Col. (Ret.) Terry F. Rowe

(Vietnam, 1964-72)

SPECIAL TEXT 51-179

THE MATA HANDBOOK FOR VIETNAM

This handbook contains useful reference material vital for the military advisor in Vietnam and is designed to assist him in the performance of his duties.

The material contained herein reflects doctrine as currently taught at the Special Warfare School and is derived from material intended for school use. This handbook is prepared for use in the MATA course of instruction and serves as a ready reference for advisors in Vietnam.

Suggestions and recommendations for changes or corrections should be submitted directly to the Commandant, U.S. Army Special Warfare School, ATTENTION: Director of Instruction, Fort Bragg, North Carolina 28307.

Col. (Ret.) Terry F. Rowe

(Vietnam, 1964-72)
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CHAPTER 1

GENERAL

1. YOUR LEGAL STATUS

a. As a United States Armed Forces advisor to the Republic of Vietnam you are accorded complete immunity from Vietnamese civil and criminal jurisdiction by the Vietnamese Government. This immunity is provided for under the provisions of the Mutual Defense Assistance Agreement—Vietnam which was negotiated between the United States and France in 1950. Both the United States and Vietnamese governments have agreed to the continuation of this agreement.

b. This immunity is not formally provided to all U.S. support personnel and the members of U.S. military units stationed within the Republic of Vietnam. Until such time as additional agreements are negotiated, such incidents that occur will have to be resolved on an individual basis by representatives of both governments.

c. All personnel are, however, subject to the provisions of the Uniform Code of Military Justice. Local incidents involving U.S. personnel are reported to MACV for appropriate disciplinary action.

d. Article 3 of the 1949 Geneva Conventions, on Prisoners of War and Civilians, governs the treatment of captured personnel in an insurgency. U.S. official policy requires United States Armed Forces personnel to adhere to the provisions of Article 3 in an insurgent situation and encourages all parties to the conflict to adhere to all of the provisions of the 1949 Geneva Conventions. Article 3 may be summarized as follows:

1. No torture of captives.
2. No use of captives as hostages.
3. No degrading treatment of captives.
4. No execution of captives without a fair trial by a regular court.

The U.S. advisor should also be alert to any injustices resulting from the behavior of the local military and encourage the maintenance of legal order and justice in the local community.
Figure 1 (d) Name of provinces corresponding to numbers on provincial map of Vietnam.
CHAPTER 2
WEAPONS

3. GENERAL

Some of the weapons described in this chapter may appear to be obsolete to the current, U.S. Army arsenal; however, the advisor will often find such weapons in use in Vietnam.

3. U.S. RIFLE, CALIBER .30, M-1

![Image of U.S. Rifle .30 M-1]

Figure 4. U.S. Rifle Caliber .30 M-1
Ring Tagging M7 M-1

a. Reference:
FM 23-5

b. Characteristics:
(1) Air cooled
(2) Semi-automatic
(3) Gas operated
(4) Shoulder weapon
(5) Clip loaded

c. Data:
(1) Weight, w/ bayonet 6.31 lbs
(2) Weight, w/ bayonet and sling 6.93 lbs
(3) Length overall 110.74 cm

d. Lubrication: All parts moving or coming against other parts need lubrication to prevent friction. Oil may be used on all these parts. In addition, the following parts and pieces should have rifle grease added or friction is heavy:
(1) The camming surface in the bump of the operating rod.
(2) Under the lip of the receiver above the bolt.
(3) Looking recesses in the receiver.
(4) Bolt camming lug on the face of the hammer.

e. Immediate Action: With the right hand palm up, pull the operating rod handle all the way to the rear, release, and fire.

f. Inspection: Check for correct assembly. (Pull operating rod to rearmost position—bolt should remain open. Close bolt, lock safety, and squeeze trigger. Hammer should not fall. With safety off, squeeze trigger. The hammer should fall.)

(1) Inspect receiver. (Chamber should be clean. Rear sight elevating knob should produce sharp clean clicks when there is proper tension. If not, run spurs up, press down if spurs drop, tension must be adjusted.)
(2) Check bolt plate cap door to make sure it closes properly. Check completeness of accessories.
(3) Check for broken or missing extractor, ejector, or firing pin. (Move bolt to rear to eject.)
(4) Check front hand guard for looseness.
(5) Check for loose or missing gas cylinder lock screw.
(6) Check functioning of safety.

6. PISTOL, CALIBER .45, M1911 AND M1911A1

![Diagram of a .45 caliber pistol](image)

Figure 5. Pistol, Caliber .45, M1911 and M1911A1

a. Reference:
   FM 23-35

b. Characteristics:
   (1) Recoil operated
   (2) Semi-automatic
   (3) Magazine fed
   (4) Air cooled
   (5) Hand weapon

c. Data:
   (1) Weight 1.43 kgs
   (2) Length 41.91 cm

d. Lubrication: A light coat of oil is required on all moving parts.

   a. Immediate Action: With slide forward—manually cock the hammer without opening the chamber and make one additional attempt to fire. If the pistol still fails to fire, wait 10 seconds, chamber a new round, and attempt to fire.

   With slide not all the way forward, remove finger from trigger and attempt to push slide forward. If it does not go, remove magazine, remove round, and chamber a new round and attempt to fire.

   f. Inspection:

   (1) Check for proper functioning of the safety lock, disconnector, grip safety, and half-cock features of the hammer. (To check safety lock, cock hammer, press safety lock upward into safe position and while depressing the grip safety, squeeze the trigger. Hammer should not fall.)

   (2) Check grip safety. (Cock hammer, release safety lock, do not depress grip safety, point pistol downward and squeeze trigger. Hammer should not fall.)

   (3) Check half-cock features. (Half-cock hammer, pull trigger, hammer should not fall; also, if hammer is drawn back between half-cock and full-cock, and hammer is released, it should fall to half-cock.)

   (4) Disconnecter functions properly. (Cock hammer, shove slide .44 cm to rear, hold slide in position, squeeze trigger. Allow slide to go forward while maintaining pressure on trigger. Hammer should not fall. Final test is to pull slide all the way to the rear, engage slide stop, squeeze trigger, and at the same time release slide. Hammer should not fall.)

   (5) Check trigger pull to determine if it is excessive heavy or dangerously light.

   (6) Sight barrel or otherwise damaged.
(7) Worn or broken firing pin, extractor, or ejector.
(8) Weak or broken trigger spring.
(9) Deformed magazine lip or magazine follower.
(10) Dented or battered magazine.
(11) Weak or broken magazine spring.
(12) Cracked or broken stocks.
(13) Improper magazine catch and release.

b. RIFLE, XM16E1, 5.56-MM

Figure 6. Rifle, XM16E1, 5.56-mm

a. Reference:
FM 25-9

b. Characteristics:
(1) Gas operated
(2) Air cooled
(3) Semi or fully automatic

(4) Shoulder weapon
(5) Magazine fed

C. Unusual Characteristics:
(1) A gas tube which replaces the gas cylinder found on most weapons.
(2) Clamp-type bipod.
(3) Flash suppressor which allows the anti-tank grenade to be directly attached.
(4) Straight line design that reduces climbing tendency.
(5) Plastic forearms and stock.

(6) A winter trigger guard that allows the weapon to be fired while wearing a mitt.

(7) Carrying handle to which a telescopic sight can be attached giving a sniper capability.

d. Data:
(1) Weight of rifle 2.75 kg
(2) Barrel length, w/flash suppressor 53.98 cm
(3) Overall length 98.42 cm
(4) Magazine capacity 20 rounds

Sights:
(a) Rear: 2-log peep for 375 and 405 meters.
(b) Front: Post.

NOTE: One click will move the strike of the bullet 1 inch for each 100 yards. This applies to both windage and elevation.
(6) Riffing: 6 grooves, right twist, 1 turn in 25.56 cm.
(7) Ammunition: Cal. .223, 55-grain, boattail bullet.

e. Firing Characteristics:
(1) Muzzle velocity (approximate): 1095.8 meters per second
(2) Muzzle energy: 1225 foot lbs
(3) Cyclic rate of fire: 750/800 per minute
(4) Maximum rate of fire:
   (a) Semi-automatic: 45/45 per minute
   (b) Automatic (using 20-rd magazines): 120/150 per minute
(5) Sustained rate of fire: 13-15 per minute
(6) Maximum effective rate of fire:
   (a) Semi-automatic: 30/40 per minute
   (b) Automatic: 50/70 per minute
(7) Maximum range: 2,578.03 meters
(8) Maximum effective range: 457.20 meters

f. Simple Field Strip:
(1) Remove magazine and pull charging handle to the rear and inspect the chamber.
(2) Depress bolt lock and put safety on SAFE position.
(3) Press take-down pin to the right.
(4) Lift up carrying handle and separate the upper and lower receiver.
(5) Withdraw charging handle and remove bolt and bolt carrier, then remove handle from its recess.
(6) Remove firing pin retaining pin.
(7) Remove firing pin.
(8) Turn bolt cam pin one-half turn to the right and remove.
(9) Separate the bolt from the bolt carrier.

   (NOTE: Further disassembly is not necessary. Notice gas hole and where it enters the bolt carrier. Notice gas type projections on front of bolt and where they lock into the barrel extension. Note the location of the hammer, disconnect, and automatic sear.)

g. Assembly of Rifle: Assemble in reverse order.

h. Care and Cleaning:
(1) The weapon is rust and corrosion resistant.
(2) The metal is an alloy that will resist corrosion. Do not use cleaning solvent.
(3) The rifle needs only to be kept lightly oiled, cleaned, and all excess carbon simply wiped off the working parts.
(4) All springs must be checked to ensure that they are not broken, weak, or bent out of shape.
(5) To keep the weapon successfully would cause it to function at a very slow rate of speed and eventually malfunction.
(6) Because of its high cyclic rate of fire, all carbon should be removed as soon as possible, before it hardens.
CARRINE, CALIBER .30, M1 AND M2

Figure 7. CARRINE, CALIBER .30, M1 and M2

a. Reference: FM 23-7

b. Characteristics:
   1. Air cooled
   2. Magazine loaded
   3. Gas operated
   4. Semi and fully automatic
   5. Shoulder weapon

c. Data:
   1. Weight, w/15-round magazine (unloaded) 2.48 kg
   2. Weight, w/15-round magazine (loaded) 2.75 kg
   3. Weight, w/20-round magazine (unloaded) 2.49 kg
   4. Weight, w/20-round magazine (loaded) 2.97 kg

   5. Length, w/bayonet-knife 187.34 cm
   6. Length, w/o bayonet-knife 90.37 cm
   7. Magazine capacity 15 & 20 rds
   8. Chamber pressure 18,000 kgf per sq in
   9. Maximum range 2001 meters
   10. Maximum effective range 156.25 meters
   11. Cycle rate of fire M3 735-775 rpm
   12. Maximum effective rate of fire 40-40 rpm

d. Lubrication: Lubrication reduces friction; therefore, all parts that work or come into contact with each other should be lubricated. Normally, preservative special oil may be used on such parts as magazine catch, safety, hammer pin, trigger pin, etc.; however, since oil evaporates where friction is greatest, it is recommended that rifle grease be used on the following parts if firing is to be done:
   1. Bolt locking and operating lug.
   2. Receiver slide lugs that operate in splines on side of barrel.
   3. Bolt camming recess in lump of slide.
   4. Guide lug that operates in splines on receiver.
   5. Receiver recess where bolt lugs operate, top rear where bolt comes in contact.

e. Immediate Action: Pull operating slide all the way to the rear with the right hand, pull up, release, aim and attempt to fire. This action will clear most stoppages.

f. Only American personnel are issued M3 Carbinos. Friendly Vietnamese personnel are issued M1 Carbines only. Therefore, any references to M3 Carbines are for information of advisors.
g. Inspection of the Carbine, M2, Cal .30:

1. Pull operating slide to rear and depress operating slide stop. (If bolt does not remain open, slide stop or catch is defective.)

2. Point safety to rear, pull and release trigger several times. (Trigger should spring forward when released. If not, trigger spring is improperly installed. Very dangerous to fire.)

3. Pull selector to rear, trigger released; pull operating slide to rear and release. (Hammer should not fall; pull trigger, hammer should fall.)

4. Hold trigger to rear, pull operating slide all the way back and allow to snap forward. (Hammer should not fall until trigger is released and squeezed again.)

5. Pull operating slide completely to the rear and allow it to go forward. Push selector to automatic position. (Hammer should not fall until trigger is pulled.)

6. Hold trigger to rear, pull operating slide to rear and release it. Repeat several times. Release trigger and squeeze. (Hammer should not fall.)

7. Leave selector in automatic position; pull operating slide to rear, hold trigger back and allow slide to go forward slowly. (Hammer should fall just as the operating slide moves the last 1/4 in. If it fails before the bolt is full locked, the weapon is defective.)

8. Test the safety with the selector in each position.

9. Oil on sling missing.

10. Rear sight windage knob blade, elevation slide fails to properly engage range indications on ramp.

11. Check to see if extractor, ejector, or firing pin broken or missing. (Open to examine bolt.)

(13) Selector--lock spring tension.
(14) Front sight loose.
(15) Front hand screw not tight.
(16) Magazine dented or otherwise damaged.
(17) Magazine catch inoperative.
(18) Trigger pull excessively heavy or light.

7. BROWNING AUTOMATIC RIFLE, M1918A2

Figure 8. Browning Automatic Rifle, M1918A2

Savage Trung-Linh

a. Reference: FM 23-18

b. Characteristics:

1. Air cooled
2. Magazine fed
c. Data:

(1) Weight, complete w/ bipod and magazine 8.73 lbs
(2) Length, overall w/ flash hider 131.41 cm
(3) Magazine capacity 20 rds
(4) Chamber pressure 22,350 lbs per sq in
(5) Muzzle velocity 3,155 meters
(6) Maximum range 463 meters
(7) Maximum effective range 300-350 rpm
(8) Cyclic rate of fire 40-60 rpm
(9) Sustained rate of fire 120-150 rpm
(10) Maximum effective rate of fire

d. Lubrication: All moving parts require a light coat of oil. CAUTION: Before firing the weapon, oil should be removed from the chamber and the face of the bolt.

e. Immediate Action:

(1) Pull operating handle to rear.
(2) Push operating handle forward.
(3) Tap up on magazine.
(4) Aim and attempt to fire.

f. Inspection of the BAR:

(1) First check by cocking the weapon, check safety, release safety, and squeeze trigger. (If bolt moves completely forward and locks into position, operating and trigger groups are correctly assembled.)

(2) Buffer and rate-reducing group must be checked by disassembly or test firing.

(3) Check gas cylinder and bipod group visually. (When gas cylinder body is positioned so that body lock key is directly under the barrel, gas cylinder assembly is correctly aligned.)

(4) Check if hinged bolt plate is loose.

(5) Check to see if stock is warped or broken.

(6) Loose sight or bladed elevating screw.

(7) Cock weapon, check for worn or broken extractor, ejector, or firing pin.

(8) Broken carrying handle or forearms.

(9) Loose sight or cover.

(10) Missing friction washer.

(11) Loose or split flash hider.

(12) Wing tube fall to lock adjustable legs when tightened.

(13) Defective magazines. (Check catch and spring.)

(14) Check if magazine release functions.

(15) Check sling for serviceability (webbing not frayed, keepers do not slip.)
8. SUBMACHINE GUN, M-3

![Image of Submachine Gun, M-3](image)

Figure 8. Submachine Gun, M-3

Singe Trag-Lima M3

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(6) Weight without magazine (approx.)</td>
<td>3.67 kg</td>
</tr>
<tr>
<td>(7) Weight of 30-round magazine (empty)</td>
<td>3.4 kg</td>
</tr>
<tr>
<td>(8) Weight of 30-round magazine (loaded)</td>
<td>9.5 kg</td>
</tr>
<tr>
<td>(9) Cyclic rate of fire</td>
<td>400 rds per minute</td>
</tr>
<tr>
<td>(10) Sights</td>
<td>91.44 meters – fixed peep</td>
</tr>
<tr>
<td>(11) Maximum range</td>
<td>1556.48 meters</td>
</tr>
<tr>
<td>(12) Maximum effective range</td>
<td>91.44 meters</td>
</tr>
<tr>
<td>(13) Pull to cock weapon – M9</td>
<td>8.1 to 10.4 kgs</td>
</tr>
<tr>
<td>– M2A1</td>
<td>4.5 to 5.4 kgs</td>
</tr>
</tbody>
</table>

d. Lubrication. Before the submachine gun is fired, the following steps should be taken to make sure that it will function properly:

(1) Field disassemble the weapon.
(2) Clean the bore and chamber with a clean, dry patch.
   (NOTE: Do not apply oil to the bore or chamber before firing.)
(3) Clean all parts thoroughly.
(4) Use a lightly oiled cloth, apply a light coat of lubricating preservative oil to all parts that do not come in contact with the ammunition. Apply a light coat of rifle lubricant grease to the guide rods.
(5) Assemble the weapon.
(6) Wipe excess oil from the receiver.
(7) Clean the magazines, and place a light film of oil on their outer surfaces.

e. Immediate Action:
9. THOMPSON Submachine Gun, M1A1, Caliber .45

![Figure 10. Thompson Submachine Gun, M1A1, Caliber .45](image)

b. Characteristics:

1. Air cooled
2. Blow-back operated
3. Semi or fully automatic
4. Shoulder weapon
5. Magazine fed

a. Reference:

1. FM 23-40
2. DA Pamphlet 30-118

c. Data:

1. Overall length of gun 83.82 cm
2. Weight, w/brushed magazine 5.4 kg
3. Chamber pressure 5,400 - 7,200 kg per sq in
4. Muzzle velocity 275 meters per sec
5. Cyclic rate of fire 600-700 rpm
6. Maximum effective range 100 meters
7. Maximum range 1,200 meters

d. Lubrication: All moving parts require a light coat of oil.

e. Immediate Action: In the event of a misfire, retract or cock the bolt with a sharp, quick pull on the actuator knob. This should assure ejection of misfired cartridge. Inspect chamber to see that it does not contain an unexpended round.

f. Inspection of the Submachine Gun, Cal. .45:

1. Check for correct functioning of the safety lock. (When bolt is forward, and cover closed, the safety lock on the cover engages in the safety lock recess in the bolt.)
2. Check trigger pull if it is excessively heavy or light.
3. Worn or broken firing pin, extractor, or ejector.
4. Dented or battered magazine.
5. Inoperative magazine catch and release.
7. Bent or deformed stock.
(8) Missing oiler cap.

(9) Broken stock catch. (Stock will not remain in open position.)

(10) Check for incorrect assembly. (Pull bolt to rear sharply. It should be engaged and held to the rear by the rear.)

(11) Pull bolt to the rear, close cover, and squeeze the trigger. (Bolt should not move forward.)

(12) Pull bolt to the rear, open cover, and squeeze the trigger. (Bolt should move forward.)

(13) Hold trigger to the rear, pull bolt to the rear, and release it. (Bolt should not be held to the rear by the rear, but should move forward.)

(14) If failure to chamber, check for dirty chamber, obstruction in chamber, and easy spring lugs. (Check stability of driving springs and guide rods.)

10. BROWNING MACHINE GUN, CALIBER .30, M1919A6

Figure 11. Browning Machine Gun, Caliber .30, M1919A6

| Photo 1 of Browning Machine Gun |

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a. Reference: FM 23-58

b. Characteristics:

1. Bolt-fed
2. Recoil operated
3. Air cooled
4. Fully automatic

<table>
<thead>
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<tr>
<td>(1) Weight, w/shoulder stock</td>
</tr>
<tr>
<td>(2) Weight on mount x2</td>
</tr>
<tr>
<td>(3) Speed</td>
</tr>
<tr>
<td>(4) Chamber pressure</td>
</tr>
<tr>
<td>(5) Maximum effective range</td>
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<tr>
<td>(6) Maximum range</td>
</tr>
<tr>
<td>(7) Maximum rate of fire</td>
</tr>
<tr>
<td>(8) Maximum effective rate of fire</td>
</tr>
<tr>
<td>(9) Sustained rate of fire</td>
</tr>
</tbody>
</table>

d. Headspace:

1. The gun should be fully assembled when making headspace adjustment.
2. Pull the bolt to the rear about three-quarters of an inch.
3. Screw the barrel into the barrel extension, using the nose of a cartridge or the combination wrench in the barrel nut, until the resulting parts
are unable to go fully forward under the pressure of the driving spring when the bolt is released from three-fourths of an inch distance. (The barrel notches will be visible between the tension block and the barrel extension.)

(4) Unscrew the barrel from the barrel extension one notch at a time (checking after each notch) until the barrel and barrel extension go fully forward without being forced.

(5) Unscrew the barrel two additional notches. This compensates for heat expansion of the barrel when the gun is fired. Correct headspace adjustment now exists.

a. Immediate Action:

1. If the gun fails to fire, pull the bolt to the rear and release it, re-lay, and attempt to fire. If the gun still fails to fire, note the position of the bolt handle.

2. If bolt handle is forward, tap cover, hold left hand on bolt at point where cartridges enter headway, simultaneously pulling bolt to rear twice, and releasing it.

3. If bolt feeds, re-lay and attempt to fire.

4. If bolt does not feed, raise cover, remove first round from bolt, close cover, reload, re-lay, and fire.

5. If gun still fails to fire, check bolt, eliminate cause of stoppage, re-load, re-lay, and fire.

6. If bolt handle is not forward, pull bolt to rear and release.

7. If bolt goes forward, re-lay and fire.

8. If bolt does not go forward, raise cover, eliminate cause of stoppage, re-load, re-lay, and fire.

9. If the gun fails to fire after the application of immediate action, it is probable that the stoppage is of an unusual type and requires a detailed inspection for the cause of stoppage.

b. Inspection of the M1918A1 Machine Gun:

1. Check for loose or bent shoulder stock.

2. Wing nut at stock loose, missing, or screw threads stripped.

3. Rear sight loose; windage screw knob, elevation knob, or elevation knob binding: unscrew the sight graduations.

4. Cover latch imperfect.

5. Cover bolt cotter key missing, cover bolt spring broken.

6. Front sight assembly incomplete, fails to raise or lower, or lock in upright position, adjusting nut binding.

7. Carrying handle retaining pin loose.

8. Flash hider loose, retaining clip missing.

9. Thumb screws damaged, fail to tighten.

10. Pistol buttstock, cotter key missing from pintle bolt.

11. Check receiver. (Before raising cover, pull bolt handle to rear and release it. Forward movement of bolt should be smooth, rapid, and sharp. Raise the trigger and the firing pin should go forward.)

12. Raise the cover; if this is difficult, check for improperly seated backplate group.

13. Check cover. (Free moving bolt feed lever, undamaged bolt feed lever and bolt holding pawl should be under spring tension. Cock weapon, lift extractor, and raise trigger. Firing pin should be visible in the T-slot of the bolt. Check ejector to ensure its spring is not broken.)

14. Check headspace. ( Tight headspace exists if notches on rear of barrel can be seen. Headspace is loose if bolt can be pulled to rear independently of barrel and barrel extension.)
11. 40MM GRENADE LAUNCHED, M-79

Figure 11. 40mm Grenade Launcher, M-79.
Ngô Phong-Luu M-79

a. Reference:
(1) TC 25-3
(2) TM 9-1820/000-13

b. Characterization:
(1) Single shot
(2) Break open
(3) Breach loaded
(4) Shoulder fired

c. Data:
(1) Length of launcher 96.29 cm
(2) Length of barrel group 37.26 cm
(3) Length of barrel 35.56 cm
(6) Weight of launcher: 2.69 kgs.

(5) Chamber pressure: 1250 kgs per sq in.

(6) Muzzle velocity: 860.30 meters per second.

(7) Maximum range: 375.50 meters.

(8) Maximum effective range (area): 350.40 meters.

(9) Maximum effective range (point): 150.00 meters.

(10) Minimum range (training): 80.00 meters.

(11) Minimum range (combat): 11.00 meters.

(12) Bursting area: 5.00 meters radius HE.

d. Ammunition:

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<tr>
<th>Model</th>
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<tbody>
<tr>
<td>381E1</td>
<td>HE</td>
<td>M352 (pin armed in 3 meters-Limited Standard)</td>
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<tr>
<td>381E1</td>
<td>Practice</td>
<td>M353</td>
</tr>
<tr>
<td>464E1</td>
<td>HE</td>
<td>M351 (pin and set back armed in 14-28 meters-Standard)</td>
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</table>

407E2  

Practice

11. BROWNING MACHINE GUN, CALIBER .50, M2HB

![Figure 11. Browning Machine Gun, Caliber .50, M2, HB]
a. Reference: FM 27-45

b. Characteristics:
   (1) Air cooled
   (2) Recoil operated
   (3) Fully and semi-automatic
   (4) Alternate feed (right and left)
   (5) Belt fed (metallic link)
   (6) Ground and vehicle weapon
   (7) Fixed, flexible and barrel-type mount

c. Data:

<p>| | |</p>
<table>
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</tr>
<tr>
<td>(2) Weight of receiver group</td>
<td>26.20 kgs</td>
</tr>
<tr>
<td>(3) Weight of barrel</td>
<td>11.70 kgs</td>
</tr>
<tr>
<td>(4) Weight of tripod mount, NL, w/declamping mechanism</td>
<td>19.26 kgs</td>
</tr>
<tr>
<td>(5) Length overall</td>
<td>168.10 cm</td>
</tr>
<tr>
<td>(6) Length of barrel</td>
<td>114.30 cm</td>
</tr>
<tr>
<td>(7) Muzzle velocity</td>
<td>880.86 meters per second</td>
</tr>
<tr>
<td>(8) Chamber pressure</td>
<td>23,400 kgs per sq in</td>
</tr>
<tr>
<td>(9) Maximum effective range</td>
<td>1,535.80 meters</td>
</tr>
</tbody>
</table>
(10) Maximum range

(11) Maximum rate of fire

(12) Maximum effective rate of fire

(13) Sustained rate of fire

d. Field Expedients:

(1) Headspace adjustment: With the gun fully assembled, and the locking parts of the gun retracted until the lug on the barrel locking spring extends (an .95 cm) hole in the right sideplate, screw the barrel all the way into the barrel extension. Make sure that the barrel extends through the barrel extension. With screw the barrel two notches. The gun should now be safe to fire. If the gun operates sluggishly, unscrew the barrel, ONE, BUT ONLY ONE, additional notch.

(2) Timing gauges: When it is impossible to use a regular timing gauge, the following may be used to represent the FIRE and NO FIRE gauges.

(a) Fire gauge:

1. One dime.
2. One dog tag.

(b) No Fire gauge:

1. One nickel and one dime.
2. Four dog tags.

(c) When using these field expedients to check timing, the check is made in the same manner as when using the regular timing gauges.

3. Immediate Action:

(1) If gun fails to fire, wait 5 seconds, pull the bolt to the rear, release it, re-lay, and attempt to fire.

(2) If the gun still fails to fire, check cover latch, ammunition belt, pull
the bolt to the rear, and release it.

(3) If the belt feeds, re-lay and attempt to fire.

(4) If the belt does not feed, raise the cover, remove the first round from the belt; remove the round from the chamber and X-chute if present; reload, re-lay, and attempt to fire.

(5) If the gun fails to fire, change the defective part, reload, re-lay, and attempt to fire.

(6) If the gun still fails to fire, or the result is unsatisfactory, check lubrication, check the belt, or reset headspace and timing; re-lay and attempt to fire.

b. Inspection Check List:

(1) Barrel: Inspect the bore and chamber for rust. See that they are clean and lightly oiled.

(2) Moving parts: Inspect that they are clean and lightly oiled. Operate the retracting slide handle and bolt latch release several times to see that the parts function without excessive friction.

(3) Headspace and timing: Check with the gages to ensure that headspace and timing are correct.

(4) Rear sight and windage knob: Ensure that the sight is in good condition, clean, free of grease or dirt, and lightly oiled. Elevation should be reset at 1,000, windage zeros, and the sight should be down.

(5) Mount: See that it is clean, lightly oiled, lubricated, and that all clamps are securely tightened. It should function properly and be complete.

15. MORTAR, 60-MM, M-19

![Mortar Image]

Figure 14. Mortar, 60-mm, M-19

a. Reference: FM 23-62

b. Characteristics:

(1) Smooth bore

(2) Muzzle loaded

(3) High angle-of-fire weapon

(4) Drop or lever fire capability

c. Data:

(1) Mortar, complete: 36.34 lbs

(2) Mortar, with M1 baseplate: 23.23 lbs

(3) Barred weight: 7.20 lbs

(4) Bipod weight: 7.38 lbs
(5) Baseplate weight 5.70 kg
(6) Baseplate, M1, weight 2.05 kg
(7) Overall length 61.95 cm
(8) Elevation w/M5 mount 40 to 95 degrees
w/M1 baseplate 0 to 56 degrees
(9) Traverse, right or left 125 mds
(10) One turn of handwheel 15 mils
(11) One turn of elevating crank 1/2 degree
(12) Maximum rate of fire 10 rpm
(13) Sustained rate of fire 10 rpm
(14) Barrage area 10.05 meter radius (HE & WP)

(NOTE: Firing for more than 1 minute at the maximum rate of fire will cause gas leakage around the base cap.)

d. Ammunition:
(1) HE, M49A2 1329.56 meters
(2) Smoke, M92 1599.76 meters
(3) Practice, M49A2 1239.56 meters
(4) Tracing, M49 226.60 meters

(2) Firing mechanism. Examine for fouling, rust, or foreign substance on any of the parts. Trip the firing lever so that the striker moves forward and strikes the base of the firing pin when the selector is on LEVER FIRE. The firing pin should protrude 51 cm. beyond the surface of the firing pin housing when the firing selector is on DROP FIRE.

(3) Bipod. Check general appearance and see that all moving parts are lubricated.
   (a) Elevating mechanism. Elevate and depress the mortar to see that the mechanism operates without binding, excess play, or undue looseness.
   (b) Traversing mechanism. Traverse the mortar to see that the mechanism operates smoothly without binding or undue looseness.
   (c) Cross-leveling mechanism. Operate the mechanism to see that it functions correctly without excess play. Check the index marks (for centering the bubble) to see that they are distinct.

(4) Base plate. Check general appearance. Examine the locking lever to ensure that it operates easily and locks the spherical projection securely to the base plate.

(5) Sight and its mounting. Check to see if the operating condition of the sight or rigidity of its mounting has been impaired.

f. Safety Checks:
(1) Before firing:
   (a) No. 1 sees that:
      1. There is mask and overhand clearance.
      2. The mortar is locked to the base plate.
      3. The mortar clamp bolt is secure.
      4. The locking nut is tight.
5. The legs are fully spread, and locked in that position by the spring latch.

(a) No. 2 sees that:
1. The bore is clean.
2. Each shell is clean—particularly the bore end.
3. The safety pin and primer spring of each shell are present.

(3) During firing:
(a) No. 1:
1. From time to time checks the clamp bolt and locking nut to see that they are tight.
2. Checks frequently to see that the base plate and tripod positions are safe for firing.

(b) No. 2: Swats the bores after every fire for effect or after every 10 rounds.

14. MORTAR, 81-MM, M29

Figure 23. Mortar 81-mm, M29

King CO 51

a. References: FM 23-96
b. Characteristics:
1. Smooth bore
2. Muzzle loaded
3. High angle-of-fire weapon
4. Drop fire
c. Data:
1. Weight complete: 42.01 lbs
2. Barrel: 12.00 lbs
3. Bipod: 1.8 lbs
4. Base plate: 11.45 lbs
5. Overall length of mortar: 129.54 cm
6. Elevation (approximate): 700-1500 mils
7. Elevation for one turn of handwheel: 10 mils
8. Total turns of handwheel for full traverse (approximate): 15 turns
9. Traverse — right or left of center (approximate): 95 mils
10. One turn of handwheel, traverse (approximate): 7 mils
11. Maximum rate of fire: 94 rpm
12. Sustained rate of fire: 9 rpm
(13) Maximum range 3657.60 meters
(14) Bursting area 27.48 x 18.29 meters

(NOTE: Firing of mortar for more than 1 minute at the maximum rate of fire causes a gas leakage at the base of the barrel.)

d. Ammunition:
   (1) HE (VT, Sq, Sq/D) 3657.60 meters
   (2) WP (74mm, VT, Sq/D) 3017.52 meters
   (3) TP (74mm) 274.22 meters
   (4) Training shell (30m) 274.22 meters

a. Inspection of the 81-mm Mortar: When inspecting the 81-mm mortar, observe the following points:

   (1) Barrel. Check the general appearance and cleanliness of the bore and the threaded exterior. Ensure that the barrel is not dented.

   (2) Firing pin. Examine for fouling, corrosion, foreign substances, and broken or bent pin. Ensure that the firing pin is properly seated.

   (3) Bipod. Check the general appearance and see that all moving parts are properly lubricated. Elevate and depress the mortar. The elevating mechanism should operate smoothly without binding or undue looseness. Operate the cross-leveling mechanism to see that it functions properly without excess play, that the level rail is clear, and that the index marks for centering the bubble are distinct.

   (4) Base Plate. Check the general appearance of the base plate. Rotate the socket cap to see that it functions without binding.

   (5) Sight and Mounting. Check to see that the sight is in operating condition and that the dovetailed base of the sight bracket is inserted and locked into the dovetailed slot of the mortar yoke.

1. Safety Checks:

   (1) Before firing:
      (a) No. 1 makes certain that:
         1. There is mask and oversized clearance.
         2. Barrel is locked to the base plate and the end of the socket cap is pointed in the direction of fire.
         3. Shock absorber chocks lock pin is secure.
         4. Linkage is secure.
         5. Chain is intact and is hooked to the left leg.
      (b) No. 1 sees that the bore is clean.
      (c) No. 2 checks to see that:
         1. Each cartridge is clean.
         2. Range safety pin of each cartridge is present and in place, if applicable.
         3. Ignition cartridge is present and in proper condition.
   (2) During firing:
      (a) No. 1 checks frequently to see that:
         1. Shock absorber chocks lock pin is secure and the fusing and is tight.
         2. Open end of the socket cap is pointed in the direction of fire.
      (b) No. 2 awakes the bore after every 12 rounds or after firing for effect.
5. MORTAR, 4.2 INCH, M30

Figure 16. Mortar, 4.2-inch, M30
Sing Ců 4.2

Technical Data Characteristics:

1. Maximum range 5460.40 meters
2. Muzzle velocity 877.82 meters
3. Type of ammunition HE, II, and CHEM
4. Send six complete sets
5. Rate of fire (prolonged fire) 20 per min.
6. Type of recoil Spring
7. Elevation limits 196 - 1156 miles
8. Traversing limits 128 lt; 125 L; 390 Total
9. Total weight 287.76 kgs

b. Check List for Maintenance:
(1) Tube must be free of oil and foreign matter before firing.
(2) Check the tube for cleanliness.
(3) Check all fire controls before firing.
(4) Check bearing surface for rust and burs.
(5) Check all ammunition and propellants.
(6) Check for tightness of screws.
(NOTE: Elevation 900 is most used.)

6. ROCKET LAUNCHER, 2.5 - INCH, M20A1B1

Figure 17. Rocket Launcher, 2.5-inch, M20A1B1
Bh-De-Ca

a. Reference:FM 55-93
b. Characteristics:
(1) Air cooled
(2) Smooth bore
(3) Open tube (2 pieces)

(9) Prime mover 1/4 or 1/4-ton, w/tri
(10) Section crew 5 men
(11) Air transportability Air drop
Recollens

Shoulder weapon

Electrical type firing mechanism

Data:

1. Weight (approx) 8.95 kg.
2. Type of operation Rocket propelled
3. Maximum range (approx) 822.06 meters
   Moving: 182.88 meters
   Stationary: 274.32 meters
4. Maximum effective range 127.0 meters
5. Bore sight 9.34 cm
6. Armor penetration (approx) 4 rpm
7. Maximum rate of fire 12 rpm
8. Sustained rate of fire 9.14 by 18.29 meters (boat)
9. Bursting area (approx) 6.05 lbs.

Ammunition:

1. Type used HE, TP and WP
2. Weight of projectile 3.5 lbs.

Safety Precautions:

1. Heavy and in transit: care is taken to avoid damage or loss.
2. Loading and unloading is done on the firing line with the launcher
   on the gunner’s shoulder. The muzzle is pointed down-range, not toward the
   ground.
3. Field protection: For temperatures below 70 degrees F, the field-
   protective mask must be worn. For temperatures above 70 degrees F, the anti-
   flash mask must be worn.
4. The weapon being of the recoilless principle has a danger zone to the
   rear. It is triangular in shape and consists of three zones. Before firing a
   rocket, clear the area to the rear of the launcher of personnel, material, and
   dry vegetation as indicated in zones A and B.
5. Clear zone A, the blast area of all personnel, ammunition, material,
   and inflammables such as dry vegetation. The danger in this zone is from the
   heat of flame to the rear. Clear zone B of personnel and material unless
   protected by adequate shelter. The principle danger in zone B is from the rear-
   ward flight of muzzle breech or igniter wires. An additional safety factor for
   training is contained in zone C.

1. Disassembly: No parts will be disassembled by the troops in the field.
2. Inspection of the 3.5-inch Rocket Launcher:
   1. Dented or cracked barrel or scored interior.
   2. Loose barrel coupling.
   3. Loose or binding sight rings.
   4. Bent indicator arm; weak indicator arm spring; marred elevation
      plates.
   5. Scratched or broken lens.
(6) Contactor latch group inoperative.
(7) Safety fails to function.
(8) Trigger has no spring action.

(9) Check electrical circuits condition. (Check for paint covered or corroded electrical contacts, loose connections, broken wires, damaged insulation, and broken or damaged plastic grips.)

(10) Check contactor latch group. (Move control handle to load position; right and left stops should protrude into bore, trip lever up. Move control handle to fire position; stops should come up out of bore, trip lever should rotate downward into rear of bore.)

(11) Check for bent shoulder stock.
(12) Check for loose or damaged trigger guard.
(13) Check for frayed carrying strap and poor condition of painting surfaces.

17. RIFLE, RECOILLESS, 27-MM, M18A1

![Image of Rifle, Recoilless, 27-mm, M18A1](image)

Figure 18. Rifle, Recoilless, 27-mm, M18A1

Sung Xiaolong Guo

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b. Characteristics:

(i) Air cooled
(ii) Recoilless
(iii) Shoulder or mounted weapon
(iv) Single-loaded
(v) Fires fixed ammunition

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c. Data:

(1) Muzzle velocity 365.76 meters per second
(2) Muzzle velocity 355.76 meters per second
(3) Length of rifle 156.46 cm
(4) Type of breach Interrupted lug
(5) Firing mechanism Percussion type
(6) Maximum range 4388.12 meters
(7) Maximum effective range 1737.26 meters
(8) Bursting area 9.14 x 21.09 meters
(9) Bursting area 13.34 meters

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d. Ammunition:

(i) Type: AP
(ii) Weight of round: 5.52 lbs

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Reference: FM 33-88
c. Immediate Action:

(1) The gunner calls "MISFIRE."

(2) The assistant gunner waits 60 seconds and then recocks.

(3) The gunner re-loads and attempts to fire.

(4) If the weapon still fails to fire, the gunner calls "MISFIRE." The assistant gunner waits 60 seconds, then opens the breech and checks the primer of the round.

(5) If the primer is dented, another round is loaded. If the primer is not dented, the assistant gunner checks firing mechanism.

(6) SAFETY: The danger zone from back blast is triangular in shape. It extends approximately 50 feet to the rear of the point of emplacement and at its widest point covers a space of 18.29 meters on either side of the axis of the emplaced rifle. Do not face the weapon within 11.44 meters of the rear of its breech because of the danger of flying particles thrown up by the blast action. The following danger zone will be for all training:

For COMBAT ONLY the following may be used:

- Area 1 - probably lethal
- Area 2 - severe wounding
- Area 3 - moderate wounding
- Area 4 - slight wounding

(1) Make sure that the hammer notch on the rear is facing the hammer.

(2) Inspect the breechblock cover screws before firing and frequently during firing to see that they are tight at all times.

(3) Make sure the qualifying marks on the breech section of the trigger handle body are aligned with the qualifying marks on the tube.

Figure 18. Howitzer, 155-mm, M114 or M114A1
a. Technical Data and Characteristics:

1. Maximum range: 14,355 meters
2. Muzzle velocity: 16.81 meters per second (s/ch 7)
3. Type of ammunition: HE, HEI, and Chem Separately loading
4. Rate of fire: Rapid fire: 2 rds per min. Prolonged fire: 1 rd per min
5. Type of recoil: Hydrostatic
6. Maximum length of recoil: 152.40 cm low angle 194.14 cm high angle
7. Elevation limits: 0 to 1156 mds
8. Traversing Limits: 414; 445, 866 mds total
9. Total weight: 5,715 kg
10. Prime mover: 4 or 5-ton truck or M5 tractor
11. Section crew: 11 mm
12. Air transportability: Air landed

b. Check List for Maintenance: Check:

1. The replenisher oil reserve before firing and once after each 10 rounds.
2. For lubrication by lubrication order.

Figure 21. Howitzer, 105-mm, M101

19. HOWITZER, 105-mm M101

b. Technical Data and Characteristics:

1. Maximum range: 11,870 meters
2. Muzzle velocity: 472.40 meters per second (w/charge 7)
HE, HE, Chemical, Road, blank, ammunist

(4) Rate of fire
Rapid - 4-8 per min
Protracted - 104 rds per hr

(5) Type of recoil
Hydropneumatic

(6) Length of recoil
99.26 to 106.68 cm

(7) Elevation limits
+30 to /- 1196 miles

(8) Traverse limits
480 L; 460 R; Total

(9) Primesan
9 mm

(10) Section crew

b. Maintenance Check List:

(1) Barrel chamber: Check for rust, cracks, or powder fouling.

(2) Recoil mechanism: Proper amount of oil, proper setting of respiration, or excessive oil leakage.

(3) Bearing surface: Check for rust, tears, dirt, and proper lubrication.

(4) Brake: Check brake mechanism for proper adjustment; clean and free of rust and dirt.

(5) Sighting equipment: Check sight mounts for looseness and proper adjustment. Check lens for dust, moisture, etc.

(6) Lubrication: See LO 9-325.

(7) Tires: Check for proper air pressure; check for cuts and other damage.

(8) Trails: Check looking latch and trail pin; check that drawer is secure.

20. ANTIPERSONNEL MINE (CLAYMORE) M18A1

![Antipersonnel Mine (Claymore) M18A1](image)

Figure 21. Antipersonnel Mine (Claymore) M18A1.
a. General

(1) Description: The claymore mine is a one-shot, directional-fragmentation weapon that is designed primarily for use in the defensive role against mass infantry attacks.

(2) Detailed description: The Claymore, M18A1, consists of a plastic body, a fixed plastic slit-type sight, four adjustable legs and two detonator wires. The front portion of the plastic case is a fragmentation face containing steel fragments. The back portion of the case contains a layer of explosive (1.5 pounds of composition C4).

b. Accessories. The Claymore, M18A1, and all accessories are carried in the M7 bandoleer. The accessories include:

(1) Instruction sheet: Sketches and printed matter on this sheet show some of the techniques of employment of the mine.

(2) Detonator: One M5 electric blasting cap which is attached to 100 feet of firing wire.

(3) Firing device: The firing device, M51, is a handheld pulse generator which may be connected to the detonator when the weapon is armed. It produces a double (one positive and one negative) electrical pulse (7 volts).

c. Effects of the Mine

(1) Casualty effects: When detonated, the Claymore, M18A1, delivers highly effective fragmentation in a fan-shaped boomerang-shaped area 2 meters high and 60 meters wide at a range of 50 meters. This makes 50 meters the optimum effective range of the weapon. The fragments are moderately effective up to a range of 100 meters and can travel up to 200 meters forward of the weapon.

(2) Danger from backblast: The minimum safe firing distance from the weapon is 16 meters provided all secondary hazards such as rubble are removed. From 16 to 100 meters, the operator should be in a foxhole or lie prone (preferably in a depression or behind protection regardless of how the weapon is employed).

d. Installation of the Claymore

(1) The claymore mine may be installed as a controlled or an uncontrolled weapon. The claymore may be mounted on a tree, a building or any similar object; however, it must be considered that damage to these objects will result from the backblast of the mine after it has been fired.

(2) To install the claymore as a controlled weapon:

(a) The legs are unfolded to about a 45 degree angle and pressed halfway into the ground, making sure that the convex surface marked "Front Toward Enemy" and the arrow on top of the case are pointing in the direction of the intended target area.

(b) Aim the mine at an aiming point approximately 1 1/2 meters above the ground at a range of approximately 60 meters. This aiming point should be in the center of the desired area of coverage.

(c) Aim through the slit sight at the aiming stake. The bottom edge of the sight should be parallel to the ground to be covered with fragment spray.

(d) Prior to inserting the blasting cap into the detonator well, secure the firing wire to a stake driven into the ground near the mine. This will minimize accidental disturbance while laying out the firing wire. The wire should be buried to protect it and to prevent detection.

(e) Time permitting, conduct a circuit test. After testing, connect the blasting cap assembly to the firing device. The mine is now armed.

(f) When claymores are employed as an uncontrolled weapon, they are treated as mines or booby traps. Their locations are marked, reported, and recorded in accordance with the procedure set forth in FM 28-32.

e. Disarming. To disarm the Claymore, M18A1, reverse the procedures described in paragraph d.

NOTE: Ensure that the man installing or examining the claymore keeps the firing device on his person at all times and does not connect it to the firing wire until actually ready to fire the mine. This ensures that a second individual does not accidentally fire the mine while the first individual is installing or examining it, and also lessens the possibility of the mine being detonated by electrical storms.
CHAPTER 3
AIR OPERATIONS

21. GENERAL CONCEPTS

a. The information presented herein applies to the aerial delivery of certain counterinsurgency forces and cargo into the operational territory.

b. Much of the criteria for size of landing zones, glide paths, etc., are extracted from Air Force publications. They can be reduced considerably if the type of aircraft and its performance characteristics, are known. The size of the field is included in the landing zone report.

22. DROP ZONES

a. General. The selection of a DZ must satisfy the requirements of both the aircrew and the reception committee. The aircrew must be able to locate and identify the DZ. The reception committee selects a site that is accessible, reasonably secure, and permits safe delivery of incoming personnel and supplies.

b. Air considerations.

(i) Desirable terrain features.

(a) The general area surrounding the site must be relatively free from obstacles which may interfere with safe flight.

(b) Flat or rolling terrain is desirable; however, in mountainous or hilly country, sites selected at higher elevations such as level plateaus can be used.

(c) Small valley or pockets completely surrounded by hills are difficult to locate and normally should not be used.

(d) In order to allow the air support unit flexibility in selecting the IP, it is desirable that the aircraft be able to approach the target site from any direction.

(e) There should be an open approach quadrant of at least 90° to allow the aircrew a choice when determining their approach track from the IP.

Figure 22. Level turning radius required for one approach DZ's and IP's (medium aircraft).
(1) 32% having a single, clear line of approach are acceptable for medium aircraft if there is a level turning radius of 5 kilometers on each side of the site (3.5 kilometers for light aircraft) (Figure 21).

(2) Rising ground or hills of more than 1,000 feet elevation above the surface of the site should normally be at least 6 kilometers from DZ for night operations. In exceptionally mountainous areas deviations from this requirement may be made. Any deviation will be noted in the DZ report.

(3) Deviations from the aforementioned minimum distances cause the aircraft to fly at higher than desirable altitudes when executing the drop.

(4) Weather in drop areas. The prevailing weather conditions in the area must be considered. Ground fog, mist, haze, smoke, and low-hanging cloud conditions may interfere with visual signals and DZ markings. Excessive winds also hinder operations.

(5) Obstacles. Due to the low altitude at which operational drops are conducted, consideration must be given to navigational obstacles in excess of 500 feet above the level of the DZ and within a radius of 6 kilometers. If such obstacles exist and are not shown on the issued maps, they must be reported.

(4) Enemy air defense. Drop sites should be located to avoid having the aircraft fly over or near enemy air installations when making the final approach to the DZ.

1. Ground Considerations.

(a) Shape and size.

2. The most desirable shape for a DZ is square or round. This permits a wider choice of aircraft approach directions than is normally the case with rectangular-shaped sites.

3. The required length of a DZ depends primarily on the number of units to be dropped and the length of their dispersion pattern.

1. Dispersion occurs when two or more personnel or containers are released consecutively from an aircraft in flight. The long axis of the landing pattern is usually parallel to the direction of flight (Figure 23).

Figure 23. Dispersion pattern.
5. Dispersion is computed using the rule-of-thumb formulas: 1/3 speed of aircraft (MPH) x exit time (seconds) + dispersion (yards). Exit time is the elapsed time between the time of the first and last items.

6. The length of the dispersion pattern represents the approximate minimum length required for DZ's. If personnel are to be dropped, a safety factor of at least 100 meters is added to each end of the DZ site.

(a) The width of rectangular-shaped DZ's should allow for minor errors in computation of wind drift.

(b) The use of DZ's measuring less than 300 x 300 meters should be avoided.

5. Surface.

(a) The surface of the DZ should be reasonably level and free from obstructions such as rocks, trees, fences, etc. Sand or patches are types of terrain which are ideal for both personnel and cargo reception.

(b) Personnel DZ's located at comparatively high elevations (6,000 feet or higher) should, where possible, use soft snow or grasslands, due to the increased rate of parachute descent.

(c) Swamps and low marshy ground, normally less desirable in the summer, and muddy fields are dry often make good drop zones.

(d) Personnel and cargo can be received on water DZ's.

1. Minimum depth for reception of personnel is 1.5 meters and arrangements must be made for rapid pickup.

2. The surface of the water must be clear of floating debris or moored craft, and there should be no protruding buoys, ledge, or pilings.

3. The water must also be clear of underwater obstacles to a depth of 1.5 meters.

4. Water reception points should not be near shallows or where currents are swift.

5. Minimum safe water temperature is 60°F. (16°C).

6. Supply drop zones may, in general, use any of the following surfaces:

1. Surfaces containing gravel or small stones no larger than a man's fist.

2. Agricultural ground, although in the interest of security, it is undesirable to use cultivated fields.

3. Sites containing brush or even tall trees. However, marking of the DZ and the recovery of containers is more difficult.

4. Marsh, swamp, or water sites, provided the depth of water or growth of vegetation will not result in loss of containers.

3. Ground security. The basic considerations for ground security are that the DZ be:

(a) Located to permit maximum freedom from enemy interference.

(b) Accessible to the reception committee by concealed approach and withdrawal routes.

(c) Adjacent to areas suitable for the caching of supplies and disposal of aerial delivery equipment.

23. REPORTING DROP CONTS.

a. Drop Zone Data. The minimum drop zone data which is reported includes:

(1) Code name. Extracted from the SOI; also, indicate if primary or alternate DZ.

(2) Location. Complete military grid coordinates of the center of the DZ.

(3) Open quadrants. Measured from center of DZ; reported as a series of magnetic azimuths. The open quadrants indicate acceptable aircraft approaches (Figure 28).
(4) Track. Magnetic azimuth of required or recommended aircraft approach (figure 24).

(5) Obstacles. Those that are over 200 feet in elevation above the level of the DZ, within a radius of 8 kilometers and which are not shown on the issued maps. Obstacles are reported by description, magnetic azimuth, and distance from the center of the DZ (figure 25).

(6) Reference point. A landmark shown on the issued maps, reported by name, magnetic azimuth and distance from the center of the DZ (figure 25). Used with (7) above in plotting the DZ location.

(7) Date/time drop requested.

(8) Supplies requested. Extracted from the catalog supply system.

b. Additional Items. In special situations, additional items may be required, e.g., additional reference points, navigational check points in the vicinity of the DZ, special recognition and authentication means. Subparagraphs (7) and (8) above are included only when requesting a resupply mission in conjunction with the reporting of the DZ.

c. Azimuths. Azimuths are reported as magnetic and in three digits. With the exception of the aircraft track, all azimuths are measured from the center of the DZ. Appropriate abbreviations are used.

d. Initial Points (IP's). It is desirable to reconcile the requested aircraft track with an identifiable landmark that may be used by the airstream as an IP. The IP, located 8-24 kilometers from the DZ, is the final navigational checkpoint before reaching the target. Upon reaching the IP, the pilot turns to a predetermined magnetic heading that takes him over the DZ within a certain number of minutes (figure 29). The following features constitute suitable IP's:

(1) Coastlines. A coastline with breaking surf is easily distinguished at night. Vessels of rivers over 50 meters wide, starry uprisings, or islands are excellent guides for both day and night.

(2) Rivers and canals. wooded banks reduce reflections, but rivers more than 50 meters wide are visible from the air. Canals are easily recognizable from their straight banks and uniform width. Small streams are not discernible at night.
Figure 25. Reporting of obstacles and reference point.
(3) Lakes. Lakes at least 1 kilometer square give good light reflection.

(4) Forest and woodlands. Forested areas at least 1 kilometer square with clearly defined boundaries of unmistakable shape.

(5) Major roads and highways. Straight stretches of main roads with one or more intersections. For night recognition, dark surfaced roads are not desirable as DZ's, although when the roads are wet, reflection from moonlight is visible.

24. MARKING DROP ZONES

a. Purpose. The purpose of DZ markings is to identify the site for the aircraft and to indicate the point over which the personnel or cargo should be released (release point). The procedures for marking DZ's are determined before infiltration and are included in the SSI.

b. Equipment.

(1) DZ's may be marked at night by using lights. A few of the possible lighting devices are flashlights; flares; and small wood, oil, or gas fires.

(2) For daylight operations the 50-lb. Marking Panel Set, AP-50 or VS-16, is satisfactory for use. If such panels are not available, sheets, strips of colored cloth, or other substitutes may be used as long as there is a sharp contrast with the background. Smoke signals, either smoke grenades or simple smoke flares, greatly assist the aircrew in sighting the DZ markings on the approach run.

(3) The use of electronic landing devices permits reception operations to be conducted during conditions of low visibility. Such devices normally are used in conjunction with visual marking systems.

c. Computation of Release Points. The release point must be determined to ensure delivery of personnel or cargo within the usable limits of the DZ. Computation of the release point involves the following factors (figure 27).

(1) Personnel and low-velocity cargo drops.

(2) Dispersion. Dispersion is the length of the pattern formed by the exit of the parachutists or cargo containers (figure 27). The desired point of impact for the first parachutist/container depends upon the calculated dispersion.
(6) Wind drift. This is the horizontal distance traveled from the point of exit to the point of landing on a result of wind conditions. The release point is located an appropriate distance upward from the desired impact point. To determine the amount of drift, use the following formulas:

1. For personnel using the T-10 parachute (feet (yards) = altitude (hundreds of feet) x wind velocity (MPH) x 4.5 constant factor).

2. For all other low velocity parachute drops: Same as 1 above; however, substitute a constant factor of 1.6 for 4.5.

NOTE: Where no mechanical wind velocity indicator is available, the approximate velocity can be determined by dropping bits of paper, leaves, dry grass, or dust from the shoulder and pointing to the dry place where they land. The estimated angle in degrees formed by the arm with the body, divided by 4, equals wind velocity.

(3) Forward throw. This is the horizontal distance traveled by the parachute or cargo container between the point of exit and the opening of the parachute. This factor, combined with reaction time of personnel in the aircraft, is compensated for by moving the release point an additional 120 meters in the direction of the aircraft approach (Figure 28).

(2) High-velocity and free-drop loads. Due to their rapid rate of descent, high-velocity and free-drop loads are not materially affected by wind conditions. Otherwise, the factors of dispersion and forward throw are generally similar to those for personnel and low-velocity drops and are compensated for in the same manner.

d. Methods of Release Point Marking. There are two methods for marking the DZ release point. The principal difference between the two is the method of providing identification. The marking systems described below are designed primarily for operational drops executed at an altitude of 500 feet. Training jumps are conducted at an altitude of 1,200 feet and require the use of a flash panel or light placed 200 meters to the left of the release point markings. The configuration of present cargo and troop-carrying aircraft prevents the pilot from seeing the markings after approaching within approximately 1.5 kilometers of the DZ while flying at 1,200 feet above the DZ. From this point on, the pilot must depend on the proper track in order to pass over the release point. The flash marker serves to indicate when the aircraft is over the release point and the exact moment the drop should be executed. Operational drops executed at 500 feet altitude do not require the flash panel because the pilot does not lose sight of the markings as he approaches the DZ.

e. Placement of Markings.

(2) Markings must be clearly visible to the pilot of the approaching aircraft. As a guide, markings must have a clearance of at least 400 meters from a 100-foot obstacle (Figure 29).

(2) Additionally, precautions must be taken to ensure that the markings can be seen only from the direction of the aircraft approach. Flashlights may be equipped with simple hoods or shields and aimed toward the flight path. Fires or improvised flares are suspended on three sides or placed in pits with sides sloping toward the direction of aircraft approach.

(3) When panels are used for daylight markings of DZ's, they are positioned at an angle of approximately 45° from the horizontal to present the maximum surface toward the approaching aircraft.

28. RECEPTION COMMITTEES

a. General. A reception committee is formed to control the drop zone landing area. The reception committee can be anyone who is capable of performing the following duties. A permanent committee for each unit provides the best results, eliminating the need to cross-train everyone to be capable of this mission; however, training in depth should be accomplished to ensure that losses of key personnel will not adversely affect the operation of the group as a whole.

b. The duties and functions of a reception committee are:

(1) Provide security for the reception operation.

(2) Employ DZ markings and air/ground identification equipment.

(3) Maintain surveillance of the site before and after the reception operation.

(4) Recover incoming personnel and cargo (FM 31-20).

(5) Provide for dispatch of personnel or cargo in evacuation operations.
Figure 28. Methods of release point marking.

Figure 29. Placement of DZ Markings.
(4) Provide for sterilitation of the site only when secrecy is possible and desirable.

a. Composition. The reception committee is normally organized into five parties. The composition and functions of the five parties are as follows:

(1) Command party.
   (a) Controls and coordinates the actions of all reception committee components.
   (b) Includes the reception committee leader (RCL) and communications personnel, consisting of messengers and radio operators.
   (c) Provides medical support, to include litter bearers, during personnel drops.

(2) Marking party.
   (a) Operates the reception site marking system, using one man for each marker.
   (b) The marking party must be well rehearsed. Improperly placed or improperly operated markings may result in aborting the mission.

(3) Security party.
   (a) Ensures that unfriendly elements do not interfere with the operation.
   (b) Consists of inner and outer security elements.
      1. The inner security element is positioned in the immediate vicinity of the site and is prepared to fight delaying or holding actions.
      2. The outer security element consists of outposts established along approaches to the area. They may prepare ambushes and road blocks to prevent enemy movement toward the site.
   (c) Provides march security for moves between the reception site and the destination of the cargo.
   (d) Recovery party.

(5) Recovery party.
   (a) Recovers cargo and aerial delivery equipment from the DZ. Unloads aircraft or landing craft.

   (b) For aerial-delivery operations, the recovery party should consist of at least one man for each parachute or cargo container. For each operation, the recovery party is usually dispersed along the length of the anticipated impact area. The members spot each parachute as it descends and move to the landing point. They then recover all parachute equipment and cargo, moving to a predetermined assembly area with the identified personnel or equipment.

   (c) The recovery party is normally responsible for sterilizing the reception site to ensure that all traces of the operation are removed when secrecy is possible and desired.

   (d) Transport party.
      (a) Moves items received to distribution points or caches.
      (b) May consist of part or all of the members comprising the command, marking, and recovery parties.
      (c) Uses available means of transportation such as pack animals and wagons.

36. LANDING ZONES (LZs)

a. General. The same general considerations applicable to LZ selections apply to the selection of LZs; however, site size, approach features, and security are far more important.

b. Selection Criteria.
   (i) Desirable terrain features:
      (a) LZ's should be located in flat or rolling terrain.
      (b) Level plateaus of sufficient size can be used. Due to decreased air density, landing at higher elevations requires increased minimum LZ dimensions. If the LZ is located in terrain above 4,000 feet or areas with a very high temperature, the minimum lengths should be increased as follows:
         1. Add 10 percent to minimums for safety areas.
2. Add 10 percent to minimum for the altitude for temperatures over 30°F. Add 20 percent for temperatures over 100°F. (38°C.)

(c) Pockets or small valleys completely surrounded by hills are usually unsuitable for landing operations by fixed-wing aircraft.

(d) Although undesirable, sites with only a single approach can be used. It is mandatory when using such sites that:

1. All takeoffs and landings are made upwind.

2. There is sufficient clearance at either end of the L.I. to permit a 90° turn to either side within a radius of 5 kilometers for medium aircraft and 1.5 kilometers for light aircraft.

(e) Weather. Prevailing weather in the landing area should be favorable, with a particular wind direction and velocity, and conditions restricting visibility, such as ground fog, haze, or low-hanging cloud formation, must be determined.

(f) Size. The required size of L.I.'s varies according to the type of aircraft and, safe operations require the following minimum dimensions (figures 30 and 31).

(a) Medium aircraft. 900 meters in length and 30 meters in width (45 meters at night).

(b) Light aircraft. 350 meters in length and 15 meters in width (45 meters at night).

(c) In addition to the basic runway dimensions, and to provide a safety factor, these extra clearances are required:

1. A cleared surface capable of supporting the aircraft, extending from each end of the runway, and equal to 10 percent of the runway length.

2. A 15-meter strip extending along both sides of the runway and cleared to within 1 meter of the ground.

(d) Surface.

(a) The surface of the L.I. must be level and free of obstructions such
as ditches, deep ruts, logs, fences, hedges, low shrubbery, rocks larger than a man's fist or grass over .45 meters in height.

(5) The subsoil must be firm to a depth of .6 meters.

(6) A surface consisting of gravel and small stones or thin layer of loose sand over a firm layer of subsoil is acceptable. Flooded fields or fields containing crops over .45 meters in height should not be used.

(7) The surface gradient of the LZ should not exceed 2 percent.

(8) Approach and takeoff clearances. The approach and takeoff clearances are based on the glide-climb characteristics of the aircraft. For medium aircraft, the glide-climb ratio is 8:1, that is, 1 foot of gain or loss of altitude for every 8 feet of horizontal distance traveled. The ratio for light aircraft is 1:2. As a further precaution, any obstructions in approach and departure lanes must conform to the following specifications (Figure 32).

(9) An obstruction higher than 2 meters is not permissible at or near either end of the LZ.

(10) A 50-foot obstruction may not be nearer than 417 meters for medium aircraft, or 305 meters for light aircraft.

(11) A 500-foot obstruction may not be nearer than 617 kilometers for medium aircraft or 3.52 kilometers for light aircraft.

(12) Hills of 1,000 feet or more altitude above the LZ may not be nearer than 15 kilometers from the landing zone for medium aircraft.

(13) The heights of the obstacles are computed from the level of the landing strip. Where land falls away from the LZ, objects of considerable height may be ignored provided they do not cut the line of ascent or descent. This condition exists more often in mountainous terrain where plateaus are selected for LZ’s.
c. Markings.

(1) For night operations, lights are used for marking L.Z.'s; during daylight, panels are used. When flashlights are used, they should be hand-held for directional control and guidance.

(2) The patterns outlining the limits of the roadway consist of five or seven marking stations (Figures 30 and 31). Station 'A' and 'B' mark the downward end of the L.Z., and are positioned to provide for the safety factors previously mentioned. These stations represent the initial point at which the aircraft should touch the ground. Station 'C' indicates the very last point at which the aircraft can touch down and complete a safe landing.

(3) A signal station marked by the RCL (a member of the operational detachment) is incorporated into light station 'B' at the approach on downward end of the L.Z. (Figures 30 and 31). For night operations, the signal light operation, a distinctive panel, or colored smoke located approximately 15 meters to the left of station 'B' (RCL) is used for recognition.

d. Conduct of Operations.

(1) The L.Z. markings are normally displayed 2 minutes before the arrival time indicated in the mission confirmation message. The markings remain displayed for a period of 4 minutes until the aircraft completes landing roll after touchdown.

(2) Identification is accomplished by the:

(a) Aircraft arriving at the proper time on prearranged track.
(b) Reception committee leader flashing or displaying proper code signal.

(3) Landing direction is indicated by the:

(a) RCL signal control light (station 'B') and marker 'A' which are always on the approach or downward end of the roadway.
(b) Row of markers which are always on the left side of the landing aircraft.

(4) The pilot usually attempts to land straight-in on the initial approach.
When this is not possible, a marked landing pattern is flown using a minimum of altitude for security reasons. Two minutes before the target time the RCL enables all lights of the LZ pattern to be turned on and aimed like a pistol in the direction of the aircraft’s approach track. The RCL also flashes the code of the day continuously with the green control light in the direction of expected aircraft approach. Upon arrival in the area within 25° to either side of the approach track and below 1,000 ft, the LZ marking personnel follow the aircraft with all lights. When the RCL determines the aircraft is on its final approach, he will cause flashing the code of the day and aim a solid light in the direction of the landing aircraft. The solid light provides a more positive pattern for the pilot during landing. If a “go around” is required, all lights follow the aircraft until it is on the ground. All lights continue to follow the aircraft during touchdown and until it passes each respective light station.

5. Landings are not normally made under the following conditions:
   a. Lack of or improper identification received from the LZ.
   b. An abort signal given by the RCL, e.g., causing LZ lights to be extinguished.
   c. Any unserviceable condition, in the opinion of the pilot, makes it unsafe to land.

6. After the aircraft passes the RCL position at touchdown and completes its landing roll and a right turn, the RCL takes a position midway between stations “A” and “B” and flashes a solid light in the direction of the taxing aircraft. This is the green light for the pilot who will taxi the aircraft toward the takeoff position. The RCL controls the aircraft with his light. If the RCL desires the aircraft to continue to taxi, he will flash a solid light in the direction of the aircraft. After taxying or co-taxiing is complete and the aircraft is ready for takeoff, the RCL moves to a vantage point forward and to the left of the pilot, causes the LZ lights to be illuminated, and flashes his light toward the nose of the aircraft as the signal for takeoff. The RCL exercised caution so that his light does not blind the pilot.

7. To eliminate confusion and ensure expeditious handling, personnel or cargo to be unloaded wait for unloading of incoming personnel or cargo.

8. When all personnel concerned are landed and members of the reception committee are clear of the aircraft, the pilot is given a go signal by the RCL. LZ markings are removed as soon as the aircraft is airborne.

27. REPORTING LANDING ZONE

The minimum LZ data required is:

a. Code Name. Extracted from 301.

b. Location. Complete military grid coordinates of center of LZ.

c. Long and Magnetic azimuth of long axis of runway. It also indicates probable direction of landing approach based on prevailing winds.

d. Description. Type of surface, length, and width of runway.

e. Operation Quadrant. Measured from center of LZ and reported as series of magnetic azimuths. Open quadrant indicates acceptable aircraft approach.

f. Track. Magnetic azimuth of desired aircraft approach.

g. Obstacles. Reported by description, magnetic azimuths, and distance from center of LZ.

h. Reference Point. Reported same as obstacles.

i. Date. Time mission requested.

j. Request. Items to be evaluated.

28. LANDING ZONES FOR ROTARY-WING AIRCRAFT

a. General.

(1) Within their range limitations, helicopters provide an excellent means of evacuation. Their advantages include the ability to:

   (a) Ascend and descend almost vertically.

   (b) Land on relatively small plots of ground.

   (c) Never nearly motionless, and take on and discharge personnel and cargo without landing.

   (d) Fly safely and efficiently at low altitudes.

   (e) Some unfavorable characteristics of helicopters are:

      (1) Compresses by engine and rotor noise and by dust.

      (2) Difficulty—sometimes impossibility—of operating when wing or high, gusty winds prevail.
(c) The reduction of lifting ability during changes of atmospheric conditions.

(4) For the maximum effective use of helicopters LZ's should be located to have landings and takeoffs into the wind.

(4) During night operations, helicopters usually must land to transfer personnel or cargo.

(5) A decrease in normal air density limits the helicopter payload and requires lengthened running distances for landing and takeoff. Air density is largely determined by altitude and temperature. Low altitudes and moderate to low temperatures result in increased air density.

b. Size. Under ideal conditions, and provided the necessary clearance for the rotors exist, a helicopter can land on a plot of ground slightly larger than the spread of its landing gear; however, for night operations a safety factor is allowed, using the following criteria as a guide.

(1) An area of 50 meters in diameter is cleared to the ground.

(2) An area surrounding the cleared area, 20 meters wide, is cleared to within 1 meter of the ground.

(3) The completed LZ is a minimum of 90 meters in diameter (Figure 33).

c. Surface.

(1) The surface should be relatively level and free of obstructions such as rocks, logs, hill grass, ditches, and fences.

(2) The maximum ground slope permitted is 15 percent.

(3) The ground must be firm enough to support the aircraft.

(4) Heavy dust or debris interferes with the raise of the pilot part before touchdown. This effect can be reduced by clearing, wetting down, or using improved mats.

(5) Landing pads may be prepared on swamp or marsh areas by building platforms of locally available materials (Figure 34). Both LZ's are normally used for daylight operations only. The size of the clearing for this type of LZ is the same as b above with the following additional requirements for the platform:

(a) Be large enough to accommodate the spread of the landing gear plus 3 meters.
Figure 34. Examples of platform landing zones for rotary-wing aircraft.

Figure 35. Preparing landing pads in mountainous terrain (rotary-wing aircraft).
(9) Be capable of supporting the weight of the aircraft.

(10) Be of firm construction that will not move when the helicopter touches down and rolls slightly forward.

(11) Be level.

(12) If logs or bamboo are used, be constructed so that the top layer of poles is at right angles to the touchdown direction.

(13) Helicopters can land in water without the use of special flotation equipment provided:

(a) The water depth does not exceed 45.72 cm.

(b) There is a firm bottom such as gravel or sand.

(14) Landing pads can be prepared on mountains or hillside by cutting and filling (figure 33). Caution must be exercised to ensure there is adequate clearance for the rotor.

d. Approach/Takeoff.

(1) There should be at least one path of approach to the LZ measuring 75 meters wide.

(2) A rotary-wing aircraft is considered to have a climb ratio of 1:5 (figure 34).

(3) Takeoff and departure from the LZ may be along the same path used for the approach; however, a separate departure path is free of obstacles as the approach path is desired (figure 35).

e. Marking.

(1) LZ's for rotary-wing aircraft are marked to:

(a) Provide identification of the reception committee.

(b) Indicate direction of wind or required direction of approach.

(c) Delineate the touchdown area.

(2) Equipment and techniques of marking are similar to those used with fixed-wing 1:7's—lights or flares at night, smoke and panels in daylight.

(3) An acceptable method of marking is the F V system. This uses four marker stations (figure 37).
### 29. FACTORS FOR SELECTING GROUND TARGETS FOR AIR STRIKE

a. Identification of Target. Can the target be easily identified by the pilot and can it be marked by smoke, if necessary?

b. Capability of organic weapons. Are organic weapons incapable of giving the necessary results?

c. Aircraft Armament Capabilities. Does aircraft armament have the capability to destroy or neutralize the target?

d. Time. Is target of such nature that it will remain long enough to get aircraft on the target?

e. Capability of unit to control the air strike directly or through liaison or helicopter aircraft.

### 30. ARMY MISSION DATA FOR CLOSE AIR SUPPORT REQUEST FORM

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
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<tbody>
<tr>
<td>1</td>
<td>Mission request number</td>
<td>See corps SOP</td>
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<tr>
<td>2</td>
<td>Unit</td>
<td>Code name or number of unit originating request.</td>
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<tr>
<td>3</td>
<td>Mission priority</td>
<td>See division SOP</td>
</tr>
<tr>
<td>4</td>
<td>Target coordinates</td>
<td>Six digits, if possible</td>
</tr>
<tr>
<td>5</td>
<td>Target number</td>
<td>See corps SOP</td>
</tr>
<tr>
<td>6</td>
<td>Target description</td>
<td>What is it? How big or how many?</td>
</tr>
<tr>
<td>7</td>
<td>Results desired</td>
<td>Normally destroy, neutralize, damage, or disrupt.</td>
</tr>
<tr>
<td>8</td>
<td>Time over target</td>
<td>Desired time.</td>
</tr>
<tr>
<td>9</td>
<td>Latest time over target</td>
<td>Latest time strike can be conducted and still be of value.</td>
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</table>

Figure 37. Marking of landing zones for use by rotary-wing aircraft.
### INFORMATION REQUIRED

<table>
<thead>
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<th>ITEM NO.</th>
<th>ITEM</th>
<th>INFORMATION REQUIRED</th>
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<td>10.</td>
<td>Distance and direction from friendly troops</td>
<td>Distance in meters. Direction in magnetic azimuth from troops to target.</td>
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<tr>
<td>11.</td>
<td>Control information</td>
<td>Forward air controller call sign, radio frequencies, target method, if applicable.</td>
</tr>
<tr>
<td>12.</td>
<td>Target tactical significance</td>
<td>Why is the mission required?</td>
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<tr>
<td>13.</td>
<td>Spot report required</td>
<td>Yes or no. Any additional data pertinent to the strike.</td>
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**NOTE:** Transmit by line item number. Do not repeat item description. Before using this format, make sure that it conforms to the format in use by the corps to which you are assigned.

### ARMY MISSION DATA FOR TAC AIR RECON REQUEST FORM

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<td>2.</td>
<td>Unit</td>
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<tr>
<td>3.</td>
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<td>4.</td>
<td>Type of mission</td>
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<td>5.</td>
<td>Target/area description</td>
<td>Personnel? Area? Point?</td>
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<td>6.</td>
<td>Desired time on target</td>
<td>Date (and hour, if applicable).</td>
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<tr>
<td>7.</td>
<td>Time</td>
<td>If applicable.</td>
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<tr>
<td>8.</td>
<td>Results desired</td>
<td>What do you want recon to look for? Vertical, oblique, or strip.</td>
</tr>
<tr>
<td>9.</td>
<td>Type of photo</td>
<td>Higher scale means fewer negatives and fewer prints to cover an area—thus faster delivery of information to you.</td>
</tr>
<tr>
<td>10.</td>
<td>Scale</td>
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### RADIO NETTING CAPABILITIES

#### TYPE | GROUND RADIO | NET WITH AIR RADIO
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>VHF-AM</td>
<td>AN/PRC-7 (88 level)</td>
<td>AN/ARC-12 (8-1)</td>
</tr>
<tr>
<td></td>
<td>AN/ARC-12 or 8 (All fighter aircraft)</td>
<td>AN/PRC-10 (8-1)</td>
</tr>
<tr>
<td>VHF-FM</td>
<td>AN/PRC-18 (88 level)</td>
<td>**AN/ARC-44 (U.S. helicopter and U.S. fighter aircraft except Jet)</td>
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<td></td>
<td>AN/PRC-14*</td>
<td>AN/PRC-25</td>
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<tr>
<td></td>
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<td>AN/PRC-25</td>
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<tr>
<td></td>
<td>AN/ARC-21*</td>
<td>AN/ARC-27 (8-1 and Jet)</td>
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<tr>
<td>UHF-AM</td>
<td>AN/ARC-25</td>
<td>AN/ARC-25 (U.S. helicopter and other U.S. aircraft)</td>
</tr>
</tbody>
</table>

* Radio nets are components of AN/PRC-30 (at regimental level) and AN/PRC-9 and 16 series radios on all channels

### DUTIES OF THE FORWARD AIR CONTROLLER

a. Monitor spot report system.

b. Provide liaison between the ground unit commander and the tactical air control system.

c. Provide safe separation between target and friendly positions.
d. Direct the air strike.

e. Report results of the air strike.

34. METHODS OF TARGET LOCATION AND IDENTIFICATION

a. Smoke and Adjust Method. Colored smoke fired by artillery, mortars, or recoilless rifle can be used as a reference point to mark targets.

b. Colored panels may be used to identify frontline troops and to give the pilot the general direction of attack. Color code of the day is required to prevent compromising location and ensure identification.

c. Map coordinates of the target can be given to the strike pilot. Coordination must be made to ensure both FAC and pilot have the same map and coordinate systems.

d. Simulated attack run on the suspected target by the attacking aircraft or airborne air controller and subsequent verbal adjustment directions can be used to identify target.

e. Landmarks and terrain features can be used as a reference point from which the target may be pointed out to the pilot. Give direction and distance to target from reference point (sufficient reference points may be required).

f. Clock method requires prestrike coordination between controller and pilot. Use aircraft inbound heading as the 12 o'clock position; then indicate the distance from the aircraft to the target and the hour position for the direction.

35. FORWARD AIR CONTROLLER (FAC) BRIEFING TO PILOT

a. Establish communications with flight leader.

b. Request ordnance report (to determine type of ordnance aboard aircraft).

c. Give air briefing to flight (short summaries for each paragraph below).

1. Target description and location: Direct target marking method, if used. Mark your location only if necessary to establish a reference point from which target location can be identified for pilot.)


**FIXED AND LOW-SPEED AIRCRAFT CAPABILITIES**

<table>
<thead>
<tr>
<th>AIRCRAFT</th>
<th>MAXIMUM SPEED</th>
<th>FUEL</th>
<th>PAYLOAD 500 LBS.</th>
<th>PAYLOAD 1000 LBS.</th>
<th>TROOPS (COMBAT)</th>
<th>LITERS</th>
<th>CO-PT. CARGO (LBS.)</th>
<th>MINIMUM SLING CAPACITY</th>
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<td>150</td>
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<td>CH-57</td>
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<td>200</td>
<td>4500</td>
<td>4100</td>
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<td>14</td>
<td>1110</td>
<td>10000</td>
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<tr>
<td>UH-60</td>
<td>90</td>
<td>390</td>
<td>500</td>
<td>550</td>
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<td>--</td>
<td>--</td>
</tr>
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<td>D-8</td>
<td>105</td>
<td>575</td>
<td>1300</td>
<td>1150</td>
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<td>U-2F</td>
<td>155</td>
<td>1300</td>
<td>2200</td>
<td>2100</td>
<td>4</td>
<td>4</td>
<td>192</td>
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<td>U-2A</td>
<td>170</td>
<td>360</td>
<td>2400</td>
<td>2200</td>
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<td>236</td>
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<tr>
<td>CV-1</td>
<td>150</td>
<td>410</td>
<td>750</td>
<td>750</td>
<td>32</td>
<td>34</td>
<td>1150</td>
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<td>157</td>
<td>1050</td>
<td>750</td>
<td>750</td>
<td>32</td>
<td>34</td>
<td>1150</td>
<td>--</td>
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</table>

**NOTE:** Above figures are to be used as guides only. Many factors will influence the capabilities of any aircraft. Increases in temperature, humidity, and altitude will decrease performance. Desired range will affect fuel load which will determine number of troops or amount of cargo that can be carried.

*Table 1.*
## Chapter 1
COMMUNICATIONS

### Phonetic Alphabet

<table>
<thead>
<tr>
<th>Letter</th>
<th>Phonetic</th>
<th>English Spell-out</th>
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<tbody>
<tr>
<td>A</td>
<td>Alpha</td>
<td>Alpha</td>
</tr>
<tr>
<td>B</td>
<td>Bravo</td>
<td>Bravo</td>
</tr>
<tr>
<td>C</td>
<td>Charlie</td>
<td>Charlie</td>
</tr>
<tr>
<td>D</td>
<td>Delta</td>
<td>Delta</td>
</tr>
<tr>
<td>E</td>
<td>Echo</td>
<td>Echo</td>
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<tr>
<td>F</td>
<td>Foxtrot</td>
<td>Foxtrot</td>
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<tr>
<td>G</td>
<td>Golf</td>
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<td>H</td>
<td>Hotel</td>
<td>Hotel</td>
</tr>
<tr>
<td>I</td>
<td>India</td>
<td>India</td>
</tr>
<tr>
<td>J</td>
<td>Juliet</td>
<td>Juliet</td>
</tr>
<tr>
<td>K</td>
<td>Kilo</td>
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<tr>
<td>M</td>
<td>Mike</td>
<td>Mike</td>
</tr>
<tr>
<td>N</td>
<td>November</td>
<td>November</td>
</tr>
<tr>
<td>O</td>
<td>Oscar</td>
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<tr>
<td>P</td>
<td>Papa</td>
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</tr>
<tr>
<td>Q</td>
<td>Quebec</td>
<td>Quebec</td>
</tr>
<tr>
<td>R</td>
<td>Romeo</td>
<td>Romeo</td>
</tr>
<tr>
<td>S</td>
<td>Sierra</td>
<td>Sierra</td>
</tr>
<tr>
<td>T</td>
<td>Tango</td>
<td>Tango</td>
</tr>
<tr>
<td>U</td>
<td>Uniform</td>
<td>Uniform</td>
</tr>
<tr>
<td>V</td>
<td>V衷心</td>
<td>V衷心</td>
</tr>
<tr>
<td>W</td>
<td>Whiskey</td>
<td>Whiskey</td>
</tr>
<tr>
<td>X</td>
<td>X-Ray</td>
<td>X-Ray</td>
</tr>
<tr>
<td>Y</td>
<td>Yankee</td>
<td>Yankee</td>
</tr>
<tr>
<td>Z</td>
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<td>Zulu</td>
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### Phonetic Numbers

<table>
<thead>
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<tr>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>Three</td>
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<td>Four</td>
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<td>Seven</td>
</tr>
<tr>
<td>8</td>
<td>Eight</td>
</tr>
<tr>
<td>9</td>
<td>Nine</td>
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Table 1.
VIETNAMESE PHONETIC ALPHABET, NUMBERS AND PHRASES

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<thead>
<tr>
<th>LETTER</th>
<th>ENGLISH</th>
<th>VN</th>
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<tbody>
<tr>
<td>a</td>
<td>alpha</td>
<td>ạ</td>
</tr>
<tr>
<td>b</td>
<td>bravo</td>
<td>bá</td>
</tr>
<tr>
<td>c</td>
<td>charlie</td>
<td>cự</td>
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<tr>
<td>d</td>
<td>delta</td>
<td>đê</td>
</tr>
<tr>
<td>e</td>
<td>echo</td>
<td>e</td>
</tr>
<tr>
<td>f</td>
<td>foxtrot</td>
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</tr>
<tr>
<td>g</td>
<td>hotel</td>
<td>hót</td>
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<td>india</td>
<td>hinh</td>
</tr>
<tr>
<td>i</td>
<td>juliett</td>
<td>juliet</td>
</tr>
<tr>
<td>j</td>
<td>juliett</td>
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<td>khi</td>
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<tr>
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<td>november</td>
<td>nha</td>
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<td>rugby</td>
<td>rôn</td>
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<td>s</td>
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<td>v</td>
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<td>w</td>
<td>whiskey</td>
<td>mon</td>
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<td>x</td>
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<tr>
<td>z</td>
<td>zulu</td>
<td>zulu</td>
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<th>AH TÔM: 90</th>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>hai</td>
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<tr>
<td>3</td>
<td>tại</td>
</tr>
<tr>
<td>4</td>
<td>tám</td>
</tr>
<tr>
<td>5</td>
<td>bô</td>
</tr>
<tr>
<td>6</td>
<td>tê</td>
</tr>
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<td>cần</td>
</tr>
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<tr>
<td>0</td>
<td>không</td>
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<table>
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<th>PROCEDURE WORDS</th>
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<tr>
<td>This is</td>
</tr>
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</tr>
<tr>
<td>Our</td>
</tr>
<tr>
<td>Roger</td>
</tr>
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<td>Say again</td>
</tr>
<tr>
<td>I spell</td>
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<td>Correction</td>
</tr>
<tr>
<td>Message follows</td>
</tr>
<tr>
<td>Notice</td>
</tr>
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<td>I say again</td>
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<tr>
<td>Break</td>
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<tr>
<td>Time</td>
</tr>
<tr>
<td>Wait</td>
</tr>
<tr>
<td>Wait out</td>
</tr>
<tr>
<td>Group</td>
</tr>
<tr>
<td>Read back</td>
</tr>
<tr>
<td>That is correct</td>
</tr>
<tr>
<td>Wrong</td>
</tr>
<tr>
<td>Relay (to)</td>
</tr>
<tr>
<td>All after</td>
</tr>
<tr>
<td>All before</td>
</tr>
<tr>
<td>From</td>
</tr>
<tr>
<td>To</td>
</tr>
<tr>
<td>Speak slower</td>
</tr>
<tr>
<td>Words voice</td>
</tr>
<tr>
<td>Verify</td>
</tr>
<tr>
<td>I verify</td>
</tr>
<tr>
<td>Silence</td>
</tr>
<tr>
<td>Silence lifted</td>
</tr>
<tr>
<td>Service</td>
</tr>
<tr>
<td>Do not answer</td>
</tr>
<tr>
<td>Disregard this</td>
</tr>
<tr>
<td>Lendmission</td>
</tr>
</tbody>
</table>

Table IV.

ANTENNA LENGTH FORMULAS: f = frequency in megacycles
answer in antenna length in feet

\[ \frac{1}{4} \text{ wave} = \frac{1}{2}f \]
\[ \frac{3}{4} \text{ wave} = \frac{3}{2}f \]
\[ \text{full wave} = 2f \]

FOR CENTER FEED ANTENNA(S), \( \frac{3}{4} \) of DESIRED ANTENNA LENGTH TO EACH SIDE OF INSULATOR

RADAR NET CONFIGURATIONS

Radar
1. Same Frequency Coverage
2. Same Elevation - CW or Phase
3. Same Mode - AM or FM
4. Compatible Distance Range

OPERATIONS

1. 501
   a. Frequency
   b. Call Signs
   c. Authentication
   d. Set Directions
2. 502
   a. Instructions for 501
   b. General Communications Information
3. Phonetic Alphabet and Numbers
4. Procedure Words

Table V.
HALF RHOMBIC

30 to 70 MC

15.24M

15.24M

DIRECTION OF RADIATION

MAXIMUM

OUTPUT WIRE

BASED SET

COMMENTS

HALF RHOMBIC

THE HALF RHOMBIC ANTENNA TERMINATED WITH A 100 OHM RESISTOR HAS A SIDE GAIN (4 TO 10 TIMES)

RECEIVED SIGNALS 15.24 METER. BOTH AREN'T DOESN'T A SIGNAL.

WITHOUT THE RESISTOR THE ANTENNA RECEIVES BI-DIRECTIONAL.

Table VI.

JUNGLE ANTENNA

THE JUNGLE ANTENNA IS A FIELD ELEVATED VERSION OF THE JUKE ANTIPOD ANTENNA. SHORT-TERM, ONE-DIRECTIONAL, FREQUENCY RANGE 406K TO 10 MC. IF VERTICAL ELEMENT IS 3/4" IS SUNKED DOWN FROM ABOVE FROM 3/4" TO BE ELEVATED, THE THREE LOWER FLARE ELEMENTS SHOULD BE AT 45 DEGREES AND MUST BE CONNECTED TO BASE SET.

Table VII.
Vertical Doublet

Total length is 1/2 wave, 1/4 wave back element. 100-200 ft twisted pair (30-70 ft) in coaxial cable. In fringe or woods areas a scheme arrangement can be outlined by setting the antenna guy wires. The electric height is very important in line of sight areas. Extreme. The lowest angle is 25°/80° for frequencies below 45 Mc. (3240-10000).

Most common heights: 40/400, 30/300, 40/400, 40/400-700.

Table VIII.

Balloon Supports

* 1/2 wave vertical
* 3/4 wave vertical doublet
* 1/4 wave vertical doublet
* 1/4 wave shorted at head

Maximum weight of wire: 100 grams

Availability of balloons and rubber bands.
SLANT WIRE ANTENNA

PERMITS RANGE BELOW 30 MC. RADIATION SET WITHführt FOR LONG RANGE COMMUNICATION. VERTICAL AND HORIZONTAL POLARIZED

Table X.

1/2 λ 14% OFF-CENTER FED

OFFSET FEED

WHEN DEPARTURE OR TWINED LINES IS NOT AVAILABLE, A 1/2 λ WIRE ANTENNA MAY BE FED WITH A SIMILAR WIRE. THE HIGHER VOLTIS 15% OF TOTAL LENGTH, MEASURED FROM CENTER. THE MATCHING FACTOR IS享受ED (SMALL) FOR FREQUENCIES BELOW 30 MC.

Table XI.
INVERTED "L" ANTENNA

PROPER VARIATIONS: BOW-DO W. DIRECTION OF VEHICLES;
VERTICAL POLARIZATION
BROAD-SIDED (RAISING GROUND WAVE)
HORIZONTAL POLARIZATION (RAISING "L" WAVE) IRRADIATION

Table XIII.

HALF WAVE "DOUBLET"

1/2 WAVE RADIAL CENTER FOR ANTENNA (HORIZONTAL)
PROPER VARIATIONS: BOW-DO W. DIRECTION OF VEHICLES; 48/405-109, 48/405-67, 48/405-19
ADVANTAGE: HIGH ANGLE RADIATION, LONG DISTANCE COMMUNICATION
DISADVANTAGE: SENSITIVE TO CONSTRUCTION-CAUSING VERTICAL/VERTICAL WAVES TO COUNTER ACTION, POOR GROUND WAVE.

Table XIV.
EXPEDIENT INSULATORS

Table XIV.

VERTICAL 1/4 WAVE ANTENNA (HELP)

THE 1/4 WAVE VERTICAL IS THE ANTENNA IN ITS SIMPLEST FORM. TRANSMISSION IS UNIMPEACHABLE. SINGLE CONSTRUCTION PARASITIC ANTENNA FOR HAM. LIMITATIONS: AVAILABILITY OF UMBRELLA SUPPORT, NOT PRACTICAL FOR PERMANENT USE 1/4 WAVE WOULD BE LARGER THAN SUPPORT AVAILABLE. NOTE: IF SUPPORT IS NOT USEN POUNDED IN "C." VERTICAL WILL BE SHORTEST THAN ON TOP OF THE VERTICAL PORTION WILL PXHD.

TABLE XV.
FREQUENTLY USED REFERENCES

GENERAL

FM 24-30, FIELD WIRE TECHNIQUES
FM 24-16, FIELD RADIO TECHNIQUES
TM 21-30, JUNGLE OPERATIONS
FM 24-16, SIGNAL ORDERS, RECORDS, AND REPORTS
SB 11-6, DRY BATTERY SUPPLY DATA

OPERATORS MANUAL

TM 11-296, RADIO SET AN/PRC-6
TM 11-5520-295-10, RADIO SET AN/PRC-19 AND AN/PRC-19A
TM 11-5520-452-10, RADIO SET AN/GRC-87 AND AN/VRC-34
TM 11-5520, ANTENNA EQUIPMENT
TO 2182-2TRCT-12, RADIO SET AN/RC-7 (USAF)
TM 38-100, MAINTENANCE RECORDS

ORGANIZATIONAL MAINTENANCE MANUAL

TM 11-296, RADIO SET AN/PRC-6
TM 11-5520-295-20, RADIO SET AN/PRC-19 AND AN/PRC-19A
TM 11-5520-452-20, RADIO SET AN/GRC-87 AND AN/VRC-34
TM 11-5520-348-12, ANTENNA EQUIPMENT RC-292
TO 2182-2TRCT-12, RADIO SET AN/RC-7 (USAF)
TM 11-4009, RADIO SET AN/PRC-6
TM 11-6015 and TM 11-4065A, RADIO SET AN/PRC-19 and PRC-10A

PARTS MANUAL

TM 11-5520-355-20P, RADIO SET AN/PRC-6
TM 11-5520-295-20P, RADIO SET AN/PRC-19 AND AN/PRC-19A
TM 11-5520-452-20P, RADIO SET AN/GRC-87 AND AN/VRC-34

Table XVII
TUNING PROCEDURES FOR AN/GRC-87 or AN/VRC-34 RADIO SETS

A. Net Control Station Tuning. In order for all stations in a net to have adequate communication, the Net Control Station will establish the operating frequency for the entire net. Perform the following steps:

1. To calibrate the receiver:
   (a) Control "E" to STANDBY.
   (b) Control "L" to CAL.
   (c) Control "M" to correct BAND.
   (d) Controls "O" and "P" to MAXIMUM CLOCKWISE.
   (e) Control "Q" to calibration point nearest the desired operating frequency and adjust it to zero beat. (This receiver provides calibration points at every even 200 kc.)

2. Set the transmitter to the receiver.
   (a) Control "L" to NET.
   (b) Control "F" to MO position on the correct band for the operating frequency.
   (c) Control "D" to CW.
   (d) Control "S" to SEND. (Except when using G-45/G and dry battery in which case it is placed on STANDBY.)
   (e) Control "P" to correct DIAL SETTING for the frequency that the RECEIVER is calibrated on.
   (f) Control "N" adjust for zero beat. (Do not close MIKE or KEY.) Apply power to set when using G-45/G hand generator.

3. Set the transmitter to the operating frequency. Control "P" to correct DIAL SETTING for desired operating frequency and lock it. (Refer to FREQUENCY CHART if interpolation is necessary.)

4. Set the receiver to the transmitter. Control "N" tune to frequency of the transmitter, adjust to ZERO BEAT and lock it.

Table XVII

<table>
<thead>
<tr>
<th>FREQ</th>
<th>/80</th>
<th>/60</th>
<th>/40</th>
<th>/30</th>
<th>/20</th>
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<tbody>
<tr>
<td>3000</td>
<td>201</td>
<td>241</td>
<td>281</td>
<td>319</td>
<td>357</td>
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<tr>
<td>3700</td>
<td>295</td>
<td>354</td>
<td>408</td>
<td>462</td>
<td>503</td>
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<tr>
<td>5000</td>
<td>574</td>
<td>661</td>
<td>744</td>
<td>814</td>
<td>870</td>
</tr>
</tbody>
</table>

STEP 1: Subtract the frequency listed immediately above the desired operating frequency from the frequency listed immediately above the desired operating frequency.

EXAMPLE: Frequency listed immediately above 3700 kc
Frequency listed immediately below 5000 kc

150 kc
STEP 2. Subtract the dial setting given for the frequency listed immediately below the desired operating frequency from the dial setting given for the frequency listed immediately above the desired operating frequency.

EXAMPLE: Dial setting for frequency immediately above 529
Dial setting for frequency immediately below 563

STEP 3. Find the number of units of dial setting per kilocycle.

EXAMPLE: (STEP 1) 50 kc = 35 units dial setting.
(STEP 2) 1 kc = 1.8 units dial setting.

STEP 4. Multiply the difference between the desired operating frequency listed immediately below the desired operating frequency by the number of dial setting units per kilocycle.

EXAMPLE: Desired operating frequency 2769 kc
Frequency listed immediately below 2769 kc

5 x 1.8 = 10.2

STEP 5. Find the dial setting for the desired operating frequency by adding the answer from Step 4 to the dial setting given for the frequency listed immediately below the desired operating frequency

EXAMPLE: Dial setting for frequency listed immediately below 503
Answer from step 4 10.2
20.3

NOTE: All stations will tune as prescribed above. At each station the NCS opens the set, all stations will then tune to the NCS or as he may direct.

Table XVIII (2)
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<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Color</th>
<th>Current (Max)</th>
<th>Voltage (Min)</th>
<th>Voltage (Max)</th>
<th>Watts</th>
</tr>
</thead>
<tbody>
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<td>RDV-25</td>
<td>Gray</td>
<td>10 A</td>
<td>120 V</td>
<td>120-277 V</td>
<td>120-277 V</td>
<td>300 W</td>
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<td>RDV-30</td>
<td>Black</td>
<td>15 A</td>
<td>208-277 V</td>
<td>208-277 V</td>
<td>300 W</td>
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<td>RDV-40</td>
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<td>208-277 V</td>
<td>208-277 V</td>
<td>400 W</td>
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<td>25 A</td>
<td>208-277 V</td>
<td>208-277 V</td>
<td>500 W</td>
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</tr>
<tr>
<td>RDV-60</td>
<td>Green</td>
<td>30 A</td>
<td>208-277 V</td>
<td>208-277 V</td>
<td>600 W</td>
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<tr>
<td>RDV-70</td>
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<td>35 A</td>
<td>208-277 V</td>
<td>208-277 V</td>
<td>700 W</td>
<td></td>
</tr>
</tbody>
</table>

*Table 1: Characteristics of Electrical Devices*
CHAPTER 4
ADJUSTMENT OF ARTILLERY FIRE

36. TARGET LOCATION

The search for worthwhile targets must be vigorous and continuous. When a
 target is located and determined to merit an artillery fire mission, the observer
designates the location in one of the following ways:

a. Military grid reference (map coordinates). Using the observed fire fan in
an aid to locating targets in this manner. The observed fire fan is a fan-shaped
protractor constructed of transparent material, covering a 1,400 mil sector. It
is divided by radial lines 50 mils apart. Concentric arcs representing distance are
printed on the fan in increments of 500 meters from 1,000 to 5,000 meters.

b. Reference to a known point. The target may be located by reference to a
known point that is the observer's position or any point which can be located on
both the map and on the ground. An imaginary line from the observer to the target
is called the observer target (O-T) line.

(1) Polar plot method. Designating the location of a target by the azimuth
of the O-T line, the difference in altitude between the observer's location and the
target, and the distance from the observer to the target is known as the polar plot
method of locating targets. This procedure may be used only after the observer's
position has been plotted on the firing chart. One advantage of the polar plot method
is that if the azimuth to the target is measured accurately, the initial round fired
should be a line-shot regardless of range estimation errors. The observer may
determine the azimuth from his map by measurement with an instrument, or by
angular measurement from a previously determined azimuth. Distance in the
adjacent chart is usually estimated by using every known range that can be deter-
mirmed to improve the accuracy of the estimation. The observer may estimate the
vertical interval or, after having measured the vertical angle, compute the vertical
interval by using the unit of range formula. Omission of any reference to altitude
indicates that the altitude of the adjusting point is the same as that of the observer.

(2) Reference normal point method. The location of a target may be design-
ated by a shift from a known point, that is, a point which is plotted on the firing
chart and which the observer can identify from the ground. This point may be a
registration point, a measured concentration, or any point which has been previous-
ly located either by survey or by firing. The observer computes the shift in both
direction and range with reference to the O-T line, first computing the necessary
shift in meters, nearest 10 meters) to the right or left to move the burst from the reference point to the GT Line. Then, determine the necessary range change (nearest 100 meters) from this point on the GT Line to the target.

c. Air Observation. The air observer must transmit his initial fire request in the same sequence as the ground observer. Most target locations are given in military grid references; other target locations are given in terms of a shift from a known point and a reference line. Since the plane is constantly moving, the GT line method is not applicable; therefore, coordinates are given on a given reference line instead of a GT line. If possible, this reference line is established before the flight. The most common reference line used is the gun-target (GT) line. The observer can visualize the GT line better if he knows the location of the weapons. If he does not know the location of the weapons, the observer requests 2 ranging rounds, 400 meters apart, along the GT line. This will tell the observer two things: the direction of the GT line, and what 400 meters looks like from his altitude in the air. This 400-meter range will help him to estimate distance on the ground for moving his subsequent round.

37. RANGE OF WEAPONS
   a. 4.2-inch Mortar - 5,500 meters.
   b. 105-mm Howitzer - 11,000 meters w/new ammo 12,000 meters.
   c. 155-mm Howitzer - 14,000 meters w/new ammo 16,000 meters.
   d. 8-inch Howitzer - 18,000 meters.
   e. 177-mm Gun - 32,800 meters.

38. INITIAL FIRE REQUEST
   a. After choosing an adjusting point and establishing communications with the fire direction center, the observer makes his initial fire request.
   b. The initial fire request includes those elements appropriate to the mission. Examples of the elements which should be considered in requesting a fire mission are listed below in the sequence they should be transmitted.

   c. Fire Request.

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identification of observer.</td>
<td>1. CO, Co. A, 1st Br, 503 ARN inf.</td>
</tr>
<tr>
<td>2. Warning Order.</td>
<td>2. Fire Mission.</td>
</tr>
<tr>
<td>3. Location of target and azimuth from observer to target.</td>
<td>3. Coordinates 109074 Azimuth 4560 (mils).</td>
</tr>
<tr>
<td>5. Type of adjustment.</td>
<td>5. Area fire or precision fire.</td>
</tr>
<tr>
<td>6. Ammunition.</td>
<td>6. When omitted will automatically be HF high explosive.</td>
</tr>
<tr>
<td>7. Fuse action.</td>
<td>7. When omitted will automatically be percussion. Observer can request VT or delay fuse.</td>
</tr>
</tbody>
</table>

39. MIL RELATION (WORM FORMULA)

   The mil (m) is the unit of angular measurement used in solving the few computations used in the adjustment of field artillery fire. A circle is divided into 6400 angles of 1 mil each. At a distance of 1,200 meters, an object 1 meter wide will measure 1 mil (Figure 39). Thus, miles can be changed to mils by multiplying the number of miles by the range (distance) taken in thousands of meters. By a similar method, the unknown width of an object or the unknown range to an object may be obtained (Figure 39 (II)).

40. SENSING

   a. Range Sensing. To sense the burst with respect to a target, the observer mentally notes what he sees at the moment the shell bursters. The observer must make his sensing promptly; if the burst is directly behind the target, the burst is short line. If the burst hits the target, the burst is short line. If the observer is not sure that the burst is over or short of a target, he senses it doublet. A burst not seen by the observer is sensed lost.
Figure 39. Worm Formula

\[ \theta = \frac{W}{R} \]

\( \theta \) = Angular width of the object in mils.
W = Width of the object in meters.
R = Range or distance in thousands of meters.

FORMULA: \[ \theta = \frac{W}{R} \]

b. Deviation settings. The bursts of rounds are aimed for deviation as right or left of the OT line, or line | on the OT line. A round must be centered carefully from the center of the burst on, in the case of a volley or volley, aimed from the center of the group of bursts. All settings for deviation to the right (left) of the OT line are stated six such right (left) and are measured in mils. For example, 40 RIGHT would mean that the observer saw and centered the burst 40 miles to the right of the OT line.

41. BRACKETING

The basic principle in adjusting artillery fires is to bracket the target. Bracketing means to enclose the target between over and short bursts for range. For example, in bracketing a target, a round bursts on the OT line between the observer and the target, and the next round is fired at a 400-meter greater range and bursts on the OT line beyond the target, the target is then bracketed between these two ranges. The observer knows that the target lies somewhere within the 400 meters and has thus established a 400-meter bracket. This bracket is split by dividing it in half to do this the observer sends a correction, DROP 200. Assuming that the escape of the next round fired is short (Figure 40), the observer will know that the target now lies within a 200-meter bracket. His next correction for range is to split this 200-meter bracket. Therefore, he announces a correction of ADD 100. At this point the bracket has been narrowed to 100 meters. If firing then results in a series of hits, the observer has completed the adjustment and has established that the target is within a 100-meter bracket. A bracket of 100 meters is considered appropriate for most targets and fire for effect is started with the splitting of the 100-meter bracket.

42. SUBSEQUENT FIRE REQUEST

Subsequent fire requests incorporate the changes in burst locations desired by the observer after the adjustment has been started. These desired changes in burst location include, as appropriate, wind, barometric pressure, and various corrections. The observer sends the fire direction center personnel the corrections which he wants applied for the next firing.
CHAPTER 7

FIELD ENGINEERING AND DEMOLITIONS

42. INTRODUCTION

The information in this chapter is intended to supplement, not replace, that contained in FM 8-29, "Explosives and Demolitions," and FM 8-34, "Engineer Field Data." These field manuals, GTA 9-14, The Demolition Card, and GTA 9-21, The Mine Card, are convenient references that should be obtained and used in conjunction with this chapter of the handbook.

44. CONSTRUCTION

A. Concrete Mixing, Placing, Curing, and Construction

(1) Cement. Use a standard brand of portland cement net weight 62.50
   bags per sack (0.35 cubic meters loose volume; 0.44 cubic meters absolute
   volume). Store in a dry, tight building.

(2) Sand. Use clean, washed, free of clay, soil, salts, organic matter, or for- 
   eign substances, and graded between No. 4 and No. 100 sieve; maximum passing
   No. 100 sieve, 2 percent.

(3) Gravel. Use clean gravel free of dust, clay balls, or foreign sub-
   stances, and graded between No. 4 sieve, and the maximum size usually 2-1/4,
   2-1/2, 3-1/2, or 4-1/2 cm). Common fault is excess of pea gravel (3/8 to 1-1/4 cm).

(4) Crushed stone. Use crushed stone free of excess dust, sticks, or for- 
   eign material, and graded between No. 4 sieve and maximum size.

(5) Water. Use clean water free of acids, alkalines, oil, and vegetable
   matter. If the water can be used for drinking purposes, it is acceptable for use
   in concrete. Sea or rain water may be used to make concrete; however, a compressive
   strength reduction of 18 to 30 percent will result. This strength reduction can
   be offset by reducing the water-cement ratio. Excess water reduces strength,
   durability, and water-tightness of concrete.

(6) Mixing. Machine mixing is preferable. Machine mixing time should
   be 1 minute for .75 cubic yards or less. Increase the time 15 seconds for each
   increase of .06 cubic yards of concrete. If mixing is done by hand, mix
materials dry, add water slowly, and continue to mix until aggregates are thoroughly coated with cement. As a general rule, hand mixing is not suitable when more than 3.15 cubic meters of concrete are required.

7) Temperature. In cold weather it is often necessary to heat the materials that go into the concrete mix and cover the fresh concrete or provide a heated encasement. In no case should the temperature of the fresh concrete be above 60°F or a strength reduction will result. In general, the air surrounding the concrete should be maintained at 70°F or above for 3 days or 60°F for 5 days.

8) Placing. Place continuously and in uniform, horizontal layers. Do not use concrete if mixing has been completed for more than 60 minutes. Discard all frozen or foreign materials in the concrete. Be sure subgrade is damp, free of mud.

9) Finishing. Remove all rough edges. Do not travel excessively.

10) Curing. After concrete has set, cover with wet burlap, moist sand, earth, paper, or straw, or a light film of asphaltic oil. Keep moist for 5 to 14 days. Long curing increases strength; a practical maximum is reached by curing for 28 days.

b. Field Expedients.

1) Strength. Increase bonding and strength of the mass, and offset the effects of poorly graded materials or rough field calculations by adding an extra 10 to 20 percent of cement to concrete mixtures.

2) Placing. To make placing easier, especially in narrow forms or those having much reinforcing steel, add more water to the mix than is allowed by the water-cement ratio. To prevent loss of strength resulting from this increase of water, add about 15 pounds of cement for each added gallon.

3) Setting. Rapid setting is obtained by heating the mix. (Do not exceed 105°F in the mix.) Concrete placed at 72°F to 90°F will set about twice as fast as that placed at 50°F to 40°F.

c. Cement Content, Slump, and Curing.

d. Batch Quantities and Strengths. The following table give batch quantities and strengths for 38 cubic meters of concrete made from standard, Portland cement. Table is based on aggregate of average grading and having a specific gravity of 2.64. Sand is assumed to weigh 46.05 lbs per 38 cubic meters (damped and loose) and to contain 3 percent free moisture. Gravel and stone are assumed to be surface dry and weigh 46.05 lbs per 38 cubic meters (loose dry measure). Strengths are based on test data for concrete placed and cured at 70°F.

<table>
<thead>
<tr>
<th>Cement content per 38 cubic meters batch (pounds)</th>
<th>Slump (inch-es)</th>
<th>Moist-curing time at temperatures of 70°F or over (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footings, foundations, and floors</td>
<td>3 1/2</td>
<td>3</td>
</tr>
<tr>
<td>Pavements</td>
<td>2 1/2</td>
<td>2</td>
</tr>
<tr>
<td>Structural elements and bridges</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Tanks and reservoirs</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

d. Batch Quantities and Strengths. The following table give batch quantities and strengths for 38 cubic meters of concrete made from standard, Portland cement. Table is based on aggregate of average grading and having a specific gravity of 2.64. Sand is assumed to weigh 46.05 lbs per 38 cubic meters (damped and loose) and to contain 3 percent free moisture. Gravel and stone are assumed to be surface dry and weigh 46.05 lbs per 38 cubic meters (loose dry measure). Strengths are based on test data for concrete placed and cured at 70°F.

Water-cement ratios should be selected on the basis of at least 3 - or 28-day strength 15 percent higher than called for. For example, if a required strength of 1,900 psi is desired, increase this value by 15 percent to find the water-cement ratio. Thus, 1,900 x 1.15 = 2,385. At this value the required water-cement ratio is 7.30 and the slump is 3 inches when using 1-inch gravel.

e. Lumber Measure. Lumber quantities are expressed in feet, board measure (fm or bm). A board foot is the lumber in a rough-sawn board 1 foot long, 1 foot wide, and 1 inch thick. As an example, a 2 x 8 x 12 board has 2 x 8 x 2 or 26 ft.

45. CULVERTS

Culverts are required whenever drainage channels are needed to cross roads, to provide ditch relief, and to continue side ditches at the intersections of roads and access routes. In lateral situations where roads will only be used a few weeks, the cross sectional areas of drainage facilities are estimated by hasty methods. See table 26.
<table>
<thead>
<tr>
<th>Aggregate batch size (cubic yard)</th>
<th>Materials per 1/2-cubic-yard batch*</th>
<th>Estimated strength (lb per sq in)</th>
<th>Actual water-cement ratio (gal per sack)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By volume</td>
<td>By weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sand (cu ft)</td>
<td>Gravel (cu ft)</td>
<td>Water (gal)</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>8.6</td>
<td>9.3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>8.7</td>
<td>9.5</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>8.9</td>
<td>9.7</td>
</tr>
<tr>
<td>2 1/2</td>
<td>4</td>
<td>9.0</td>
<td>9.4</td>
</tr>
<tr>
<td>2 1/2</td>
<td>3</td>
<td>9.1</td>
<td>9.6</td>
</tr>
<tr>
<td>2 1/2</td>
<td>2</td>
<td>9.3</td>
<td>9.8</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>7.4</td>
<td>9.3</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>7.6</td>
<td>9.7</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>7.7</td>
<td>9.9</td>
</tr>
<tr>
<td>3 1/2</td>
<td>4</td>
<td>6.9</td>
<td>9.6</td>
</tr>
<tr>
<td>3 1/2</td>
<td>3</td>
<td>7.0</td>
<td>9.8</td>
</tr>
<tr>
<td>3 1/2</td>
<td>2</td>
<td>7.2</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Strength and 1/2-cubic-yard batch quantities for concrete made from standard, Portland cement and 1-inch gravel.

*Table is based on 5 percent free moisture in sand. If sand is dry, correct tabular values as follows:

- Water: Add 10 percent.
- Sand: Subtract 10 percent from volume and 5 percent from weight.

Table XXI
### 2-INCH GRAVEL

<table>
<thead>
<tr>
<th>Cement per % cubic-yard batch (cu. ft.)</th>
<th>Approx. slump (inches)</th>
<th>Materials per % cubic-yard batch*</th>
<th>Estimated strength (lb per sq in)</th>
<th>Actual water-cement ratio (gal per sack)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>By volume (cu. ft.)</td>
<td>By weight (lb)</td>
<td>Added water (gal)</td>
</tr>
<tr>
<td>Sand</td>
<td>Gravel</td>
<td>Added sand (lb)</td>
<td>Added gravel (lb)</td>
<td>1005</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>7.9</td>
<td>10.2</td>
<td>16.0</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>8.3</td>
<td>10.4</td>
<td>17.4</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>9.2</td>
<td>10.6</td>
<td>18.8</td>
</tr>
<tr>
<td>2½</td>
<td>4</td>
<td>7.4</td>
<td>10.3</td>
<td>14.2</td>
</tr>
<tr>
<td>2½</td>
<td>3</td>
<td>7.3</td>
<td>10.5</td>
<td>13.7</td>
</tr>
<tr>
<td>2½</td>
<td>2</td>
<td>7.7</td>
<td>10.7</td>
<td>11.1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>6.8</td>
<td>10.3</td>
<td>14.5</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>7.2</td>
<td>10.6</td>
<td>13.0</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>7.1</td>
<td>10.8</td>
<td>11.4</td>
</tr>
<tr>
<td>3½</td>
<td>4</td>
<td>6.3</td>
<td>10.4</td>
<td>14.8</td>
</tr>
<tr>
<td>3½</td>
<td>3</td>
<td>6.4</td>
<td>10.6</td>
<td>13.3</td>
</tr>
<tr>
<td>3½</td>
<td>2</td>
<td>6.5</td>
<td>10.9</td>
<td>11.7</td>
</tr>
</tbody>
</table>

Strength and 1/2-cubic-yard batch quantities for concrete made from standard Portland cement and 2-inch gravel.

*Table is based on 5 percent free moisture in sand. If sand is dry, correct tabular values as follows:

- Water: Add 30 percent.
- Sand: Subtract 10 percent from volume and 5 percent from weight.

Table XXII
### 1-Inch Stone

<table>
<thead>
<tr>
<th>Cement per 1 cu.-yd batch (160 lb sacks)</th>
<th>Approx slump</th>
<th>Materials per 1-cu.-yd batch</th>
<th>Estimated strength (lb per sq in)</th>
<th>Actual cement-water ratio (gal per sack)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>By volume</strong></td>
<td><strong>By weight</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td>Stone</td>
<td>Added water</td>
<td>Sand</td>
<td>Stone</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>9.6</td>
<td>8.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>16.1</td>
<td>655</td>
<td>4</td>
<td>107</td>
</tr>
<tr>
<td></td>
<td>16.3</td>
<td>900</td>
<td>820</td>
<td>121</td>
</tr>
<tr>
<td>2 1/2</td>
<td>3</td>
<td>9.3</td>
<td>8.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>16.3</td>
<td>820</td>
<td>820</td>
<td>123</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.5</td>
<td>8.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>840</td>
<td>850</td>
<td>97</td>
</tr>
<tr>
<td>3 1/2</td>
<td>3</td>
<td>9.7</td>
<td>8.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>850</td>
<td>850</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.1</td>
<td>8.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>860</td>
<td>850</td>
<td>97</td>
</tr>
</tbody>
</table>

*Strength and 1/2-cu.-yd-batch quantities for concrete made from standard, Portland cement and 1-inch stone.*

*Table is based on 3 percent free moisture in sand. If sand is dry, correct tabular values as follows:

Water: Add 35 percent.

Sand: Subtract 15 percent from volume and 5 percent from weight.

---

### 2-Inch Stone

<table>
<thead>
<tr>
<th>Cement per 1 cu.-yd batch (160 lb sacks)</th>
<th>Approx slump</th>
<th>Materials per 1-cu.-yd batch</th>
<th>Estimated strength (lb per sq in)</th>
<th>Actual cement-water ratio (gal per sack)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>By volume</strong></td>
<td><strong>By weight</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td>Stone</td>
<td>Added water</td>
<td>Sand</td>
<td>Stone</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>9.5</td>
<td>9.2</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>16.7</td>
<td>830</td>
<td>800</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>900</td>
<td>905</td>
<td>98</td>
</tr>
<tr>
<td>2 1/2</td>
<td>3</td>
<td>9.5</td>
<td>9.2</td>
<td>12.7</td>
</tr>
<tr>
<td></td>
<td>16.7</td>
<td>845</td>
<td>845</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>900</td>
<td>900</td>
<td>98</td>
</tr>
<tr>
<td>3 1/2</td>
<td>2</td>
<td>9.7</td>
<td>9.2</td>
<td>15.1</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>860</td>
<td>850</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.1</td>
<td>9.2</td>
<td>16.4</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>880</td>
<td>850</td>
<td>97</td>
</tr>
</tbody>
</table>

*Strength and 1/2-cu.-yd-batch quantities for concrete made from standard, Portland cement and 2-inch stone.*

*Table is based on 3 percent free moisture in sand. If sand is dry, correct tabular values as follows:

Water: Add 35 percent.

Sand: Subtract 15 percent from volume and 5 percent from weight.

---

Table XXII

Table XXIV
### Bridge Components of Timber Trestle Bridge

<table>
<thead>
<tr>
<th>No.</th>
<th>Bridge Component</th>
<th>Comment, Size or Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tread</td>
<td>See figure 42 - Timber Trestle Bridge</td>
</tr>
<tr>
<td>2</td>
<td>Open-laminated deck</td>
<td>See figure 43 - Timber Trestle Bridge</td>
</tr>
<tr>
<td>3</td>
<td>Curb</td>
<td>11.34 x 11.34 cm., Figures 42 and 43</td>
</tr>
<tr>
<td>4</td>
<td>Curb center block</td>
<td>See figures 43 and 44</td>
</tr>
<tr>
<td>5</td>
<td>Handrail</td>
<td>See figures 42 and 43</td>
</tr>
<tr>
<td>6</td>
<td>Handrail post</td>
<td>See figures 42 and 43</td>
</tr>
<tr>
<td>7</td>
<td>Handrail brace</td>
<td>3.05 x 16.16 cm., Figures 42 and 43</td>
</tr>
<tr>
<td>8</td>
<td>End cap</td>
<td>See tread material</td>
</tr>
<tr>
<td>9</td>
<td>Timber stringers</td>
<td>See figure 43</td>
</tr>
<tr>
<td>10</td>
<td>Small stringers</td>
<td>See figure 43</td>
</tr>
<tr>
<td>11</td>
<td>Cap</td>
<td>See figure 44</td>
</tr>
<tr>
<td>12</td>
<td>Post</td>
<td>See figure 44</td>
</tr>
<tr>
<td>13</td>
<td>Transverse bracing</td>
<td>5.08 x $\frac{3}{16}$ or $\frac{7}{32}$ cm., Figure 44</td>
</tr>
<tr>
<td>14</td>
<td>Longitudinal bracing</td>
<td>10.16 x 11.34 cm. or $\frac{3}{4}$ x 10.33 cm., Figure 43</td>
</tr>
<tr>
<td>15</td>
<td>Scales</td>
<td>See tread material</td>
</tr>
<tr>
<td>16</td>
<td>Hill</td>
<td>See figure 44</td>
</tr>
<tr>
<td>17</td>
<td>Footings</td>
<td>See figure 44</td>
</tr>
<tr>
<td>18</td>
<td>Abutment sill</td>
<td>See figure 41</td>
</tr>
<tr>
<td>19</td>
<td>Abutment footings</td>
<td>See figure 41</td>
</tr>
</tbody>
</table>

*See figures 41 and 44

Table XXV

---

![Figure 41. Timber trestle pier.](image1)

![Figure 42. Timber trestle bridge.](image2)
Figure 43. Curb and headrail system (minimum specifications).

Figure 44. Typical timber trussic bent.

Figure 45. Pile bent.

Figure 46. Concrete slab bridge.
a. Culvert Placement.

1. A way to prevent erosion is shown in Figure 47. Suggestions on their alignment are shown in Figure 48.

2. Culverts are normally of the grade of the natural and artificial drainage channels which discharge into them. Gradients of 2 to 4 percent are desirable. Velocities should not be over 3.44 meters per second nor less than 0.76 meters per second.

3. Culverts should be placed where natural drainage channels require cross-drainage. Figure 46 shows the spacing of ditch-relief culverts. The bedding and spacing of multiple-pipe culverts is equal to at least half the diameter of the pipe (Figure 50).

b. Box Culverts. There are several types of box culvert: log box and timber box. Examples of each are shown in Figures 51 through 53.

c. Notable Corrugated Pipe Culverts. These culverts are of two types:

1. Notched, having an notched edge and plain edge.

2. Flanged, having flanges with slotted holes.

The two are not interchangeable. Figure 54 shows the strutting diagram for assembling the corrugated pipe.

d. Expansive Culverts.

1. One type of this kind is made for gasoline, oil and asphalt drums. Remove their ends with a rotameter and store, sharp hand tools, or with the pressmatic metal drum opener. CAUTION: Do not use a torch or other tools as gasoline or oil drums unless they are completely empty. Join these drums end to end by tank welding, bolting, or wiring (Figure 55).

2. Another type of expansive culvert is also illustrated in the lower part of Figure 55. It uses sandbags and placed metal panels, the latter being placed both above and below the sandbags as shown in Figure 56.

e. Cover. A minimum cover requirement of one-half the diameter can be used for reinforced concrete pipe and corrugated metal pipe culverts. Culverts other than pipe should have a minimum of 20.48 cm., preferably 40.64 cm., of cover. Where heavy equipment is used in construction, adequate cover must be provided to protect culvert structures from damage.
Figure 47. Culvert extended beyond SLH to prevent erosion.

Figure 48. Alignment of culverts.

Figure 49. Spacing of ditch-relief culverts.
Figure 50. Spacing of multiple-pipe culvert.

Figure 51. Log culvert, 20-inch.

Figure 52. Timber box culvert, 18 x 12-inch.

Figure 53. Timber box culvert, 19 1/2 x 12-inch.
Figure 54. Sectional diagram showing end and longitudinal views.
46. FIELD FORTIFICATIONS

a. Layout and Methods.

(1) Many of the jobs involved in preparing a defensive position are carried on concurrently, but some will be executed in priority. The commander, therefore, specifies the sequence for the preparation of the position and any special precautions to be taken regarding camouflage. The following is a recommended sequence:

(a) Establishing security.

(b) Positioning weapons.

(c) Clearing fields of fire, masking observation, and determining ranges to probable target locations.

(d) Providing for signal communications and observation systems.

(e) Preparing weapons emplacements and individual positions to include overhead cover and camouflage.

(f) Laying minefields and preparing important demolitions.

(g) Preparing obstacles (other than minefields) and less vital demolitions.

(h) Preparing routes for movement, supply, and evacuation.

(i) Preparing alternate and supplementary positions.

(j) Preparing CBR protective shelters as required.

(k) Preparing defensive installations in accordance with defensive plans of higher headquarters.

b. Clearing Fields of Fire. In all cases, when preparing defensive positions for expected contact with the enemy, suitable fields are cleared to the front of each position. The following principles are observed:

(1) Principles. Do not disclose friendly positions by careless or excessive clearing.

(b) When organizing for close defense, start clearing near the FERA and work forward at least 100 meters.

(c) Leave a thin, natural screen to hide defensive positions.

(d) In sparsely wooded areas, remove lower branches of large scattered trees, or remove entire trees which might be used as reference points.

(e) Do not completely clear fields of fire in heavily wooded areas. Thin down the undergrowth, remove lower branches of trees, and clear narrow lanes of fire for automatic weapons.

(f) Remove or thin out thin brush.

(g) Remove hay or grain crops by moving.

(h) Drag away cut brush.

(2) Manhours required. The manhours required to clear 100 square meters are tabulated in Table 27.

<table>
<thead>
<tr>
<th>Description of clearing</th>
<th>Tools used</th>
<th>Manhours required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual clearing:</td>
<td>Axes, hoes</td>
<td>3</td>
</tr>
<tr>
<td>Clearing undergrowth</td>
<td>Axes, hoes, axe</td>
<td>2</td>
</tr>
<tr>
<td>and trees less than</td>
<td>brushes, saws</td>
<td></td>
</tr>
<tr>
<td>30.48 sq. in diameter</td>
<td>hooks, hatchets</td>
<td></td>
</tr>
<tr>
<td>Light clearing:</td>
<td>Axes, hoes, axe</td>
<td>2.5</td>
</tr>
<tr>
<td>Clearing small brush</td>
<td>brushes, hatchets</td>
<td></td>
</tr>
</tbody>
</table>

* Figures are for daylight; for work at night, increase labor by 30 percent.

Table XXVII

142
c. Excavation.

(2) Time and labor for constructing entrenchments. Information is presented in the following table:

<table>
<thead>
<tr>
<th>Type of emplacement</th>
<th>Excavation meters</th>
<th>No. of men working</th>
<th>Approx. time, h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crewd trench (per linear meter)</td>
<td>0.5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Standard trench (per linear meter)</td>
<td>1.5</td>
<td>3</td>
<td>2/3</td>
</tr>
<tr>
<td>Proma emplacement</td>
<td>0.7</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1-man foxhole</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2-man foxhole</td>
<td>1.8</td>
<td>2</td>
<td>1½</td>
</tr>
</tbody>
</table>

Table XXVIII

(3) Excavation and camouflage data for emplacements.

<table>
<thead>
<tr>
<th>Type of emplacement</th>
<th>Area to be covered, meters</th>
<th>Excavation, meters</th>
<th>Hours required to construct in round shot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rifle, .30-cal.</td>
<td>3 x 3</td>
<td>3 x 3</td>
<td>2</td>
</tr>
<tr>
<td>Rifle, 7.62-mm, M1</td>
<td>3 x 3</td>
<td>3 x 3</td>
<td>2</td>
</tr>
<tr>
<td>Launcher, rocket, 3.5-in.</td>
<td>2 3 x 3.5</td>
<td>3 x 3</td>
<td>2</td>
</tr>
<tr>
<td>Howitzer, 155-mm</td>
<td>4.5 x 4.5</td>
<td>4.5 x 4.5</td>
<td>4</td>
</tr>
<tr>
<td>Mortar, 105-mm</td>
<td>4.8 x 4.8</td>
<td>4.8 x 4.8</td>
<td>6</td>
</tr>
<tr>
<td>Rifle, 106-mm, Jeep-mounted</td>
<td>9.7 x 8.1</td>
<td>11</td>
<td>30</td>
</tr>
</tbody>
</table>

* Figures are for daylight; for work at night, increase by 50 percent. Time pertains to average, untrained team.

Table XXIX
Figure 57. Open one-man shelter.

Figure 58. Open two-man shelter.

Figure 59. Two-man shelter with half-cover and adjoining shelter.
Figure 60. Plain view and cross-section of pit type emplacement for caliber .30 machine gun.

Figure 61. Completed horseshoe type emplacement.
Figure 65. Method of anchoring pickets

Figure 66. Making a brushwood hurdle

Figure 67. Continuous brushwood revetment
a. Wire Obstacles.

(1) Estimating barbed wire requirements, when the length of front is taken as the straight-line distance between limiting points, the rules are:

(2) Tactical wire. Length of tactical wire entanglement is 1 1/4 times the length of front, regardless of the size of the unit involved.

(3) Protective wire. Length of protective wire entanglement is 3 times the length of the front being defended. Because protective wire encircles each platoon area, the protective wire for each platoon is 2 1/3 times the average platoon frontage, times the number of platoons.

(4) Supplementary wire. Supplementary wire in front of the FERA to the nearest reserve unit.

(5) Material and labor required.

(6) See table.

(7) For a sample estimate of material and labor required to organize a given defensive position, see FM 5-15.

Basic Demolition Formulas

Steel, Structural:

\[ P = \frac{A}{2} (\text{in}) \]

K = \frac{A (\text{cm})}{8}

Steel, Rods, Bars, Cables (inch or less hard carbon steel):

\[ P = \frac{D^2}{12} (\text{in}) \]

K = \frac{D^2 (\text{cm})}{14}

Wood, External:

\[ P = \frac{D^2}{24} (\text{in}) \]

K = \frac{D^2 (\text{in})}{48}

Wood, Internal:

\[ P = \frac{D^2}{250} (\text{in}) \]

K = \frac{D^2 (\text{in})}{250}

Pressure:

\[ P = \frac{342}{(\text{ft})} \]

Metric Pressure Formula

Note: When metric weights and measures are used, substitute breaching formula for the pressure formula.

\[ P = \frac{K^2}{12} (\text{ft}) \]

\[ K = \frac{10}{10} \text{Kg/cm}^2 \text{ (add 10 percent if less than 50 pounds)} \]

C - Tamping Factor for Breaching (see Demo Card)

K - Material Factor for Breaching

\[ \text{Material} \quad \text{P in Feet} \quad \text{P in Meters} \quad \text{K Factor} \]

Ordinary Earth All Values All Values .05

Brick Masonry All Values All Values .20

Stone, Good Timber and Earth Construction

Concrete, Rock Less than 3 Less than 1 .35

3 to 5 1 to 1.5 .28

5 to 7 1.5 to 2 .33

More than 7 More than 2 .38

Reinforced Concrete (However Less than 3 Less than 1 .70

Less than 3 1 to 1.5 .55

will not cut 1.5 to 2 .50

Backfilling (Steel)

Crating

Deliberate:

Alternate 3 feet (1.5 m) and 7 feet (2 m) holes spaced at 9 feet (1.8 m) intervals. End holes always 3 feet deep, no adjoining 3 feet holes.
Use 40 pounds (18 kg) in shallower holes and 60 pounds (26 kg) in deeper holes. (Standard 40 pound crating charges are best.)

Hardy:

Holes of equal depth - 2.5 to 5 feet (0.75 to 1.5 m) spaced at 5 feet (1.5 m) intervals.

Use 10 pounds (5 kg) of explosives per foot (.3 m) of depth.

BRIDGE ABUTMENT DESTRUCTION

Abutments 5 feet (1.5 m) or less in thickness (5-4-4-54 method.)

Place 1.5 meter holes 1.5 meters apart and 1.5 meters from river face of abutment.

Use 18 kg explosives in each hole, all charges detonated simultaneously.

Abutments more than 1.5 meters in thickness:

Use breaching formula.

Place against rear face (road side) at a depth equal to thickness of abutment.

Space same as breaching charges.

When abutment is over 6 meters in height, add a row of breaching charges on river face at base of abutment, all charges primed to detonate simultaneously.

47. ADVANCED TECHNIQUES

Charges employing advanced techniques generally produce more positive results while using less explosive than conventional or standard formulas. Disadvantages of advanced technique charges are that they usually require more time to construct and once constructed they are usually more fragile than conventional charges. Following are rules of thumb for various charges and the targets they are designed to destroy.

a. Steel Cutting Charges

(1) Saddle charge. This charge can be used to cut mild steel, cylindrical targets up to 20.32 cm in diameter. Dimensions are as follows: The length of the charge is equal to the circumference of the target. Thickness of the charge is 1/2 block of C3 or C4 for targets up to 12.38 cm in diameter. Use one-half block thickness for targets from 16.24 to 20.32 cm in diameter. Above 20.32 cm in diameter, use alloy steel shells, use the diamond charge. Prime the charge from the apex of the triangle, and the target is cut at a point directly under the short base by cross-fracture. Neither the saddle nor diamond will produce reliable results against non-solid targets, such as gun barrels. These charges may be packaged or wrapped, provided that no more than one thickness of the wrapping material is between the charge and the target to be cut. Heavy wrapping paper or aluminum foil are excellent, and parachute cloth may be used if nothing else is available (see figure 79).

(2) Diamond charge. This charge can be used to cut hard or alloy steel, cylindrical targets of any size that would concretely be encountered. It has reliably been used, for instance, against a destroyer propeller shaft of 45.72 cm diameter. Dimensions are as follows: the long axis of the diamond charge should equal the circumference of the target, and the points should be on the far side. The short axis is equal to one-half of the circumference. Thickness of the charge is 1/2 thickness of a block of C3 or C4. To prime the charge, both points of the short axis must be primed for simultaneous detonation. This can be accomplished electrically or by using equal lengths of detonating cord, with a nondestructive blasting cap crimped on the end that is inserted into the charge. As detonation is initiated in each point of the diamond and moves toward the center, the detonating waves meet at the small center of the charge, are deflected downward, and cut the shaft cleanly at that point. The diamond charge is more time-consuming to construct, and requires both more cast and more materials to prime. Transferring the charge dimensions to a template of cardboard or even cloth permits relatively easy charge construction (working directly on the target is extremely difficult. The completed, wrapped charge is then transferred to the target and taped or tied in place, ensuring that maximum contact is achieved. The template technique should be used for both the saddle and diamond charges. (See figure 77).

(3) Ribbon charge. To cut flat or conical steel targets the ribbon charge produces excellent results at a considerable saving in explosives. Dimensions are as follows: the thickness of the charge is equal to the thickness of the target to be cut. (NOTE: Never construct a charge less than 7.62 cm thick.) Width of the ribbon is equal to twice the thickness of the target. Length of the charge is equal to the length of the desired cut. Prime from an end, and for relatively thin charges, build up the end to be primed. Build up corners if the charge is designed to cut a target such as an L-beam. Tuning is unnecessary with the ribbon charge. A frame can be constructed out of stiff cardboard or plywood to give rigidity to the charge and to facilitate handling, carrying, and replacing it. The ribbon charge is effective only against targets up to 9.08 cm thick, which effectively accounts for the great majority of flat steel targets likely to be encountered. (See figure 79)
### Wire Enragement Materials

<table>
<thead>
<tr>
<th></th>
<th>Approx. weight, kg</th>
<th>Approx. length, m</th>
<th>Approx. weight of matal, kg</th>
<th>No. carried by 1 unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reel</td>
<td>57.5</td>
<td>366</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>Bobbin</td>
<td>3.3 - 6.0</td>
<td>27.5</td>
<td>16.5 - 20.5</td>
<td>6 - 6</td>
</tr>
<tr>
<td>Standard bored wire</td>
<td>23</td>
<td>15.2</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Expedient bored wire</td>
<td>12.3</td>
<td>6.2</td>
<td>12.5</td>
<td>1</td>
</tr>
<tr>
<td>screw pickets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>long</td>
<td>6</td>
<td>1.6</td>
<td>16.3</td>
<td>4</td>
</tr>
<tr>
<td>medium</td>
<td>2.7</td>
<td>0.61</td>
<td>16.3</td>
<td>6</td>
</tr>
<tr>
<td>short</td>
<td>1.8</td>
<td>0.51</td>
<td>14.5</td>
<td>8</td>
</tr>
<tr>
<td>U-shaped pickets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra long</td>
<td>7.7</td>
<td>2.4</td>
<td>31.8 - 32.0</td>
<td>3 - 4</td>
</tr>
<tr>
<td>Long</td>
<td>9.5</td>
<td>1.5</td>
<td>18.1</td>
<td>4</td>
</tr>
<tr>
<td>Medium</td>
<td>2.7</td>
<td>0.61</td>
<td>18.3</td>
<td>6</td>
</tr>
<tr>
<td>Short</td>
<td>1.8</td>
<td>0.61</td>
<td>14.5</td>
<td>8</td>
</tr>
<tr>
<td>Wooden pickets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra long</td>
<td>7.5 - 10.5</td>
<td>2.13</td>
<td>35.4 - 35.8</td>
<td>2</td>
</tr>
<tr>
<td>Long</td>
<td>5.4 - 7.5</td>
<td>1.5</td>
<td>16.3 - 21.3</td>
<td>3</td>
</tr>
<tr>
<td>Short</td>
<td>1.4 - 2.7</td>
<td>0.35</td>
<td>11.0 - 15.1</td>
<td>6</td>
</tr>
</tbody>
</table>

Table XXX

108
Material and Labor Requirements for 300-meter Sections of Various Barbed-Wire Entanglements

<table>
<thead>
<tr>
<th>Type of entanglement</th>
<th>Pickets</th>
<th>Barbed wire, No. of yds. of 1.5-kg wire</th>
<th>No. of staples of entangle ment</th>
<th>Kg of material per linm of entanglement</th>
<th>Hours to erect 300 m of entanglement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extra</td>
<td>Long</td>
<td>Short</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>200</td>
<td>200</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Short</td>
<td>100</td>
<td>100</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Double expansion, semi-standard</td>
<td>150</td>
<td>5</td>
<td>3</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>Double expansion, standard</td>
<td>150</td>
<td>5</td>
<td>3</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Triple expansion, semi-standard</td>
<td>150</td>
<td>5</td>
<td>3</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Triple expansion, standard</td>
<td>150</td>
<td>5</td>
<td>3</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>

1. Lower number of staples applies when screw pickets are used; high number when U-shaped pickets are used. Add difference between the two to the higher number when wood pickets are used.

2. Average weight when any issue metal pickets are used.

3. With the exception of the triple-standard consignment, hours are based on the use of screw pickets. When driven pickets are used, add 20 percent to hours. With experienced troops, reduce hours by one-third. Increase hours by 50 percent for night work.

4. Based on consignment being made up in rear areas and ready for issue. One expedient consignment consists of 10 meters of barbed wire, 50 staples of entanglement, 20 kg of material, and 25 hours of labor.

Table XXXII
Figure 69. Methods of blasting boulders.

Rules of Thumb. Use dynamite as follows:
1. For dead stumps = 1 pound per feet of diameter.
2. For live stumps = 2 pounds per feet of diameter.
3. For standing timber = add 30 percent by standing timber.

Figure 69. Stump-blasting methods for various root architectures.
Figure 78. Saddle charge.
Figure 71. Diamond charge.

Figure 72. Ribbon charge.

1. Standoff-3 to 5 times diameter of cone
2. Cone Angle-30° to 60°
3. Explosive Depth-2 times height of cone
4. Detonated Base Dead Center

Figure 73. Wedge charge.
(4) Shaped charges. If available, manufactured shaped charges will always give results far superior to those produced by any improvised shaped charges. The angle of the cavity of an improvised shaped charge should be between 30 and 60 degrees. Stand-off should be from 1 to 2 times the diameter of the cone. Height of the explosive, measured from the base of the cone should be twice the height of the cone. Exact center priming is important, as in tightly packed C4. Trial and error experimentation in determining optimum stand-off is necessary. A point worth mentioning in preparing hollow-bottomed bottles for shaped charge use is to hold the bottle upright when burning the string soaked with gasoline. As the flame goes out, submerge the bottle, neck first, in water, and if properly done, the bottle will break cleanly where the string was burned. Hemispherical cavities will produce more surface damage on the target, but less penetration. A true cone with an angle of approximately 45 degrees will produce more penetration, which ultimately is the desired result (see figure 73).

b. Bangalore torpedoes, if available, can be extremely effective in an anti-personnel role. Best results are obtained if the bangalore is planted upright in the ground, so that the fragmentation effect will radiate 360 degrees.

c. The fragmentation hand grenade is a versatile weapon that lends itself to a wide variety of body-trapping actions. One of the simplest body traps is the grenade-in-a-can. The shipping container or can is affixed to a tree or other permanent object. The grenade, with pull ring removed, is placed in the can so that the arming lever is held down by the can. A string or wire is then placed so that the victim will pull the grenade from the can, releasing the lever and detonating the grenade.

d. Improvised Electrical Body Trap Firing Devices. Each of the following simple body traps can be used in conjunction with a wide variety of casualty producing charges, from the 3.5-inch rocket fired by expeditious electrical means, to the bangalore torpedoes primed to be detonated in an anti-personnel role.

e. Open Loop. The open loop arrangement shown in figure 74, is the only break in an otherwise complete electrical circuit. A wide variety of actions on the part of the victim could result in pulling the two bare ends of the wire together.
TARGET RECONNAISSANCE REPORT GUIDE

TARGET: ________________________
LOCATION: ________________________
TIME OBSERVED: ________________________
GENERAL DESCRIPTION: ________________________
PROPOSED ACTION: ________________________
ROUTE: TO AND FROM TARGET AREA, APPROACH, AND WITHDRAWAL ROUTES, RALLYING POINTS, MISSION SUPPORT SITES, CACHE SITES, AND FINAL ASSEMBLY AREAS MAY BE SELECTED.
REQUIREMENTS: (DETERMINE AVAILABILITY BEFORE RECON)
EXPLOSIVES: ________________________
EQUIPMENT: ________________________
PERSONNEL: ________________________
TIME: ________________________
REMARKS: ________________________
UNUSUAL FEATURES OF SITE: ________________________
GUARD SYSTEM: ________________________
LABOR AND TIME ESTIMATE REQUIRED FOR BYPASS OR REPAIR: ________________________
SKETCHES: (ON REVERSE SIDE)
SITUATION MAP SKETCH (OVERHEAD VIEW): MAGNETIC NORTH, PRINCIPAL TERRAIN CONCEALMENT, AVENUES OF APPROACH TO TARGET, DIRECTION OF ENEMY, ETC.
LINE DRAWING OF TARGET (SIDE OR ANGLE VIEW): CRITICAL OVER-ALL DIMENSIONS AND PLACEMENT OF CHARGES,
CROSS SECTIONS OF MEMBERS TO BE CUT (CUT-AWAY VIEW): EXACT DIMENSIONS.
46. TROOP LEADING PROCEDURE.

a. Begin Planning.

(1) Study terrain from map, sketch, or aerial photo for:
   (a) Critical terrain features.
   (b) Observation and fields of fire.
   (c) Cover and concealment.
   (d) Obstacles.
   (e) Avenue of approach.
   (f) Make quick estimate of situation (as thorough as time permits).
   (g) Make preliminary plan.

b. Arrange For:

   (1) Movement of Unit. (Where, when, how?)
   (2) Reconnaissance (select routes, schedules, persons to take along, and use
      of subordination).
   (3) Issuance of order to subordinate leaders of time and place. (See
      appendix 3.)
   (4) Coordination (adjacent and supporting units).

   c. Make reconnaissance. (Examine the ground—see 3a, above) if necessary,
      change preliminary plan.

   d. Complete plan (receive recommendations, complete estimate, change
      preliminary plan as necessary, and prepare order). (See appendix 3.)

   e. Issue order (include orientation on terrain if possible). (See appendix 3.)

   f. Supervise.

48. PATROL, WARNING ORDER

The patrol warning order should consist of the following items of information:

   a. A brief statement of the enemy and friendly situation.
b. Mission of the patrol.

c. General Instructions:
   (1) General and special organization.
   (2) Uniform and equipment common to all, to include identification and camouflaging measures.
   (3) Weapons, ammunition, and equipment each member will carry.
   (4) Who will accompany patrol leader on reconnaissance and who will supervise patrol members' preparation during patrol leader's absence.
   (5) Instructions for obtaining rations, water, weapons, ammunition, and equipment.

(6) The chain of command.

(7) A time schedule for the patrol's guidance. As a minimum, include meal times and the time, place, and uniform for receiving the patrol leader's order.

50. PATROL LEADER'S ORDER
a. Situation:
   (1) Enemy forces: Weather, terrain, identification, location, activity, and strength.
   (2) Friendly forces: Mission of next higher unit, location and planned actions of units on right and left, fire support available for patrol, and mission and routes of other patrols.

(3) Attachments and detachments.

b. Mission: What the patrol is going to accomplish.

c. Execution (subparagraphs for each subordinate unit):
   (1) Concept of operation.
   (2) Formation and order of movement.
   (3) Route and alternate route of return.
   (4) Departure from, and reconnoiter of, friendly areas(s).
   (5) Rallying points and actions as rallying points.
   (6) Actions on enemy contact.

(7) Actions at danger areas.
(8) Actions at objectives.
(9) Sentries and inspections.
(10) Embarkation.

d. Administration and Logistics:
   (1) Rations.
   (2) Arsenals.
(3) Uniform and equipment (state which members will carry and use).
(4) Method of handling wounded and prisoners.

(5) Command and Signal:
   (1) Signals to be used within the patrol.
   (6) Communication with higher headquarters—radio call sign, primary and alternate frequencies, times to report, and special code to be used.

(7) Command:
   (1) Chain of command.
   (2) Location of patrol leader and assistant patrol leader information.

51. TARGET ANALYSIS AND SELECTION
a. Select targets for attack by elements of the area command based on the following factors of target selection:
   (1) Criticality: Critical to accomplishment of mission.
   (2) Vulnerability: Susceptibility to attack by means available to the area command, i.e., direct, demolitions.
   (3) Accessibility: Measured by the ability of the area command to infiltrate or gain access to the target area.
   (4) Recuperability: Ability and time involved by the enemy to restore a damaged facility to its normal operating capacity or to recover from an attack.
b. In considering criticality of a target, consider all of the ramifications of the entire target complex whether it be transportation, communications, industry, power, fuel, or military installations, and personnel.

c. Use all elements of the area command to produce diagrams, photographs, and other intelligence on a particular target complex.

d. Major Factors Pertinent to Destructive Mission:
   (1) Detailed target intelligence.
   (2) Extensive ground reconnaissance.
   (3) Sound plan with alternates.
   (4) Detailed rehearsals.
   (5) Achieve maximum destruction with minimum effort, time, material, and personnel.

e. A common target is a critical item of equipment or material found in the majority of industries which, if destroyed, will slow down or stop production.

(1) A common target:
   (a) Serve a critical need.
   (b) Is difficult to replace.
   (c) Is difficult to repair.
   (d) Is easy to destroy.
   (e) Is easy to recognize.

(2) Categories of common targets:
   (a) Power.
   (b) Materials handling.
   (c) Transportation.
   (d) Storage.

52. RAIDS AND AMBUSHES

a. Purposes of a Raid:
(1) Destroy or damage vital installations, equipment, and supplies.
(2) Capture supplies, equipment, and key enemy personnel.
(3) Lure enemy troops from other operations.
(4) Release friendly prisoners of war.

b. Purpose of an Ambush:
(1) Destroy or capture enemy personnel and supplies.
(2) Harass and demoralize the enemy.
(3) Delay or block movement of personnel and supplies.
(4) Channel enemy movement by making certain routes useless for traffic.

Composed of Raid and Ambush Forces:
(1) Command element: Commander, communications, observers, medical personnel, and other liaison personnel such as underground members.
(2) Assault element:
   (a) Assault team accomplishes primary mission.
   (b) Support team provides fire support within the objective area.
   (c) Special task teams eliminate obstacles, breach obstacles, destroy targets, conduct searches, lay mines, or other similar tasks. (These may be separate teams or additional duties assigned to individuals of the assault or support teams.)
   (d) Security element provides all-around security for the assault element to prevent enemy from violating or entering the area, provides early warning of enemy approach, covers the withdrawal of the assault element, and acts as rear guard for the raid force. (This element may be divided into separate security teams.)

Characteristics of Ambush Sites:
(1) Target must be concealed.
(2) Good fields of fire to target.
(3) Good cover and concealment for ambush force.
(4) Natural obstacles to prevent enemy from reorganizing or fleeing from site.
(5) Concealed approach and withdrawal route from site for ambush force.

Conduct of Raid and Ambush:
(1) Always put 24-hour surveillance on targets or objective areas before attack.
(2) Always rehearse the elements of a raid and ambush force.
(3) Always strike quickly to gain surprise.
(4) Always withdraw by a different route than the one used to objective areas.

Tips:
(1) Make a detailed map study; know the terrain and route by memory, including features which will aid in navigation. Confirm those terrain features as you pass over or near them.
(2) Consider the use of difficult terrain in planning your route; you are less likely to encounter the enemy.
(3) In mountainous terrains, plan to use ridge lines for movement whenever possible, but stay off the skyline.
(4) Plan an offset in your route when applicable. An offset is planned magnetic deviation to the right or left of the straight line ambush to an objective. Use it to verify your location right or left of the objective. Each degree you offset will move you about 17 meters to the right or left for each 1,000 meters traveled.
(5) When your patrol is to infiltrate enemy lines, select a reconnaissance point behind enemy lines. Select an alternate reconnaissance point for use if the first point is occupied by the enemy.
(6) Light automatic weapons are good on combat patrols where terrain or conditions of visibility will not permit effective employment of machineguns. Reconnaissance patrols should carry at least one automatic weapon.
(7) Clean, check, and load all weapons before departure.
(8) Consider terrain vegetation; gloves may be necessary to protect hands from briars and scrub.
(9) Consider carrying two pairs of binoculars, wire cutters, flint and steel, and other small items.
(10) Carry at least two flashlights for night operations and extra batteries for them and radio.
Every man should carry his canteen and potato. Punches can be used to make litters, construct raft, conceal lights, and as shelters.

22. Have every man carry an extra pair of socks. Carry a sharp knife on the harness or concealed in a boot.

23. Carry individual weapons cleaning equipment on all patrols.

24. Consider the use of scout dogs if they are available.

25. A length of rope, secured to the harness, can be used for binding prisoners, climbing or descending obstacles, and crossing streams.

26. Two pieces of luminescent tape, each about the size of a lieutenant's bar, worn on the back of the collar, aid in control and movement on dark nights. Turn the collar down when close to the enemy. The tape can also be worn on the back of the cap, but cover or remove it when close to the enemy.

27. Use friction tape to secure rifle barrels, slings, and other items which might rust.

28. Be sure to camouflage the back of your neck, behind your ears, and the back of your hands.

29. A clear plastic sheet placed over luminescent tape can be used to make rough strip maps at night. The map will glow in the dark, making the use of light unnecessary. Use a grease pencil so information can be easily erased.

30. Designate at least two pacers and use the average of their individual counts.

31. Preset compasses before departing.

32. Prepare a list of coordination questions to be asked at the position from which you depart.

33. When appropriate, arrange to have a light aircraft reconnoiter ahead of your patrol to keep you informed of any activity or ambushes along your route.

34. Take your assistant patrol leader or element leaders with you on reconnaissances.

35. Prearrange and rehearse all signals to be used. Keep signals simple.

36. If you have a night patrol, plan time for your patrol members to adapt their eyes to darkness.

37. Do not carry maps marked with information that might aid the enemy.

38. Conduct rehearsals on terrain similar to that over which you will operate. Conduct day and night rehearsals for a night patrol.

39. Inspect your patrol carefully before rehearsals and before departure. Question men to check their knowledge and understanding of the actions planned.

b. Execution.

1. Have your assistant patrol leader check and count the patrol through friendly positions.

2. On small patrols, the count should be made automatically after each halt or passage of a danger area. In large patrols, use the chain of command to account for men.

3. Use the point man as a point and not as a compass man; he is primarily concerned with security. Have the second or third man responsible for navigation. Check navigation frequently.

4. Use a code word or a password other than the assigned challenge and password forward of friendly positions.

5. At halts and during movement, odd-numbered men to observe to the left, even-numbered men to the right.

6. When moving at night take advantage of any noises such as wind, vehicles, planes, wildlife, noise sounds, and even sounds caused by insects.

7. Stay off roads and trails for movement unless their use is deemed absolutely necessary.

8. When close to the enemy's main battle position, avoid lateral movement across the front.

9. When men have difficulty staying awake on security and at halts, minimize the number and length of halts and have the men assume a kneeling rather than prone position.

10. Over short distances, such as the width of a road, the compass can be used for signaling at night. A piece of luminescent tape can also be used for this purpose.

11. There are several accepted methods of crossing roads. Whatever the method used, the basic principles of reconnoissance and security apply. Some of the accepted methods are:
(a) Patrol can form a skirmish line and advance quickly across the road.

(b) The entire patrol can form a file, following the footsteps of the man in front in order to minimize detection of footprints.

(c) Men cross the road a few at a time until patrol is across.

(i3) Crossing streams is similar to crossing roads; reconnaissance and security are both necessary.

(i3) If it is necessary to leave a wounded man to be picked up on your return trip, leave another man with him, if possible. Walking wounded return on their own to friendly lines, if feasible. When close to the enemy, remove the wounded from the immediate area before applying first aid.

(c) Miscellaneous.

(i) Keep the cutting edge of the entrenching tool extremely sharp. It is a good, silent weapon and can be used in lieu of a machete.

(ii) A garrota can be used for killing a sentry or capturing a prisoner.

(iii) Binoculars increase visibility at night.

(iv) Do not jeopardize security by letting earflaps and hoods interfere with the hearing ability of the patrol.

(iii) When on patrol, pass on simple instructions, allow time for dissemination, then execute.

(iv) Keep talking to a minimum. Use arm and hand signals to the maximum.

(v) When reconnoitering enemy positions, keep the covering force within supporting distance of the reconnaissance element.

(vi) Never throw trash on the ground while on patrol. Bury and camouflage it to prevent detection by the enemy.

(vii) When possible, allow men to sleep on long patrols; but, maintain proper security.

(viii) When contacting friendly agents, such as partisans, never take the entire patrol to make contact with them. Have one man make the contact and cover him.

(xi) The best nights for patrols are dark, rainy, and windy nights.
Figure 82. Convoy with a strong security detachment.

Figure 84. Counterramshak by fire and maneuver.

Legend:
- Infantry and Armor
- Engineers
- Security Det HQ
- Infantry and Armor
- Armor
- Elements of Convoy
- Holding Element
- Attacking Element
- Friendly Elements

AMBUSH
Figure 85. Type of guerilla ambush.

LEGEND
- CONCEALED FRIENDLY TROOPS WHO SEIZE PERSONNEL WHO ATTEMPT TO TURN BACK ON SEEING ROADBLOCK.
- SECURITY FORCES.
- VEHICLE AND PERSONNEL INSPECTION AREAS.

Figure 86. Physical layout of a roadblock.
34. IMMEDIATE ACTION DRILL (FOOT)

a. Frequent Drill:
(1) Person sighting enemy freezes in aiming position.
(2) Remainder of patrol follows suit.
(3) Open fire on patrol leader’s order or when enemy sights patrol.
(4) If meeting on trail, patrol moves off trail in site determined by lead soldier, takes up firing position, and fires on patrol leader’s order.

b. Immediate Assault:
(1) Used when:
(a) Patrols meet and become aware of each other’s position at the same time.
(b) Enemy camp is entered unexpectedly.
(c) Enemy is moving out of range after a “troops.”
(2) Characterized by:
(a) A frontal assault by entire patrol.
(b) Maximum fire to the front.
(c) Rapid execution.

c. Countersnatch Drill:
(1) If entire patrol is caught in ambush, launch immediate assault into enemy positions with maximum fire by all weapons.
(2) If part of patrol is caught in ambush, those engaged return fire and those out of ambush area execute ambush site.

35. IMMEDIATE ACTION DRILL (MOTORIZED)

a. Preparation Check List:
(1) Tops off trucks.
(2) Guards posted front and rear.
(3) Commander of troops in rear with his unit.
(4) Troops seated and equipment arranged in order that all personnel can deliver accurate fire immediately, if attacked.

(5) Communication within the convoy.
(6) All personnel briefed thoroughly.
(7) Commander of convoy positioned to control convoy.

b. Action of Convoy if Ambushed:
(1) Vehicles in killing zone.
(2) Drive through if possible; all personnel return fire.
(3) Vehicles return fire; remainder detaches, then motives detach; all launch frontal attack.
(4) Vehicles not in ambush detach and launch counterattack on ambush.

36. HAMLET CORDON AND SEARCH TECHNIQUES

a. The first consideration in conducting cordon and search operations is that it must have a definite purpose, such as:
(1) Destroy or capture guerrillas.
(2) Gain intelligence.
(3) Dissemination of psychological operations information, civic action, and other government sponsored activities.
(4) Harass the guerrillas.

b. Other principles are:
(1) Know the enemy, his tactics, equipment, and possible hiding places.
(2) Know the village layout and the villagers.
(3) Organize for a specific purpose based on best available intelligence.
(4) Have a well-rehearsed procedure.

c. A cordon and search operation can be launched from a clandestine base or it can be a quick thrust from your home base. The operation must be accurate and surprise is essential. An objective rallying point is used for control and no movement is conducted within the cordon (encirclement) area until all units are in position.

D. The majority of the cordon and search force will normally be employed on the cordon.
a. In order to achieve maximum benefit, interrogation techniques and procedures can best be carried out by intelligence specialists.

f. Principles of interrogation include:

(1) All interrogation is in private.

(2) Men, women, and children should be questioned.

(3) Coordination between interrogators is necessary to crosscheck answers, e.g., children with answers of their parents.

(4) All individuals should be interrogated for the same length of time.

(5) Standardized question forms should be used by interrogators in order to facilitate cross-checking and correlation between interrogators.

b. The perimeter search may be conducted by personnel from the search element with the cordons remaining in position, or it may be conducted by ordering the cordons to sweep toward the center of the village.

c. Caution must be exercised during cordon and search operation to avoid injuring innocent civilians.

1. Methods for control of the population within a cordon are:

(2) Assemble all villagers in a central location.

(3) Restrain all villagers to their homes.

(4) Assemble all villagers, except heads-of-households, in a central location, with the heads-of-households accompanying the search party through their respective dwellings (most preferable method).

f. The search element may be augmented by:

(1) Psychological operations teams.

(2) Civic action teams.

(3) Specialist interrogation teams.

(4) Escort troops to evacuate PW's or individuals worthy of further interrogation.

(5) Documentation teams.

h. The cordon element should be prepared to fight Viet Cong on the fringes of the village since VC will not normally draw fire on their families.

m. If encircled or trapped, the VC can be expected to patrol aggressively to find gaps in troop positions or weak units in the encirclement. The VC can often find an avenue of escape over what might be considered impassable terrain or through impenetrable underground.

(1) If the VC can locate a weak link, they may attempt to form a breakout force and penetrate the encirclement.

(2) If a breakout fails to occur an attempt to infiltrate the encirclement by one or two VC at a time. It is probable that an infiltrating attempt will occur during hours of limited visibility. If the VC successfully infiltrate, they will regroup at a predesignated location outside the encirclement.
CHAPTER 9
EVASION AND SURVIVAL

57. EVASION

a. General: First, get as far away as possible. Sometimes this may mean several kilometers; at other times, just a few meters. Plan your escape so that you run blindly, like your head—there is no substitute for common sense. As soon as possible, sit down, think out your problem, recall what you learned in training.

b. Pinpoint your location as accurately as possible, using your compass, sun, map, known landmarks, etc. If your compass is broken or lost, remember that when facing the sunrise, north is to your left. The following methods can be used for determining direction.

1. Using the Southern Cross: In the Southern Hemisphere you can find south by locating the Southern Cross. Compare this group of stars to a kite. If you can figure the length of the kite from the tip to tail and extend an imaginary line from the tip of the tail 1-1/2 times the length of the kite, you can determine the approximate direction of south.

2. Using a watch to find north: Twelve o'clock is pointed toward the sun, and halfway between 12 o'clock and the hour hand will be a north-south line.

3. Finding north on cloudy days using a watch: On cloudy days, place a stick at the center of the watch and hold it so that the shadow of the stick falls along the hour hand. One-half the distance between the shadow and 12 o'clock is north.

4. Shadow tip method for finding directions: Drive a stake so that at least 1 meter of it is above the ground. Mark the tip of the shadow it casts. Wait for a few minutes (15 minutes is long enough) and mark the spot where the tip of the shadow is then resting. A line drawn between the two marks will always point north.

c. Study the Map. Determine the slope of the land to guide on. Notice all large waterways. People usually live and travel on the waterways. Determine the direction in which you wish to go, move in one direction, but not necessarily in a straight line. Pick a linear objective, not a point objective, because it is easier to locate. Avoid obstacles; don't fight them. Take advantage of natural cover and concealment. Bivouac through jungle and wooded areas leads to bruises, scratches, and quick exhaustion.

d. Check Bearings Often. Roads and trails can be used to guide on, but never
travel on them. Stay alert. Natives remain on trails by preference. A few feet from
the trail you are usually quite safe. Convolvulus upon the approach of any
other person until he passes or until you determine whether or not he is friendly.

a. The easiest traveling is often on the crests of ridges. Remember, however,
that crests are more exposed than hillsides, and because of ease of travel, they are
not to be traveled more frequently than other areas.

b. Streets or streams can make good roads but remember that the majority of
native villages and encampments are on water. Roads attract attention. Floating on
or close to a log or drifting bush may be the simplest way to travel. Keep to the
middle of the stream. If using a native boat, sink it during periods when not in use.
c. When close to known enemy locations, move right after sunset or just before
dawn when there is sufficient light to enable you to avoid enemy installations,
mine fields, antitanks, etc., but dark enough to prevent recognition by the enemy.
Arrange your clothing, weapons, etc., to present a profile as similar as possible
to the natives of the area.

d. Be quiet, noise carries far and natives are alert to any strange noise. Bury
your refuse. If the enemy finds signs of your presence, it may lead to your capture.

1. Do not sleep near your fire or your water supply. Get far enough away to be
concealed.

f. If you in grass that is so tall that you cannot see over it, as a last resort cut
down enough to give you some freedom of movement and, using your machete or any
other tool, dig a hole to crawl into and set fire to the grass. Take every precaution
not to get burned by fire or suffocated by smoke.

2. The jungle provides many hiding places. You may have to use them. Bam-
boo thickets are excellent, because you cannot be approached without being alerted
by the noises of dry bamboo.

3. When approaching camp use extra precaution, for the camp is probably being
watched.

m. At all times, when hiding or remaining in one location, be sure to plan more
than one exit.

§8. SURVIVAL

a. Get to a village you know to be friendly as soon as possible. Avoid all others
except as a last resort. It is difficult for a person unfamiliar with the jungle to
live in it without native assistance.
When requesting native assistance:

- Show yourself and let the natives approach you.
- Do not approach groups.
- Do not display weapons.
- Do not risk being discovered by children.
- Treat natives well. There is much you can learn from them.
- Respect local customs and manners.
- Learn all you can about woodcraft.
- Take their advice on local hazards.
- Never approach a woman.

Before entering any strange village, whether it is friendly or not, conceal your weapon. If it is an enemy village, weapons will be taken from you. If it is a friendly village, you can always go back and get them.

Many of the jungle diseases are insect-borne. Use insect repellent. It repels poisonous reptiles and large mammals of the jungle will cause few problems. Given a choice, they will avoid you. Take time to repair your clothes. It helps to prevent insect bites and further tearing of clothes. Examine your surroundings carefully. Many of your needs are there. There are broken tree branches or trees can be used for needles. Lines of vines can be made into thread. If you need rope, vines will do. Your food and shelter; in fact, your life may depend on your ability to make use of things that are all around you. Be careful. Do not use trees and vines to pull yourself up ladders as thorns, ants, scorpions, etc., will be encountered and may become infected. Use a walking stick to push back vines and branches.

If a survival kit is available, most articles are self-explanatory. Some have multiple uses. The waterproof adhesive tape can be used for temporary repairs to clothing and mosquito nets as well as covering body wounds. Fish line can be used for snare. Three fish hooks, their shafts tied together with their hooks pointing out, can be used on the line to try to catch fish, crabs, etc. Head nets can be used to fish nets and snare. A fish hook fashioned to a length of line; baited with fish or meat and left on the sea shore or in a field may be used to catch birds.

SHELTER

- Pack a high cot when making camp. Avoid dry river beds, dead trees, and dust nests. Avoid hot water, darkness may cause dizziness.

Types of Jungle Shelters:

- A simple parachute shelter can be made by draping a parachute over a rope or wire stretched between two trees.

- A stretched shelter (see figure 8) can be made by covering an A-type framework with a good thickness of palm or other leaves, twigs or leaves, or matting is considered ideal since it can be made completely waterproof. After you finish it will keep the floor dry.

- Don’t sleep on the ground. Use a hammock if you have one, or make one from your poncho or all-purpose net. You can also make yourself a bed of bamboo or these leaves. A parachute hammock, even the barks of a dead tree is better than nothing.

WATER

- Water is more important than food. If you have no water, do not eat. Check all drinking water for insects and other small aquatic animals.

- Many times have water in them. The water should be cut through. When a sick cut in the line about 2 meters above the cut out a potato liquid will drip out juice for many are poisonous. Water can be found at the base of the leaves of palms. Place a section of bamboo against a sapling. Rub these with a cloth or other absorbent material, squeeze it into a half meter above the right hand line.

- If water is scarce, travel during coolest part of day or night. Rest during the heat of the day. By doing this, the water content of the body is conserved. (See survival water chart, figure 96.)

FOOD

- There is food in the jungle if you know where to find it. Plan one good meal each day but nibble on any food that you may have or can find. Eat strange food in small quantities and wait for a reaction. Avoid all mushrooms. There is little cold food cannot be avoided but an anti-diarrheal pill. All vegetables or fruit preserved in a village or hundred by natives should be avoided.

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b. Possession of a knife is vital for successful foraging. If you do not have one, a serviceable blade can be made from split bamboo. Split dry bamboo with a stone, break out a piece, sharpen on a stone, fire harden, and retouch. The result will be a crude but effective tool or weapon.

c. Grasshoppers, ant eggs, hairless caterpillars, larvae, and termites are good when cooked. Remove heads, skin, and intestines of snakes, rats, mice, frogs, and lizards, before cooking. Rats can be caught in cages by filling the air through which they are flying with a multi-branched stick. Inasmuch as bats are carriers of hydrophobia, do not get bitten. Avoid all cone snails and boring insects; some have poisonous stings that can be fatal.

d. Indiscriminate placing of traps is a waste of time. Small game such as rabbits or mice, travel in pairs through the vegetation. Set traps in or over these trails. A serpentine fence will guide certain birds, like pheasants and some larger animals, to your traps. Cut or collect brush for the fence and build it at least 41 meters high. Place traps in depth of curves (figures 96, 97, and 98).

e. There is no rule to determine edible fish. Avoid all strange or oddly shaped fish. Only those mussels, clams, oysters, etc., that are found underwater at low tide are safe. Saltwater fish and shellfish can be safely eaten raw. Do not eat the eggs or intestines of any fish. Saltwater snails come in all sizes and shapes. All are good to eat. Never eat fresh water fish without cooking or when the flesh is soft or the eyes sunken, for they are probably diseased. Fish are attracted to light. If the area is safe, use torches at night to attract fish. A head net made in a circular form by threading with bamboo or string on a crocheted stick will make a dip net. Fish in ponds or at the edge of the beach can be driven into the shallows by flowing the water with hands or brush. Clean fish immediately when caught. If you are in a group, work together to drive the fish and net them. Help each other. Do not try to preserve meat or fish for any length of time. In the tropics, flesh of any kind spoils rapidly unless dried or smoked (figures 99 and 100).

f. Plant Foods: Cook all plants before eating. To eliminate bitterness in plants boil in two or more changes of water. The jungle natives of Southeast Asia use the slash-and-burn method of farming and move their villages frequently, leaving many formerly cultivated areas throughout the jungle. Among the most common edible plants and fruits are coconut, bananas, plantain, and papaya.

g. Fire: Keep your fire small. In the rainy season or in damp jungles, dry fuel may be difficult to obtain. Carry dry tinder with you to assist in starting your fire. By cutting away the wet outer cover of a sound log, dry fuel can be obtained. Shave dry wood or dead bamboo into thin slivers and stack in bed formation over tinder.
Figure 96. A simple deadfall using a figure 4 trigger.

Figure 97. Hoisting snares.

Figure 98. Fixed snares.

Figure 99. Improvised hooks and lines.

Figure 100. Shower hook.
Pile heavier fuel around fire and add slowly until fire is well started. If fuel is
damp, stack it close to fire to dry out. If the jungle floor is flooded or may become
so, build your fire on a hearth of stones or wet wood. If necessary, build a shelter
over the fire to protect it from the rain. If the weather gets cold and you need a fire
for survival, build a screen on the opposite side of the fire from you to reflect the
heat toward you. A screen of leaves or branches 1 meter square tied together with
fish line or vines will do the job. Till the screen with the top toward you. Fiberous
material soaked in insect repellent makes good tinder.

b. Cooking: If large game has been killed, the stomach or skin can be made
into a cooking vessel after being cleaned. Fasten three strings into holes made in
the top wall of the open stomach or skin pouch and tie to the edge of a tripod made
of sticks. Fill with water and bring to boiling point by putting in fire-heated stones.
If sticks are not available and if the ground is not too wet or stony, the skin or
stomach pouch can be used as a liner for a hole in the ground. Then fill with water
and place fire-heated stones in it. Meat and fish can be stuck onto a sharpened green
stick and roasted over a fire. Small animals and birds can be roasted easily. Draw
and skin them and wrap in leaves, clay, or mud.bury them in a pit, the bottom
of which is lined with heated stones. Fill pit with dirt. In the morning when the pit
is opened, you will find the meat well cooked and hot. Larger game can be pre-
pared the same way by cutting into small pieces (figures 101 and 103).
CHAPTER 10
TROPICAL SANITATION AND HYGIENE

63. DEFINITIONS

a. Sanitation is the effective use of measures to maintain healthful environmental conditions. Among these measures are safeguarding food and water, and the control of disease-bearing insects and rodents.

b. Hygiene is practice used by the individual which will keep him healthy. Among these measures are proper eating, body cleanliness, and avoiding known sources of disease. Personal hygiene is extremely important, if you have a survival kit, directions for the use of drugs are printed on the container.

c. Communicable disease is a disease, the natural agent of which may pass or be carried from one person to another, or from one animal to man.

d. A vector is a carrier, especially an animal (usually an insect), which transfers infection from one person to another, or from one animal to man.

64. ILLNESSES

Illness is as much a casualty producer as a high velocity missile. Maintaining good health within a command is the commander's highest responsibility. He must enforce the practices of sanitation and hygiene within his command. Strict enforcement of these rules will interrupt the chain of transmission of disease by breaking one of the links in the chain. The three links in the chain are:

a. The source, which may be a case, carrier, or animal. A case is one who is actually ill with the disease; a carrier is one who harbors infection without actually being ill himself. Many animals can also harbor infections which will affect man.

b. The vehicle, or method of transmission, may be by direct contact with an infected case or carrier; or indirect contact via insects, food and water, air, or fomites. Fomites are objects which have become contaminated with infective organisms and include bed linen, clothing, utensils, etc.

c. The susceptible individual who is an individual without immunity, or resistance, to the infecting organism. Immunity may be natural by having had the disease or artificial by having had an injection or swallowing vaccines produced from killed or weakened organisms.

65. CATEGORIES OF DISEASE

a. Respiratory diseases include the common cold, influenza, whooping cough, diphtheria, meningitis, and tuberculosis. The most important of these in Vietnam is tuberculosis. For best protection against this disease is the maintenance of good living habits. Intestinal tuberculosis and tuberculosis of the skin can be acquired by drinking unpasteurized milk, or eating dairy foods (cheese, butter, ice cream, etc.) made from unpasteurized milk.

b. Intestinal diseases include typhoid fever, amoebic and bacterial dysentery, cholera, food poisoning, and various parasitic infections. These are all spread through food and water, contaminated with feces or urine from an infected case or carrier. To prevent illness, eat nothing which has not been thoroughly cooked. Drink only water which has not been disinfected by boiling. Solid vegetables should be washed in a solution of chlorine disinfectant for 5 minutes. One package of "Red Cross" Chlorine, Food Service" does not disinfect 10 gallons of water for 5 minutes.

66. SOURCES OF INFECTION AND DISEASE

a. Water can be the vehicle of infection for hepatitis, typhoid fever, cholera, dysentery, and many other infections. No water in Vietnam can be considered safe unless boiled or disinfected with chlorine or lime. Water used to make ice should be treated in the same manner. Two capsules of efficient hypochlorite per 30-gallon water container or two inch tablets if water is chlorinated per quart of water provides sufficient chlorine to disinfect water. Permit the water to stand for 30 minutes before drinking. Water for bathing should also be purified to avoid gastroenteritis.

b. Insect-borne diseases include malaria, dengue fever, encephalitis, scrub typhus, and plague. The anti-malarial tablets, taken faithfully once a week, will prevent malaria. The standard U.S. Army insect repellent, mosquito nets, and insecticides are other indirect measures which can be taken to avoid other insect-borne diseases.

c. The deep paper infections can be prevented by proper use of protective clothing and by immediate first and treatment of even the most minor injuries (see appendix 4, First Aid). superficial infections, such as "jock-itch" and athlete's foot can be prevented by faithful cleansing and drying of sores, and feet. Also, frequent changes of clothing and shoes and the application of Deodorant powder to these areas are helpful preventive measures.
d. Venereal diseases include syphilis, gonorrhea, chancre, and lymphogranuloma inguinale and reinoculation. All are transmitted through intercourse, though syphilis can also be acquired by kissing. Individual prophylaxis includes using a condom, urinating, and washing the genitalia after intercourse. If you suspect that you have acquired an infection, don’t delay treatment; obtain your treatment from U.S. Army personnel. Tuberculosis and other nonvenereal diseases can be acquired through intimate contact.

e. Venomous snakes, leeches, and predatory animals represent animals of minor medical importance. Antivenom is the only satisfactory treatment for snakebites. Treat all snake bites as poisonous. (See appendix 4, First Aid.) Leech bites should be treated as any other minor wound. Animal bites from predatory animals should be treated as if the animal is known to be rabid. If the animal escapes, so that examination of the head for rabies cannot be accomplished, treatment against rabies should be started immediately. This applies to domestic animals also.

f. Nutritional diseases, prevalent in Vietnam, include beriberi (from vitamin B deficiency), vitamin A deficiency, and goiter. It is unlikely that you will be exposed to a deficient diet long enough to acquire these diseases. Fresh vegetables are an important source of vitamin A and B. Unpolished rice is preferable to polished rice because of its high vitamin B content.

67. TIPS ON HYGIENE AND HEALTH

a. Treat wounds or sores as soon as possible.

(1) To stop bleeding when you have no bandages, apply freshly made spider web to assist in the coagulation of the blood.

(2) In the absence of toilet paper, use leaves and grasses. Be careful to examine the leaves and grasses for insects. Use no leaves that have funny or hairy surfaces taken from a tree or plant with milky sap, or grass that has a serrated edge. Do not use material that is lying on the ground.

(3) Leeches and ticks can be partially avoided by tying ruffles of your jacket at the wrists and the bottoms of trouser legs outside the boots and applying insect repellent to all openings. Check your clothes and body frequently. Remove leeches and ticks carefully. If pulled off quickly, they may leave their heads in the bite; infection will result. Wet salt, fire, or lime juice will cause them to withdraw their heads and fall off. Don’t hurry the process.

(4) In case of heat stroke, heat exhaustion, or heat cramps lower the body temperature by drenching with water or covering the body with wet clothing. Dissolve two salt pills in the equivalent of a cup of water and drink. Rest until all symptoms have passed. Avoid sunburn. Even a short time in the jungle will reduce your resistance to the sun. Serious infection can result from over-exposure. Keep covered; do not risk a painful, dangerous burn.

(5) In cases of diarrhoea when no drugs are available, a tea made from boiled grasses leaves or charcuter odds with hot water will be beneficial.

(6) Apply hot pads to bring boils to a head.

(7) Use tourniquets for bleeding, only after everything else fails.

(8) Most important of all, keep your head dry, try not to get too tired, rest frequently, be careful, and do not give up.

Figure 103. Shower unit, using 55-gallon drum.
Figure 104. Handwashing device, using 5-gallon water cans.

Figure 105. Pipe grill arrangement.

Figure 106. Straddle trench latrines for 106 men, with handwashing device.
APPENDIX I
OTHER USEFUL DATA

68. POINTS TO REMEMBER

a. Corps tactical zones (CTZ) report to Joint General Staff (JGS). Corps troops may include:

(1) Divisions (only infantry in ARVN).

(2) Separate infantry regiments.

(3) Engineer groups (which may be directly under JGS).

(4) Nondivisional artillery battalions.

(5) Ranger Battalions (unless attached to division).

(6) Armored cavalry squadrons.

b. Each province in the divisional tactical area (DTA) is a subordinate military sector. New sector commander, sector operations and intelligence center (SOIC) reports to the division or a special zone tactical operations center (TOC). Sector is authorized a regional forces battalion consisting of a headquarters, an administrative and logistical company, and a number of rifle companies depending on the local situation. Sectors in the Mekong Delta area are authorized two platoons augmented to form two companies consisting of eight LCVP’s. Some provinces have popular forces training centers.

c. Each province in a province is a subsector military command. District chief’s organic troops are the popular forces; additionally he may have operational control of one or more regional forces companies. An artillery platoon may be positioned at the district headquarters.

d. MACV chain of command parallels Vietnamese chain of command.

(1) MACV commands and has operational control of support organization.

(2) Members of support organizations are to administer support to MACV elements and command U.S. Army troops in Republic of Vietnam. A Marine headquarters squadron operates in I Corps. Second Air Division supports provincial tactical concept for Vietnamese Air Force. Special Forces in Republic of Vietnam are trained Vietnamese personnel to defend their villages.

(3) MACV is primarily interested in administration, organization, training, and logistics.

(4) Field detachments are subordinate to MACV.

(5) Division detachments found in division advisory teams.

(a) Detachments to division units:

1. Regiment.

2. Battalion.

3. Support companies.

(b) Sector:

1. Sector advisor.

2. Sector intelligence advisor.

3. Intelligence NCOs.

4. Civil guard advisor.

5. JICD advisor if there is an JICD training center in the province.

69. TIPS TO ADVISORS

a. Professional Duties and Interests

(1) Self-in-place training once units return to posts. One thousand-yard approx. 35 meters) firing ranges are ideal for small posts to fire weapons.

(2) Spend all time in your units so that the troops get to know and trust you. Keep abreast of what is going on in the unit, and keep in close contact with the commander and staff.

(3) Encourage frequent command inspections by the commander. Many officers show a reluctance to inspect, relying solely on correspondence and reports to evaluate the effectiveness of the unit.

(4) Continually stress mutual advantages of good military-civilian relations to avoid pitfalls of military arrogance, which usually irritates the civilian populace. The development of a proper military-civilian relationship is given utmost at the least.

(5) Constantly strive to raise the standards of your unit to your standards. Guard against lowering your standards to those of the unit you advise.

(6) Keep training standards high enough so that the unit is ready for all inspections at all times. This saves the wear and tear of preparation for inspections and the disappointment that follows when it is cancelled. Do not use training time for
housekeeping matters; discourage the idea that the two of you can compete to "tyrannical" instructions.

(7) MACV advisors should have sufficient knowledge of all aspects of U.S. aid programs to counter insurgent propaganda depicting them as interference in the affairs of the people.

(8) Constantly observe for signs of fatigue. There is a marked difference between American and Vietnamese stamina. Pushing at peak performance will cause a long-term decrease in efficiency.

b. Techniques:

(1) An advisor must constantly bear in mind that he is an advisor and not a commander. He is not in Vietnam to fight or to lead troops.

(2) Avoid rushing your acceptance by your counter part. Overreacting yourself will arouse suspicion and delay acceptance. Time spent developing a healthy relationship will pay large dividends later on.

(3) Adversaries work both ways. Set an example for your counterpart by asking his advice; you will get many good ideas from him.

(4) Avoid giving your counterpart the impression that each time he sees you, you are interested in asking for status reports, etc. You will soon find him sending you secret information increasingly difficult to get.

(5) Transact important business directly with your counterpart to assure full understanding of difficult subjects. Work from the soft sell to the request for official information.

(6) Don't present too many subjects at one time or prolong unnecessary discussion of one subject; it is better to have another conference a later time. Don't speak rapidly or use slang. By the same token, don't speak too slowly; it will enrage his intelligence.

(7) Correct the most important inaccuracies first. When you arrive you will see many things you will want to correct immediately. At all costs avoid the impression that everything is all wrong. In some cases it may take a month or more to sell one idea.

(8) Avoid making recommendations that lead to decisions. Leave sufficient room for your counterpart to exercise his prerogative. One of his greatest fears is that he will appear dependent upon his advisor to his troops. Carefully choose a time and a place to offer advice.

(9) Use your subordinate advisors to lay the groundwork for new ideas at their level.

(10) For successful combat operations do your homework thoroughly. The amount of advising done during combat operations is small. The advisor does most of his advising in preparation for combat, having his advice upon his observations or those of his subordinates during past operations. Hold a private critique with the commander upon completion of an operation.

(11) Don't be afraid to advise against a bad decision, but do it in the same manner you would recommend a change of action to an American commander for whom you have respect and with whom you work daily.

(12) Approach the subject under discussion from different directions and with different words, until you know that your ideas are understood. The Vietnamese system admit that they do not understand. Don't accept a yes answer at its face value; you may mean that the person understands but does not mean that he buys your suggestion. It may also be used to cover a failure to understand.

(13) Always exercise patience in your dealings with your Vietnamese counterpart. Never expect the job to be done at the snap of a finger--and don't snap your fingers.

(14) Information from your counterpart cannot be accepted in blind faith. It must be checked discreetly and diplomatically, but checked.

(15) After presenting an idea, let the Vietnamese take credit for it as if it were his own idea.

(16) Advisors are transient--especially infantry battalion advisors. Try to learn what your predecessor had attempted and has or has not accomplished. Ask him for his files. Deliberate him if you have the chance.

(17) Begin preparing a folder about your advisory area and your duties as soon as you enter the job. By posting a worksheet-type folder during your tour, you will better understand your job and your successor will have a complete file to assist him in carrying out projects you initiate.

(18) Your successor at the next higher echelon will often be unable to visit you. He will travel with a counterpart and not get a good chance to talk with you. Your efficiency report will probably be based largely on your reports. Consider writing at least once weekly thirty to your chief. Tell him what your area is like, what are trying to do, what you have been able to accomplish, what you need his help to do. At the least, send him copies of advisory recommendations. Write up ideas you
(9) Take time to brief supporting pilots. Take helicopter pilots along on combat visits. Try to get helicopter and observation pilots included in operational briefings. Pilots are branch qualified officers and warrant officers; they are more effective when they know the overall situation. They are less apt to complain about how they are being used when they are fully briefed on your plans.

(20) Use proper radio procedure. Your division advisory team publishes its own SL and SOE. Remember that much advisory FM radio traffic is air-ground communication. The Viet Cong are capable of intercepting.

c. Personal Attitude and Relations:

(1) Getting accustomed to the native food and drink presents a problem in somewhat varying degrees to the advisor. You will not lose face if you eat and drink with your counterpart; conversely, you will gain face.

(2) Don't become discouraged. All of your advice won't be accepted. Some of it will be implemented at a later date.

(3) Don't forget that a careless word or action can cost the United States dearly in goodwill and cooperation, which have been built up with great effort and at considerable cost.

(4) Don't discuss Vietnamese policy with Vietnamese personnel. It is your obligation to support the present government just as you do your own. This is U.S. national policy.

(5) Study your counterpart to determine his personality and background. Every effort to establish and maintain friendly relationships. Learn something about the personal life of the Vietnamese with whom you work and demonstrate this interest.

(6) Set a good example for the Vietnamese in dress, posture, and conduct as well as in professional knowledge and competence.

(7) Emphasize the importance of doing things on time by being punctual yourself. Many Vietnamese have a very casual attitude toward time.

(8) Develop a sense of responsibility toward the unit being advised to the degree that you feel a personal gratification from a job well done. Do not become so identified with the unit that you cannot readily recognize failures.

(9) Accept invitations to Vietnamese dances, cocktail parties, and ceremonies. Shake hands with all Vietnamese in a room when entering and leaving. Exchange amenities with officials before discussing business matters.

(10) Don't summon Vietnamese by whistling or shouting. You will note that Vietnamese summon each other by a wave of the hand, similar to our farewell wave.

(11) Don't fail to observe and recognize military courtesy.

d. Personal Qualities and Requirements:

(1) Based upon observation and experience, U.S. advisors returning from the Republic of Vietnam have pointed out that what it takes to be an effective advisor. No doubt each of us is most anxious to do our best to assist our Vietnamese allies speedily get out of their country as soon as possible. For this reason we feel that you will welcome the opportunity to examine what other advisors have said on the subject of advising. Give these comments consideration and, to the extent indicated by introspection, make them a part of your personal attributes before and during your tour in Vietnam. These qualities and requirements, along with a general summation of desirable traits, are set forth in the following paragraphs:

(a) Perseverance in implementing sound advice; exercise patience and forbearance: display a pleasing personality; be adaptable to environment and changing situations; be honest; maintain high moral standards; be understanding and sincere; present a sharp, military appearance; exercise discretion in free speech; keep in good physical condition; acquire ability to demonstrate effectively; know your job; know thoroughly the unit you are advising as to organization, equipment, and training; know thoroughly your own branch and have a good working knowledge of other branches; know your counterpart's problems; and demonstrate your awareness of them to him.

(b) Advisors are restricted in their operations because they are not authorized to exercise command in accomplishing advisory functions. They must rely on their ability to sell the most effective commodity which is represented in the individual advisor. The traits of an advisor encompass all the traits of leadership plus the ability to adjust to his environment. This environment changes with the locality or area in which the advisor is assigned. In the Far East, he must remember that arrogance and dogmatism are all the more taken, for the religious and philosophical backgrounds of the Asian strongly oppose this type of
personality. To sell one's self, you must prove your value—no supplier must present a favorable personality in the eyes of his counterpart. This can be accomplished in the field by a gradual demonstration of your capabilities in an unassuming but firm manner. Be patient but do not nag in your approach to any subject, however, if you are not sure of the subject matter, it is better to say so and take timely measures to obtain the correct information. To attempt to bluff through problems will only result in irreparable loss of prestige.

(4) A most favorable trait is persistence, tinged with patience. If a problem area is discovered, continue efforts to solve it. Recommend appropriate measures to be taken, and then follow through again, remembering that patience is of utmost import. But, the matter must be continually brought to your counterpart's attention until he is sold on the measures necessary to solve the problem or correct the deficiency in the case may be. The ultimate in good advice is to advise your counterpart in such a way that he takes the desired action feeling that it was through his own initiative rather than yours.

(5) Possibly the most desirable trait is that you can possess as an advisor is knowledge of the subject, ability to demonstrate your capabilities in an unassuming but convincing manner, and a clear indication of your desire to get along and work together with your counterpart and other advisors; however, to the extent of obsequious behavior or acceptance of abusive treatment. These traits, along with leadership ability and desirable character traits accepted in our own society, will usually lead to a successful and satisfying advisory relationship.

Helpful Hints for Personal Security. (Comments by former M-14 teachers.)

(1) "If living in a U.S. compound, always provide some security of your own."

(2) "Always send your jeep. Also lock the hood doors to help prevent "fudging" your vehicle. You can use a chain and padlock. Check the vehicle before using."

(3) "Try not to wear white (U.S.) insignia on operations. Carry the same weapons and equipment as the Vietnamese. The VC can almost always pick out the Americans even at great range because of size. The VC will kill Americans first, if they can sniper especially."

(4) "If you have only one route to and from work in the combat area, vary the time you go to and from work. Also vary the speed; always accelerate and decelerate when driving on a road in the combat area."

(5) "Always drink as much water as possible during the dry season. When you receive a new source of good water, drink as much as you can, even though you might just have had a drink. Then fill up your canteen."

(6) "Always carry the following as a minimum: (a) bivouac kit; (b) salt tablets; (c) toilet paper; (d) antacid medication to prevent indigestion; (e)成交 to put on to small cuts instantly to stop infection; (f) salt tablets; and patches for weapons; and (g) during the wet monsoon season, carry only clothes that during the day you can constantly wipe your weapon clean to prevent rust."

(7) "Everyone must have an individual ditch (knotch) and a device of defense."

(8) "Just recently we had a young advisor killed and another wounded. Both of these people were with the lead element of their group. I have yet to see my counterpart lead any operation. When we go out on a search and clear mission, we have security to the front, both flanks, and to the rear. My own personal feelings are that if you get carried away and start leading the attack, you have done your counterpart a great injustice when you get hurt. For one thing, you are wounded, you are a liability, and you can offer no assistance nor advice."

(9) "Check your personal items before using."

(10) "Wardrobes, drawers, and suitcases must be locked."
(11) "Don't worry about the food when you go to the field. Your counterpart will take care of you."

(12) DON'T SET A PATTERN!

f. Helpful Hints for Unit Security: (Comments by former MATA students.)

(1) "On the tactical side, never, never travel in a single column. You will either make no contact or you'll be ambushed. When communication is difficult and the terrain is rugged, a single column is the easiest way to move an uncontrolled unit. It's also the easiest way to lose it."

(2) "Do not have film-developed (photos taken by advisors) at local photo shops. Advise the normal American custom of being a camera bug, photograph everything including ARVN compounds portraying the complete defense setup. These photos serve as a tremendous source of intelligence for the VC."

(3) "When on dismounted operations, stay off roads."

(4) "Establish temporary bivouacs after dark only (especially important for small units). Don't sleep where you cook."

(5) "When on operations always keep at least one-third of all U.S. personnel awake during hours of darkness. Have them check the perimeter at irregular intervals."

(6) "When on patrol spread the U.S. personnel out among the units on patrol. Make sure you always have at least one NCO or officer with the lead unit to keep you informed of the situation."

(7) "Advise your counterpart to make sure that no guard knows "ahead of time" which guard post he will occupy. This could prevent an inside job."

(8) "Have the Vietnamese commander conduct frequent stand-to-alarms for his unit, camp, bivouac, etc. This will give a good indication of the time required for reaction in the event of an attack, and it is also a good time to fire concentrations, barrages, and low-fire cross-serve weapons."

(9) Periodically review FM 21-75, Combat Training of the Individual Soldier and Patrolling."

(10) "Change the defensive posture of your command frequently. VC study this before attacking and have been known to call off an attack on even the slightest indication of change."

(11) "Do not let anyone know your itinerary. Keep a long distance between your car and another car. Take the canvas covers off all vehicles if possible. During the night, suggest you use one light and low beams."

(17) "Constantly check the F/1 TROOPs to see that they are where they are supposed to be. Many times they will just pack up and leave, especially at mealtime."

g. Helpful Miscellaneous Hints: (Comments by former MATA students.)

(1) "On a recent operation to the most distant district objective, we were preparing to depart for home station when we received an intelligence report that the VC had prepared an extensive ambush on our route. When pointed to my map, I saw that we were more or less surrounded. I made some suggestions as to how to counter this superior force. This is what my counterpart did. He briefed his leaders and started out and transmitted a false order to go to a certain destination knowing the VC had a USNCOM radio and would monitor; the VC shifted their major force, and we skirted right and were only fired at by ‘local boys’ on the trip back. No casualties. This, incidentally, was a purification operation and we had about two platoons for security."

(2) "Coordination with chopper pilots is a must for a battlefield team. Most of the pilots don’t have the current SOI. Also, they must switch back and forth from what they call their ‘night-following’ frequency to the air-ground frequency. It’s rather frustrating when they forgot and say ‘call me’ to contact them on the air-ground frequency. We operated down in Phux Lam Special Zone. The choppers came from III Corps area. They had no idea what the 324th Division call sign were. A small point, maybe, but still important."

(3) "A program has been initiated in Da Nang to reduce the excessive number of weapons surrendered to the VC without a fight. An impressive ceremony was conducted 2 January at 17th Div to encourage combat youth and popular forces to return VC weapons. Their primary fear is lack of assistance from ARVN. Political and popular forces were given by the provincial chief and the commanding general. All weapons were collected and the militiatri were sworn to death before giving up their weapons. This program is continuing throughout the province."

(4) "You should normally charge a small ambush. The enemy has selected his position and already picked his kill zone, so you must get out of it as quickly as possible. To retreat would normally make you vulnerable to his blocking force, so do the unexpected—charge! However, the best solution is don’t get ambushed."

(5) "When in the jungle, keep off the trails, move through the jungle properly, and move in at least two separated columns."

(6) "Due to the influence of both the U.S. and French, the leaders in Vietnam have a tendency to set objectives in sweep and clear operations. If this
is done, the subordinate leaders will not, repeat, will not, deviate from their line of march to fight the VC within the area. It's not because they lack courage, but rather because they head for the 'goose egg' that has been drawn on their map by their leader. Whenever possible, advise your counterpart to include zones of action in his operation plan. Instead of objectives, have him include checkpoints and phase lines as control measures.*

(1) *Train all officers to adjust artillery. This regiment has trained only its own officers and NCO's, but all regional forces and popular forces all know in our area. The training paid off last week when two main force companies attacked a platoon guarding a bridge and were repelled after a 4-hour fight, largely because artillery fire was brought in and properly adjusted over the position. Incidentally, overestimation for such posts is very necessary but rarely exists. We've even gone so far to have all villages dig protective shelters with overhead cover because, of late, the VC have been setting up their mortars in villages, which has made them immune to counterbattery fire.*

(2) *Decentralize operations. This requires some skill but it's worth the effort. The lower the level of command, down to platoon anyway, the better the intelligence because in many cases the commander on the ground can't reveal the source of their information for fear were will leak out and the source will lose his head. Since sources cannot be evaluated, higher levels of command frequently discuss many of the valid reports they receive. Also, centralized control greatly increases reaction time, particularly in the mountains where communication is difficult.*

(3) *Be careful passing through gates and crossing fences in VC areas; these are likely mines and booby traps areas.*

(15) *An excellent tactic to use is that of sending a company or two through a VC village and follow up 3 hours later with one or two platoons. After the first element has passed, the VC come out of their hiding places and you'll then catch them by surprise.*

(12) *Think one of the most important points that I can make is, the officers and NCO's coming over here must remember that they are advisors. They are not coming to Vietnam to be a point man in a patrol, and they are not here to lead a platoon in an attack. This is one of the easiest ways I know of to come home 'quarrymaster style,' in a pine box.*

(12) *When filling in VC trenches, put one grenade in the trench, cover it, and let some soldier casually see you do. Then tell the village you have mined the trenches. After you leave (if you leave), the VC will come back and work all night looking for mines you haven't even put there. Also, it will take them a long time to rebuild the trenches.*

**APPENDIX II
USEFUL TABLES AND DATA
CONVERSION TABLE - WEIGHTS AND MEASURES

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Table XXIII

221
Determine Scale:

Flying Height Method:

Scale = \frac{F}{H} \text{ (Focal length of camera in inches)}
\quad \text{H (Altitude above ground in inches)}

Map Distance Method:

Scale = \frac{PD}{GD} \text{ (Photo distance in inches)}
\quad \text{GD (Map distance in inches)}

Point Designation Grid System:

1. Turn photo so that written data is in normal reading position.
2. Draw lines across photo parallel to the focal length and declination marks.
3. Space grid lines, starting with center lines, a distance equal to 4 cm or 1.67 inches apart.
4. Number each center line 50 and give numerical values to the other lines, increasing right and up.
5. Read coordinates at top left.
### PRINCIPLES OF WAR

<table>
<thead>
<tr>
<th>M</th>
<th>Z</th>
<th>S</th>
<th>T</th>
<th>C</th>
<th>O</th>
<th>I</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>Objective</td>
<td>Impetuous</td>
<td>Surprise</td>
<td>Command</td>
<td>Offensive</td>
<td>Maneuver</td>
<td>Economy of Forces</td>
</tr>
<tr>
<td><strong>REPORTING INFORMATION</strong></td>
<td>Size</td>
<td>Activity</td>
<td>Location</td>
<td>Unit</td>
<td>Time</td>
<td>Equipment</td>
<td></td>
</tr>
</tbody>
</table>

### TERRAIN ANALYSIS

<table>
<thead>
<tr>
<th>C</th>
<th>O</th>
<th>A</th>
<th>B</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>Observation</td>
<td>Over and Concealment</td>
<td>Baskets</td>
<td>Approach and Withdrawal</td>
</tr>
<tr>
<td><strong>PRISONERS OF WAR</strong></td>
<td>Search</td>
<td>Operate</td>
<td>Silence</td>
<td>Sacrifice</td>
</tr>
</tbody>
</table>

### INTELLIGENCE EVALUATION LEGEND

<table>
<thead>
<tr>
<th>Source</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Completely reliable</td>
<td>1 - Confirmed by other sources</td>
</tr>
<tr>
<td>B - Usually reliable</td>
<td>2 - Probably true</td>
</tr>
<tr>
<td>C - Fairly reliable</td>
<td>3 - Possibly true</td>
</tr>
<tr>
<td>D - Not usually reliable</td>
<td>4 - Doubtfully true</td>
</tr>
<tr>
<td>E - Unavailable</td>
<td>5 - Improbably</td>
</tr>
<tr>
<td>F - Reliability unknown</td>
<td>6 - Truth cannot be judged</td>
</tr>
</tbody>
</table>

The legend should be applied to intelligence originating in the field and the evaluation sent forward with the information.

Table XXXV

223
USEFUL KNOTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Illustration</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td><img src="image1" alt="Illustration" /></td>
<td>Join two ropes of same size. (Will not slip, but will draw tight under strain.) To red block lashing.</td>
</tr>
<tr>
<td>Double about bend</td>
<td><img src="image2" alt="Illustration" /></td>
<td>Join wet ropes, of unequal size, or ropes in an eye. (Will not slip or draw tight under strain.)</td>
</tr>
<tr>
<td>Bowline</td>
<td><img src="image3" alt="Illustration" /></td>
<td>Form a loop. (Will not slip under strain and is easily untied.)</td>
</tr>
<tr>
<td>Timber hitch</td>
<td><img src="image4" alt="Illustration" /></td>
<td>Lifting or dragging heavy timbers, to more easily controlled if supplemented by half hitches.</td>
</tr>
<tr>
<td>Clove hitch</td>
<td><img src="image5" alt="Illustration" /></td>
<td>Fasten rope to pipe, timber, or post. (It is used to start and finish all lashings and may be tied at any point in rope.)</td>
</tr>
<tr>
<td>Sheepshank</td>
<td><img src="image6" alt="Illustration" /></td>
<td>Shorten rope or take load off weak spot in rope.</td>
</tr>
<tr>
<td>Anchor knot</td>
<td><img src="image7" alt="Illustration" /></td>
<td>To fasten cable or rope to anchor.</td>
</tr>
</tbody>
</table>

Table XXXV

METRIC CONVERSION TABLES

<table>
<thead>
<tr>
<th>English</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.27</td>
<td>0.127</td>
</tr>
<tr>
<td>2</td>
<td>2.54</td>
<td>0.254</td>
</tr>
<tr>
<td>3</td>
<td>3.81</td>
<td>0.381</td>
</tr>
<tr>
<td>4</td>
<td>5.08</td>
<td>0.508</td>
</tr>
<tr>
<td>5</td>
<td>6.35</td>
<td>0.635</td>
</tr>
<tr>
<td>6</td>
<td>7.62</td>
<td>0.762</td>
</tr>
<tr>
<td>7</td>
<td>8.89</td>
<td>0.889</td>
</tr>
<tr>
<td>8</td>
<td>10.16</td>
<td>1.016</td>
</tr>
<tr>
<td>9</td>
<td>11.43</td>
<td>1.143</td>
</tr>
<tr>
<td>10</td>
<td>12.70</td>
<td>1.270</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metric</th>
<th>Metres</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.3048</td>
<td>0.03048</td>
</tr>
<tr>
<td>2</td>
<td>0.6096</td>
<td>0.06096</td>
</tr>
<tr>
<td>3</td>
<td>0.9144</td>
<td>0.09144</td>
</tr>
<tr>
<td>4</td>
<td>1.2192</td>
<td>0.12192</td>
</tr>
<tr>
<td>5</td>
<td>1.5240</td>
<td>0.15240</td>
</tr>
<tr>
<td>6</td>
<td>1.8288</td>
<td>0.18288</td>
</tr>
<tr>
<td>7</td>
<td>2.1336</td>
<td>0.21336</td>
</tr>
<tr>
<td>8</td>
<td>2.4384</td>
<td>0.24384</td>
</tr>
<tr>
<td>9</td>
<td>2.7432</td>
<td>0.27432</td>
</tr>
<tr>
<td>10</td>
<td>3.0480</td>
<td>0.30480</td>
</tr>
</tbody>
</table>

Table XXXVI
### Local Conversions (rounded)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Equivalents</th>
<th>cm</th>
<th>mm</th>
<th>in</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm</td>
<td>1</td>
<td>10</td>
<td>100</td>
<td>0.39</td>
</tr>
<tr>
<td>mm</td>
<td>1</td>
<td>10</td>
<td>1000</td>
<td>0.039</td>
</tr>
<tr>
<td>in</td>
<td>2.54</td>
<td>100</td>
<td>10000</td>
<td>0.0039</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>Equivalents</th>
<th>kg</th>
<th>lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>1</td>
<td>2.20462</td>
<td>2.20462</td>
</tr>
<tr>
<td>lb</td>
<td>0.4535927</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Units of Measurement

<table>
<thead>
<tr>
<th>Unit</th>
<th>Equivalents</th>
<th>kg</th>
<th>lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>1</td>
<td>2.20462</td>
<td>2.20462</td>
</tr>
<tr>
<td>lb</td>
<td>0.4535927</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table XXVII (i)

<table>
<thead>
<tr>
<th>Grade</th>
<th>1</th>
<th>100</th>
<th>1000</th>
<th>10000</th>
<th>100000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain</td>
<td>0.0001</td>
<td>0.001</td>
<td>0.01</td>
<td>0.1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table XXVII (ii)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>1</td>
</tr>
<tr>
<td>lb</td>
<td>2.20462</td>
</tr>
</tbody>
</table>

### Notes on Conversion - English-Metric System

Example: Convert 20 pounds to kg:

1. There are 2.20462 pounds in 1 kg.
2. To convert 20 pounds to kg, divide 20 by 2.20462.
3. The result is approximately 9.07185 kg.

(1) The weight of 1000 grams is approximately 1.10231 pounds.
(2) The height of 1000 meters is approximately 3280.84 feet.
(3) The area of 1 square meter is approximately 10.7639 square feet.


### Table XXVII

<table>
<thead>
<tr>
<th>Unit</th>
<th>Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>1</td>
</tr>
<tr>
<td>lb</td>
<td>2.20462</td>
</tr>
</tbody>
</table>

---

Table XXVII (iii)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>1</td>
</tr>
<tr>
<td>lb</td>
<td>2.20462</td>
</tr>
</tbody>
</table>
Sample Intelligence Estimate

[Classification]

Sitting section and headquarters

[Classification]

Plano

Date and Time

INTELLIGENCE ESTIMATE NO.

Reference: Maps or charts or other documents.

1. MISSION: State the assigned or assumed mission.

2. THE AREA OF OPERATIONS

This paragraph discusses the influence of the area of operations and the
arriving at conclusions. This paragraph is based on the facts and conclusions
of the analysis of the area of operations if one has been prepared. Effects on
our courses of action may be omitted if adequately covered in a current
analysis of the area of operations.

a. Weather.

(i) Existing situation. Include light data and either a weather forecast or
forecast of climatic information as appropriate. Use appendix for
detailed information.

(ii) Effect on enemy courses of action. Discuss the effects of weather on
each enemy broad course of action. Each discussion concludes with
a summary statement as to whether the course of action is favored
or not by the weather. Among the courses of action include use of
nuclear weapons, chemical and biological agents, special methods,
techniques, equipment, procedures, or forces. For example, use of
airborne, armament force, surveillance devices, communications,
electronic warfare, tactical cover and deception, significant effects
on personnel management, logistical support, and civil affairs opera-
tions.

(iii) Effect on our courses of action. Discuss each major course of action
and accomplish the mission in the same manner as for enemy courses of
action above.

b. Terrain.

(i) Existing situation. Use graphic representations where possible. Use
appendix for detailed material. Include as much information as

2If distributed outside the headquarters, the first line of the heading is the
official designation of the issuing command and the ending modified accordingly.

[Classification]

[Classification]

necessary for an understanding of observation and fire, concealment
and cover, obstacles, key terrain features, avenues of approach and
include effects of soil and on each, as appropriate, of nuclear fires, bio-
technical and chemical agents, etc.

(2) Effect on enemy courses of action. Discuss in the same manner as for
the effects of weather in paragraph 2(a). For defense courses of
action give the best defense area and the best avenues of approach
leading to the best defense area. For attack courses of action give
the best avenues of approach.

(3) Effect on our courses of action. Discuss in the same manner as for
effects of terrain on enemy courses of action.

c. Other characteristics. The following additional characteristics are con-
considered, as pertinent, in separate subparagraphs: topography, politics,
economies, psychology, and other factors. Other factors may include
such items as science, materiel, transportation, manpower, and hydro-
graphy. They are analyzed under the same headings as weather and
terrain.

3. ENEMY SITUATION

This paragraph gives that information of the enemy which will permit later
development of enemy capabilities and vulnerabilities and refinement of
these capabilities into a specific course of action and their relative proba-
bility of adoption.

a. Dispositions. Reference may be made to overlays or enemy situation maps
or previously published documents.

b. Composition. Summary of order of battle of opposing forces and other
enemy forces that can affect accomplishment of mission. Reference may
be made to previously published documents. Special mention is made of
units capable of electronic warfare, guerrilla warfare, etc., as appropri-
ate.

c. Strength. Enemy strength in this subparagraph is categorized as commit-
ted forces, reinforcements, air, and nuclear, chemical, and biological
warfare. The purpose of the categorization is to assist in developing
enemy capabilities and vulnerabilities for use by the commander and
staff in selecting courses of action.

(1) Committ ed forces. Includes artillery and other units in position to sup-
port the committed forces with fire, chemical, and biological war-
fare agents. Specify which units can deliver nuclear, chemical
agents, etc., as appropriate. Count if there are no committed forces.
Committed forces are those enemy ground units (excluding guerrillas, if appropriate), together with their supporting ground fire units, which are reasonably certain of being employed within a decisive area regardless of the specific friendly course of action that may be implemented. Disposition, location, echelon of control, or other factors considered at the time of the estimate are considered in determining which enemy forces are committed forces. The major subordinate units of the comparable enemy commander committed against our force are usually considered as committed forces. The reserve of the enemy commander, comparable to that of the estimator’s command, committed against our force and the reserves of higher enemy commanders are usually considered as reinforceable. If there is doubt as to whether a unit should be considered as committed forces or a reinforceable, it is considered as a reinforceable. This attribute to the enemy the maximum capability to reinforce his forces that can oppose a given friendly course of action.

(2) Reinforcement. Include designation and location. Omit if there are no reinforceable. Reinforceable are those enemy forces which may or may not be employed against us depending on our choice of specific course of action and enemy plans. To be considered as reinforceable, the enemy forces must also be capable of being employed against us at various times and places, subject to time and distance considerations, in time to affect the accomplishment of the mission. Disposition, location, echelon of control, or other factors considered at the time of the estimate are considered in determining which enemy forces are considered as reinforceable.

(3) Air. List number of aircraft by type within operational radius. Include number of possible sorties per day by type of aircraft, if known.

(4) Nuclear, chemical, and biological warfare. Make estimate, as appropriate, of number, type, yield, and delivery means of nuclear weapons, chemical, and biological warfare agents available to the enemy. (Estimates of enemy air, nuclear, chemical, and biological warfare capabilities are usually prepared at field army level and higher headquarters. Units subordinate to field army level use the estimates of higher headquarters.)

Recent and present significant activities. In this subparagraph selected items of information are listed to provide a basis for analyses to determine relative probability of adoption of specific courses of action and enemy vulnerabilities. Enemy failures to take expected actions are listed as well as positive information.

c. Possibilities and weaknesses. Based on knowledge of enemy tactical doctrine, practices, the principles of war, the area of operations, and the enemy situation previously described and discussed, list those items permitting development of vulnerabilities and determination of relative probability of the enemy adoption of specific courses of action. The items listed are grouped under the headings indicated below. Only pertinent headings are used.

(1) Personnel. An estimate of strengths usually is included if less than 80 percent are authorized and status of morale is included if known.

(2) Intelligence. An estimate of enemy intelligence success, effectiveness, and susceptibility to deception and detection.

(3) Operations. An estimate of combat effectiveness usually is included if less than excellent.

(4) Logistics. An estimate of enemy capability to support his forces logistically is included if there are any apparent capabilities to do so.

(5) Civil affairs. An estimate of the attitude of enemy population, status of food, supply, medical facilities, and communications.

(6) Communications. An estimate of the capabilities and/or weakness of enemy commanders and principal staff officers.

4. ENEMY CAPABILITIES

Based on all the previous information and analyses, develop and list the enemy capabilities. The listing provides a basis for analyzing the available information to arrive at those capabilities an enemy can adopt as specific courses of action and their relative probability of adoption.

a. Enumeration. State what, where, when, and to what strength for each capability.

b. Analysis and Discussion. To provide a basis for conclusions on adoption of enemy capabilities and their relative probability of adoption, each capability, or appropriate combination, is discussed in a separate subparagraph. All pertinent previous information and conclusions are tabulated as either supporting or rejecting the adoption of the capability. After listing all the evidence, each capability is judged from the enemy point of view on whether the adoption of the capability is or is not advantageous to the enemy. Such judgments need not be made if the conclusion is obvious or if there is no evidence that the enemy will adopt the capability, except when the capability is one which will make the accomplishment of friendly mission highly doubtful or impossible. This exception is to focus attention on dangerous threats.

5. CONCLUSIONS

Based on all the previous information and analyses, conclusions are stated as
to the total effects of the area of operations on friendly broad courses of action, the courses of action most probable of adoption by the enemy to include their relative probability of adoption, and the effects of the enemy vulnerabilities which can be exploited, and thus furnish a basis for the selection of a friendly course of action.

a. Effects of the area of operations on our courses of action. For attack courses of action, indicate the best avenues of approach. For defense courses of action, indicate the best defense areas and the best avenues of approach leading to and into the defense areas.

This paragraph is omitted if the discussion of the effects of the area on our courses of action in paragraph 2 has been omitted because of the availability of a current analysis of the area of operations.

b. Probable courses of action. Most probable courses of action are listed in order of relative probability of adoption. A listed course of action may include several courses of action which can be executed concurrently. This is a statement of conclusions based on the preceding information and analysis. Usually not more than two or three courses of action in order of probability of adoption can be justified by the available evidence. If the available evidence of enemy activities is not definitive enough to justify selecting the enemy course of action most probable of adoption, the intelligence officer selects one based on his knowledge of the area of operations, enemy doctrine, enemy practices, and the available evidence. The bases of such selections are clearly indicated to the commander.

c. Enemy vulnerabilities. List the effects of peculiarities and weaknesses that result in vulnerabilities that are exploitable at one higher, or lower echelons. The order of listing has no significance.

/s/ G2

Annexes

Distribution

Authentication

(For Classification)

234

Title of Lesson:

Day and Date:

Place:

Class:

Instructor:

Assistance:

Uniform and Equipment:

References:

Training Aids:

Transportation:

1. Presentation: (state method and time required)

a. Introduction: (time required)

(1) Objectives: (what will be presented)

(2) Reasons: (why it is important)

(3) Standards (minimum student will be expected to learn)

b. Explanation or demonstration: (time required)

(1) Main Point:

(a) Outline in proper form. Do not use paragraphs.

(b) Indicate notes in capital.

(2) Second main point:

(a) Outline in proper form.

(b) Continue breaking subjects into three or four main points and as many subdivisions as necessary.

c. Summary:

(1) Review main points.
APPENDIX IV

FIRST AID

70. FIRST AID PRINCIPLES
   a. Stop bleeding.
   b. Protect the wound.
   c. Prevent or treat for shock.
   d. Splint fractures.

71. CONTROL OF BLEEDING
   a. Elevate injured member if not fractured.
   b. Apply pressure bandage.
   c. Use pressure points if blood is gushing, wherever strong pulse is felt. (See
      Figure 107 on pressure points.)
   d. Use tourniquet only as last resort.

72. TYPES OF BLEEDING
   a. Arterial - spurting.
   b. Venous - flowing.
   c. Capillary - oozing.

73. ARTIFICIAL RESPIRATION - BACK-PRESSURE ARM-LIFT
   a. Place your hands on the flat of the victim's back so that the palms lie just
      below an imaginary line running between the armpits. With tips of your
      thumbs just touching, spread your fingers downward and outward.
   b. Rock forward, with elbows straight until your arms are almost upright
      and let the weight of the upper part of your body press slowly, steadily, and
      evenly downward on your hands on the victim's back.
   c. Incline the pressure by removing the hands from the back without a push
      and rock slowly backward on your heels. As you do this, slide your hands outward
      and grasp the victim's arms near the elbows.
   d. Draw the victim's arms upward and forward with just enough lift to feel
      resistance and tension at the victim's shoulders. (Do not bend your elbow.) Then
      lower the arms to the ground.
   e. Continue this action until normal breathing is resumed by victim.
### First Aid Treatment

<table>
<thead>
<tr>
<th>Ailment</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shock</strong></td>
<td>Pale face, cold, clammy skin, rapid, weak pulse, shallow breathing</td>
<td>Lay patient on back. Lower head, elevate feet. Loosen clothing, keep warm. Feed hot liquids, if conscious.</td>
</tr>
<tr>
<td><strong>Wound</strong></td>
<td>Expose wound. Control bleeding. Apply sterile dressing.</td>
<td>Treat for shock.</td>
</tr>
<tr>
<td><strong>Fracture</strong></td>
<td>Pain and tenderness, partial or complete loss of motion, deformity, swelling, discoloration</td>
<td>Handle with care; splint before moving. Support the limb on either side until splint is applied. Splints must be long enough to reach below joint above and below fracture and must be tied twice above and below break to immobilize limb. Pad all splints.</td>
</tr>
<tr>
<td><strong>Burn</strong></td>
<td>First degree: skin red, no blister. Second degree: skin blistered. Third degree: skin destroyed and charred.</td>
<td>Carefully remove or cut clothing away from burned area. Cover area with sterile dressing. Don't open blister. Keep burned areas apart by separate bandages.</td>
</tr>
</tbody>
</table>

**Table XL**

<table>
<thead>
<tr>
<th>Ailment</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunstroke</td>
<td>Flushed face, dry skin, strong rapid pulse, spots before eyes, headache, high temperature</td>
<td>Remove from sun. Take off all clothing. Elevate head and shoulders. Apply cool compresses or bathe patient in cool water. Give patient cool, salt water.</td>
</tr>
<tr>
<td>Heat Exhaustion</td>
<td>Dizziness, nausea, pale face, cramps, cold clammy skin, weak pulse.</td>
<td>More patient to shade. Treat as for shock. Give, cool water.</td>
</tr>
<tr>
<td><strong>Snake Bite</strong></td>
<td></td>
<td>Treat all snake bites as poisonous. Remain quiet, don't move. Place constricting band between bite and heart just tight enough to distend surface veins. Cold pack - treat for shock.</td>
</tr>
</tbody>
</table>

**Table XL (1)**
HOT - WET SURVIVAL INFORMATION

1. Be alert.
2. Be wary of strangers.
4. Follow or float on waterways to sea coast.
5. Food grows in fields near villages.
6. Conceal all evidence of your being in an area.
7. A few feet of dense jungle is sufficient to conceal a man.
8. Insect repellent applied to throat material makes good tinder.
9. Boil or treat all water used for drinking or washing.

Table XLI

APPENDIX V
GLOSSARY

GLOSSARY OF TERMS AND ABBREVIATIONS

A and L Company - Administrative and Direct Support Logistics Company. There is at least one per sector for support of RF/FF with finance, maintenance, supply, medical, and transportation sections.

ARVN - Army of Vietnam. The common term used to refer to regular army forces to include airborne and ranger units.

CALC - Corps Area Logistic Command. Four of them provide support with areas of responsibility that approximate corps boundaries.

CTZ - Corps Tactical Zone. The geographical area of responsibility of a corps, but frequently used to refer to the corps headquarters itself, e.g., "CTZ will review..." "DTA will submit to CTZ..."

Chieu Hoi - The "Open Arms" program for encouraging the VC to defect to the GVN side.

DAML - Director of Army MAP Logistics. The MACV staff agency that directs Military Aid Program logistics.

DSU - Direct Support Unit. The direct support technical service support unit. Each serves in a particular technical service chain, e.g., Cpl DSU, GM DSU.

DTA - Division Tactical Area. The geographical area of responsibility of a division, but frequently used to refer to the Division Headquarters itself, as with CTZ, above.

GYN - Government of the Republic of Vietnam. Used to refer to the national government, to the entire governmental structure, or as an adjective to describe one of the agencies or agencies.

RED SUP PAC - Headquarters Support Activity, Saigon. Also NSA. The U.S. Navy activity supporting the U.S. Mission in Saigon.
HOP TAN
- Sometimes called PICA for Purification intensification in Critical Areas. The program for priority attention to expanding the critical Saigon-Cholon base of Govt control.

NSA
- HDI SPF PAC

PAD
- Public Administration Division. A USOM agency with interest chiefly in assisting in the development of the Vietnamese governmental organization and administration.

PHD
- Public Health Division. A USOM agency with interest in assisting the Vietnamese public health program.

PF
- Popular Forces. Military forces recruited and employed within a district, organized as battalions and squads.

PSD
- Public Safety Division. A USOM agency which assists Vietnamese development of police forces.

RF
- Regional Forces. Military forces recruited and employed within a Province. Organized as companies.

RVN
- Republic of Vietnam. The nation itself although sometimes used interchangeably with Govt when referring to the government or with SVN when referring to the land.

RVNAF
- Republic of Vietnam Armed Forces. All armed forces of the republic, all services.

SVN
- South Vietnam. Generally connotes the land itself.

U.S. Mission
- The entire United States team, headed by the U.S. Ambassador and including all U.S. forces and agencies assigned to Vietnam to assist the South Vietnamese government.

USOM
- United States Operations Mission. The members of the U.S. Mission generally responsible for the civil side of U.S. advice and assistance, with the exception of that related to the information service.

USHIS
- United States Information Service. Serves U.S. interests as well as advising the Vietnamese in the information field. Also offers support to PHOS/CA advisors.

VC
- Viet Cong. Communist insurgents against the RVN government.

VSI
- Vietnamese Information Service.

VW
- Vietnam, Vietnamese.

VNAF
- Vietnamese Air Force.

VNN
- Vietnamese Navy.

VNNMC
- Vietnamese Marine Corps.