolation. To lay off an angle in mils, it is only necessary to place the edge of the fan on the highest whole hundred and find the remainder in the first 100 mils on the fan. The same procedure applies in laying off an angle in degrees, finding the highest whole five degrees and the remainder on the graduated degree scale shown in Figure 5.

The Fan

The range deflection fan is numbered on the right edge with red china marking pencil every 25 yards up to 400 yards. This china pencil is protected by covering it with lacquer, sheet "Celluseal" (a commercial cellophane with adhesive on one side), or transparent "Scotch tape," When using this side of the fan (each graduation 5 yards), the readings are as in numbered examples above. The left edge of the range deflection fan is numbered every 50 yards—only a zero has to be added with china pencil to the existing figures. Each graduation then becomes 10 yards and readings can be made up to 800 yards. In order to do this it is necessary to place the left edge of the fan at the bearing angle by subtracting the correct amount from the next highest graduation on the chart arc above the bearing angle. Then by reading the black figures on the X and Y scales (each block 10 yards) the readings can be taken. However, if the leg does happen to go over 400 yards, the red scales could still be used by dividing the leg by 2 and doubling the answer of the X and Y distances. It is a matter of opinion which method the operator chooses to use.

Figures 4 and 5 show a section of the board to illustrate this marking. At two points on each edge of the fan a block has been divided into 5 equal spaces. Each of these divisions equals 1 yard on the red scale and 2 yards on the black scale. By removing the fan from its pivot and placing this block on the square in which the plotted point lies, accurate reading is facilitated if there is a question of interpolation.

In order to obtain readings smaller than 5 degrees, a

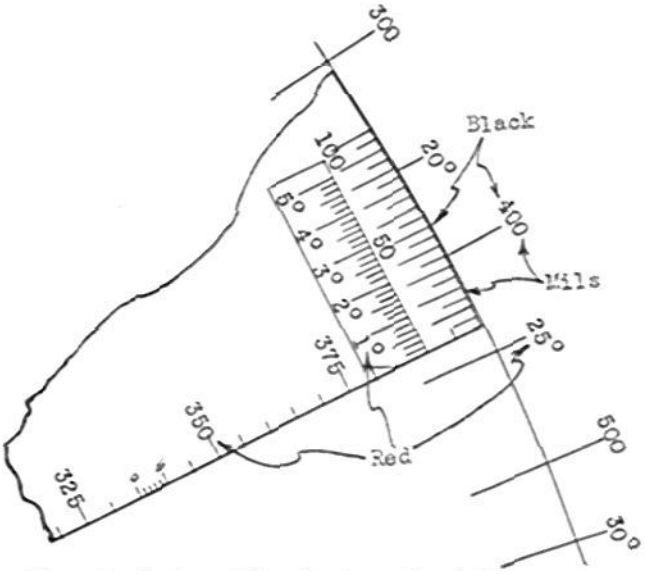


Figure 5—Section of fan showing mil and degree scales.

scale has been placed on the fan just below the mil graduation using white cloth mending tape or adhesive at this point (Figures 3 and 5). This white scale has been divided into 5 equal degrees and each degree broken down into 6 graduations, making each one 10 minutes. This is done on each side of the fan for use as mentioned above. The scale is covered with lacquer or transparent tape. For traverse distances of 40 yards or less it is necessary to multiply the distance by 10 and then divide the X and Y distances obtained by 10. This is necessary because of the fan offset.

The Board

The board can be waterproofed by using a few coatings of lacquer or by using several sheets of "Celluseal," which gives very satisfactory results.

After the waterproof material is placed on the board, the pivot can be inserted. When the pivot is made for the fan, fan and board should be plainly numbered so they can be kept together. For the pivot a long thumb tack is used and placed so that the graduations of the fan coincide with the graduations of the grid sheet. The thumb tack is forced into the board until it presses against the fan. If the graduations do not coincide, plug the hole with wood and try again. The pivot should be as near "true" as possible. In order to protect it, 3 additional thumb tacks with cardboard washers are placed around it so that they are a little higher than the pivot, then the four thumb tacks are covered with several thicknesses of "Scotch tape."

Sundry

Several plotting pins should be forced into the side of the board so that they cannot fall off the board and become lost: a *thin* plotting pin is necessary for accurate work. On the back of the board should be placed some form of cardboard envelope with a flap and a string fastener to hold the range deflection fan.

OPERATION AND EXAMPLES

Figures 2 and 3 show the Rapid Computer, using mils in the former and degrees in the latter. To find the X and Y distances from one station on a traverse to another it is only necessary to lay off the bearing angle of that leg with the edge of the fan, place a plotting pin at the measured distance of the leg in yards to nearest tenth, and read the X and Y distances directly on the respective sides of the board.

It is a simple matter to check any figures you obtain. Using the computer, the recorder or note taker can take the field notes and using the computer as a clip board compute the X and Y distances immediately. When the practical field work is completed the note taker should have practically finished his calculations, ready to hand the information over to the S-3 for immediate use. The recorder's computations can easily be back-checked.

The diagram in the upper right corner of the board (Figures 2 and 3) assists the recorder in determining the signs of the X and Y distances. These correct signs can be also obtained by remembering that East and North give plus signs to X and Y respectively and West and South give minus signs.

Example 1

Using the aiming circle, let us consider that the leg of the traverse, station 1 to 2, is Y-azimuth 2047 mils, and the taped distance is 197.1 yards. The bearing angle is then S 1153 E. In Figure 2 it is seen that the right edge of the fan is set at 1153 mils. The plotting pin is then inserted at the measured distance of 197.1 yards. Reading down on the horizontal X scale, each block being 5 yards, the red figures are read to be 178.5 yards; reading the red figures on the left side of the chart, the Y distance is 84 yards. The signs in the second quadrant give X plus and Y minus.

Example 2

The aiming circle gives the Y-azimuth of the next leg of the traverse, station 2 to 3, as 6230 mils, and the distance as 291.9 yards. This azimuth gives a bearing angle of N 170 W. Laying off 170 mils as in Figure 2, it is seen by reading the right edge of the fan and the red figures that the X distance is minus 48.5 and the Y distance is plus 288 (4th quadrant).

Example 3

Now consider the use of the transit. The Y-azimuth of the leg of traverse from station 1 to 2 is 149º 37′ 20″, and the measured distance is 229.8 yards. The bearing angle of this leg is therefore S 30º 22′ 40″ E. If we place the right edge of the fan at 30º 23′ and place the plotting pin in position at 229.8 yards as in Figure 3, it is seen that the X distance, using the red figures, is plus 116 yards and the Y distance is minus 198.5 yards (2d quadrant).

Example 4

Y-azimuth of the leg is 259º 36′ 00″ and the distance is 176.5 yards. The bearing of this leg is therefore S 79º 36′ 00″ W. Setting this angle off as in Figure 3 and placing the pin at distance 176.5 yards, the X distance is read as minus 174 yards and the Y distance as minus 32 yards, reading red figures (3d quadrant).

ADVANTAGES

This rapid survey data computer has the following advantages over the old methods of arriving at the complete survey data for unobserved firing:

(1) *Speed:* The board will enable computations to keep up with the practical field work. The S-3 and the CO can get data for firing almost immediately after field work is completed.

(2) *Accuracy:* All possible errors in looking up logarithms or natural functions, plus errors in adding, subtracting, or multiplying, are eliminated. It plots to a scale of 1/1000 and can be read to the nearest yard,

in some cases, five-tenths of a yard. Any distance can readily be checked for accuracy in reading.

TM 6-200 states on page 46, that "if space permits, by plotting angles and distances to a scale of such as 1:2000, 1:5000, 1:10,000," precise results will be obtained. This graphical computer lays off the necessary angle with a 29″ protractor to get only the X and Y distances to a scale of 1:1000. This is far more accurate than the scales mentioned above for plotting traverses, and it eliminates the possibility of the proportional angular errors that creep in when using the small 12″ protractor.

(3) *Ease of Instruction:* Anyone can be taught to use it accurately. It can easily be explained to enlisted men. They can actually see what they are doing and are more inclined to trust the accuracy of their results. Bearing angles are simple to teach with use of appropriate signs for X and Y distances.

It is not necessary for the men to have a thorough knowledge of trigonometric functions, logarithms, etc. Under enemy fire there will not be time to teach survey personnel replacements the use of sines, cosines, logarithms. . . . Considering the fact that computers now (in relative quiet) have trouble reading the tables correctly, in order to check one another, how are they going to get accurate results when the noises of battle are around?

(4) *Ease of Replacement:* The board is made out of simple materials in the hands of every field artillery unit. If it is kept simple, anyone can be taught to make a board readily.

(5) *No Reliance on Tables:* It is hard to keep a book of surveying tables in good shape with constant usage. Covers start falling off, pages come loose, and the book sometimes gets wet. Tables are not needed with this computer. They are not even needed to lay off the graduations on the board.

If at any time the sine, cosine, or tangent of any angle is needed and no tables are available, by setting off the angle and placing the pin opposite 100, the sine can be read to approximately three places on the X side, the cosine can be read on the Y side, and the tangent can be computed by dividing the X reading by the Y reading.

(6) *Location Targets:* The coordinates of targets can be checked after the short base calculations by use of the board, dividing the range by a number to fit the board and multiplying the answers by that number. In using the law of sines for the short base calculations the sine of any angle can be obtained as noted above if the tables are lost.

HOW IT ACTUALLY WORKS OUT*

In case you are interested, here is a little dope on how artillery is being handled in the Solomons.

Maps are highly inaccurate, and generally of a scale that is almost worthless to artillery. You will always find this any place outside of the large, highly developed countries. The rapid production of aerial photos and transformation of them into suitable means of fire control is a dream that works out well only in THE FIELD ARTILLERY JOURNAL. Generally the safest thing to do is build up your own fire control maps from your own survey, and use the available maps for the intelligence and orientation only. Some adaptation of the Fort Sill method of using the battery details, under the Bn RO, is best. Chief difficulty is that target area survey is out of the question here. Points for bases for long or short base intersection just ain't. Traverse is generally the only means of locating the guns. The RO's must be thoroughly grounded in the *aims* and general *principles* of survey, so that they can use any or all the known methods of location, and (even more important) be able to figure out new methods on the spot. "K"'s are usually great, and vary greatly, due to the inevitable inaccuracy and approximation; however, they do work usually. There are no OP's in the jungle, and so far all firing has been done by FO. Wire is the only reliable communication, and wire crews have to work all the time. Walkie-talkies are unreliable and too easy for the other side to detect. Flares are out for the same reason. One FO adjusted at night by sound. He moved the burst by sound until he could see it, then called for the battalion and put the fire where he wanted it.

All targets have been area targets, so the FDC operates continuously. Fire of individual batteries is ineffective. Batteries maintain an up-to-date fire chart by splicing into the FDC-FO line and listening constantly. All local avenues of approach are registered on and fired on in an attack, whether anything is seen or not. High angle fire with impact fuzes is the most effective. The positions are dug in as deeply as possible, as are all personnel and ammunition.

It is absolutely necessary to have a man trained for each job, as all units and all sections function constantly 24 hours a day. How in hell this can be done satisfactorily under the present strength by the T/O is a little beyond me, but apparently it is being done, so that must be the answer.

The chief thing I have learned over here is to learn all known ways of doing anything and then being able to do it by some unknown way. In other words, it is absolutely essential that the officers and noncommissioned officers be adaptable. There still isn't enough stress laid in training on a crystal clear understanding of just what the mission is and then the determination of the most rapid and accurate accomplishment of the mission. If the book method works best, swell; but too frequently things occur that the books never mentioned, and then it's up to the individual. There wasn't nearly enough attention in the past paid to the development of resourcefulness and initiative on the part of all ranks.

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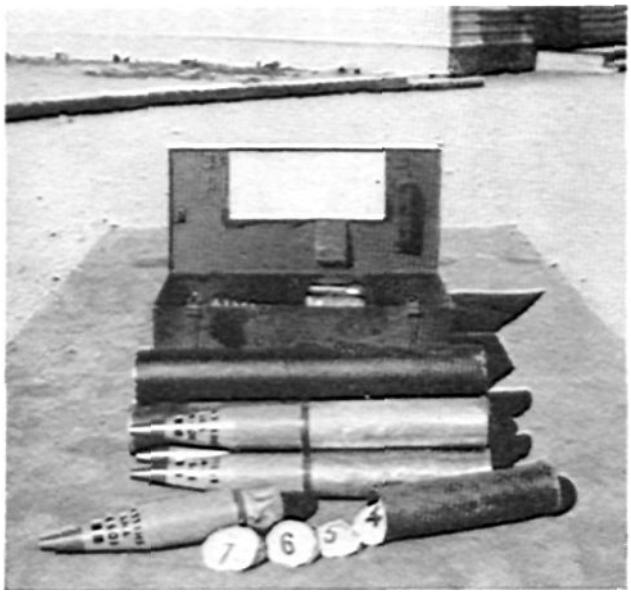
*Extracts from a letter dated 3 November, 1942, from an artillery officer now in the Solomon Islands.



PRACTICE SHELLS FOR 105-mm. HOWITZER

By Lt. Joel Crain, FA

"Battery Adjust, Shell HE, Charge V, Fuze Quick, Base Deflection, Right 120, Site 300, Number Two, One Round, Elevation 325." Shell HE, Charge V, Fuze Quick, is an important part of the command to the howitzer squad—so important, in fact, that the "powers that be" have moved it to first place in the sequence of commands. This particular part of the fire command is especially important to a howitzer crew in training for service of the piece because it involves the handling of ammunition. Since in practice it is not advisable to use real ammunition, even if it were available, there must be some form of practice ammunition devised.

No doubt due to the manufacturing difficulties, priorities, and other factors inherent to the great speed-up in war production, the 105-mm. howitzers do not have practice ammunition. But because we know that the handling of ammunition is a vital part of cannoneers' training, a practice shell has been developed which is a reasonable facsimile of the real thing.

The practice shell for the old 75-mm. gun was comparatively simple, but that of the 105-mm. howitzer presents a much different problem. The complete round for the "75" had only to be fuzed and thrown into the breech, while the "105" involves the separation of the projectile from the case, preparation of the charges, replacing the projectile in the case, and then the proper ramming of the shell into the chamber. These additional operations in the preparation of the ammunition makes it much more important to have something in the form of practice ammunition for cannoneers' drill. Not only does it help in acquiring skill and technique, it creates as well as holds the interest of the cannoneers in the many "dry run" problems that are necessary if the howitzer squads are to attain any degree of proficiency.

Practice ammunition is a vital factor in the training of the ammunition section of the battery. It gives them the feel of real ammunition, and the amount of space needed in hauling. Another subject in which the ammunition section needs training is the colors and markings of different ammunition. This is facilitated by a number of projectiles painted and marked in the proper colors.

We secured four 105-mm. brass cases, got some 6 × 6 timber, had four projectiles turned out on a lathe, painted them yellow with black markings and presto, four practice HE shells were available for cannoneers' drill. At a previous service practice some of the powder bags which were left to be burned were emptied of powder, filled with pinto beans, and sewn up, making a very good imitation of the powder charge; the beans even feel and sound like the real powder. On these bags were painted the proper number of the charge. The projectiles were turned to very nearly correct proportions and four of them painted yellow and marked for HE with black paint; rotating bands and fuzes were painted on. From the rotating band to the base, the shell was turned slightly smaller than the rest of the projectile so that it would fit easily into the case. The weighting of the projectile to approximate the thirty-three pounds of the fuzed round may be accomplished by boring the projectile from the front end and pouring lead, or putting metal, inside; a copper or lead rotating band should be affixed. The rotating band must be small enough it will not engage the lands enough to stick every time the projectile is rammed home. A rotating band on the practice shell will also protect the lips of the shell cases.

Cannoneers' drill with these practice shells can very nearly compare with actual service practice. Cannoneers 2, 4, 5, 6, and 7 do exactly the same thing in drill that they do in firing. Like with the 155-mm. howitzer, ramming the shell home properly and consistently is important to the 105-mm. howitzer, and No. 2 cannoneer gets the "feel" of ramming the shell.

An aid to No. 2 cannoneer in service practice is the use of a heavy leather glove on the right hand, used when the shell is rammed home. The cannoneer closes his fist for the final ram and the leather glove protects the back of his hand. Any type of glove is a help, but a heavy one has been found to be best.

Why Logarithms? Why Sines and Cosines?

Capt. C. R. Oliver, FA

I

The technique of massing artillery fire has brought survey into a particularly prominent spot in Field Artillery. Because target area survey is generally considered, and undoubtedly is, the most difficult part of survey, much stress has been laid on it and little has been done to simplify position area survey.

The main purposes of target area survey are to afford a means of tying the position area to the target area and to furnish accurately located points for registration corrections. Both of these functions are essential to unobserved fires but are of little value where fires are observed.

Actually, the available maps or map substitutes in most battle zones are of so little value as firing charts that true unobserved fire will be impossible except on targets located by sound and flash methods. This is the method that must be used in densely wooded terrain with little commanding observation, such as in Louisiana. Since the available firing charts will probably cause the larger percentage of effective artillery fires to be observed, there is little need to spend much time or effort on extensive target area survey. In almost all cases, the only target area work necessary will be the location of one point to be used as a base point to give all batteries a common direction. Therefore, the big problem seems to be a rapid method of tying batteries together in order to facilitate the massing of observed fires.

When the need for target area work arises, an officer is invariably present to supervise it. However, an officer with a traverse party is a rare sight, as this work is almost without exception handled entirely by enlisted personnel. Consequently, the method of position area survey must not only be a speedy one but it must also be simple. It must not only be simple to use but must be easily taught, because instruction time for casualty replacements must be expected to be the bare minimum.

With these ideas in mind, an attempt has been made to arrive at a plan as nearly mechanical as possible which is logical enough to allow the men to understand what they are doing, and one which does not further burden them with some kind of "gadget."

The first question that had to be settled was whether a simplified plan of computing would be as simple as merely plotting the traverse. At first glance, plotting seems to be the better of the two. However, closer study of actual field work reveals that loss of time and accuracy in plotting offsets any doubtful gain in simplicity.

Computation proves faster than plotting because it is carried on simultaneously with the field work and the desired information is at hand immediately upon conclusion

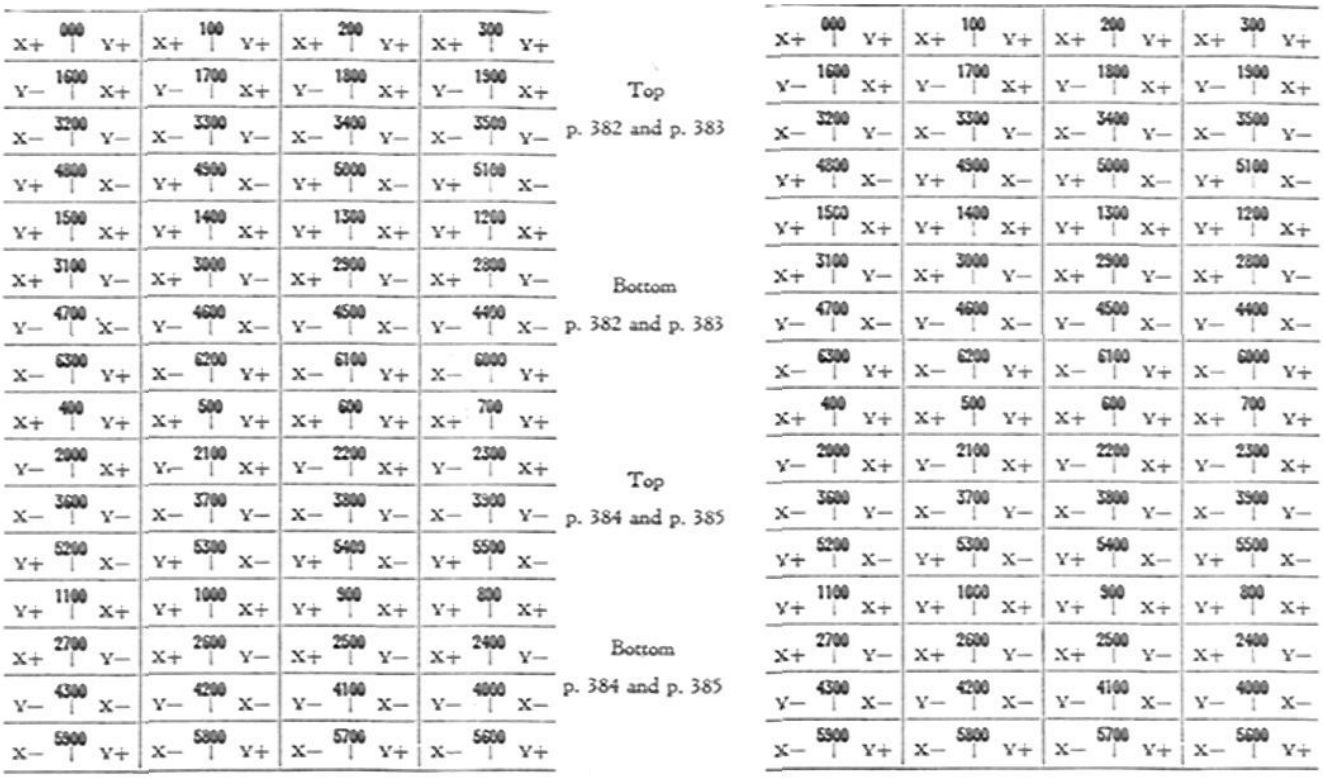


Figure 1

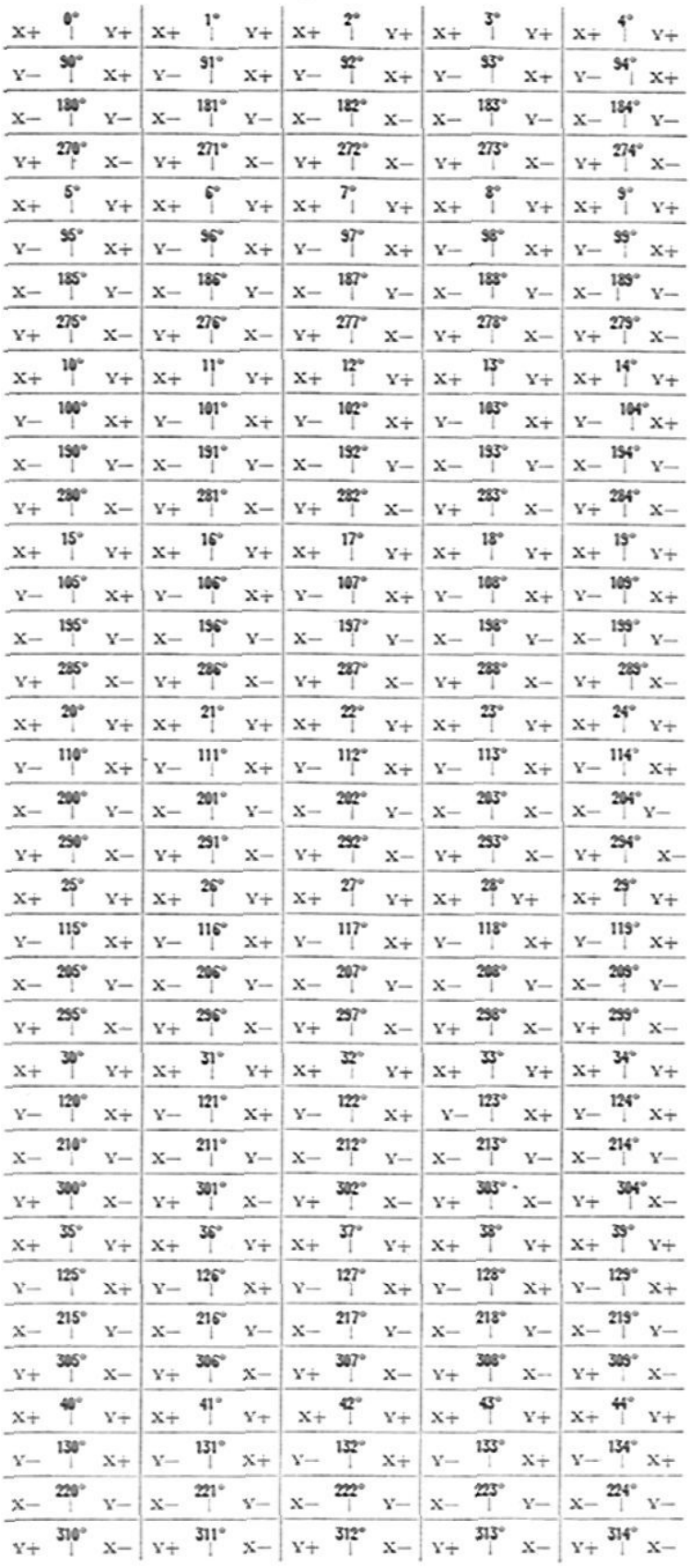

X+ 0° Y+ X+ 1° Y+ X+ 2° Y+ X+ 3° Y+ X+ 4° Y+
Y− 90° X+ Y− 91° X+ Y− 92° X+ Y− 93° X+ Y− 94° X+
X− 180° Y− X− 181° Y− X− 182° X− X− 183° Y− X− 184° Y−
Y+ 270° X− Y+ 271° X− Y+ 272° X− Y+ 273° X− Y+ 274° X−
X+ 5° Y+ X+ 6° Y+ X+ 7° Y+ X+ 8° Y+ X+ 9° Y+
Y− 95° X+ Y− 96° X+ Y− 97° X+ Y− 98° X+ Y− 99° X+
X− 185° Y− X− 186° Y− X− 187° Y− X− 188° Y− X− 189° Y−
Y+ 275° X− Y+ 276° X− Y+ 277° X− Y+ 278° X− Y+ 279° X−
X+ 10° Y+ X+ 11° Y+ X+ 12° Y+ X+ 13° Y+ X+ 14° Y+
Y− 100° X+ Y− 101° X+ Y− 102° X+ Y− 103° X+ Y− 104° X+
X− 190° Y− X− 191° Y− X− 192° Y− X− 193° Y− X− 194° Y−
Y+ 280° X− Y+ 281° X− Y+ 282° X− Y+ 283° X− Y+ 284° X−
X+ 15° Y+ X+ 16° Y+ X+ 17° Y+ X+ 18° Y+ X+ 19° Y+
Y− 105° X+ Y− 106° X+ Y− 107° X+ Y− 108° X+ Y− 109° X+
X− 195° Y− X− 196° Y− X− 197° Y− X− 198° Y− X− 199° Y−
Y+ 285° X− Y+ 286° X− Y+ 287° X− Y+ 288° X− Y+ 289° X−
X+ 20° Y+ X+ 21° Y+ X+ 22° Y+ X+ 23° Y+ X+ 24° Y+
Y− 110° X+ Y− 111° X+ Y− 112° X+ Y− 113° X+ Y− 114° X+
X− 200° Y− X− 201° Y− X− 202° Y− X− 203° X− X− 204° Y−
Y+ 290° X− Y+ 291° X− Y+ 292° X− Y+ 293° X− Y+ 294° X−
X+ 25° Y+ X+ 26° Y+ X+ 27° Y+ X+ 28° Y+ X+ 29° Y+
Y− 115° X+ Y− 116° X+ Y− 117° X+ Y− 118° X+ Y− 119° X+
X− 205° Y− X− 206° Y− X− 207° Y− X− 208° Y− X− 209° Y−
Y+ 295° X− Y+ 296° X− Y+ 297° X− Y+ 298° X− Y+ 299° X−
X+ 30° Y+ X+ 31° Y+ X+ 32° Y+ X+ 33° Y+ X+ 34° Y+
Y− 120° X+ Y− 121° X+ Y− 122° X+ Y− 123° X+ Y− 124° X+
X− 210° Y− X− 211° Y− X− 212° Y− X− 213° Y− X− 214° Y−
Y+ 300° X− Y+ 301° X− Y+ 302° X− Y+ 303° X− Y+ 304° X−
X+ 35° Y+ X+ 36° Y+ X+ 37° Y+ X+ 38° Y+ X+ 39° Y+
Y− 125° X+ Y− 126° X+ Y− 127° X+ Y− 128° X+ Y− 129° X+
X− 215° Y− X− 216° Y− X− 217° Y− X− 218° Y− X− 219° Y−
Y+ 305° X− Y+ 306° X− Y+ 307° X− Y+ 308° X− Y+ 309° X−
X+ 40° Y+ X+ 41° Y+ X+ 42° Y+ X+ 43° Y+ X+ 44° Y+
Y− 130° X+ Y− 131° X+ Y− 132° X+ Y− 133° X+ Y− 134° X+
X− 220° Y− X− 221° Y− X− 222° Y− X− 223° Y− X− 224° Y−
Y+ 310° X− Y+ 311° X− Y+ 312° X− Y+ 313° X− Y+ 314° X−
Top p. 73
Top p. 74
Top p. 75
Top p. 76
Top p. 77
Top p. 78
Top p. 79
Top p. 80

Figure 2

of the field work. Conversely, plotting can hardly begin until the field work is completed.

The chance for error in computed traverse is nonexistent *provided the computing is done separately* by two men and *only the results* are checked. On the other hand, in plotting, not only can two people very easily make the same mistake but the element of human error enters into the results in the reading of scales and protractors.

II

In the usual method of traverse computation, the average soldier runs into two things with which he is not familiar. One of these is logarithms and the other is circular functions.

Logarithms are easily eliminated by the use of natural functions, which reduces the actual mathematical processes to simple multiplication and addition or subtraction. Contrary to popular belief, the omission of logarithms speeds up rather than slows down the computation. Actual tests prove computation of traverses with natural functions using the tables set up as described herein to be about 20% faster than computation by the usual logarithmic methods.

There are two advantages, in addition to the time saved, in using natural functions instead of logarithms. When natural functions are used, it is necessary to look up only three values in the tables, whereas seven values must be taken from the tables when logarithms are used. Anyone who has thumbed through tables while working under field conditions will readily appreciate this fact. The other and more important advantage lies in the ease of teaching. It is safe to assume that all men are able to multiply while very few of them have any knowledge at all of logarithms. Complete computation of coordinates by this method can be taught to a new man in only a very small fraction of the time required to teach logarithms alone to the same man.

Elimination of circular functions is of course impossible, so simplification has to suffice. This simplification is accomplished by revising the headings of existing natural function sine and cosine tables in such a manner that X and Y "factors" are given for all 6400 mils (360 degrees). These X and Y factors, when multiplied by the distance between two points, give the difference in the X and Y coordinates of the points. The sign of the factors determines whether the difference should be added or subtracted, thereby eliminating the necessity of figuring each time which quadrant the leg is in and what the signs of the X and Y differences in that quadrant are. The use of these factors for all azimuths does away with the necessity of figuring the alpha angle or angle of departure, thereby eliminating a complete step from the computation. Further, using the X and Y factors completely abolishes the confusion in the average soldier's mind brought on by the mention of sines or cosines and leaves nothing for him to have to memorize or figure out.

III

The revision of the headings is very simple. Technical Manual 5-236, "Survey Tables," was changed because it was more readily available than any other. Headings, showing the X and Y factors, are prepared (Figures 1, 2, and 3) to fit the dimensions of the natural function tables on pages 73-81 and 382-385. These are then pasted in the books over the existing headings so that the azimuths of the first quadrant are in their proper place, in accordance with existing headings of the table, and so that corresponding azimuths of the other three quadrants are immediately below. For example, the first four lines of Figure 1 are pasted above and the second four lines below the tables on pages 382 and 383.

Since the only natural function tables available in quantity give only the values of the sine and cosine for angles of the first quadrant (0-1600 mils, 0-90 degrees), it is necessary to make the headings so X and Y factors for all azimuths can be derived from functions of angles of the first quadrant. The headings are based on the following table.

Azimuth	*X Factor*	*Y Factor*
0-1599	Sin A +	Cos A +
1600-3199	Cos A +	Sin A —
3200-4799	Sin A —	Cos A —
4800-6399	Cos A —	Sin A +

The derivation of the table is as follows:

If angle A is any angle less than 1600 mils, then:

Sin A = Cos (A + 1600m) = Sin (A + 3200m) = Cos (A + 4800m), and

Cos A = Sin (A + 1600m) = Cos (A + 3200m) = Sin (A + 4800m).

In the first and third quadrants, the X difference is the sine of A and the Y difference is the cosine of A. In the second and fourth quadrants, the X difference is the cosine of A and the Y difference is the sine of A. The sign of the factors varies appropriately with the quadrant. Figure 4 offers a graphical explanation of this.

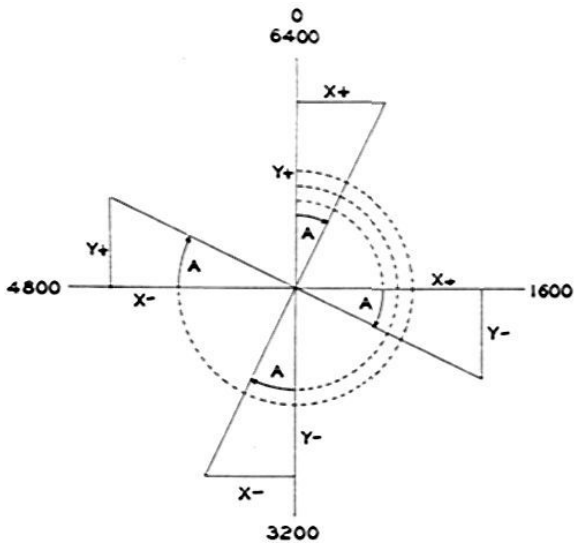
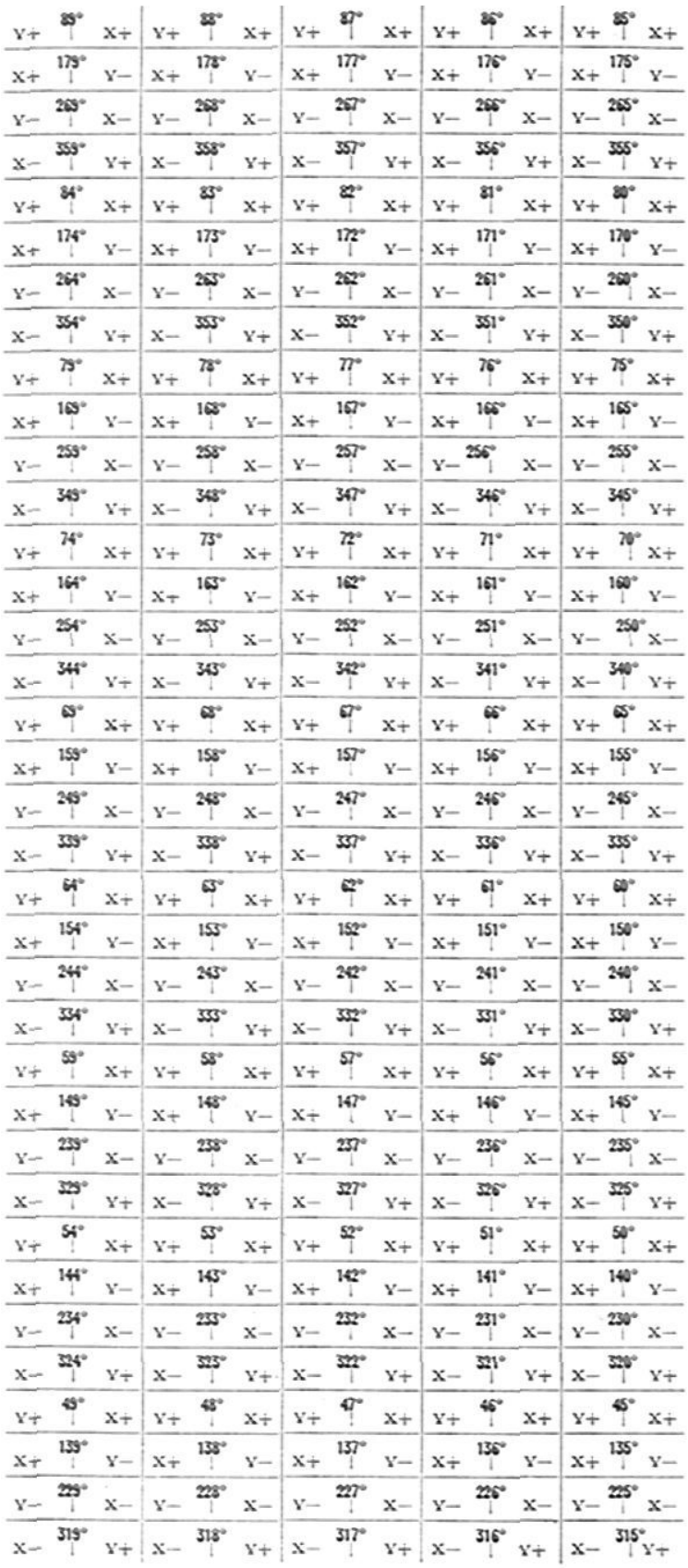


Figure 4



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Top p. 81

Figure 3

Vertical control is computed by using the natural function of the tangent of the vertical angle as the Z factor. This table may or may not be changed by heading it Z factor. The sign of the Z difference is, of course, the same as the sign of the vertical angle.

IV

For use with the table, a form (Figure 5) was set up. The form is practically self-explanatory but is discussed here in

Figure 5

detail to clear up any possible doubtful points.

ORIENTING POINT—The name or number of the point on which the instrument is backsighted before measuring the angle. This will be either the point of initial direction or the station last occupied.

TURNING POINT—The name or number of the point which the instrument is over at the time the angle is turned.

OLD AZIMUTH—The azimuth from the point previously occupied to the station occupied by the instrument.

BACK AZIMUTH—The old azimuth plus 3200 mils (180 degrees) if the old azimuth is less than 3200 mils (180 degrees), or the old azimuth minus 3200 mils (180 degrees) if the old azimuth is equal to or greater than 3200 mils (180 degrees). If the orienting point is the point of initial direction, the initial direction is the back azimuth.

ANGLE READ—The *clockwise* angle with vertex at the turning point from the orienting point to the point whose coordinates are sought.

AZIMUTH—The sum of the back azimuth and the angle read. If the total is greater than 6400 mils (360 degrees) then 6400 mils (360 degrees) is subtracted from the total.

DISTANCE FEET—The distance between the turning point and the point whose coordinates are sought.

DISTANCE YARDS — The distance feet expressed as yards.

VERTICAL ANGLE—The vertical angle from the turning point to the point whose coordinates are sought.

X AND Y FACTORS—Taken from the table corresponding to the azimuth.

Z FACTOR—Taken from the table corresponding to the vertical angle.

OLD X, OLD Y, AND OLD ELEV.—Coordinates and elevation of the point occupied or of the initial point of the traverse.

X, Y, AND Z DIFF.—The product of the factors and the distance yards.

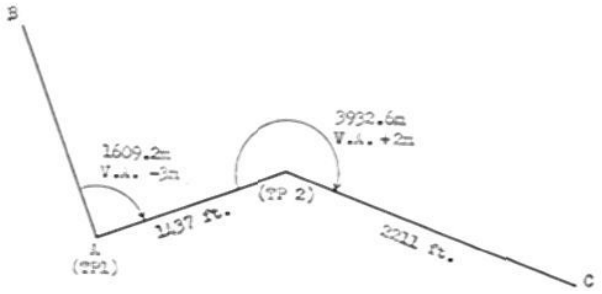
NEW X, Y, AND ELEV.—The algebraic sum of the old X and X Diff, Old Y and Y Diff, Old Elev and Z Diff. These are the coordinates and elevation sought.

This form is particularly useful in teaching the system. It may be abandoned after the men have become familiar with the method, although the same general routine should always be followed.

V

Given: Coordinates Point A (20000-40000), Elevation 300 yards; azimuth line AB 6000 mils.

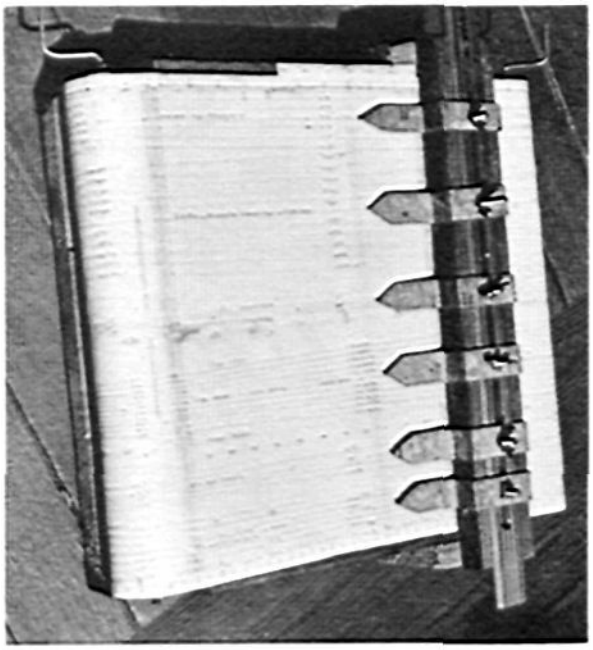
Find: Coordinates and elevation of point C.



(*For solution see Figure 5*)

Note that factors are taken for azimuth to the nearest mil (nearest minute if using transit) but that direction is carried forward to the nearest tenth of a mil (nearest ten seconds for a transit).

Two things are essential to the success of this method. All angles turned must be clockwise from orienting point to point whose coordinates are sought. Computations must be done independently by two men using different tables, and only the final (sought) coordinates checked.



MECHANIZED MIF-MIFS

By Capt. Daniel Rogers, FA

In numerous tests we have computed range corrections taking in weight of projectile, powder temperature, old VE, air temperature, wind, density, and site; applied corrections to map range; and converted to mils quadrant elevation—all in less than one minute. Accuracy varies from about 5 to 10 yards, or one mil in elevation (even when corrections totalled more than 200 yards) when the results were compared with a long-hand solution of the same initial data. It is felt that many situations may arise when the saving of several minutes (or frequently much more time) is worth a one-mil error in elevation, especially as the long-hand method may frequently introduce much larger errors from use of the wrong sign, an eventuality almost impossible with the device described.

The instrument we use consists mainly of a chart and rollers for convenient handling, and a system of pointers for convenient reading of the chart and accumulated errors. The chart itself is a strip of paper 14 inches wide and long enough to include the usual powder charges for the weapon concerned. The chart is ruled or made of engineering paper so as to provide one-inch squares, each subdivided into 100 1/10-inch squares. Horizontally along the chart each one-inch division represents 100 yards of range, and the chart is so marked along the bottom with ranges from lower to upper limits of the zone or powder charge concerned. Also along the bottom of the chart are placed small numerals (in our case we used red ink) to indicate the line of the "metro" message and eliminate reference to firing tables. Vertically, the one-inch divisions also represent 100 yards; in this direction, however, the divisions apply to yards of error rather than to range.

Lines of zero changes or correction are ruled horizontally along the chart at convenient intervals as illustrated, and refer to standard weight of projectile, zero muzzle velocity change, 50º air temperature, zero wind, and 100% air density. By referring to range tables, data is obtained to plot both positive and negative effects of variations from standard conditions.

The instrument described was constructed for the 155-mm. howitzer and was provided with curves for weights of projectiles of 2, 3, 4, 5, and 6 squares, VE change from -25 f/s to +25 f/s at 5 f/s intervals, temperature

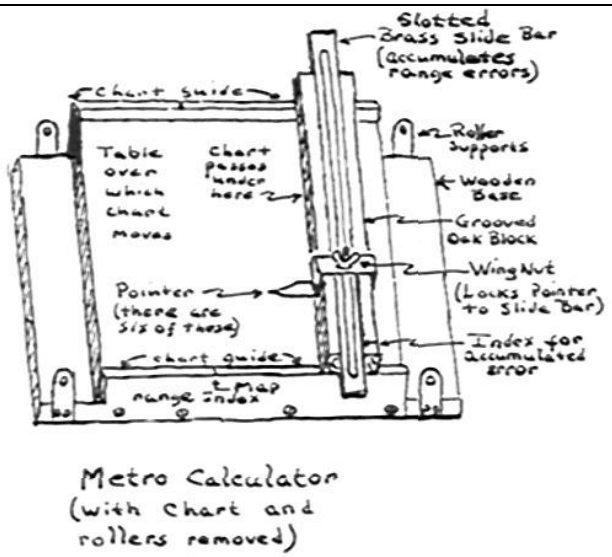


Figure 1.

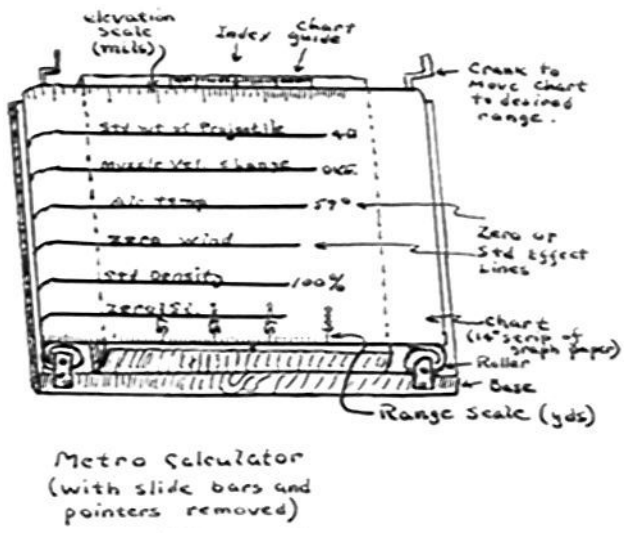


Figure 2.

from 19 degrees to 99 degrees at 10 degree intervals, wind velocity from —40 mph to +40 mph at 5 mph intervals, and density from 92.5% to 105% at 2.5% intervals. At the end of each zone we placed the powder-temperature-versus-muzzle-velocity-change table for convenience. All curves were labelled at intervals of five inches.

The sliding pointer must be free to slide independently, yet must have no play. The slotted accumulative error slide bar must move freely back and forth without disturbing the pointers unless the wing-nuts are tightened, and is graduated in one-inch and 1/10-inch divisions which measure the accumulated displacement of this slide bar wtih reference to a fixed index.

To operate, set the chart at the proper map range, then with all pointers on the zero curves successively clamp them to the slide bar by tightening the wing-nuts. Each pointer is moved to the curve on the chart representing the element of "metro" data concerned, and then loosened before the next pointer is moved. Thus, when a "metro" message has been solved, all pointers will lie on the curves of latest data—and on successive messages, only the pointers concerning data that has changed need be moved. On our instrument all curves which represented EFFECTS causing an *increase* in range were drawn *above* the zero line, and *decrease, below*. Thus, if after moving each pointer to the proper curve we find the slide bar indicating a total displacement away from the operator, a plus effect is indicated, and the amount of displacement read as so many yards plus effect. The correction is therefore minus, so the corrected elevation is read from the mil elevation

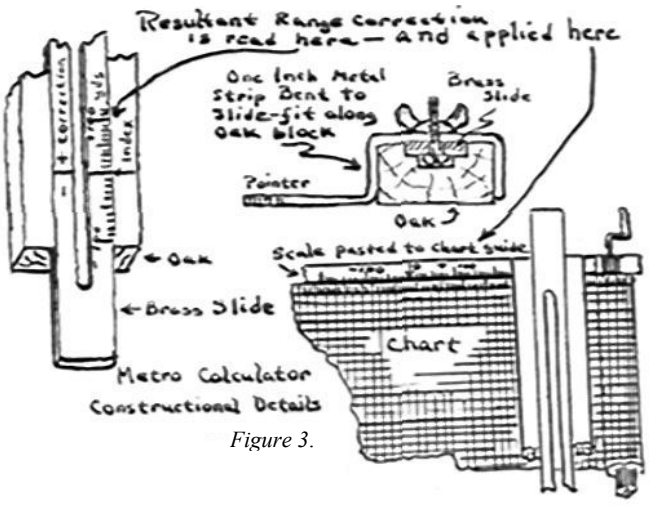


Figure 3.

scale, along the top margin of the paper chart, using the *negative* side of the correction scale inscribed on the chart guide as an index (see Figure 3). The correction scale here also has one-inch and 1/10-inch divisions.

The cost of the device was negligible. The following materials were used for its construction: base—scrap wood; rollers—broom handles; slide—brass; slide support—hardwood grooved to receive the brass slide; and chart guides—plywood. The part of the chart underneath the pointers is protected with a sheet of plastic which also bears a vertical index for setting the chart at map range.

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

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"I have examined the *Guide* carefully and I can state without any hesitation that I believe it is the best publication of its type, which has appeared to date.

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"I was particularly pleased to note that you have included a chapter on rail loading.

"I have recommended this publication to all the officers in my command and I believe it will find wide use in the present expansion of the Army."—BRIGADIER GENFRAL, U. S. A.

Two firing points being used; third point not shown. Targets, hills and valleys can be seen.

Miniature Service-Practice Range

By Col. Frank C. Mellon, FA

After experimenting with many aids, the idea for a miniature smoke puff range embodying as many features of actual service practice conditions as were feasible was conceived. Several ranges were constructed and operated. The outcome was the range in the form as presented here.

Space requirements are not great; a plot of ground about 300 × 300 feet would be more than ample. Little time is required for erection and layout. The amount of labor and the degree of skill involved are minor requirements. Very little, if any, special equipment or materials are needed, as practically all can be drawn from the various supply branches or purchased with Special Field Exercises funds.

The range can be laid out in the form of a square or a fan. If only one gun position is to be used the fan-shaped arrangement is better, but if two or more gun positions are to be used a square shape is to be desired. A very convenient scale is one of one foot equals fifty yards, but this scale can be altered to suit any needs or requirements. A range approximately 160 feet square would be ideal for practically any type weapon. The actual details of the layout plan are shown to scale on the accompanying sketch.

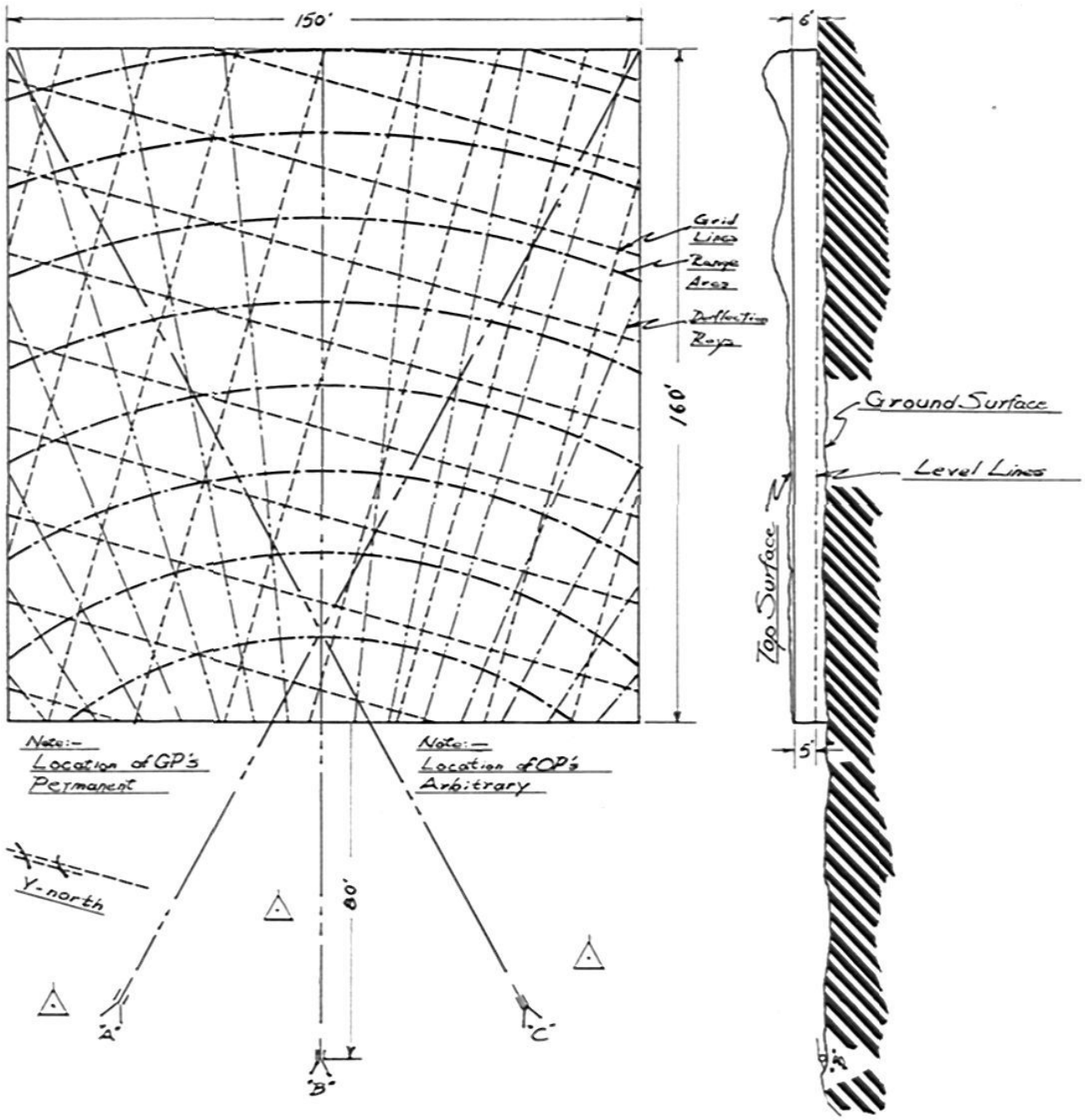
Gun positions are located about 80 feet away from the range. This allows use of practically any charge Positions are so located that when three guns are used the angle of intersection of the lines extending from them to a target is about 300 mils; this allows enough distance between the various firing points to prevent any confusion. Such an arrangement also works very nicely for fire direction center work. There are several outstanding reasons for having more than one gun position: one is to provide a suitable setup for

Shows burst in center of range right of telephone pole and right of target (irregular object) with wind blowing to left.

FDC work, and another is to allow the same size angle T to be used at all firing points at the same time.

The range proper is made of small-mesh chicken wire stretched over a frame of galvanized wire, or camouflage nets might be used. This wire network is mounted on poles about six feet above the ground to allow plenty of freedom of movement for the crews working under the net. In various places the chicken wire is raised to simulate hills and ridges. The range is garnished with grass and burlap. Small villages, farms, trees, rivers, bridges, and other terrain features are put in to scale to give a most realistic appearance.

Each gun position is the center from which a series of rays extend: deflection lines, equally spaced. Deflection lines are 10 mils apart and are marked or tagged every 100 mils. The gun positions are also the center of a series of concentric arcs which actually are range arcs. Each arc has a radius 2 feet greater than the last, representing a distance of 100 yards. Tags or markers are put on the intersection of each 500-yard range arc and 100 mil deflection ray. Tags of different colors are used for each gun position, and the lines that are used as arcs and rays also use this same distinctive color for each battery. To aid the operators who must work under the range, boards



showing deflection, range, elevations for the approximate charges, and C for the charges are used to supplement these tags. All lettering is in black and a different color is used as background color for each charge, but the background for the ranges and deflection (common to all charges) is white. These boards are 5″ × 8″, with half-inch to one-inch lettering.

A grid system is used to check all FDC operations, survey work, and computation of firing data. Y-lines of the range run parallel to the actual Y-lines of the locality, the lines being laid off on the ground with medium gage galvanized wire. Of course this grid has the same scale as the range.

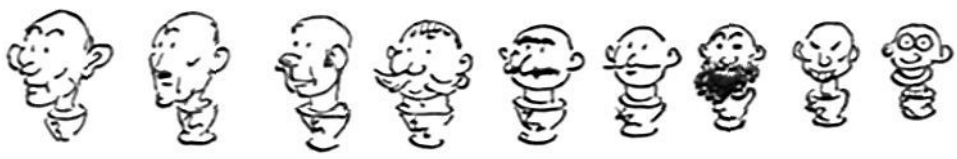
Elevation of a point, or any point, is found by measuring up from a level line determined by laying a thin board across two pegs of equal elevation. A series of pegs are driven in the ground under the range to be used in determining the elevation of any point. Each peg has the same elevation. Several convenient bench marks are placed in the position area to help determine the elevation of targets.

For the smoke puff apparatus all that is required are two or three feet of some rubber tubing, two pint bottles, two two-hole rubber stoppers, some glass tubing, and a thistle tube. The chemicals used are commercial ammonia and hydrochloric acid. Smoke is generated by blowing into the ammonia and forcing its fumes over into the hydrochloric acid. With a little practice a very realistic effect can be achieved. Salvo or volley fire can be handled easily with this apparatus.

To operate the range, each operating crew needs only two telephone operators (one under the net and one at the firing point), smoke puff operator, and recorder. The recorder is usually in charge of the crew, since he must be able to read range tables readily and keep up with the problem. Small white paddles may be used to simulate bursts instead of smoke; they may also be used to mark established brackets when conducting observed fires.

Since an officer firing gets exactly what he asks for both in range and deflection, this range lends itself as a training aid in many different ways. Officers and noncoms can be trained in the proper technique and procedure in the conduct of observed fires: small-T, large-T, axial, and forward observation problems can be handled with equal ease. All members of a FDC team can be trained very thoroughly. Telephone operators and radio operators can be given valuable training; all errors in procedure and technique can be rapidly corrected. Everyone concerned can obtain a very clear picture of the operation of a battalion of artillery. Instructors are able to see and correct all bad practice immediately.

When flood lights can be installed, night shooting can be conducted exactly as in daylight hours. With the lights off, a small flashlight can be used to simulate the flash of bursts at night. High burst and center of impact adjustments can also be made at night by this method.



Field Artillery Board

Conduct of Fire by Film Strips

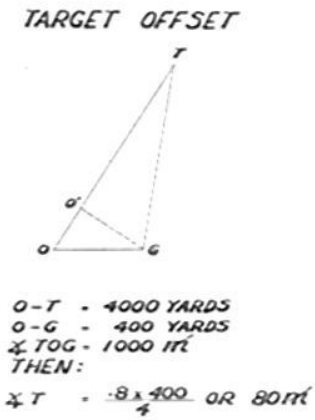
By Lt. John L. Linville, FA

Blackboard firing is artificial, indoor terrain boards restrict instruction to one student at a time, and neither shows the appearance of actual bursts. Film strips overcome these objections, are inexpensive to make, duplicate, and use, and offer a great variety of possible sensings. Home-made ones are being used with great success in the Officer Candidate Batteries at Camp Roberts to speed instruction in both preparation and conduct of fire.

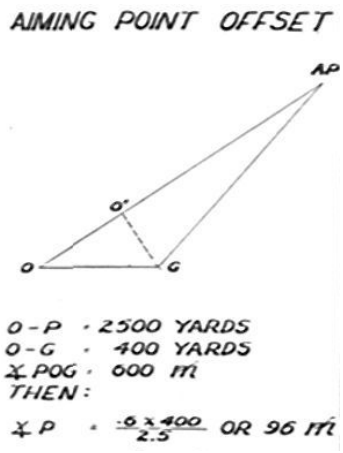
From photos taken with a telephoto lens from a dugout some 800 yards from the impact area, prints are selected to illustrate a particular type of fire. Appropriate titles are made, and the entire assembly rephotographed as a 35-mm. film strip to give the complete sequence of a typical problem. The principal difficulty is to obtain good pictures of target hits.

The accompanying illustrations are from an "axial" strip. Frames 7, 9, and 11 are respectively the same as 8, 10, and 12 except that no title is superimposed; while these odd-numbered frames are on the screen, the students make their own sensings and write them down along with their own "next commands." These jottings, together with the solutions on the even-numbered frames, form an excellent basis for the instructor's discussion.

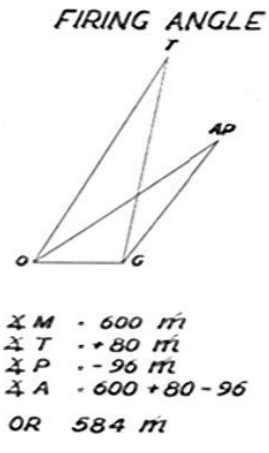
Frame 1



Frame 2



Frame 3



Frame 4

Frame 5

Frame 6

Frame 8

Frame 10

Frame 12

Time Fuzes and Fuze Setters

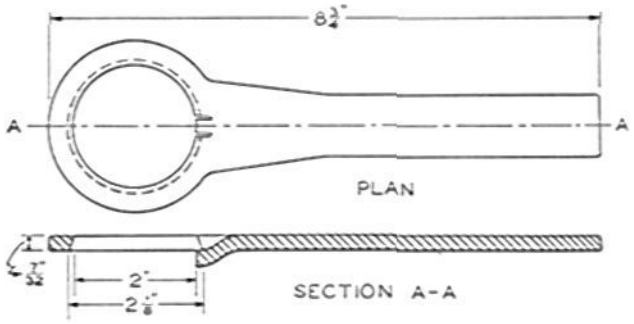
By Capt. G. C. Chadwick, Jr., FA

There are three standard time fuzes for field artillery ammunition, as follows:

Fuze, Point-Detonating, M54
Fuze, Point-Detonating, M55
Fuze, Mechanical Time, M67

The first two are 25-second combination time-and-super-quick powder-train fuzes, and are identical in design and dimensions. The difference in their nomenclature is due to the fact that the M54 is issued as part of a complete round of fixed or semifixed ammunition (75-mm. guns and howitzers, 105-mm. howitzer) with the M20 booster, while the M55 is issued assembled with the M21 booster as a separate component of a complete round of separate-loading ammunition (4.5-inch gun and 155-mm. howitzers). The third fuze, the M67, is a 75-second mechanical time fuze, issued, with the M21 booster, as a separate component for the 155-mm. guns and larger separate-loading weapons. The M67 fuze affords time action only, having no impact element.

Two hand fuze setters for the M54 fuze have been standardized for field artillery weapons. They are the Fuze Setter M15 for the 75-mm. howitzers, the M16 for the 75-mm. guns, and the M17 for the 105-mm. howitzer. Each has a CORRECTOR disc and a TIME disc moved by knobs. The CORRECTOR disc bears a scale graduated from 0 to 60, 30 representing normal setting. The TIME disc bears a scale graduated in one-tenth-second increments from 0 to 25 seconds, with a setting of "S" for safe. The settings of the TIME and CORRECTOR discs determine the angular separation of the two lugs which engage the slot in the time ring of the fuze and the slot on the fuze body and thus establish the length of the powder train. The two scales thus effect an algebraic addition of TIME and CORRECTOR, the sum being applied mechanically in setting the time-ring of the fuze. The TIME disc of each fuze setter is also graduated in FUZE RANGE, in hundreds of yards, for a specified charge. Thus the fuze-range graduations of the M15 fuze setter are for HE shell M48, charge 3; those of the M16 for HE shell M48, normal charge; and those of the M17 are for HE shell M1, charge 5.



While each of these fuze setters is dimensionally suitable for the M55 fuze, none has been standardized for the 4.5-inch gun or for the 155-mm. howitzers. No fuze setter has been standardized for the 75-second mechanical time fuze M67.

The fuze setter M14 is a simple wrench which fits the time ring of the M54 or M55 fuze and which has a lug to engage the slot in the time ring. By this means the fuze may be set directly for time of burning by reference to the scale on the time ring. This device has been placed in the substitute standard category pending production of the standard fuze setters described in par. 2 above. Its appearance and dimensions are shown in the above illustration. It can be made up readily from flat steel stock about 1/8 to 3/16 inches thick. It is believed to be dimensionally suitable for the M67 fuze also.

The disadvantage of the fuze setter M14 in comparison to standard types is that it does not provide a means of using a CORRECTOR setting; the appropriate correction of the firing-table value for time of burning must be included in the value "TIME" sent to the gun position as part of the command, or, preferably, the height of burst can be adjusted by change of SITE. For observed fires, a site correction is fully as satisfactory as a "corrector for the day," although the latter affords greater facility when registering for subsequent transfers of time fire. On the other hand, the fuze setter M14 has advantages in simplicity and in speed of setting and reduces the chance of errors in the application of data. It has been used very satisfactorily in time fire at the Field Artillery School.

PERIMETERS in PARAGRAPHS

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

By Colonel Conrad H. Lanza

NORTH AFRICA

Losses of the forces engaged in the four days of fighting resulting from the American invasion of Morocco and Algeria commencing November 8th were

American	**360 killed**	**1,050 wounded**	**600 missing**
French	**490**	**969**	**none.**

The American figures are approximate only. The missing are supposed to have been drowned from loss of some ships from enemy air and sea action.

With the stopping of French resistance as a result of an accord arrived at between the American commander (Lieut. Gen. Eisenhower) and the French High Commissioner (Admiral Darlan, recently deputy Chief of State for France), the French cooperated with the American Army on and after November 12th. All feelings of enmity between the Americans and French disappeared. It was agreed that French troops would join the Allies in an invasion of Tunisia, which was to be undertaken at an early date.

The British Lieut.-Gen. Kenneth A. N. Anderson was assigned to command the expeditionary force to be organized for this purpose. At Algiers on the evening of November 9th he reported to General Eisenhower for this duty. The British First Army was to form the nucleus of the proposed invading force, but was to be reinforced by American units and as many French ones as practicable. Maj. Gen. Charles W. Ryder, U. S. A., was assigned as second in command to General Anderson. At this date there was no enemy in Tunisia. That state, ruled by a Dey, had been handed by the American Consul General (on November 8th) a letter from President Roosevelt announcing the intention of the Allies to send troops through his country for the purpose of protecting it against the Axis, and for the further mission of advancing on Axis forces in Tripolitania. The good offices of the Dey were solicited. As far as known, the Dey never replied to this letter.

The first Axis forces in Tunisia arrived on 10 November. According to British Intelligence reports they numbered about 1,000, and thereafter arrived fairly regularly at about the same rate per day. The initial landing of troops from the British First Army was on the 11th, at Bougie, a good port east of Algiers. This was discovered by the enemy air reconnaissance, and during the day a violent air attack was made on the port of Bougie. The British have admitted loss of ships, without disclosing just what they were; the Axis claims they sank two transports and damaged twelve others.

On November 12th more British troops commenced to land at Bone. As this was close to the Tunisia border, motorized units were at once sent out and established an outpost at La Calle, 50 miles to the east and just outside Tunisia. The enemy air force again bombed Bougie and also Bone, and claim to have sunk and damaged numerous transports and some escorting naval vessels.

Thereafter the British troops landed rapidly. Two columns were organized: the north one was to advance along the coast road and railroad, a south column to advance along the main railroad from Algiers to Tunis, initially east from Gueban. French troops in Algeria were forwarded as fast as possible, and assigned the task of protecting the right of the First Army by advancing across the mountains toward the Tunisian city of Sousse, a secondary port. To facilitate this mission American parachutists were (on November 15th) dropped at the Algerian airfield near Youks-les-Bains to give our air forces an advanced field to operate from.

On the 16th British parachutists were dropped at Souk el-Arba (Tunisia), on the road assigned to the south column and leading to Tunis. American troops arrived to join the British. The delay in moving forward was caused by the blocking of harbors by air attacks, which the enemy made daily and which interfered with the forwarding of needed materiel and supplies. On this day the enemy air forces started an intensive machine gunning and bombing of roads and railroads leading to the front, which helped prevent completion of preparations. However, the advance crossed the Tunisia frontier in three columns—two British and one French—on the 17th.

On November 18th the north column had its advance guard attacked 20 miles east from Tabarca by a German force of about a battalion of infantry supported by 30 light tanks. A restricted but severe action resulted in the enemy retiring after losing 11 of his tanks. As he

retreated he destroyed bridges and arranged obstacles to delay the British advance.

On the 19th the south column encountered strong opposition as it neared Medjez el-Bab. The French right column intervened to aid the British. British parachutists were hastily rushed up. The enemy, supported by dive bombers, made four separate attacks; the French are reported to have lost heavily. The enemy held on to Medjez el-Bab. French patrols on this day reached the general vicinity of Sfax and Gabés, but Axis troops were between these patrols and the main French force.

On the 20th the British north column continued eastward and had another brush with the German infantry and tanks, whom they again drove off. A light British motorized column sent toward Mateur found that town occupied by the enemy; failing to drive him out, they rejoined their main body.

During the next three days the Allies deployed and prepared to make a general attack against the line Mateur—Tebourba—Medjez el-Bab. There was considerable patrol activity and some 40 enemy prisoners were brought in. A new task force was detailed to operate between the north and south columns. It consisted mostly of armored units and was to be in readiness to operate independently or with either or both the north and south columns.

On November 24th the advance of all columns started. The north column marched on Mateur, the south one on Medjez el-Bab, the mixed liaison column toward Tebourba. Upon arriving in the vicinity of the enemy's positions attack was deferred until next day. On the 25th the south column of British Guard troops delivered an attack on Medjez el-Bab. The attack started during the night of 24/25 November against the high ground west of the town. At dawn it was pressed forward with strong artillery and air support. Medjez el-Bab lies on the east slope of a hill which had to be carried first. The enemy made a stubborn defense but by afternoon withdrew eastward, leaving the town in British hands. Some American units participated in this action.

The mixed liaison column in the center passed around Tebourba and arrived at an airfield near Djedeida, about 6 miles northeast of Tebourba. They destroyed 40 enemy planes found on the field. An enemy armored force now appeared and attacked, and a tank battle occurred. The enemy was driven off, losing 18 of his tanks while only 7 Allied tanks were disabled.

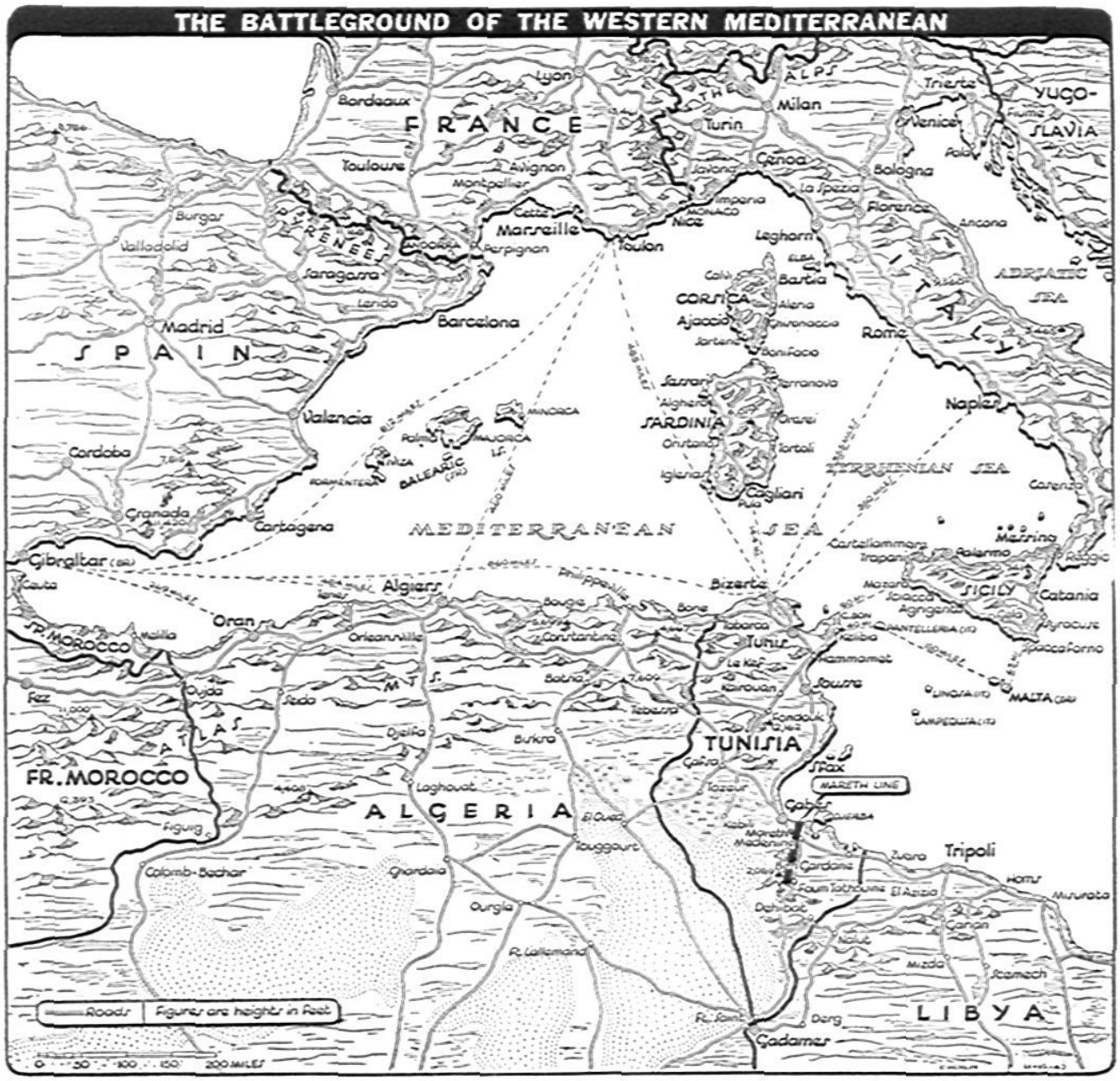
No special fighting took place next day. The north column appears to have stopped before Mateur. The allied estimate of the situation was that the Axis was on the defensive and was unable to do anything more than delay the allied advance, principally through demolitions.

On November 27th the mixed liaison detachment attacked Tebourba from the north while the south column attacked from the south. Between the two, the enemy was forced out. He counterattacked later but lost 10 of his tanks. Rain set in, and it became very muddy. Usually the rain came in short but very heavy downpours lasting about an hour at a time. When not raining the days were very hot, while the nights were bitter cold. Troops were in shelter tents. The native population disappeared—another horde of refugees.

On the 28th the mixed liaison detachment was changed over to operate with the north column in a joint operation against Mateur. It retained a detachment east of Djedeida. On the 29th the enemy attacked this detachment suddenly, while the main force was around Mateur. The enemy recaptured Djedeida, claiming that he took over 200 prisoners.

A British regiment of Lancers, now mounted on motor vehicles, counterattacked Djedeida November 30th, after that place had been first bombed by American planes. They succeeded in entering the town but could not capture all of it. The enemy secured a few prisoners, sufficient for identification purposes. While this action was in progress the attack on Mateur commenced. The first objective was a hill north from Jefua. After an all-day fight the British failed to take it.

The allied attacks on Mateur and Djedeida were ordered continued the next day. That on Djedeida started with an artillery preparation at 0745; but instead of our troops attacking, the enemy attacked first not only at Djedeida but also at Tebourba. A severe battle commenced, and soon afterward the enemy attacked near



Mateur. In view of this situation the Allies' mixed liaison detachment was sent back to the center and does not appear to have engaged in the general action which soon covered nearly the entire front. The enemy's attack from Mateur north of Jefua was repulsed by the north column, and no change in the line took place here. At Djedeida, the enemy's tank attack was stopped by artillery fire which disabled 7 of his 25 tanks; here he made only minor gains.

A very strong enemy tank attack supported by dive bombers and much artillery made progress against Tebourba from the beginning. Notwithstanding the resistance of the British south column, with which United States troops were serving, the enemy recaptured this town and compelled our troops to withdraw southwest toward Medjez el-Bab. This left a dangerous gap in the line which the British First Army closed by ordering the mixed liaison detachment to take over this part of the front by establishing a new line on the high ground west from Tebourba. The enemy did not interfere with this.

Next day the enemy did not press his attack but confined himself to minor operations to improve his newly captured positions. More American troops, rushed to near Tebourba, arrived in time to enable the withdrawal of British troops who had been threatened with being encircled. The Axis reports that in the two days' fight they captured about 200 prisoners and destroyed some 30 to 40 British or American armored vehicles.

On December 3d minor Axis offensives continued. Some British parachutists were dropped in rear of the Axis lines. It seems that they fell just near a place where a battalion of Italian Bersaglieri (special infantry type) happened to be, who report capturing the entire detachment of about 300 men. German reports claim that in improving their lines near Tebourba they took 456 more prisoners. These losses were partly compensated for by a French success in the south, where they captured several hundred German prisoners in an advance near Sidi bon-Zid.

Next day the enemy renewed his attack, advancing westward from Tebourba. He used tanks, artillery, and dive bombers, and made substantial advances. As this threatened a penetration of the Allied line, the British First Army ordered a withdrawal of the center to a new position which would extend in an almost straight line from Mateur (held by enemy) to Medjez el-Bab (to Allies). This eliminated the bulge near Tebourba and involved the abandonment of Djedeida, but it shortened the front from around 45 miles to only 25 miles. The enemy followed on this and the next day and reports taking in all 1,100 prisoners, 70 tanks, and 41 guns. The Allies have made no claims as to Axis losses during the battle of Tebourba. On the 6th the enemy renewed his attack, pushing southwest from Teboura, and in face of the strength of his forces the allies after confused fighting fell back to below El Guerra, a small town 10 miles from Tebourba.

On December 10th the enemy delivered two attacks against Medjez el-Bab. One came from the north on the west side of the Medjerda River, from territory acquired in the battle of Tebourba; this was immediately counterattacked by British and American armored forces. The other enemy attack came from the southeast and was opposed by French troops. Both attacks were repulsed, and both sides lost an undetermined number of tanks. Further fighting occurred in this area on the 12th, without materially changing the situation.

Action now shifted to the south, while in the north a temporary stabilization set in. On the 19th French troops advanced on Kairouan on the road to Sousse. They were attacked before they reached Kairouan; the enemy was repulsed, but he held on to the city. More fighting took place in succeeding days without either side being able to overcome the other. A second French advance against Sousse was started on the 21st by a French column moving southeast from the vicinity of Pont du Fahs. This column had considerable success next day, taking numerous prisoners and some guns and tanks. On the 23rd the enemy counterattacked both French advances and (although he made no gains) the advances came to a temporary halt.

On the 23rd the south British column made an attack opposite Tebourba near Medjez el-Bab. After a heavy downpour the moon shone and before dawn American and British troops moved forward in trucks preceded by small detachments which mopped up enemy security detachments. The attack toward Tebourba failed to obtain any success, but that near Medjez el-Bab captured some high ground. Next day the Axis counterattacked, quite heavy fighting developed on this hill, and the enemy succeeded in regaining a foothold and taking some American prisoners. To clear him off a new Allied attack was planned for that night. Just at dusk the Allied artillery fired a 24-minute preparation. The infantry then moved forward. German counterbattery from 88-mm. batteries replied to our artillery and secured a narrow bracket on some of our guns, inflicting not a few casualties. Our infantry went forward in the night, and just before midnight secured their objectives.

At dawn on Christmas day the enemy made a new attack on the hill and swept the Allies off the crest. Although the weather was rainy and windy, a new counterattack was prepared and later launched. This resulted in recapturing most of the hill. The fighting was severe. No report of casualties has been announced from either side, and neither claims taking prisoners, but it appears that the losses were probably heavy. This hill was abandoned by the Allies on December 28th.

On December 26th the French made another advance from southeast of Pont du Fahs toward Sousse, taking 100 prisoners. It was announced that these French troops were being supported by American planes and were being reequipped with American arms.

In the middle of November the British Eighth Army was in Libya, pursuing the forces of Marshal Rommel, who was retiring eastward. On the 19th the British entered Bengasi without opposition, the enemy retiring to the vicinity of El Agheila. As this is a good defensive position which Rommel had held successfully once before, it was believed that he might stand there again. The British were obliged to delay an attack until they could bring forward supplies; they were ready on December 12th.

Rommel immediately retired from El Agheila without making any fight. He left the roads behind him full of mines and obstacles, the clearing of which necessitated such a delay that a close pursuit was impracticable. The British sent a light mechanized column across country to go around the enemy's flank. On the 16th this column, after a very difficult march, reached Wadi Matratin, where it turned south from near the coast and occupied a position believed to be in the midst of the enemy's columns and thereby cutting off all that portion of his forces which were to the east.

How Rommel escaped from this scrape has not yet been explained. But he did, and his retreat was not thereafter substantially interfered with. As these lines are written, the Axis troops have withdrawn to near Misurata.

COMMENTS

How far Rommel will retreat is an important question. He may retire into Tunisia, or he may stop and attempt to hold Tripoli. Should the Axis abandon Tripolitania and concentrate in Tunisia, they would have an excellent defensive position

against a force coming from Tripolitania. This extends westwards from Gabés and consists of a series of depressions, salt marshes, and lakes, with but few passageways across in about 400 kilometers. This line is discussed in all French plans for the defense of French North Africa, and is considered by them as a line which is almost impregnable. The French had prepared some fortifications, posts, wells, etc., on and near this line. Tripoli can of course be defended, but it has not any natural defenses.

President Roosevelt's letter to the Dey of Tunisia, together with a similar one to the French Resident General at Tunis, warned the Axis of the allied intention of seizing Tunisia and advancing from there into Tripolitania. However, this merely confirmed an estimate as to our intentions, which the Axis would undoubtedly have arrived at. They then promptly proceeded to Tunisia first.

According to British Intelligence reports of December 4th, it was believed that the Axis had not succeeded in landing over 9,000 troops around Bizerte and Tunis, plus an unstated number at ports further south. Up to the beginning of December the British First Army's estimate was that the enemy was on the defensive. His offensive delivered on the 1st and succeeding days appears to have been a surprise. The estimate of December 11th raised the strength of the enemy in north Tunisia up to 23,000. Additional enemy troops were known to be at Sousse, Sfax, and Gabés, but it was believed these were not strong.

It is possible that the enemy has even more troops than indicated. Notwithstanding constant efforts to intercept his sea and air convoys, a sizable proportion have gotten through. He has had, however, considerable losses. According to radio broadcasts, some large convoys with tanks, artillery, and other heavy materiel have crossed from Italy to Tunis during fogs which protected them from attacks. There is no way at this time to verify this statement, but that the enemy has numerous tanks and considerable artillery is indisputable.

THE SOUTHWEST PACIFIC

THE SOLOMON ISLANDS

On Guadalcanal Island our occupation has not been seriously threatened since October. Japanese troops were landed on that island on the night of 2/3 November, in numbers estimated at about 1,500. They have appeared only as replacements, and have been gradually eliminated by frequent patrol encounters, sought for and regularly won by our Marines and soldiers. Daily Japanese losses from this cause are reported as around 50 a day. At this rate the entire 1,500 men would have been absorbed within a month.

The most valuable installation on Guadalcanal which we hold is Henderson Field. It has been steadily improved by constant work, and by the latter half of November it was possible to base the largest military planes on that airfield. This has made it possible to bomb enemy installations at the maximum flying range from Guadalcanal. Rabaul, an important enemy base, is now bombed from Guadalcanal instead of from Australia, as had hitherto been necessary.

The Japanese have also improved an air base which they held near Munda on New Georgia Island, less than 200 miles from Henderson Field. American bombers almost daily raid this place both by day and night. They have destroyed all buildings which could be seen from the air and have downed many Zero fighters protecting Munda, against very small American losses. The enemy occasionally retaliates by bombing Henderson Field at night. Only a few planes come over at any one time, and the damage they have caused so far has been slight.

On the night 30 November - 1 December the Japs sent a naval surface force towards Guadalcanal. This was intercepted by our own Navy off Savo Island, just off the north end of Guadalcanal and the scene of several previous naval encounters. The night battle lasted only 20 minutes, commencing at 2317. The enemy used torpedoes at a range of about 4,500 yards. There was little gun firing. Our Navy reports that no Japanese landed on Guadalcanal, which presumably was the mission of the enemy's task force. Instead they lost 3 transports and 6 destroyers, a few survivors being picked up the following morning. Against this we lost one cruiser, with damage acknowledged to an unstated number of other ships. The Japanese deny that they had any transports, and explain their presence in these waters as that of a torpedo flotilla attacking U. S. naval vessels. They admit the loss of only 1 destroyer and claim to have sunk several American ships (including a cruiser of the *Augusta* class, which was the only identification they made).

Another Japanese naval force was discovered by the Air Force approaching Guadalcanal at about 1800, December 11th. It consisted of 11 destroyers, also presumably bringing replacements to put ashore. Our Air Force attacked just before dark, with undetermined results. U. S. Navy surface forces intercepted the Japs (again near Savo Island) a little after midnight, and in the resulting engagements sank one enemy destroyer and damaged two others. One American motor torpedo boat was lost. What became of the uninjured Japanese destroyers, and whether these landed replacements on Guadalcanal, is not known.

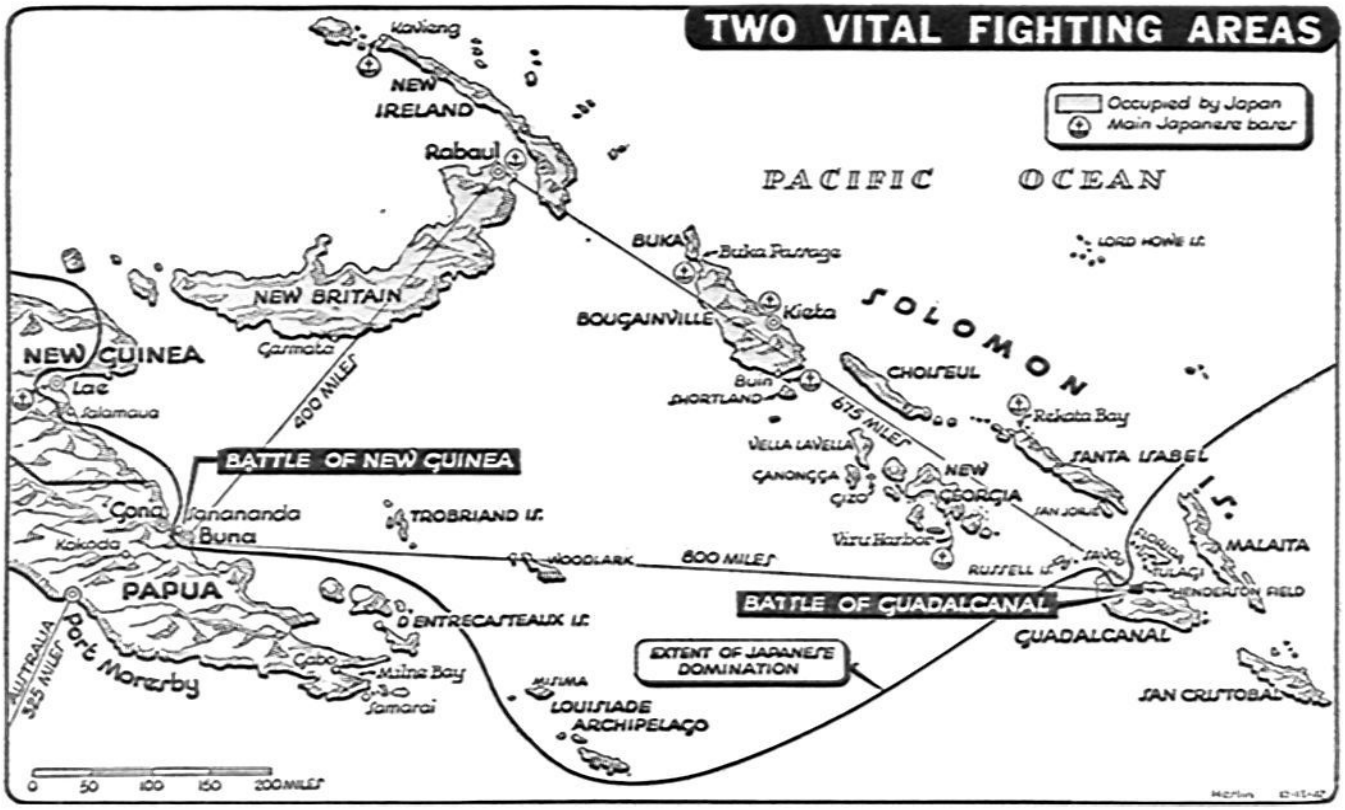
Up to the end of December patrol activity on Guadalcanal continued constant, with a gradual enlargement (toward the west) of the American-held area. Bombing of Japanese bases to the north, made more practicable by the improvement of Henderson Field, is being intensified, with very special attention to Munda on New Georgia Island.

In general, both sides in the Solomon Islands have been on the defensive since October.

NEW GUINEA

At the beginning of November the Japanese in that part of New Guinea known as Papua held only a narrow strip of coast land extending from Gona to Buna (both inclusive) and in all some 10 miles long. This stretch of territory had been the objective of a joint force of Americans and Australians who had invested it and were actively engaged in a campaign to reduce it.

This strip is lowland. Back of the beach it is heavily



wooded and is full of jungle. Visibility therein is limited and camouflage is facilitated. The Japanese had taken full advantage of the terrain. With immense patience and labor they had constructed a most intricate system of strong points covering their entire front, and in most places they had more than one line of defense. Among their fortifications were pill boxes of reinforced concrete, and others of earth revetted with logs. They had a very large number of machine guns and infantry mortars, all well emplaced and difficult to locate. There was considerable wire. The whole set of positions were interconnected by an elaborate series of trenches and tunnels, so that if one post were under fire the garrison could quickly withdraw unseen to an adjacent one. The majority of machine gun and infantry nests could not be destroyed by infantry weapons; either artillery or bombing was required. Bombing was tried with no remarkable results, due to difficulty of locating targets concealed in the jungle. The artillery was handicapped by the difficulty of observation. The only OPs which could see the targets were so close to them that it was dangerous to adjust fire while the OPs were occupied, and if they were not occupied the fire could not be properly adjusted. Tanks were needed, but none were available at this time.

The Japanese had trouble too. They were under incessant attack, for the Allies gave them no rest. The Allies had superior air power and interfered with the arrival of Japanese supplies, which necessarily had to come by sea.

By the middle of November the Allies—American and Australian troops—had about cleared the surrounding country of isolated enemy outposts and were close in on both flanks of the long and narrow Japanese main position along the shore. On November 18th eight Japanese destroyers arrived off the coast, and as soon as night fell commenced to debark troops and stores for their comrades at Buna and Gona. A first air attack against these ships had been made before dark, without the results having been observed. A second and better-prepared attack was made during the night. Our planes were met by Japanese overhead cover. This was disregarded and a low altitude bombing attack made. Flares were dropped first, then bombs. One enemy cruiser and one destroyer were sunk. The barges were attacked with unknown results. From identifications of enemy killed made on November 26th it appears that this attack, however successful it was, did not prevent the enemy from landing a substantial number of men.

Every day the Allies undertook some offensive action, making a small advance here and another there. It was a process of whittling away at the very strong Japanese positions. On the 23rd Australian troops entered Gona and passed on eastward to continue further attacks in that direction. Gona was not, however, completely cleared of the enemy, who continued to hold out from several centers of resistance within Gona. The Japanese defended with fanaticism this small, inconsequential collection of native huts. Some were dug in under roots of giant trees, others were up in the trees, still others in

prepared fortifications. They fought until the last man was killed. They did not remove their dead—could not do it, but kept on fighting alongside decaying corpses. Some Japs, before death reached them, concealed grenades about themselves so that if our troops picked up their dead bodies for burial they would explode the grenades and kill themselves. By a strange quirk of the mind they prepared letters to their families in Japan advising them of their approaching deaths, and having placed appropriate addresses on the same, left them in prominent places to be picked up and forwarded by the Red Cross.

The same day that Gona was entered the right of the allied attack was at Cape Endaiadere. Although under direct attack, Buna was resisting strongly. By daily small advances the allies slowly moved forward, rolling up the enemy flanks from both east and west ends. The long south front was attacked everywhere. Every day saw a gain somewhere, perhaps unimportant in itself but one which did its part in gradually reducing the strong enemy lines. Some strong points (in addition to that at Gona) were bypassed and later reduced by separate detached operations.

The steadiest advance was from the west, where troops coming from captured Gona advanced along the beach, mopping one strong point after another. On the night of 1/2 December the Japanese made another effort to land reinforcements from ships. Again the allied air forces intervened. There was a good sized air battle with the enemy overhead cover, our aviators reporting 23 enemy Zero planes shot down. Our own losses were not given. No loss of enemy ships having been claimed, it is assumed that they accomplished, at least in part, their mission of landing troops. Later on the 2nd the allied attack reached the outskirts of Buna.

On December 5th the Japanese commenced to land supplies by parachute. The Japanese air force appears to have been based on airfields near Lae, the former capital of Northeast New Guinea, which at one time had been a German colony. This is within 200 miles of the Buna area.

The last of the Japs in Gona was killed on December 8th and the route through that small village opened. It turned out that the enemy garrison had been a battalion with 456 men present for duty; 440 bodies were buried and 16 Japs taken prisoner. On this day the air force attacked 8 Japanese destroyers, who once more were seeking to land troops to aid their beleaguered forces at Buna. One Jap destroyer is reported sunk. The remainder apparently succeeded in landing some men, while a strong Japanese counterattack was launched from near Sanananda to divert the attention of our planes.

December 19th the air force discovered that a Japanese force of some strength had been landed during the preceding night at the harbors of Madang and Finschafen, on the far or west side of Lae. At date of writing the mission and strength of this new force are unknown. It is reported as establishing new bases, for some purpose not yet disclosed. On this day large and heavy allied attacks were made to level off Capt Endaiadere (where some enemy posts had remained) and the vicinity of the mouths of the Amboga and Kunussis Rivers, really creeks (on our left). The fighting was heavy, and 196 enemy dead were found on the field. After dark a considerable number of Japanese planes raided our rear areas. Perhaps they had heard of the arrival of American tanks

On the 20th a general attack was launched by the allies. Tanks were covered by an artillery barrage and provided with overhead air cover. Infantry followed closely. Bitter fighting developed. The enemy's position was not captured, but it was dented. On the 21st the attack continued in the same manner, by united action of all arms. This day our troops overran the main line of resistance, capturing pill boxes, concrete works, and other defenses. Notwithstanding this battle the Air Force found time to send planes to Finschafen, where they sank two medium cargo ships. The allied offensive continued for two more days, making but slow progress due to the intricate nature of the enemy's works and his desperate resistance.

On December 24th the allied assault was renewed with all available strength. Both flanks of the enemy and his center were attacked simultaneously. Tanks and artillery, infantry and planes concentrated on the remaining points in the enemy main line of resistance which had not been taken. Before this determined advance the Japs were overwhelmed and driven back to the citadel of their position. This consists of a narrow strip of coast not over 600 yards deep and about a mile long, with its center at Cape Giropa. Here the allied attack temporarily stopped. Next day was Christmas, and General MacArthur ordered a suspension for that day of all activities other than necessary safety measures.

The end of the Japanese position at Buna appears to be rapidly approaching.

MISCELLANEOUS

The Australian and American Air Forces have given great attention to the island of Timor. It is kept under constant observation and hardly a day passes without allied planes attacking some installation on that island. It is receiving the same attention on the west as Munda in the Solomon Islands is receiving on the east. Both places seem to be under preparation for a future attack on the march to Tokyo.

MINUTES OF THE ANNUAL MEETING OF THE UNITED STATES FIELD ARTILLERY ASSOCIATION, DECEMBER 14, 1942

In accordance with the call of the Executive Council, the thirty-third annual meeting of the United States Field Artillery Association was held at the Army and Navy Club in Washington, D. C., at 5:30 PM, December 14, 1942. The Vice-President, Maj. Gen. Lewis B. Hershey, presided.

A quorum was present in person or by written proxy for the transaction of business.

It was moved, seconded, and carried that the reading of the minutes of last year's annual meeting be dispensed with, these having previously been printed in the JOURNAL.

The Secretary-Treasurer presented and read his annual report and financial statement, which are appended hereto and made a part of the minutes.

Lt. Col. George L. Danford and Maj. Shirley B. Metzger had previously been appointed to audit the financial statement. At the direction of the chair, the Secretary read the report of the auditors, which stated that the auditing had been performed and the financial statement had been found to be correct. A motion was made, seconded, and carried, to approve the annual report and financial statement.

The Vice-President stated that there were three vacancies in the Executive Council caused by the expiration of terms of office of Brig. Gen. George R. Allin, Col. Thomas North, and Lt. Col. George L. Hart, Jr., and that a fourth vacancy arose from the request of Brig. Gen. Rex W. Beasley that he be replaced. A nominating committee consisting of Col. A. L. Campbell, Col. Thomas North, and Lt. Col. Michael Buckley, Jr., had been appointed. At the direction of the chair the Secretary read the report of this committee in which the following names were submitted to fill the vacancies: Maj. Gen. Lewis B. Hershey, Col. Frank A. Henning (to serve for the unexpired portion of General Beasley's term), Col. Edmund W. Searby, and Maj. James P. Hart, Jr.

After opportunity had been given for further nominations, a vote was taken which resulted in the unanimous election of the choices of the nominating committee.

Col. Bishop and the chair stated that the annual report was gratifying and indicated considerable progress in the affairs of the Association.

The meeting adjourned.

ANNUAL REPORT OF THE SECRETARY-TREASURER FOR THE YEAR ENDING NOVEMBER 30, 1942

Assets November 30, 1941 Gov't. bonds, value 11/30/41	$13,458.00		
Securities, cash value	6,972.50	$20,430.50	
Balance in checking account 11/30/41		3,176.96	
Inventory (furniture, equipment, supplies)		2,588.35	
Net worth 11/30/41			$26,195.81
Assets November 30, 1942 Gov't. bonds, value 11/30/42	$19,207.00		
Securities, cash value	7,501.12	$26,708.12	
Balance checking acount 11/30/42		3,190.65	
Inventory (furniture, equipment, Supplies)		3,132.95	
Net worth 11/30/42			33,031.72
Net gain for year ending 11/30/42			$6,835.91
Cash value of securities 11/30/41	$20,430.50		
Cash value of securities 11/30/42	26,708.12		
Net gain in value of securities		$6,277.62	
Inventory (furniture, equipment, supplies) 11/30/41	$2,588.35		
Inventory (furniture, equipment, supplies) 11/30/42	3,132.95		
Increase in value of 1942 inventory over 1941		544.60	
Excess of receipts over expenditures for fiscal year 1942		13.69	
Net gain for fiscal year 1942			$6,835.91

The following is a detailed statement of receipts and expenditures for fiscal year 1942, as compared with fiscal year 1941:

RECEIPTS

	1941	*1942*
Membership dues	$29,090.77	$41,387.04
Books and Magazines	6,700.40	23,246.03
Visiting cards	457.80	429.65
Interest on securities	506.42	361.92
Miscellaneous	9,238.80	4,974.48
	$45,994.19	$70,399.12
Balance in checking account Nov. 30, 1941		3,176.96
		$73,576.08

EXPENDITURES

Printing and mailing THE FIELD ARTILLERY JOURNAL	$19,020.18	$27,493.33
Authors, engravers, artists, photographers	6,694.27	4,684.65
Job printing	1,629.11	1,172.14
Office equipment	1,504.16	722.65
Office supplies	333.09	667.25
Postage	1,535.78	1,898.44
Books and magazines	4,584.63	17,457.54
Services	3,981.60	5,257.00
Insurance and taxes	98.80	154.98
Donations	32.00	40.00
Government bonds	3,700.00	5,476.00
Visiting cards	356.91	335.56
Rent	495.00	1,435.00
Telephone	106.03	184.39
Petty cash	249.49	393.07
Temporary services	245.21	118.05
Refunds	135.20	248.33
Unpaid checks returned by bank	160.58	335.05
Miscellaneous	1,121.45	2,312.00
	$45,983.49	$70,385.43
Balance in checking Account Nov. 30, 1942		3,190.65
		$73,576.08
Receipts for year ending Nov. 30, 1942		$70,399.12
Expenditures for year ending Nov. 30, 1942		70,385.43
Excess of receipts over expenditures for fiscal year 1942		$ 13.69

The JOURNAL now has a paid circulation some 3,000 greater than a year ago. Active and associate memberships have increased even more, due to a reduction in special arrangements such as ROTC plans. Our membership is steadily increasing but the percentage of members to total Field Artillerymen should be even higher. All members are asked to help bring the JOURNAL to the favorable attention of non-members.

During the year the *History and Constitution* of the Association was printed and distributed to all members. The JOURNAL staff also prepared and published *The Field Artillery Guide*, a condensation of manuals to afford convenient reference in the field. This project, started under the last Chief of Field Artillery, has been received with great favor by officers of all grades.

Frequent changes of station by our members has placed a tremendous load on our Circulation Department. All requested changes, however, are made promptly. Each member is urged to minimize our work by advising us as soon as he knows what his new address will be.

JOHN E. COLEMAN,
Major, GSC, Secretary-Treasurer

Diary of War Events

(As Reported in the American Press)

DECEMBER, 1942

1st — Heavy air fighting over Tunisia. Long supply lines slow up Allied attack.
Admiral Darlan assumes the post of Chief of State in French Africa.
American bombers active in India. Japanese attempt to reinforce troops in Buna-Gona area.

2nd — Germans counterattacking in Tunisia; Mussolini admits 400,000 men lost.
Soviets advance slowly at Stalingrad and on the central front.
Patrols active on India-Burma frontier.
Allies fighting on the outskirts of Buna. Guadalcanal troops capture Jap artillery and MGs.

3rd — Japs repulsed in reinforcement attempt at Guadalcanal; 21 Jap planes destroyed on Kupang.
Allies repel German counterattacks in Tunisia.

4th — Fierce tank battle being fought in Tunisia; Axis controls air in that area.
Stalingrad Russians recapture several fortified positions.
Albanian guerrillas attack Italians in Tirana.
Japs resort to parachute in attempt to supply New Guinea troops.

5th — British and U. S. Troops withdraw in Tunisia. U. S. fliers bomb Naples.
Moscow claims new successes at Stalingrad and Rzhev.
American planes attack surface vessels 150 miles north of Guadalcanal.

6th — Heaviest daylight bombing raids of the war carried out by U. S. and British fliers over France and Germany.
Russians meeting strong resistance in their winter offensive.
Marines kill 400 Japs on Guadalcanal, lose 17 men.

7th — Tank battle in progress around Tebourba, Tunisia; air activity increasing.
Dakar joins Allies.
Large British bomber force raids German traffic centers.
Soviet troops moving slowly forward in Stalingrad area.

8th — Allied forces improve positions in North Africa; Axis air power losing punch there.

9th — 10 Jap planes shot down by Allied bombers off New Guinea.
British bombers pound Turin; attack northern Italy.

10th — German High Command reorganized. New commanders take over.
British 8th Army increases patrol activity near Agheila.
RAF over Turin again; Italians admit great damage.
MacArthur reports unsuccessful Jap counterattack at Buna.

11th — Soviets down 60 more large transports near Stalingrad.
Vandegrift, commanding on Guadalcanal, says that only mopping up tasks remain for troops there.
San Francisco entered San Francisco harbor after sinking a Jap battleship, cruiser, and destroyer in Solomons fight.

12th — British 8th Army resumes offensive at Agheila.
RAF bombs Turin, U. S. and British planes strike Naples, and U. S. fliers blast Rouen.

13th — Rommel retreats from El Agheila.
U. S. heavy bombers attack Bizerte, Tunis, and Sousse in Tunisia.
Jap destroyer sunk, others damaged at Guadalcanal.
Japs starting new invasion of China.

14th — Russians repulse German attempts to break Stalingrad trap.
Hitler orders Laval to mobilize 400,000 French workers.
500,000 French African troops may be armed by U. S.

15th — British advancing slowly in Libya; moving west of El Agheila.
Russian troops capture point 80 miles west of Stalingrad; move west of Rzhev on central front.

16th — Allied bombers from India attack Jap bases in Burma.
U. S. planes from Guadalcanal strike Jap airfields at Buin on Bougainville Island and Munda on New Georgia Island.

17th — Major air operations continue in Tunisia. U. S. and British planes bomb and strafe Axis posts and positions.
Red troops advancing west of Stalingrad astride railway to Kotelnikov.
Aerial activity dominates Solomons operations: 12 Zeros downed by Flying Fortresses.

18th — Rommel retreating across Tripolitania; Eighth Army pursuing.
British subs sink 3 Axis supply ships off North Africa.
U. S. subs blast 7 Jap supply vessels in the Far East.
Russians move on to the west, start attack in Caucasus.

19th — British forces under Wavell strike south from Chittagong into Burma, toward Akyab.
U. S. planes attack Kiska Island base in Aleutians.
British 135 miles west of El Agheila; Rommel continues retreat.
Russians break through German lines on upper Don River front.

20th — Germans retreating rapidly on Don River front; Soviets advance 75 miles.
British and U. S. planes over Northern France in force.
Axis withdrawing toward Tripoli in North Africa; little action in Tunisia.
Wavell's army advances southward in Burma.

21st — Germans in disorderly retreat on central Don front.
RAF attacks German traffic center at Duisburg.
British 175 miles west of El Agheila.
RAF and U. S. fliers active over Burma; stubborn fighting continues in Northern New Guinea.

22nd — British Eighth Army teaches Sirte; Rommel refuses to fight.
RAF blasts Munich; German night fighters down 12 British planes.
Jap planes attack Calcutta; Allied bombers strike Akyab airfield.

23rd — RAF and U. S. planes operate over France and the Netherlands.
Rangoon and Akyab bombed; Japs strike Calcutta again.
Japs' New Guinea position is now desperate.

24th — Admiral Darlan killed by young Frenchman.
Reds progress in offensive near Nalchik in Caucasus.
British and American forces attack several Jap bases in Burma.
Allied forces overrun main Jap defensive positions in New Guinea.

25th — Action heavier in Tunisia despite heavy rains.
British 50 miles west of Sirte in Libya.
American planes attack Naples and Taranto.
Soviet troops advance on all fronts.
U. S. fliers destroy 24 Jap planes on New Georgia Island.

26th — Tokyo claims American air-raid on Wake Island.
Russia continues advance on all fronts; becomes threat to 1,000,000 German soldiers.
Japs raid Calcutta again; RAF bombs Magwe in Burma.

27th — Russians still moving but slowed by stiff German resistance.
U. S. Flying Fortresses with fighter escort bomb Bizerte and Sfax in Tunisia.
General Henri Giraud selected new High Commissioner of French Africa, replacing assassinated Admiral Darlan.

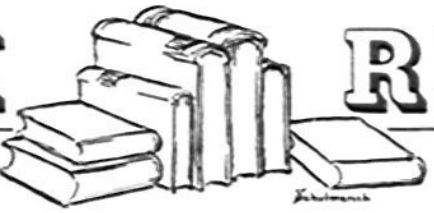
28th — Red Army passes Kotelnikov; Germans caught in giant pincers.
Patrols in sharp fighting in Medjez el-Bab sector in Tunisia.
Japs trying to supply Gusdalcanal forces by parachute.
American planes active in Yunnan Province.

29th — Kotelnikov captured; Reds advance swiftly to cut off Germans' retreat.
British subs sink 2 Axis supply ships in the Mediterranean.
Wavell's troops only 25 miles from Akyab in Burma.
Jap counterattacks fail in New Guinea.

30th — Allied artillery active in Tunisia; U. S. troops approach Gabes.
3 American bombers lost over France; several German planes shot down in the fight.
Allied planes from India blast Jap shipping at Rangoon.

31st — British and German fleets fighting on the northern convoy route.
Chinese military mission leaving Washington for China.
U. S. fliers "get" 5 landing barges and 20 planes in southwest Pacific attacks.

BOOK REVIEWS



POPULAR MATHEMATICS. By Denning Miller. 616 pp. Coward-McCann, Inc. $3.75.

More teachers of math should have Mr. Miller's enthusiasm for the hows and whys of things. If they did, the study of arithmetic, geometry, algebra, trig, and calculus would hold the keenest of interest. A businessman, he wrote *Popular Mathematics* in an effort to explain to his wife and a few friends the fundamental beauty of a subject that has universal application in business, industry, or sheer enjoyment of life.

No professor could have done this job—it required a layman, with his knowledge and understanding of the difficulties of the average man. It needed, too, one with sound background and a delight in his topic. These Mr. Miller has, for this is the book he had long intended to write in collaboration with his mother, the late Alice Duer Miller—novelist, short-story writer, author of the famous *The White Cliffs*, and one-time teacher of mathematics. It can be considered a magnificent tribute to the early training she gave him.

Popular Mathematics adheres primarily to the simple fundamentals. It covers, in fact, some of the basic factors which are not to be found in conventional texts but which, at least for this reviewer, shed infinite light upon elementary matters that had either been overlooked by instructors or long since forgotten completely. The book begins with primitive man and his ability to number off his flocks even before he could count above ten, and continues through Newton and his experiments with alchemy while administering the Royal Mint. Mr. Miller thus paces mathematical exposition with the lives and times of the men who created mathematics. It is a magnificent job—simple, direct, lucid. There is not a sign of stuffiness—in fact, little "asides" in colloquial vein illustrate relationships or clear up obscurities in an almost uncanny fashion.

Who can use the book? Almost anyone. It is the perfect refresher for all artillerymen. Prospective officer candidates will find it invaluable. Instructors in gunnery, including survey, will find many a pedagogical help within its pages. The graduate engineer will encounter quirks and aids that will smooth his path. And even those without much interest in math will be intensely interested in Mr. Miller's accounts of historical developments and the relationships of mathematics to other fields of thought.

INCOME TAX AND ARMY PAY. By Col. J. H. Doherty. 45 pages. Military Service Publishing Co. 50c.

Col. Doherty, author also of *The Fourth Horseman*, has again brought this highly useful book up-to-the-minute. This year it is of even more value than usual, because of the large number of new officers, new to the peculiar quirks of the tax laws as they apply to those in the military service. Some exemptions are different from those applying to civilians; not all "pay-check" receipts from the Government are taxable; certain items of insignia and equipment constitute lawful deductions; individuals on foreign service may postpone the evil day of reckoning; and so forth.

In clear, plain language Col. Doherty briefly covers the field. He also shows by model forms just how to go through the painful experience of reporting your situation and figuring what you owe. More he can not do; it is up to you to work out your own final salvation—and settlement.

BETWEEN HITLER AND MUSSOLINI. By Prince Ernst R. Starhemberg. 281 pages. Harper & Bros., 1942. $3.00.

Scion of an ancient and honorable line, Prince Starhemberg was reared in disciplined luxury. When old enough, he served in World War I. Since then he has made his own way, and gone far on the basis of his active ability. He has also drastically changed his youthful political activities, and perhaps his opinions as well.

After the last war he was a member of the German Free Corps, illegal military organization whose political assassinations had much effect. He was a close friend of Hitler and marched with him in Munich in 1923. Back in Austria he devoted his energies and fortune to developing and leading the Heimatschutz (or Heimwehr, as it was usually known here), an organizer of Austrian fascism, and variously Minister of Interior and Vice-Chancellor under Dollfuss and Schuschnigg, finally breaking with the latter. In Switzerland at the time of the Anschluss, he volunteered for the French Air Force when the present war broke. In June, 1940, he escaped to England, Beginning early in 1941 he spent 18 months in French Equatorial Africa flying for the Free French. He is now in Buenos Aires.

It is probably too soon to evaluate the effects of his Austrian activities on international developments. Too much is still unknown, the record is too sketchy. And of course this volume of memoirs is to some extent axe-grinding and white-washing even though Starhemberg is self-critical at times.

One thing is sure, however—Starhemberg tells a fascinating tale, and he tells it well. His high positions through several years gave him unique opportunities to see Mussolini at close range, and he confirms the general impression that Il Duce was unalterably opposed to Der Führer until circumstances forced his capitulation. Von Papen and Schuschnigg are seen from startling angles, and some new light is shed on the ambitious Major Ney. The whole pattern of Nazi penetration and intrigue is well told—even though one frequently notices how carefully the Prince is choosing his words to give the self-portrait he desires.

The period of the '20s is skipped over, and some later incidents could stand a fuller treatment; it is to be hoped that Starhemberg and others will round out his tale one day. Even so, this flowing account of Danube developments through years of stress is good reading for background understanding.

EUROPE IN REVOLT. By Rene Kraus. 563 pages. The Macmillan Company. $3.50.

Dr. Rene Kraus was born in Paris in 1902, of French and Austrian parentage. He received his Ph.D. from universities of Berlin and Vienna and has spent most of his life in European diplomacy, politics, and journalism. He was Editor-in-Chief of newspapers in Berlin and

Vienna. He has written a number of books, among them being biographies of Socrates and Winston Churchill. Since 1923 he has been fighting the rise of Hitler and Nazism.

The author gives as his sources of information the embassies, legations, consulates, and press services in allied countries, stating, however, that the opinions and judgments expressed are his own. The volume is a survey by a skillful journalist of what has occurred under the Nazi rule for the past three years.

Dr. Kraus has presented a complete and stupendous political, ecclesiastical, economic, and human picture of Europe under the heel of a relentless and despotic tyrant. From the first chapter he pictures the growing unrest and revolt of the common people in the countries under oppression. Throughout the book is the threat of ever-increasing revolt, sabotage, and guerrilla warfare. He relates the technique of occupation, the different types of administration, both economic and political, set up in each country; the jealousies, politics, the private wars among and between the German military and German civilian authorities. He exposes the methods of the Gestapo, the sadistic cruelties of the concentration camp and the hostage system. He gives the future plans and ultimate aims of Hitler. The hope that the German generals may overthrow Hitler and make a peace on behalf of the German people he treats as a delusion, stating that the conduct of their outstanding representatives in command of the armies of occupation proves that the German generals are the "New Order in pure culture." But his conclusion is that the New Order will end and that "when the end comes, it will come with lightning speed."

M. E. P.

DECISIVE BATTLES OF THE U. S. A. By Maj. Gen. J. F. C. Fuller. 401 pages; index. Harper & Bros., 1942. $4.00.

Professional soldier (now retired), military writer, and historian of international repute, General Fuller is a keen analyst. For example, nearly a year before our North African campaign began, he wrote "At the very least, Tunisia and its great naval base must be occupied by us, and powerful airfields must be established there to command the waist of the Mediterranean." Ever wide awake, he was perhaps Britain's earliest and certainly her most vigorous exponent of mechanization. His military training was of the best, his scholarship is sound.

In 1940 his *Decisive Battles** furnished a broad, overall picture of warfare through the ages. Ever interested in American military history, Gen. Fuller now uses the same technique to describe what he considers *our* decisive battles. Perhaps others would alter his list somewhat, but these are his choices: Trenton and Prineton; Bennington, Freeman's Farm, and Saratoga; Chesapeake and Yorktown; Lake Erie and Lake Champlain; San Jacinto,

*Scribner's; $4.50.

Contreras-Churubusco, and Chapultepec; the Seven Days' Battle; Gettysburg; Vicksburg and Chattanooga; Atlanta and Nashville; El Caney-San Juan Hill and Santiago de Cuba; and St. Mihiel and the Meuse-Argonne.

Each battle is clearly described, but Fuller does not stop there. He feels that ". . . war should be looked upon as a whole . . . and its activities must be related to the cycles of peacefulness out of which each conflict arises and into which it sinks. There is a rhythm between peace and war, between the last war and the next war." Thus the historical consequences of each battle are traced, and between chapters he gives a synopsis of the intervening years.

We should hope, however, that no future historian will comment on the close of this war as he does upon the end of World War I, when he says "I do not intend here, as I have done in former chapters, to conclude the story of this war with a summary of the peace treaty which sealed its end—and for two reasons: (1) It was not an American peace. (2) It was not a peace at all."

Plain, salty at times, with a minimum of British viewpoint as contrasted with some of our cherished thoughts of our Revolution and surrounding times, *Decisive Battles of the U. S. A*. is well worth the reading even in these days of battles far larger than any Gen. Fuller covers.

RIOT CONTROL. By Col. Sterling A. Wood. 157 pages; bibliography; index; illustrated. Military Service Publishing Co. $1.50.

A few years ago *Riot Control for the National Guard* was a welcome "first" in this field. With name shortened, this thoroughly revised edition remains tops.

Both form and content make it highly useful, especially for Security Commands, Military Police units, and protective Civilian Defense elements. Of about technical manual size and bound in well-wearing, treated paper, it covers the whole field: weapons, chemicals, tactics, formations, preparation for riot duty, illustrative problems, etc. All these are well illustrated by photos, drawings, and sketches.

THE RED ARMY. By Michel Berchin and Eliahu Ben-Horin. 265 pages; index; photographs. W. W. Norton & Co., Inc. $3.00.

The story of the development of the Red Army from the time of its organization in 1917 up till the present time. Told without the use of too many statistical figures by two Russian-born authors who state that while they are unable to be sure their data is completely correct, they are sure that it has been presented without the

prejudice which has highly colored all such previous treatments of the subject.

The second part of the book deals with the Army in action. Thumbnail sketches of the best known leaders are concise, as are the pictures of the spirit of the soldiers and their fighting non-military helpers. The way of the guerrillas is very interesting. The summary of the German invasion is well boiled down, and thus presents a clear picture of the skeleton unmuddled by the addition of hourly reports on skirmishes.

J. M. C.

HANDS OFF! By Maj. W. E. Fairbairn. 41 pp.; photographs. D. Appleton-Century Co. 75c.

After telling the male sex how to *Get Tough!* Maj. Fairbairn has prepared a book to tell wives, sisters, and daughters how to take care of themselves. Such a book is not so far-fetched, either, when one reads the ever more frequent accounts of hold-ups, strong-arming, thievery, and assault. Illustrated by photographs by Maj. F. A. R. Leitao of the Shanghai Volunteer Corps, *Hands Off!* gives twenty different means of self-protection by jiu-jitsu methods suitable for the weight, strength, and stature of the average woman. A pretty good book, especially for those in urban centers which have become a mecca for the none-too-lawful.

WAR IN THE WEST. By Daniel Vilfroy. 163 pages; endpaper map. Military Service Publishing Co. $2.50.

Described as telling how and why France was crushed and beaten, *War in the West* gives the reaction of a young man who was a staff officer with the 2nd D.L.M. during the Battle of France. A law graduate of the University of Paris, Vilfroy was continuing his studies in California when war came. He was one of only 30-odd reservists who returned to France in February, 1940, to serve the homeland. Young, energetic, and patriotic, he holds definite opinions, many of which are refreshing although some are perhaps on the dogmatic side. His account and comments are well worth the reading, however, especially since this is one of the first books on the subject to be written by a Frenchman who experienced the fall of France.

Mr. Vilfroy has been in this country for some time, writing and delivering broadcasts beamed to Europe by CBS.

THE LATIN AMERICAN REPUBLICS: A HISTORY. By Dana Gardner Munro. 618 pages, reading list; index; maps. D. Appleton-Century Co. $5.00.

Admittedly, it is difficult to give a rounded picture of the development of former European colonies into the twenty nations of Central and South America, each with its own individuality and problems. Many parts must

be somewhat tentative due to the great need for more research than has yet been completed by any scholar. Even the compression of known facts into a single volume is no mean task.

Few men, however, are better equipped for such a job than Dr. Munro, Director of Princeton's School of Public and International Affairs and also Professor of Latin American History and Affairs at the same university. First-hand experience is added to his scholarly attainments. He has studied Central American conditions under the Carnegie Peace Endowment, was the State Department's economist for Mexico and the Caribbean Region, and for twelve years served in our Foreign Service in posts in and concerning Latin America.

In this new book he covers more than just the immediate history of the countries. The background of their first European conquerors is considered. Pre-Columbian Indian civilizations, the Spanish colonial system, the war for independence, and the general post-war problems are covered. With this background, the reader is taken through the countries' separate histories in the past century or more. Concluding chapters consider present relations with the United States, and pan-Americanism and the present world war.

The Latin American Republics gives sound background which should contribute to a sound co-operation in the coming years.

A MODERN MILITARY DICTIONARY. 2nd Edition. By Colonels Max B. Garber and P. S. Bond. 272 pp. P. S. Bond Publishing Co. $2.00.

It is highly appropriate that the "meat" of this excellent book should open and close with the artillery—it runs from *Abatage* to *Z-Z Line*. In between are thousands of terms ranging from archaic to the most up-to-the-minute, all well defined in understandable language.

In addition to general revision through the volume, there are five pages of "Addenda. Modern Slang," with some of the definitions themselves at least verging on the slangy—for instance, "Give it the Gun. To step on the gas." Your answers are here, though, and if you don't want a copy for yourself you can be sure the folks at home will find a copy mighty useful.

THE ARTICLES OF WAR ANNOTATED. By Lee S. Tillotson, Colonel, J.A.G.D., U.S.A., Ret. 263 pp.; glossary. Military Service Publishing Co., 1942. $2.50.

Rounding out its comprehensive series of outstanding volumes on Military Law, this publisher has given us an outstandingly useful reference work in this carefully annotated compilation. The "guard house lawyer" may not find it so useful, but all concerned with the administration of military justice should find it a "must."

Each Article is given in full, and is followed by clear summaries of the outstanding or clarifying decisions which interpret it; these are keyed to the several *Digests of Opinions* of The Judge Advocate General, so that their full text can readily be found. A helpful feature is the outline of all annotations (as well as a table of contents for the Articles themselves), which clearly shows the logical arrangement of the Articles and greatly speeds any necessary search for "the" Article which covers a given situation. The language throughout is crystal clear, and for the few technical legal terms which necessarily have been used, there is an explanatory glossary.

Prepared by an outstanding military lawer thoroughly conversant with his field, *Articles of War Annotated* fills a great current need.

HOW TO GET ALONG IN THE ARMY. By "Old Sarge." 168 pp. D. Appleton-Century Co., 1942. $1.50.

High above the welter of advice, pseudo-advice, and sheer hooey published for the benefit (?) of the prospective soldier, stands this straightforward, plain spoken volume. It is written by an A.E.F. veteran who conducts the "This Man's Army" page in *Liberty*. He knows what he's talking about—and his suggestions make easy reading. Especially good is his treatment of what to take along on leaving for camp, the first few days of training, the importance of appearance, medication, and sanitation in the Army, and—perhaps not so far-off and visionary as it sounds—"after it's all over" and a civilian job is needed.

LORD OF ALASKA. By Hector Chevigny. 306 pp. The Viking Press, 1942. $3.00.

This tale of the Russian adventure in Alaska is primarily the story of Alexsandr Baranov, son of a humble storekeeper, who, by his own Herculean efforts, came to be "Lord of Alaska" and master of all he surveyed. It is the story of one man's unending fight against incredible odds: a treacherous climate that made men old before their time if it did not kill them, hostile natives, incompetent and often traitorous underlings, rival colonizers, and a distrustful and faithless sponsor at home. Totally disclaimed by the Empress Catherine, it was not until the accession of Tsar Alexander I some 30 years later that any protection was extended to the colonies.

Through those years Baranov lived "surrounded by continual danger, struggling against the innate depravity of the kind of Russian sent to this country, suffering

endless privations and hardships—even hunger—unable to depend on a single man for the furtherance of his plans." His motive remains a mystery; certainly it was not desire for gain, for he gave away huge sums of money and died a poor man. Possibly it was pure stubbornness, a complete inability to recognize or admit defeat. In any event, when at last he handed over the reins of government to his son-in-law, Yanovski, the value of the Company in America had increased to an estimated "seven million hard, nineteenth-century gold rubles," and from the humble beginnings of 1790 twenty-four establishments had risen from the barren coasts of the New World.

The sequel to this history of Russia's Alaskan Empire—its speedy degeneration and final sale in 1867—has nothing to do with Baranov. For a man who, before his time, saw that "he who controls Alaska may control the Pacific" and labored mightily for that control, it would have meant grim failure. Death spared him that.

Lord of Alaska comes at a moment when all eyes are focussed on the Pacific. For those who would know more about our outposts there, it is well worth reading.

H. P. C.

STRATEGY AT SINGAPORE (A Study of the American Council on Public Affairs). By Eugene H. Miller. The Macmillan Co., 1942. 145 pp. $2.50.

This book is not a critique of the defense of Singapore; that would have been a misuse of the word strategy. It is rather an accurate and scholarly account of English and British Empire politics and of international relations during the years when the great naval base was being projected and finally built.

Dr. Miller starts out by reviewing the strategic shift which occurred after World War I when Britain and Japan did not renew the alliance which had left the former free to use its fleet in the oceans other than the Pacific. For this two-party alliance were substituted the Four Power Pact (Great Britain, the United States, Japan, and France) and the naval and base-fortifications limits of the Washington Conference. The abandonment of the Anglo-Japanese alliance (largely at the insistence of the United States) left Britain without an ally in the Pacific. Her obligations to her Dominions and colonies in that area, plus her traditional policy of protection of free commerce on the open seas, made it necessary to establish a base much nearer the unprotected area than Malta or Trincomalee. Singapore was the logical choice.

It is interesting to note that there was more opposition to the Singapore base project by the war-sick, taxation-ridden British people than was expressed by the leaders of Japan. This at least was true from the inception of the project in 1923 until about 1927, when the liberal government in Japan was replaced by the fanatically militaristic group that has dominated Japanese policy

ever since. The Four Power Pact deliberately omitted Singapore from the list of areas whose fortifications were not to be strengthened, although Hong Kong and the Philippines were included on that list. A distance of 3,000 miles from Japan at that time seemed unobjectionable to her representatives.

The Singapore project was started, abandoned, renewed, and finally completed, its progress fluctuating with the state of international relations and the temper of the British people. Dr. Miller's treatment of the strength of the base itself suffers from the lack of accurate information about its defenses; that information is now in the possession of the Japanese. It seems clear, however, that there was not sufficient protection against an overland attack. *Strategy at Singapore* is an excellent study of the forces that brought about the great naval base and its undoing.

L. B. C.

HOW WARS ARE FOUGHT: The Principles of Strategy and Tactics. By Capt. J. E. A. Whitman. 120 pages; illustrated. Oxford University Press, 1942. $1.75.

". . . strategy plans the moves to be made; but tactics works out the details of *how* the moves shall be made."

". . . principles of strategy do not change throughout the ages . . . on the other hand . . . improvement in firearms, the introduction of new and faster methods of transport, aeroplanes and tanks . . . have had a profound effect upon tactics."

This entire book is an explanation of those truths. Throughout, there is recourse to historical example that proves or explains a point unquestionably.

How Wars Are Fought is not a technical treatise for experienced professional soldiers, 'though many might read it with benefit. It is, rather, an elementary introduction to the science of generalship.

The book is interestingly written, contains none of the dry subject matter you might expect. It is a good beginning for the beginner.

A. V. R.

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