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Fort Bragg, North Carolina

MATA HANDBOOK
for
VIETNAM

JANUARY 1966
(Revised)



Col. (Ret.) Terry E. Rowe

(Vietnam, 1964-72)

SPECIAL TEXT 31-179

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 courses 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 E. 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 provision 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.

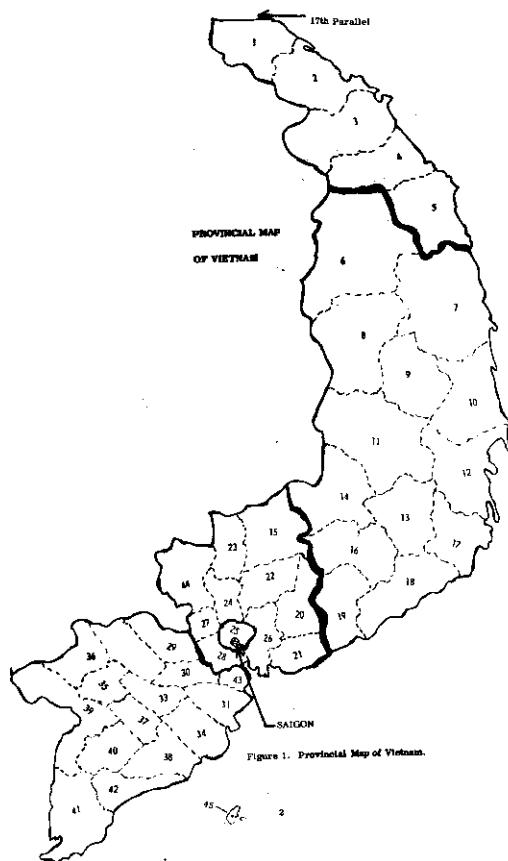
b. This immunity is not formally provided to all U.S. support personnel and the members of U.S. military units stationed within the Republic of Vietnam. Until such time as additional agreements are negotiated, each incident that occurs will have to be resolved on an individual basis by representatives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

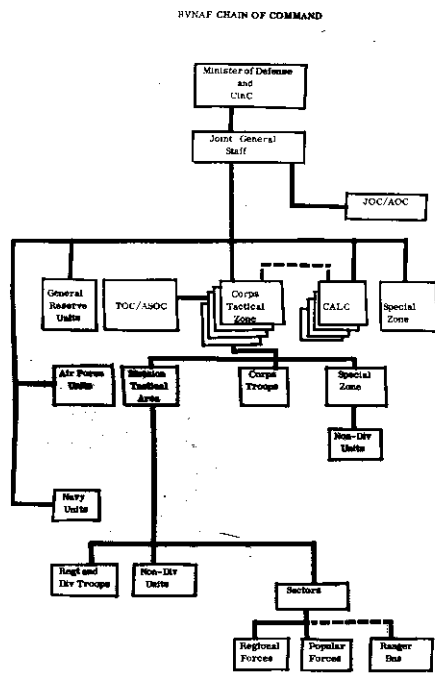
- (1) No torture of captives.
- (2) No use of captives as hostages.
- (3) No degrading treatment of captives.
- (4) No execution of captives without a fair trial by a regular court.

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.



NUMBER	PROVINCE	NUMBER	PROVINCE
35	AN-GIANG	16	LÂM-ĐỒNG
41	AN-XUYỀN	28	LONG-AN
38	BA-XUYỀN	20	LONG-KHÁNH
42	BAC-LIÊU (New Province)	17	NINH-THUẬN
26	BIÊN-HÒA	8	PLEIKU
7	BÌNH-ĐÌNH	37	PHONG-ĐÌNH
24	BÌNH-DƯƠNG	22	PHƯỚC-THÀNH
23	BÌNH-LONG	9	PHÚ-BÓN
18	BÌNH-THUẬN	10	PHÚ-YẾN
19	BÌNH-TUY	15	PHƯỚC-LONG
36	CHÂU-ĐỐC (New Province)	21	PHƯỚC-TUY
40	CHƯƠNG-THIỆN	5	QUẢNG-NGÃI
45	CÔN-SƠN	1	QUẢNG-TRỊ
11	DARLAC	13	TUYÊN-ĐỨC
30	ĐÌNH-TƯỚNG	33	VĨNH-LONG
25	GIA-ĐỊNH	14	QUẢNG-ĐỨC
43	GỖ-CÔNG (New Province)	3	QUẢNG-NAM
27	HÀU-NGHĨA (New Province)	4	QUẢNG-TÍN
12	KHÁNH-HÒA	2	THỪA-THIỆN
39	KIÊN-GIANG	34	VĨNH-BÌNH
31	KIÊN-HÒA	44	TÂY-NINH
32	KIÊN-PHONG	6	KONTUM
29	KIÊN-TƯỚNG		

Figure 1 (1) Name of provinces corresponding to numbers on provincial map of Vietnam.



NOTE: There are two types of special zones, those under the direct control of JGS and those under tactical zone control.

Figure 2. RVNAF Chain of Command.

	(Silver)	General of the Army	Thống - Tướng
	(Silver)	Lt. General	Đại - Tướng
	(Silver)	Major General	Trung - Tướng
	(Silver)	Brigadier General	Thiếu - Tướng
	(Silver)	Sub Brigadier General	Chuẩn - Tướng
	(Silver)	Colonel	Đại - Tá
	(Silver)	Lt. Colonel	Trung - Tá
	(Silver)	Major	Thiếu - Tá
	(Gold)	Captain	Đại - Úy
	(Gold)	First Lieutenant	Trung - Úy
	(Gold)	2nd Lieutenant	Thiếu - Úy
	(Raised & Gold)	Aspirant	Chuẩn - Úy
	(Groove Red & Gold)	Student Officer	Sinh-Viên Sĩ Quan
	(Gold)	Sgt Major	Thượng - Sĩ - Nhất
	(Silver)	First Sergeant	Thượng - Sĩ
	(Silver)	Sergeant First Class	Trung - Sĩ - Nhất
	(Silver)	Sergeant	Trung - Sĩ
	(Silver Gold)	Corporal First Class	Hạ - Sĩ - Nhất
	(Gold)	Corporal	Hạ - Sĩ
	(Gold)	Private First Class	Binh Nhất

Figure 3. Rank of the Army of the RVN.

CHAPTER 2

WEAPONS

2. GENERAL

Some of the weapons described in this chapter may appear to be obsolete in 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

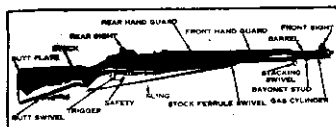


Figure 4. U.S. Rifle Caliber .30 M-1
Súng Trường Mỹ M-1

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/o bayonet | 4.31 kgs |
| (2) Weight, w/bayonet and sling | 4.93 kgs |
| (3) Length overall | 110.74 cm |

d. Lubrication: All parts moving or camming against other parts need lubrication to prevent friction. Oil may be used on all these parts. In addition, the following parts and places should have rifle grease added as friction is heavy:

- (1) The camming surface in the hump of the operating rod.
- (2) Under the lip of the receiver above the bolt.
- (3) Locking 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, aim, 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 aperture all the way up, press down; if aperture drops, tension must be adjusted.)

(2) Check butt 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 check.)

(4) Check front hand guard for looseness.

(5) Check for loose or missing gas cylinder lock screw.

(6) Check functioning of safety.

4. PISTOL, CALIBER .45, M1911 AND M1911A1

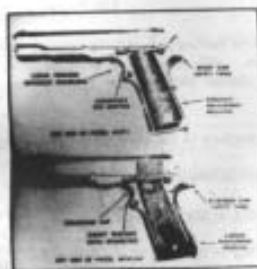


Figure 5. Pistol, Caliber .45, M1911 and M1911A1
Sig. Lp 11.43

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 | 1.13 kgs |
| (2) Length | 21.91 cm |

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

e. 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 correct functioning of the safety lock, disconnector, grip safety, and half-cock feature 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 feature. (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) Disconnector functions properly. (Cock hammer, shove slide .64 cms 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 excessively heavy or dangerously light.

(6) Sight barrel or otherwise damaged.

- (7) Worn or broken firing pin, extractor, or ejector.
- (8) Weak or broken firing 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) Inoperative magazine catch and release.

5. RIFLE, XM16E1, 5.56-MM

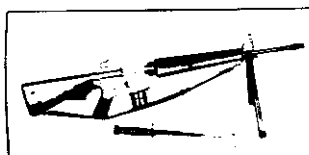


Figure 6. Rifle, XM16E1, 5.56-mm
Súng-Trưởng M16

a. Reference:

FM 23-9

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

d. Data:

- (1) Weight of rifle 2.75 kgs
- (2) Barrel length, w/flash suppressor 53.98 cm
- (3) Overall length 98.43 cm
- (4) Magazine capacity 20 rounds
- (5) Sights:
 - (a) Rear: 2-leg post for 273 and 455 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) Rifling: 6 grooves, right twist, 1 turn in 35.56 cm.

(7) Ammunition: Cal. .223, 55-grain, boat-tail bullet.

e. Firing Characteristics:

(1) Muzzle velocity (approximate) 1005.8 meters per second

(2) Muzzle energy 1328 foot lbs

(3) Cyclic rate of fire 700/800 per minute

(4) Maximum rate of fire:

(a) Semi-automatic 45/65 per minute

(b) Automatic (using 20-rd magazine) 120/150 per minute

(5) Sustained rate of fire 12-15 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 on 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 tube and where it enters the bolt carrier. Notice gear 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 oil the weapon excessively 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.

(7) The cleaning rod should be inserted from the rear of the bore, to ensure that the cleaning patch follows the same path as the projectile, thus preventing the bore from becoming pitted.

c. CARBINE, CALIBER .30, M1 AND M2



Figure 7. Carbine, Caliber .30, M1 and M2
Sung Cao-Bis M1 & 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 kgs
(2) Weight, w/15-round magazine (loaded)	2.75 kgs
(3) Weight, w/30-round magazine (unloaded)	2.49 kgs
(4) Weight, w/30-round magazine (loaded)	2.97 kgs

(5) Length, w/bayonet-knife	187.34 cm
(6) Length, w/o bayonet-knife	90.37 cm
(7) Magazine capacity	15 & 30 rds
(8) Chamber pressure	18,000 kgs per sq in
(9) Maximum range	2002 meters
(10) Maximum effective range	294.35 meters
(11) Cyclic rate of fire M2	750-775 rpm
(12) Maximum effective rate of fire	40-60 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 cushioning recess in lump of slide.
- (4) Guide lug that operates in spline 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 palm up, release, aim, and attempt to fire. This action will clear most stoppages.

f. Only American personnel are issued M2 Carbines. Friendly Vietnamese personnel are issued M1 Carbines only. Therefore, any references to M2 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 notch 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 79 cm. If it falls 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) Recoil plate screw loose.
- (11) Rear sight windage knob binds, elevation slide fails to properly engage range indications on ramp.
- (12) 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 band 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

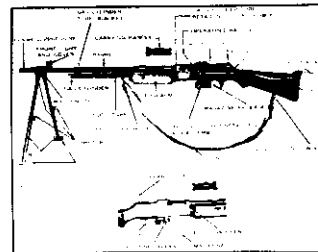


Figure 8. Browning Automatic Rifle, M1918A2
Súng Trung-Liên

- a. Reference: FM 23-15
- b. Characteristics:
 - (1) Air cooled
 - (2) Magazine fed

(3) Shoulder weapon

(4) Gas operated

(5) Fully automatic

c. Data:

- | | |
|---|------------------------------|
| (1) Weight, complete w/bipod and magazine | 8.73 kgs. |
| (2) Length, overall w/flash hider | 121.41 cm |
| (3) Magazine capacity | 20 rds |
| (4) Chamber pressure | 22,500 kgs per sq in |
| (5) Muzzle velocity | 841.5 meters per sec |
| (6) Maximum range | 3,185 meters |
| (7) Maximum effective range | 455 meters |
| (8) Cyclic rate of fire: | Slow-350 rpm
Fast-550 rpm |
| (9) Sustained rate of fire | 40-60 rpm |
| (10) Maximum effective rate of fire | 120-150 rpm |

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 butt plate is loose.

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

(6) Loose sight or binding elevating screw.

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

(8) Broken carrying handle or forearm.

(9) Loose sight or cover.

(10) Missing friction washer.

(11) Loose or split flash hider.

(12) Wing nuts fail 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

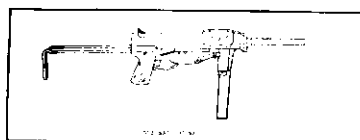


Figure 9. Submachine Gun, M-3
Súng Tiểu-Liên M3

a. Reference: FM 23-41

b. Characteristics:

- (1) Air cooled
- (2) Blow-back operated
- (3) Automatic
- (4) Shoulder weapon
- (5) Magazine fed

c. Data:

(1) Diameter of bore	1.14 cm
(2) Number of grooves	4
(3) Length of barrel	20.32 cm
(4) Length, overall with stock extended	75.70 cm
(5) Distance between sights	27.62 cm

(6) Weight without magazine (approx)	3.67 kgs
(7) Weight of 30-round magazine (empty)	.34 kg
(8) Weight of 30-round magazine (loaded)	.95 kg
(9) Cyclic rate of fire	450 rds per minute
(10) Sights	91.44 meters - fixed peep
(11) Maximum range	1556.48 meters
(12) Maximum effective range	91.44 meters
(13) Pull to cock weapon - M3	8.1 to 10.4 kgs
- M3A1	4.5 to 5.4 kgs

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:

a. As the first step in reducing a stoppage, remove the magazine, retract the bolt, and inspect the chamber to ensure that it does not contain a live cartridge or any other obstruction. If there is no obstruction, close the cover, replace the magazine, open the cover and attempt to fire. If the gun still does not fire, check to see whether a live cartridge has chambered; if it has not, remove the magazine and insert a new magazine.

b. If there is a live cartridge or other obstruction lodged in the chamber, cock the gun and hold the cover down firmly; remove the barrel; then clear the chamber by using the stock to push the obstruction out of the barrel. Under combat conditions, when time is short, omit the step of removing the barrel.

9. THOMPSON SUBMACHINE GUN, M1A1, CALIBER .45

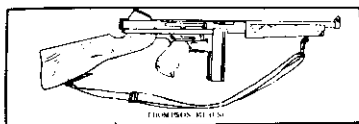


Figure 10. Thompson Submachinegun, M1A1, Caliber .45
Sung Tiêu-Liên Tom-Sôn

a. Reference:

- (1) FM 23-40
- (2) DA Pamphlet 30-115

b. Characteristics:

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

c. Data:

(1) Overall length of gun	83.82 cm
(2) Weight, w/loaded magazine	5.4 kgs
(3) Chamber pressure	5,400 - 7,200 kgs per sq in
(4) Muzzle velocity	276 meters per sec
(5) Cyclic rate of fire	600-725 rpm
(6) Maximum effective range	100 meters
(7) Maximum range	1,500 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 ensure ejection of mis-fired 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 back 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.
- (6) Broken hand loader and cleaning rod stop.
- (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 sear.)

(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 sear, but should move forward.)

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

10. BROWNING MACHINE GUN, CALIBER .30, M1919A6



Figure 11. Browning Machine Gun, Caliber .30, M1919A6
Sung Dai-Lien 30

a. Reference: FM 23-55

b. Characteristics:

- (1) Belt-fed
- (2) Recoil operated
- (3) Air cooled
- (4) Fully automatic

c. Data:

- | | |
|--|--------------------------|
| (1) Weight, w/bipod and shoulder stock | 14.85 kgs |
| (2) Weight on mount M2 | 22.05 kgs |
| (3) Muzzle velocity | 841.50 meters per second |
| (4) Chamber pressure | 22,500 kgs per sq in |
| (5) Maximum effective range | 1,097.28 meters |
| (6) Maximum range | 3,200.40 meters |
| (7) Maximum rate of fire | 600-675 rpm |
| (8) Maximum effective rate of fire | 150 rpm |
| (9) Sustained rate of fire | 75 rpm |

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 notches, until the recoiling 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 trunnion 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 goes 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.

e. 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 belt at point where cartridges enter feedway, simultaneously pulling bolt to rear twice, and releasing it.

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

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

(5) If gun still fails to fire, check bolt, eliminate cause of stoppage, reload, 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 belt does not go forward, raise cover, eliminate cause of stoppage, reload, 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.

f. Inspection of the M1919A6 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; illegible sight graduations.

(4) Cover latch inoperative.

(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) Pintle battered, 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 back-plate group.

(13) Check cover. (Free moving belt feed lever, undamaged belt feed lever stud belt feed pawl and belt holding pawl should be under spring tension. Cook 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 LAUNCHER, M-79



Figure 12. 40mm Grenade Launcher, M-79.

Sung Phong-Lan M-79

a. References:

- (1) TC 23-3
- (2) TM 9-1810200-12

b. Characteristics:

- (1) Single shot
- (2) Break open
- (3) Break loaded
- (4) Shoulder fired

c. Data:

- | | |
|----------------------------|----------|
| (1) Length of launcher | 69.29 cm |
| (2) Length of barrel group | 37.56 cm |
| (3) Length of barrel | 35.56 cm |

(4) Weight of launcher	2.65 kgs
(5) Chamber pressure	1250 kgs per sq in
(6) Muzzle velocity	76.20 meters per second
(7) Maximum range	275.00 meters
(8) Maximum effective range (area)	350.00 meters
(9) Maximum effective range (point)	150.00 meters
(10) Minimum range (training)	30.00 meters
(11) Minimum range (combat)	31.00 meters
(12) Bursting area	3.50 meters radius HE

d. Ammunition:

Model	Type	Fuze
381E1	HE	M352 (xps armed in 2 meters-Limited Standard)
381E1	Practice	M352
404E1	HE	M351 (xps and set back armed in 14-25 meters-Standard)
407E2	Practice	

13. BROWNING MACHINE GUN, CALIBER .30, M2HB



Figure 13. Browning Machine Gun, Caliber .30, M2, HB
Sing Dai-Lien 58

a. Reference: FM 23-65

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 turret-type mounts

c. Data:

- | | |
|--|--------------------------|
| (1) Weight of gun | 57 kgs (approx.) |
| (2) Weight of receiver group | 25.20 kgs |
| (3) Weight of barrel | 11.70 kgs |
| (4) Weight of tripod mount, M3, w/elevating mechanism. | 19.80 kgs |
| (5) Length overall | 165.10 cm |
| (6) Length of barrel | 114.30 cm |
| (7) Muzzle velocity | 893.06 meters per second |
| (8) Chamber pressure | 23,400 kgs per sq in |
| (9) Maximum effective range | 1828.80 meters |

- (10) Maximum range 6766.56 meters
- (11) Maximum rate of fire 600 rpm
- (12) Maximum effective rate of fire 100 rpm
- (13) Sustained rate of fire 60 rpm

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 ~~enters the~~ .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. ~~and~~ 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.

e. 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 T-slot if present; reload, re-lay, and attempt to fire.

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

(6) If the gun still fails to fire, or the recoiling groups fail to go into battery, check lubrication; recheck or reset headspace and timing; re-lay and attempt to fire.

7. Inspection Check List:

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

(2) Moving parts. See that they are clean and lightly oiled. Operate the retracting slide handle and belt 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 re-set at 1,600, windage zero, 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.

13. MORTAR, 60-MM, M-19



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

a. Reference: FM 23-85

b. Characteristics:

- (1) Smooth bore
- (2) Muzzle loaded
- (3) High angle-of-fire weapon
- (4) Drop or level fire capability

c. Data:

(1) Mortar, complete	26.34 kgs
(2) Mortar, with M1 baseplate	8.23 kgs
(3) Barrel weight	7.30 kgs
(4) Bipod weight	7.38 kgs

(5) Baseplate weight	5.76 kgs
(6) Baseplate, M1, weight	2.03 kgs
(7) Overall length	81.92 cm
(8) Elevation w/M5 mount w/M1 baseplate	40 to 85 degrees 0 to 85 degrees
(9) Traverse, right or left	125 mils
(10) One turn of handwheel	15 mils
(11) One turn of elevating crank	1/2 degree
(12) Maximum rate of fire	30 rpm
(13) Sustained rate of fire	18 rpm
(14) Bursting 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	1828.80 meters
(2) Smoke, M302	1508.76 meters
(3) Practice, M50A2	1828.80 meters
(4) Training, M69	228.60 meters

e. Inspection of the 60-mm Mortar: When inspecting the 60-mm mortar, observe the following points:

- (1) Barrel. Check general appearance and cleanliness of the bore.

(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 bushing 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 overhead 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.

(b) No. 2 sees that:

1. The bore is clean.
2. Each shell is clean--particularly the bourrelet.
3. The safety pin and striker spring of each shell are present.

(2) 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 bipod positions are safe for firing.

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

14. MORTAR, 81-MM, M29



Figure 15. Mortar 81-mm, M29
Súng Cối 81

a. Reference: FM 23-90

b. Characteristics:

- (1) Smooth bore
- (2) Muzzle loaded
- (3) High angle-of-fire weapon
- (4) Drop fire

c. Data:

(1) Weight complete	42.08 kgs
(2) Barrel	12.60 kgs
(3) Bipod	18 kgs
(4) Base plate	11.48 kgs
(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)	19 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	24 rpm
(12) Sustained rate of fire	3 rpm

- (13) Maximum range 3657.60 meters
- (14) Bursting area 27.43 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 (Sq, VT, Sq/D) 3657.60 meters
- (3) TP (Sq) 3017.52 meters
- (4) Training shell (inert) 274.32 meters

e. 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 burred point. 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 vial 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.

f. Safety Checks:

(1) Before firing:

(a) No. 1 makes certain that:

1. There is mask and overhead clearance.
2. Barrel is locked to the base plate and the open end of the socket cap is pointing in the direction of fire.
3. Shock absorber clevis lock pin is secure.
4. Locking nut is secure.
5. Chain is taut and is hooked to the left leg.

(b) No. 2 sees that the bore is clean.

(c) No. 3 checks to see that:

1. Each cartridge is clean.
2. Fuse safety pin of each cartridge is present and in place, if applicable.
3. Increments are present and in proper condition.
4. Ignition cartridge is present and in proper condition.

(2) During firing:

(a) No. 1 checks frequently to see that:

1. Shock absorber clevis lock pin is secure and the locking nut is tight.

2. Open end of the socket cap is pointed in the direction of fire.

- (b) No. 2 swabs the bore after every 10 rounds or after each fire for effect.

3. MORTAR, 4.2 INCH, M30

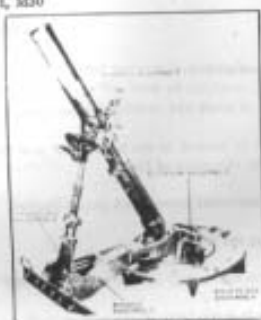


Figure 16. Mortar, 4.2-inch, M30
Sing Cui 4.2

a. Technical Data Characteristics:

(1) Maximum range	5486.40 meters
(2) Muzzle velocity	817.82 meters
(3) Type of ammunition	HE, ILL, and CREM. Semi fix complete Rd
(4) Rate of fire (prolonged fire)	30 per min
(5) Type of recoil	Spring
(6) Elevation limits	106 - 1156 mils
(7) Traversing limits	125 R; 125 L; 250 Total
(8) Total weight	287.78 kgs

(9) Prime mover	1/4 or 3/4-ton, w/trl
(10) Section crew	7 men
(11) Air transportability	Air drop

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 burrs.
- (5) Check all ammunition and propellants.
- (6) Check for tightness of screws.
(NOTE: Elevation 900 is most used.)

16. ROCKET LAUNCHER, 3.5 - INCH, M20A1B1



Figure 17. Rocket Launcher, 3.5-inch, M20A1B1
Ba-D6-Ca

a. Reference: FM 23-32

b. Characteristics:

- (1) Air cooled
- (2) Smooth bore
- (3) Open tube (2 pieces)

- (4) Recoilless
- (5) Shoulder weapon
- (6) Electrical type firing mechanism

b. Data:

- | | |
|--------------------------------|--|
| (1) Weight (approx) | 5.85 kgs. |
| (2) Type of operation | Rocket propelled |
| (3) Maximum range (approx) | 822.96 meters |
| (4) Maximum effective range | Moving-182.88 meters
Stationary-274.32 meters |
| (5) Bore sight | 1371.60 meters |
| (6) Armor penetration (approx) | 27.94 cm |
| (7) Maximum rate of fire | 12-18 rpm |
| (8) Sustained rate of fire | 4 rpm |
| (9) Bursting area (approx) | 9.14 by 18.29 meters (heat) |

d. Ammunition:

- | | |
|----------------------|-----------------|
| (1) Type used | Heat, TP and WP |
| (2) Weight of rocket | 4.05 kgs |

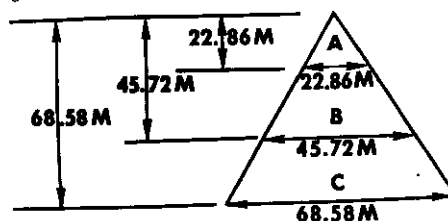
e. Safety Precautions:

(1) All 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.

(2) Face protection: For temperatures below 70 degrees F, the field protective mask must be used. For temperatures above 70 degrees F, the anti-flash mask must be worn.

(3) 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.

(4) 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 blast 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 rearward flight of nozzle closure or igniter wires. An additional safety factor for training is contained in zone C.



f. Disassembly: No parts will be disassembled by the troops in the field.

g. 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 hinge.
- (4) Bent indicator arm; weak indicator arms spring; marred elevation plate.
- (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 pistol 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, 57-MM, M18A1



Figure 18. Rifle, Recoilless, 57-mm, M18A1
Súng Không Gát

a. Reference: FM 23-86

b. Characteristics:

(1) Air cooled

(2) Recoilless

(3) Shoulder or mounted weapon

(4) Single-loaded

(5) Fires fixed ammunition

c. Data:

(1) Rifle with integral mount	19.38 kgs
(2) Rifle with machine gun tripod	44.10 kgs
(3) Length of rifle	156.46 cm
(4) Type of breach	Interrupted lug
(5) Firing mechanism	Percussion type
(6) Muzzle velocity	365.76 meters per second
(7) Maximum range	4399.12 meters
(8) Maximum effective range	1737.36 meters
(9) Bursting area	9.14 x 31.09 meters 15.54 meters

d. Ammunition:

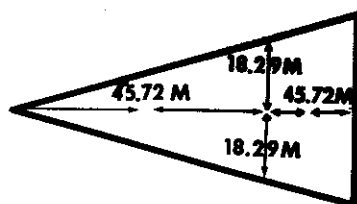
(1) Type used	HE, Heat, WP and AP
(2) Weight of round	3.32 kgs

e. Immediate Action:

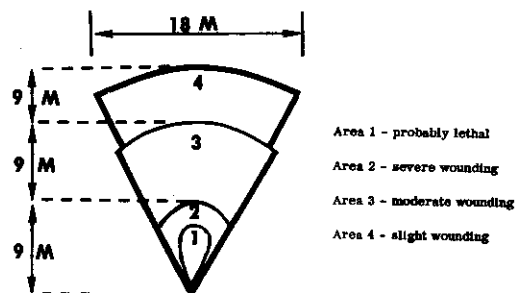
- (1) The gunner calls "MISFIRE."
- (2) The assistant gunner waits 60 seconds and then recocks.
- (3) The gunner re-lays and attempts to fire.
- (4) If the weapon still fails to fire, the gunner calls "MISFIRE." The assistant gunner waits 60 seconds, then opens the breech and checks the primer of the round.
- (5) If the primer is dented, another round is loaded. If the primer is not dented, the assistant gunner checks firing mechanism.

(NOTE: CAUTION 1. All troops should be clear of the breech end of the weapon. If the weapon is hot, and in the opinion of the safety officer, the possibility of a "cook-off" exists, the weapon will be abandoned and personnel moved a safe distance. After 1 hour the weapon may be unloaded.)

f. 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 91.44 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:



g. Inspection Check List:

- (1) Make sure that the hammer notch on the sear 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 bracket section of the trigger handle body are aligned with the qualifying marks on the tube.

18. HOWITZER, 155-mm

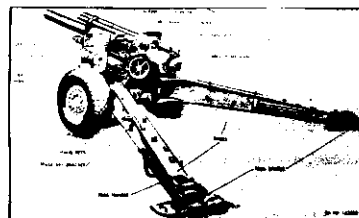


Figure 19. Howitzer, 155-mm, M114 or M114A1
Dai-Bao 155

a. Technical Data and Characteristics:

(1) Maximum range	14,955 meters
(2) Missile velocity	16.91 meters per second (w/oh T)
(3) Type of ammunition	HE, ILI and Chem Separate loading
(4) Rate of fire	Rapid fire: 2 rds per min; Prolonged fire: 1 rd per min
(5) Type of recoil	Hydropneumatic
(6) Maximum lengths of recoil	153.45 cm low angle 194.34 cm high angle
(7) Elevation limits	9 to 1150 mils
(8) Traversing limits	418L; 448R; 866 mils total
(9) Total weight	5,715 kgs
(10) Prime mover	4 or 5-hp truck or MB tractor
(11) Section crew	11 men
(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.

- (3) Bearing surface for rust, scores, or burrs.
- (4) Breech block for rust and cleanliness.
- (5) Primer vent for cleanliness.
- (6) All fire control before firing.
- (7) All ammunition and powder before firing.
- (8) Recoil and recoil maintenance. (Note: See TM 9-331A.)
- (9) Air brake hose coupling.

19. HOWITZER, 105-mm M101

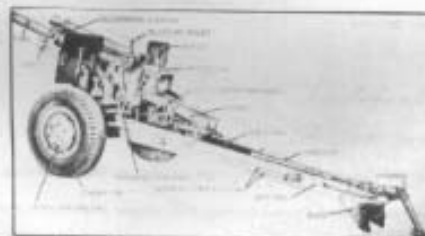


Figure 23. Howitzer, 105-mm, M101
Dul-Bac 105

a. Technical Data and Characteristics:

(1) Maximum range	11,270 meters
(2) Missile velocity	472.45 meters per second (w/charge T)

(3) Type of ammunition	HE, M1, Chemical, Heat, blank, semi-fixed
(4) Rate of fire	Rapid - 4-8 per min Prolonged - 100 rds per hr
(5) Type of recoil	Hydropneumatic
(6) Length of recoil	99.06 to 106.68 cm
(7) Elevation limits	-39 to +1156 mils
(8) Traversing limits	400 L; 409 R; Total mils
(9) Prime movers	3/4-ton truck, 2 1/2-ton truck, or M-4 tractor
(10) Section crew	9 men

b. Maintenance Check List:

- (1) Bore and chamber: Check for rust, cracks, or powder fouling.
- (2) Recoil mechanism: Proper amount of oil, proper setting of respirator, or excessive oil leakage.
- (3) Bearing surface: Check for rust, burrs, dirt, and proper lubrication.
- (4) Brake: Check brake ratchet 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 locking latch and trail pin; check that drawbar is secure.

20. ANTIPERSONNEL MINE (CLAYMORE) M18A1

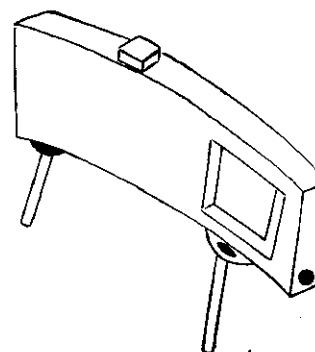


Figure 21. Antipersonnel Mine (Claymore) M18A1.

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 wells. 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 bandolier. 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 M6 electric blasting cap which is attached to 100 feet of firing wire.

(3) Firing device: The firing device, M57, is a handheld pulse generator which by a single actuation of the handle produces a double (one positive and one negative) electrical pulse (3 volts).

c. Effects of the Mine.

(1) Casualty effects: When detonated, the Claymore, M18A1, delivers highly effective fragments in a fan-shaped beaten zone 2 meters high and 50 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 250 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 pebbles 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 may be installed as a controlled or as 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 half-way into the ground, making sure that the convex surface marked "Front Toward Enemy" and the arrows on top of the case are pointing in the direction of the intended target area.

(b) Aim the mine at an aiming point approximately 2 1/2 meters above the ground at a range of approximately 50 meters. This aiming point should be 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.

(3) When claymores are employed as uncontrolled weapons, they are treated as mines or booby traps. Their locations are marked, reported, and recorded in accordance with the procedures set forth in FM 20-32.

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

NOTE: Ensure that the man installing or disarming 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 disarming 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.

(1) 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 afford 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.

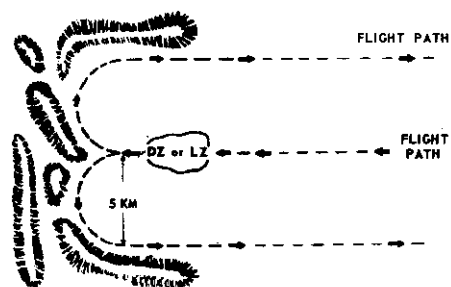


Figure 22. Level turning radius required for one approach DZ's and LZ's (medium aircraft).

(f) DZ's 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 (1.5 kilometers for light aircraft) (figure 22).

(g) Rising ground or hills of more than 1,000 feet elevation above the surface of the site should normally be at least 16 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.

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

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

(3) Obstacles. Due to the low altitude at which operational drops are conducted, consideration must be given to navigational obstacles in excess of 300 feet above the level of the DZ and within a radius of 8 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.

c. Ground Considerations.

(1) Shape and size.

(a) 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.

(b) 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).

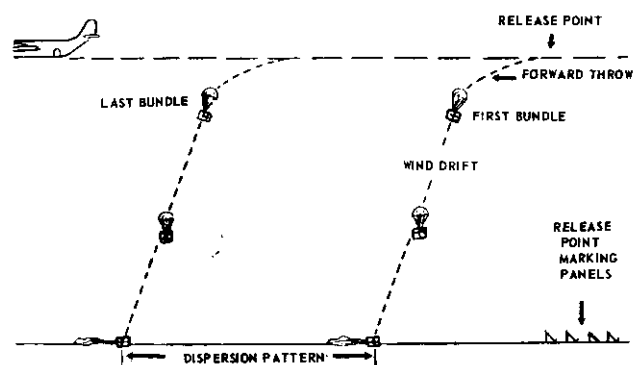


Figure 23. Computation of dispersion.

2. Dispersion is computed using the rule-of-thumb formula: $1/2$ speed of aircraft (MPH) x exit time (seconds) = dispersion (yards). Exit time is the elapsed time between the exits of the first and last items.

3. The length of the dispersion pattern represents the absolute 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.

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

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

(2) Surface.

(a) The surface of the DZ should be reasonably level and free from obstructions such as rocks, trees, fences, etc. Tundra and pastures 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 paddy fields when dry often make good drop zones.

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

1. Minimum depths 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 boulders, ledges, or pilings.

3. The water must also be clear of underwater obstructions 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 $\neq 50^{\circ}\text{F}$. ($\neq 10^{\circ}\text{C}$).

(e) 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 inadvisable 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 disposition of aerial delivery equipment.

23. REPORTING DROP ZONES

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 quadrant. Measured from center of DZ, reported as a series of magnetic azimuths. The open quadrant indicates acceptable aircraft approaches (figure 22).

(4) Track. Magnetic azimuth of required or recommended aircraft approach (figure 24).

(5) Obstacles. Those that are over 300 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 (2) 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 aircrew 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 26). The following features constitute suitable IP's:

(1) Coastlines. A coastline with breaking surf is easily distinguished at night. Mouths of rivers over 46 meters wide, sharp uprisings, or inlets are excellent guides for both day and night.

(2) Rivers and canals. Wooded banks reduce reflectings, but rivers more than 27 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.

TREES OR TERRAIN THAT WOULD MASK PILOT'S VIEW OF DZ MARKINGS

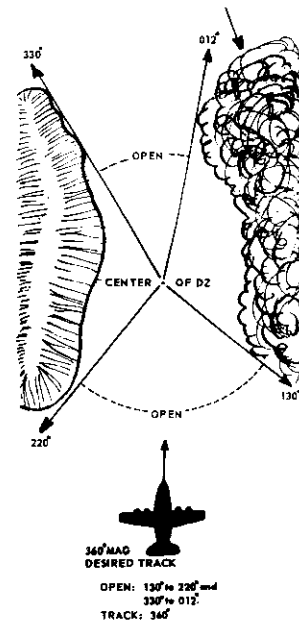


Figure 24. Computation of open quadrant and desired heading.

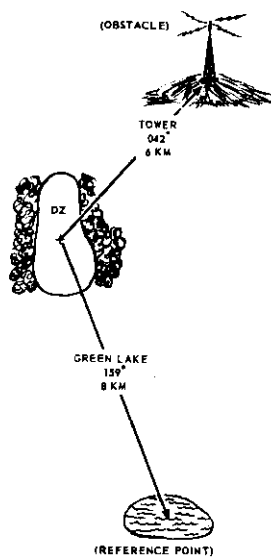


Figure 25. Reporting of obstacles and reference point.

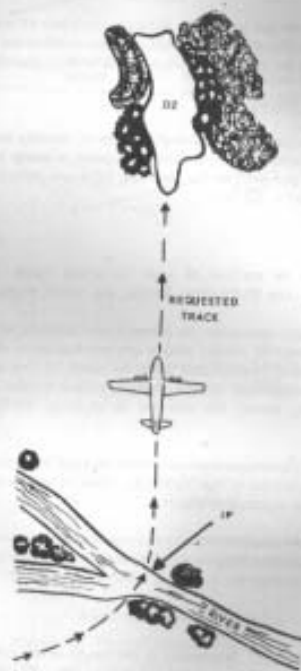


Figure 26. Relationship between IP and requested track.

- (2) 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 IP'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 aircrew 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 SOL.

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 issued Panel Marking Set, AP-50 or VS-16 is satisfactory for use. If issued 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 smudge fires, greatly assist the aircrew in sighting the DZ markings on the approach run.

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

6. Computation of Release Point. 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.

(a) Dispersion. Dispersion is the length of the pattern formed by the exit of the parachutists or cargo containers (figure 23). The desired point of impact for the first parachutist/container depends upon the calculated dispersion.

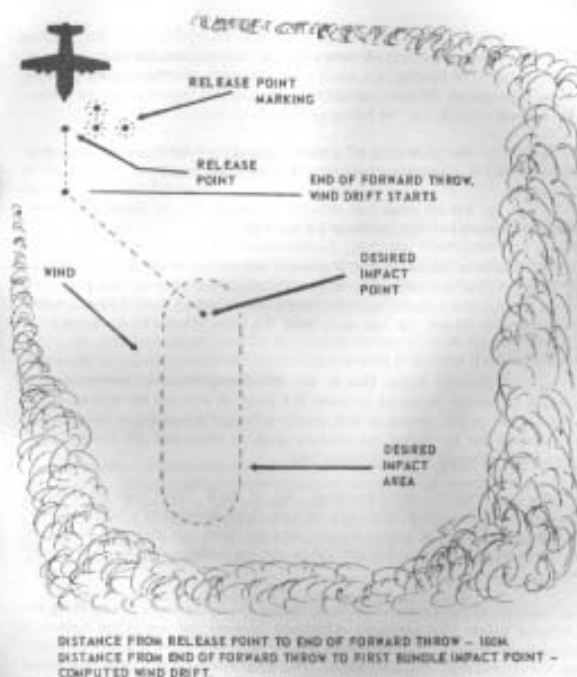


Figure 27. Computation of release point.

(b) Wind drift. This is the horizontal distance traveled from the point of exit to the point of landing as a result of wind conditions. The release point is located an appropriate distance upwind from the desired impact point. To determine the amount of drift, use the following formulas:

1. For personnel using the T-10 parachute: Drift (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 2.8 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.

(c) Forward throw. This is the horizontal distance traveled by the parachutist 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 100 meters in the direction of the aircraft approach (figure 28).

(2) High-velocity and free-drops. 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 800 feet. Training jumps are conducted at an altitude of 1,250 feet and require the use of a flank 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 1,250 feet above the DZ. From this point on, the pilot must depend on flying the proper track in order to pass over the release point. The flank 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 800 feet altitude do not require the flank panel because the pilot does not lose sight of the markings as he approaches the DZ.

e. Placement of Markings.

(1) Markings must be clearly visible to the pilot of the approaching aircraft. As a guide, markings must have a clearance of at least 460 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 screened 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.

25. RECEPTION COMMITTEES

a. General. A reception committee is formed to control the drop zone or 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 every one 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 to:

- (1) Provide security for the reception operation.
- (2) Emplace 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.

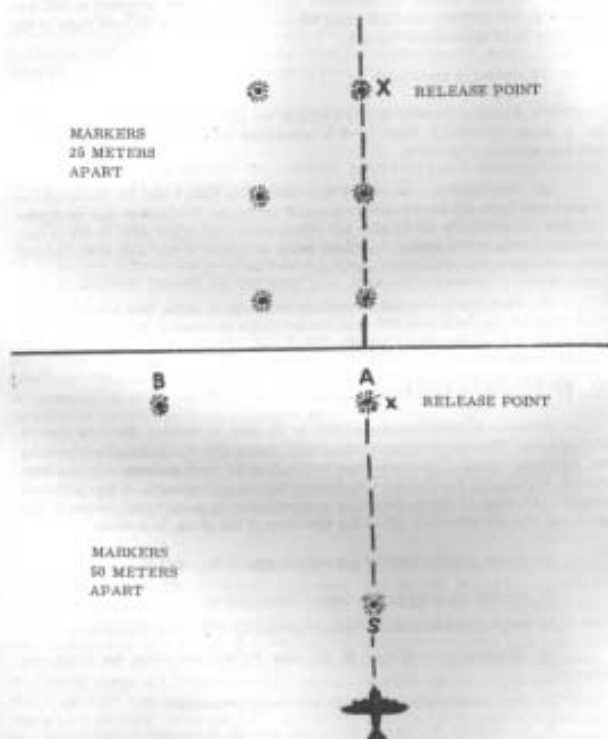


Figure 28. Methods of release point marking.

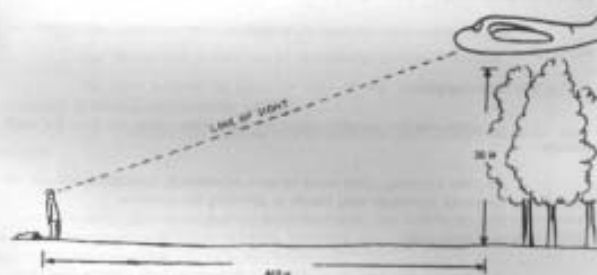


Figure 29. Placement of D2 Markings.

(6) Provide for sterilization of the site only when secrecy is possible and desirable.

c. 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 normally 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.

(4) 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 parachutist or cargo container. For such operations, 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 infiltrated 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.

(5) 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.

26. LANDING ZONES (LAND)

a. General. The same general considerations applicable to DZ selections apply to the selection of LZ's; 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, landings at higher elevations require 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 90° F. Add 30 percent for temperatures over 100° F. (35°C.)

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

(vi) 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 LZ to permit a 180° turn to either side within a radius of 5 kilometers for medium aircraft and 1.6 kilometers for light aircraft.

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

(3) Size. The required size of LZ's varies according to the type of aircraft used. Safe operations require the following minimum dimensions (figures 30 and 31).

(a) Medium aircraft. 920 meters in length and 30 meters in width (45 meters at night).

(b) Light aircraft. 305 meters in length and 15 meters in width (15 meters at night).

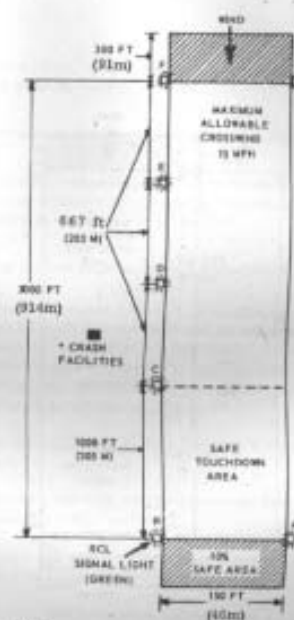
(c) In addition to the basic runway dimensions, and to provide a safety factor, these extra clearances are required.

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.

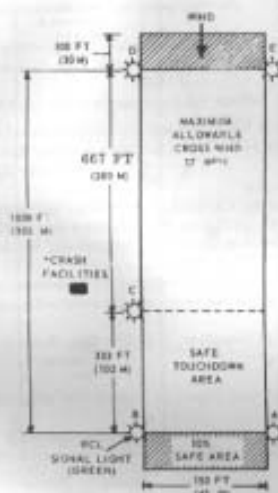
(4) Surface.

(a) The surface of the LZ must be level and free of obstructions such



NOTES:
* WHEN AVAILABLE,
FOR DAY OPERATION SUBSTITUTE PANELS
FOR LIGHTS AND MINIMUM WIDTH IS 10 FT (3 M)

Figure 30. Landing zone (and) medium aircraft (night operations)



NOTES
 * WHEN AVAILABLE
 FOR DAY OPERATION SUBSTITUTE PANELS
 FOR LIGHTS AND MINIMUM WIDTH IS 50 FT (15.2 M)

Figure 31. Landing zone (land) light aircraft (night operations).

as ditches, deep ruts, logs, fences, hedges, low shrubbery, rocks larger than a man's fist or grass over .45 meters in height.

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

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

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

(5) Approach and takeoff clearance. The approach and takeoff clearances are based on the glide-climb characteristics of the aircraft. For medium aircraft the glide-climb ratio is 1 to 40; that is, 1 foot of gain or loss of altitude for every 40 feet of horizontal distance traveled. The ratio for light aircraft is 1 to 30. As a further precaution, any obstructions in approach and departure lanes must conform to the following specifications (figure 32).

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

(b) A 50-foot obstruction may not be nearer than 610 meters for medium aircraft, or 305 meters for light aircraft.

(c) A 100-foot obstruction may not be nearer than 617 kilometers for medium aircraft or 3.32 kilometers for light aircraft.

(d) Hills of 1,400 feet or more altitude above LZ may not be nearer than 13 kilometers from the landing zone for medium aircraft.

(e) 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.

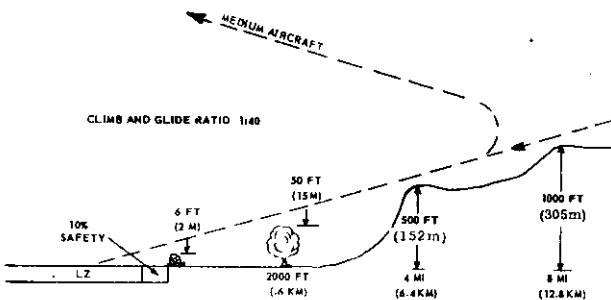
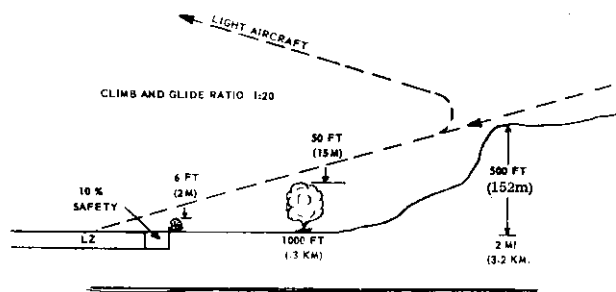


Figure 32. Takeoff and Approach clearances (fixed wing aircraft).

c. Markings.

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

(2) The pattern outlining the limits of the runway consists of five or seven marking stations (figures 30 and 31). Stations "A" and "B" mark the downwind end of the LZ 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 manned by the RCL (a member of the operational detachment) is incorporated into light station "B" at the approach on downwind end of the LZ (figures 30 and 31). For night operations, the signal light operations, 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 LZ 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 or 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 the 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 downwind end of the runway.

(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 modified landing pattern is flown using a minimum of altitude for security reasons. Two minutes before target time the RCL causes 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 15° to either side of the approach track and below 1,500 feet), the LZ marking personnel follow the aircraft with all lights. When the RCL determines the aircraft is on its final approach, he will cease 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 perspective 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 existing condition that, 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 shines a solid light in the direction of the taxiing aircraft. This is the guide light for the pilot who will taxi the aircraft back to 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 off-loading or on-loading 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 exercises caution so that his light does not blind the pilot.

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

(8) When all evacuating personnel are loaded 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 SOI.
- b. Location. Complete military grid coordinates of center of LZ.
- c. Long Axis. 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. Open 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 azimuth, and distance from center of LZ.
- h. Reference Point. Reported same as obstacles.
- i. Date. Time mission requested.
- j. Request. Items to be evacuated.

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) Hover nearly motionless, and take on or discharge personnel and cargo without landing.
- (d) Fly safely and efficiently at low altitudes.

(2) Some unfavorable characteristics of helicopters are the:

- (a) Compromise of secrecy by engine and rotor noise and by dust.
- (b) Difficulty--sometimes impossibility--of operating when icing or high, gusty winds prevail.

(c) The reduction of lifting ability during changes of atmospheric conditions.

(3) 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, tall 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 vision of the pilot just 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). Such 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.

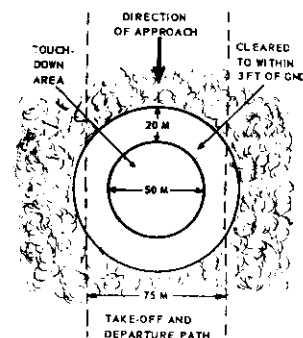


Figure 33. Landing zone for rotary-wing aircraft.

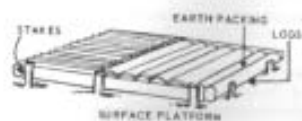


Figure 34. Examples of platform landing zones for rotary-wing aircraft.

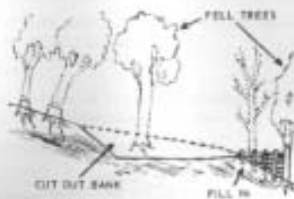


Figure 35. Preparing landing pads in mountainous terrain rotary-wing aircraft.

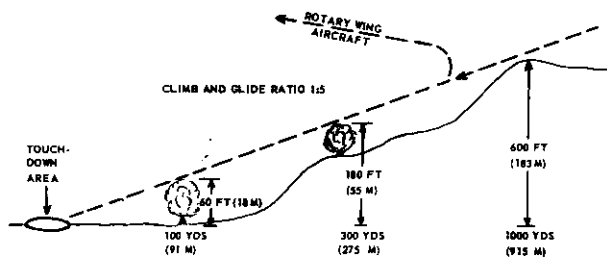


Figure 36. Approach/takeoff clearances (rotary-wing aircraft).

- (b) Be capable of supporting the weight of the aircraft.
- (c) Be of firm construction that will not move when the helicopter touches down and rolls slightly forward.
- (d) Be level.
- (e) If logs or bamboo are used, be constructed so that the top layer of poles is at right angles to the touchdown direction.
- (6) 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.

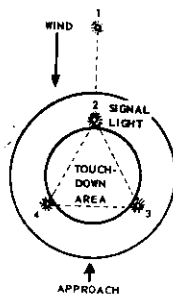
(7) Landing pads can be prepared on mountains or hillsides by cutting and filling (figure 35). Caution must be exercised to ensure there is adequate clearance for the rotors.

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 36).
- (3) Takeoff and departure from the LZ may be along the same path used for the approach; however, a separate departure path as free of obstacles as the approach path is desired (figure 36).

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 LZ's--lights or flares at night, smoke and panels in daylight.
- (3) An acceptable method of marking is the "Y" system. This uses four marker stations (figure 37).



NOTE: ALL LIGHTS SPACED 50 METERS APART

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

CHAPTER 4 TACTICAL AIR SUPPORT

29. FACTORS FOR SELECTING GROUND TARGETS FOR AIR STRIKE

- Identification of Target. Can the target be easily identified by the pilot and can it be marked by smoke, if necessary?
- Capabilities of organic weapons. Are organic weapons incapable of giving the necessary results?
- Aircraft Armament Capabilities. Does aircraft armament have the capability to destroy or neutralize the target?
- Time. Is target of such nature that it will remain long enough to get aircraft on the target?
- 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

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

ITEM NO	ITEM	INFORMATION REQUIRED
10.	Distance and direction from friendly troops	Distance in meters. Direction in magnetic azimuth from troops to target.
11.	Control information	Forward air controller call sign, radio frequencies, target method, if applicable.
12.	Target tactical significance	Why is the mission required?
13.	Spot report required	Yes or no.
14.	Remarks	Any additional data pertinent to the strike

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.

31. ARMY MISSION DATA FOR TAC AIR RECON REQUEST FORM

ITEM NR	ITEM	INFORMATION REQUIRED
1.	Mission request number	See corps SOP.
2.	Unit	Code name or number of unit originating request.
3.	Mission priority	See division SOP.
4.	Type of mission	Photo, visual, radar, ECM.
5.	Target/area description	Personnel? Area? Point?
6.	Desired time on target	Date (and hour, if applicable).
7.	Time	If applicable.
8.	Results desired	What do you want recon to look for?
9.	Type of photo	Vertical, oblique, or strip.
10.	Scale	Higher scale means fewer negatives and fewer prints to cover an area--thus faster delivery of information to you.

ITEM NO	ITEM	INFORMATION REQUIRED
11.	Oblique camera direction	Direction from which you want oblique photos taken.
12.	Number of prints desired	The more you want, the longer it will take.
13.	Deliver film or prints to	Unit you wish to receive film/prints.
14.	Spot report required	Yes or no.

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. (All recon requests are submitted to corps ACofS.)

32. RADIO NETTING CAPABILITIES

TYPE	GROUND RADIO	NET WITH AIR RADIO
VHF-AM	AN/TRC-7 (Ba level)	AN/ARC-12 (0-1) AN/ARC-1 or 3 (All fighter aircraft)
VHF-FM	AN/PRC-10 (Co level) AN/GRC-14* AN/GRC-9* AN/PRC-25	AN/PRC-10 (0-1) **AN/ARC-44 (U.S. helicopter and U.S. fighter aircraft except Jet)
UHF-AM	AN/ARC-27*	AN/ARC-27 (A-1 and Jet) AN/ARC-55 (U.S. helicopters and other U.S. aircraft)

* Radio sets are components of AN/VRC-30 (at regimental level)
** Nets with AN/PRC and AN/VRC-9 and 10 series radios on all channels

33. DUTIES OF THE FORWARD AIR CONTROLLER

- Monitor spot report system.
- Provide liaison between the ground unit commander and the tactical air control system.
- Provide safe separation between target and friendly positions.

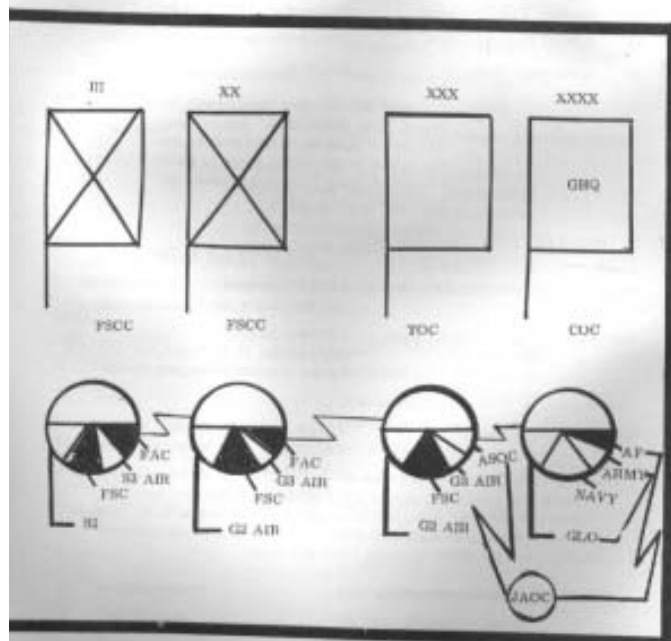


Figure 34. ARVN AIR-GROUND SYSTEM.

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 (successive 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) 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 transmissions for each paragraph below).

1. Target description and location: (Give 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.)

2. Terrain: (Cover hazards to flight such as hills, box canyons.)

3. Enemy ground-to-air fire: (Small arms, flak.)

4. Alternate frequencies to use if radio contact is lost.

5. Target and friendly troop separation distance.

d. Recommended priority of expenditure of ammunition (heaviest load first, unless situation dictates otherwise).

e. Recommended direction of attack and direction of pull-out (best general approach is from friendly side toward target--never from target into friendly troops).

f. Advise pilots of fire adjustment, as required, for succeeding passes.

g. Exchange estimates of strike results with flight leader.

h. Pass strike results to army unit commander.

FIXED AND ROTARY-WING AIRCRAFT CAPABILITIES

AIR CRAFT	CRUISE SPEED (KNOTS)	RANGE FULL FUEL NM	PAYLOAD 50 NM RADIUS	PAYLOAD 100 NM RADIUS	TROOPS COMBAT EQUIPPED	LITERS	CU. FT. CARGO SPACE	EXTERNAL SLING CAPACITY
UH-1B	80	210	3000	2600	7	3	140	3000
UH-1D	100	293	3300	2700	11	6	220	4000
CH-21	80	240	4000	3600	20	12	422	5000
CH-34	80	200	4000	3500	18	8	363	5000
CH-37	80	120	6500	4100	23	24	1142	10000
OH-6	87	390	500	500	1	--	--	--
U-6	105	575	1300	1150	4	2	125	--
U-8F	165	1100	2200	2100	4	4	192	--
U-1A	100	700	2400	2200	9	6	286	--
OY-1	200	410	2000	--	--	--	--	--
CV-2	157	1050	7500	7500	32	14	1150	--

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 I.

CHAPTER 5
COMMUNICATIONS

PHONETIC ALPHABET

Letter	Pronunciation	Letter	Pronunciation
A	ALFA	N	NOVEMBER
B	BRAVO	O	OSCAR
C	CHARLIE	P	PAPA
D	DELTA	Q	QUEBEC
E	ECHO	R	ROMEO
F	FORTY	S	SIERRA
G	GOLF	T	TANGO
H	HOTEL	U	UNIFORM
I	INDIA	V	VICTOR
J	JULIETT	W	WHISKEY
K	KILO	X	XRAY
L	LIMA	Y	YANKEE
M	MIKE	Z	ZULU
PHONETIC NUMBERS			
1	WUN	4	FOUR
2	TWO	5	FIVE
3	THREE	6	SIX
		7	SEVEN
		8	EIGHT
		9	NINE
		0	ZERO

Table II.

<u>PROCEDURE WORDS</u>	
<u>PROWORD</u>	<u>DEFINITION</u>
THIS IS	This transmission is from the station whose designation immediately follows.
OVER	This is the end of my transmission and a response is necessary. Go ahead; transmit.
OUT	This is the end of my transmission and no answer is required. (Since OVER and OUT have opposite meanings, they are never used together.)
ROGER	I have received your last transmission satisfactorily.
SAY AGAIN	Repeat all of your last transmission.
I SPELL	I shall spell the next word phonetically.
CORRECTION	An error has been made in this transmission. Transmission will continue with the last word correctly transmitted.
MESSAGE FOLLOWS	A message which requires recording is about to follow.
WILCO	I have received your message, understand it and will comply. (To be used only by the addressee. Since the meaning of the proword ROGER is included in that of WILCO, the two prowords are never used together.)
I SAY AGAIN	I am repeating transmission or part as indicated.
BREAK	I hereby indicate the separation of the text from other portions of the message.
TIME	That which immediately follows is the time or date/time group of the message.
WAIT	I must pause for a few seconds.
WAIT OUT	I must pause longer than a few seconds.
GROUPS	This message contains the number of groups indicated by the numeral following.
READ BACK	Repeat this entire transmission back to me exactly as received.

Table III.

<u>PROMWORD</u>	<u>DEFINITION</u>
I READ BACK	The following is my response to your instructions to read back.
THAT IS CORRECT	What you have transmitted is correct.
WRONG	Your last transmission was incorrect. The correct version is _____.
RELAY (TO)	Transmit this message to all addressees or to the address designations immediately following.
ALL AFTER	The portion of the message to which I have reference is all that which follows _____.
ALL BEFORE	The portion of the message to which I have reference is all that precedes _____.
FROM	The originator of this message is indicated by the address designation immediately following.
TO	The addressee(s) whose designation(s) immediately following are to take action on this message.
SPEAK SLOWER	Reduce speed of transmission.
WORDS TWICE	Transmit(ing) each phrase (or code group) twice.
VERIFY	Verify entire message (or portion indicated) with the originator and send correct version. (To be used only at the discretion of or by the addressee to which the questioned message was directed.)
I VERIFY	That which follows has been verified at your request and is repeated. (To be used only as a reply to VERIFY.)
SILENCE	"Silence" spoken three times means "Cease transmission immediately." Silence will be maintained until instructed to resume. Transmissions imposing "listening" silence must be authenticated.
SILENCE LIFTED	Resume normal transmission. (Silence can be lifted only by the station imposing it or by a higher authority. When an authentication system is in force, transmission lifting "listening" silence must be authenticated.

Table III (4)

<u>PROMWORD</u>	<u>DEFINITION</u>
SERVICE	The message that follows is a service message.
DO NOT ANSWER	Stations called are not to answer this call, receipt for this message, or otherwise transmit in connection with this transmission. (When this promword is employed, the transmission shall be ended with the promword OUT.)
DISREGARD THIS TRANSMISSION	This transmission is in error. Disregard it. (This promword shall not be used to cancel any message that has been completely transmitted and for which receipt or acknowledgment has been received.)
FLASH	Precedence FLASH. (Reserved for initial enemy contact reports or special emergency operational combat traffic.)
IMMEDIATE	Precedence OPERATIONAL IMMEDIATE. (Reserved for important TACTICAL messages pertaining to the operation in progress.)
PRIORITY	Precedence PRIORITY. (Reserved for important messages which must have precedence over routing traffic.)
ROUTINE	Precedence ROUTINE. (Reserved for all types of messages which are not of sufficient urgency to justify higher precedence, but must be delivered to the addressee without delay.)
FIGURES	Numerals or numbers follow. (Optional)
EXEMPT	The addressee designation immediately following are exempted from the collective call.
INFO	The addressee designations immediately following are addressed for information.
UNKNOWN STATION	The identity of the station with whom I am attempting to establish communication is unknown.
GROUP NO COUNT	The groups in this message have not been counted.
EXECUTE	Carry out the purport of the message or signal to which this applies. (To be used only with the executive method.)
EXECUTE TO FOLLOW	Action on the message or signal which follows is to be carried out upon receipt of the promword "EXECUTE." (To be used only with the executive method.)

Table III (5)

VIETNAMESE PHONETIC ALPHABET, NUMBERS AND PROWORDS
(VIET VA DAM THOAI CAC MAU TU)

LETTER	ENGLISH	VN	PROCEDURE WORDS
A	alfa	anh-dung	This is
B	bravo	bac-binh	Over
C	charlie	cai-cach	Out
D	delta	dong-da	Roger
E	echo	e-de	Say again
F	foxtrot	foxtrot	I spell
G	golf	gay-go	Correction
H	hotel	hong-ha	Message follows
I	india	im-lang	Wilco
J	juliett	juliett	I say again
K	kilo	kinh-ky	Break
L	lima	le-loi	Time
M	mike	manh-me	Wait
N	november	non-nuoc	Wait out
O	oscar	oanh-liet	Group
P	papa	phu-quoc	Read back
Q	quebec	quang-trung	I read back
R	romeo	rach-gia	That is correct
S	sierra	son-tay	Wrong
T	tango	tu-tuong	Relay (to)
U	uniform	ung-he	All after
V	victor	ve-vang	All before
W	whiskey	wit-ki	From
X	xray	xung-phong	To
Y	yankee	yen-bai	Speak slower
Z	zulu	zulu	Words twice

PHONETIC NUMBER
AM THOAI SO

1 = một	một
2 = Hai	Hai lần một
3 = Ba	Hai với một
4 = Bốn	Hai lần hai
5 = Năm	Ba với hai
6 = Sáu	Ba lần hai
7 = Bảy	Ba với bốn
8 = Tám	Hai lần bốn
9 = Chín	Bốn với năm
0 = Không	Không chỉ

Table IV.

ANTENNA LENGTH

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

$$\frac{1}{2} \text{ wave} = \frac{234}{f} \quad \frac{1}{4} \text{ wave} = \frac{468}{f} \quad \text{full wave} = \frac{936}{f}$$

FOR CENTER FED ANTENNA(S), $\frac{1}{2}$ OF DESIRED ANTENNA LENGTH TO EACH SIDE OF INSULATOR

RADIO NET CONSIDERATIONS

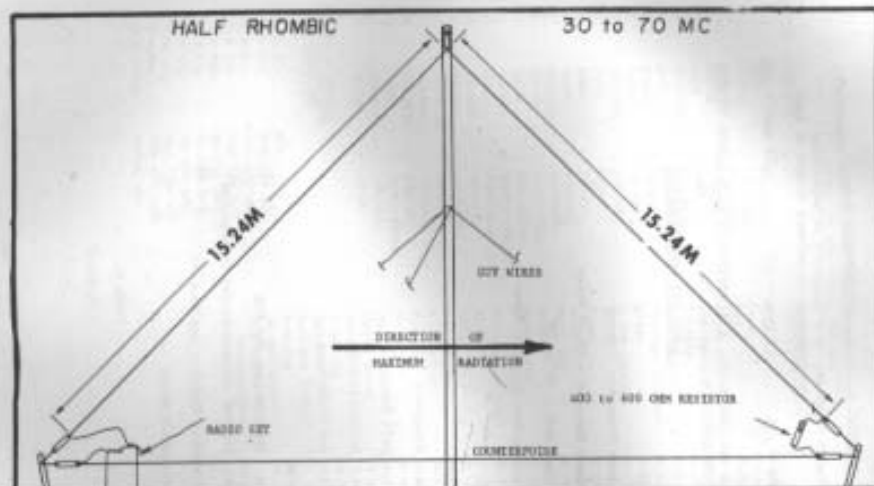
RADIOS

1. Same Frequency Coverage
2. Same Emission - CW or Voice
3. Same Mode - AM or FM
4. Compatible Distance Range

OPERATIONS

1. SOI
 - a. Frequency
 - b. Call Signs
 - c. Authentication
 - d. Net Directions
2. SSI
 - a. Instructions for SOI
 - b. General Communications Information
3. Phonetic Alphabet and Numbers
4. Procedure Words

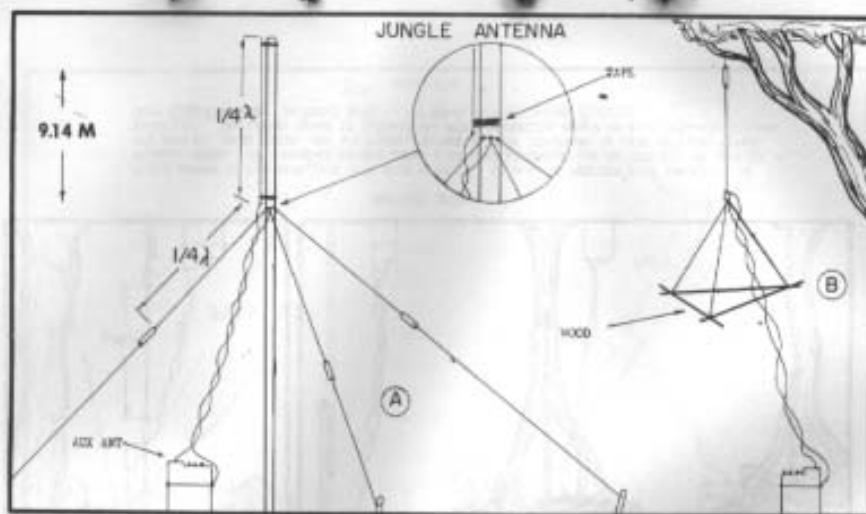
Table V.



HALF RHOMBIC

THE HALF RHOMBIC ANTENNA TERMINATED WITH A 500 OHM RESISTOR HAS A SIZE GAIN (4 to 10 TIMES).
HEIGHT SHOULD BE 9.14 METERS. BOTH ARMS MUST BE EQUAL.
WITHOUT THE RESISTOR THE ANTENNA BECOMES BI-DIRECTIONAL.

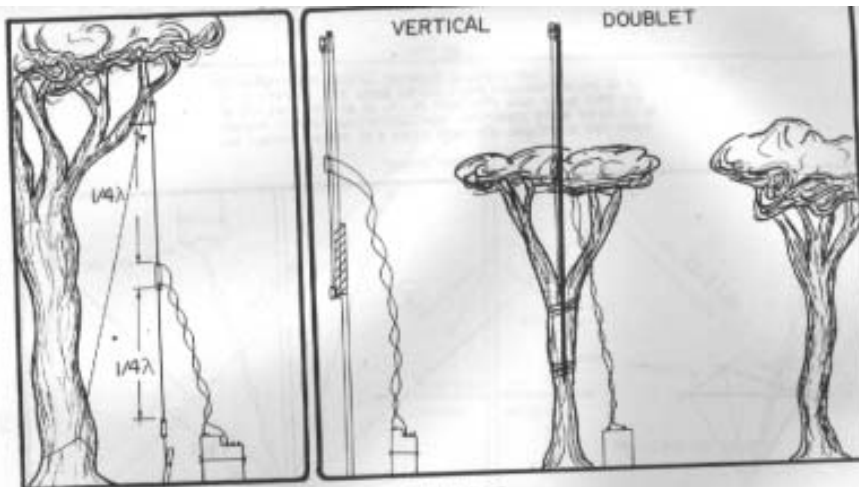
Table VI.



JUNGLE ANTENNA

THE JUNGLE ANTENNA IS A FIELD EXHIBITION VERSION OF THE JUNGLE ANTENNA NO. 250, OMNI-DIRECTIONAL, FREQUENCY RANGE 100 TO 20 MC. IF VERTICAL ELEMENT IS "A" IS SUBSTITUTED FROM ABOVE POLE CAN BE ELIMINATED, THE THREE GROUND PLANE ELEMENTS SHOULD BE AT 45 DEGREES AND MUST BE GROUND TO RADIO SET.

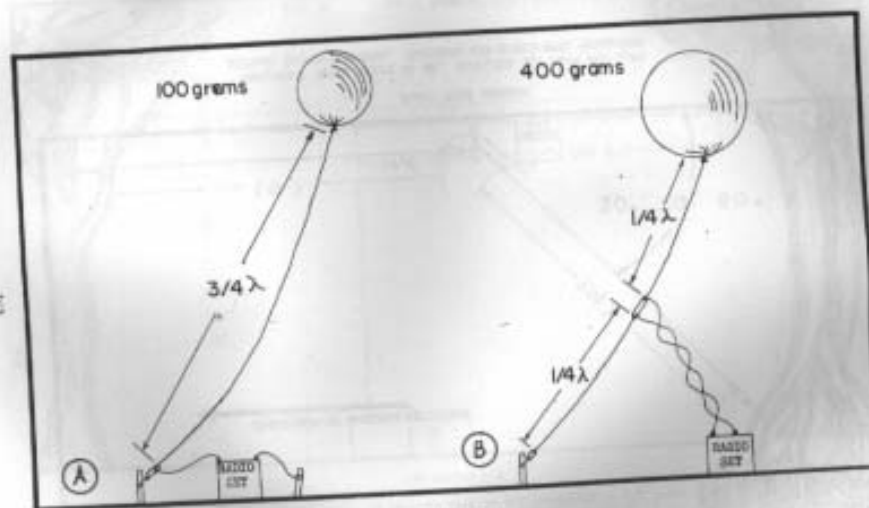
Table VII.



VERTICAL DOUBLET

TOTAL LENGTH IS $1/2$ WAVE, $1/4$ WAVE EACH ELEMENT. LEAD-IN IS TWISTED PAIR (WG-1/TT) OR COAXIAL CABLE. IN JUNGLE OR WOODED AREA A DESIRED ADVANTAGE CAN BE OBTAINED BY GETTING THE ANTENNA ABOVE TREES, FOR ADDITIONAL HEIGHT IS VERY IMPORTANT IN LINE OF SIGHT COMMUNICATION. THE LENGTH MAKES IT IDEAL FOR PRODUCEING BALL-WAVE. (SINGLE-DIRECTIONAL) MOST COMMON RADIOS: AN/GR-5 TYPE 2, AN/PRC-6, AND AN/PRC-10.

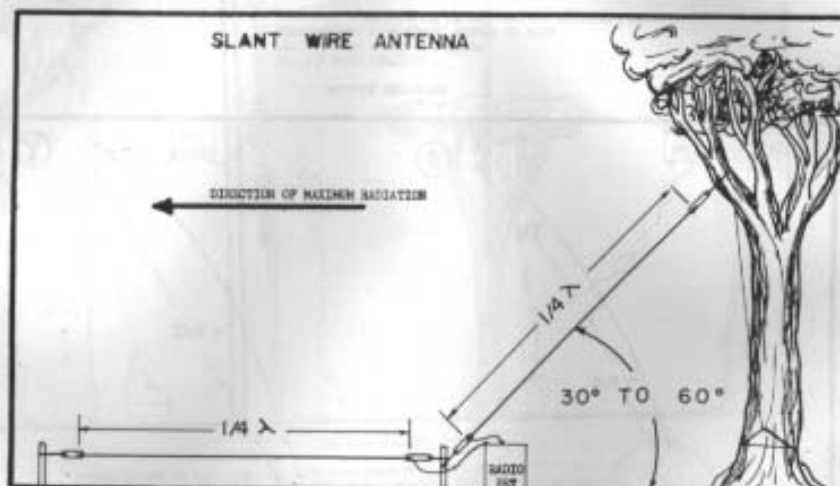
Table VIII.



BALLOON SUPPORT

A $3/4$ WAVE VERTICAL
 B $1/2$ WAVE VERTICAL DOUBLET
 LIMITATIONS: HIGH WINDS, WEIGHT OF WIRE
 AVAILABILITY OF BALLOON AND HYDROGEN CHARGE

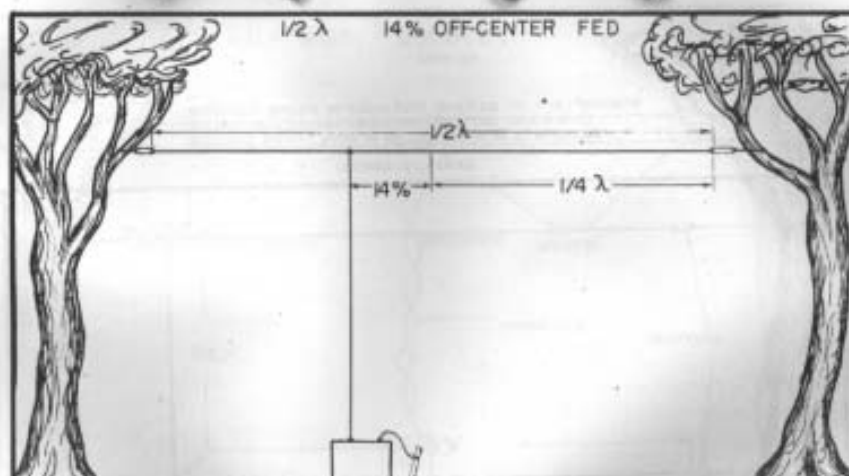
Table IX.



SLANT WIRE ANTENNA

FREQUENCY RANGE BELOW 30 MC. RADIATES KEY NOTE FOR LONG DISTANT COMMUNICATIONS. VERTICAL AND HORIZONTAL POLARIZED

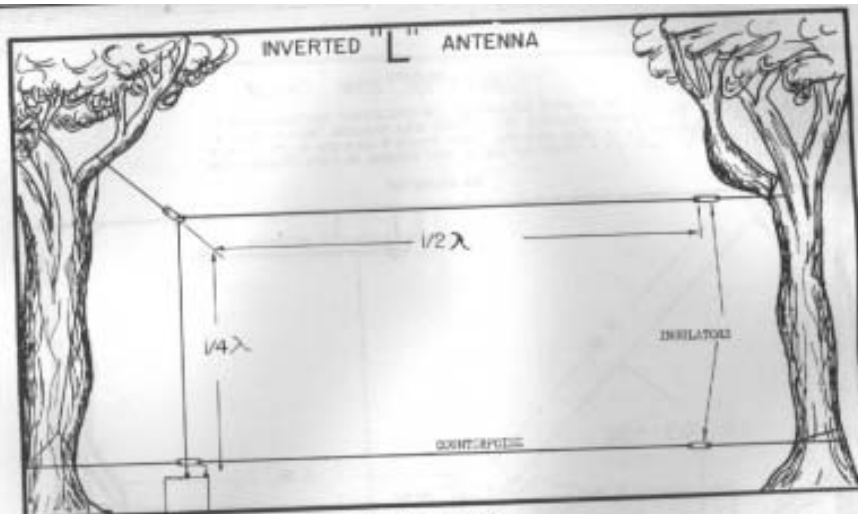
Table X.



1/4 OFF-CENTER FED

WHEN SERIAL CABLE OR TWISTED PAIR IS NOT AVAILABLE, A 1/2 1/4-1/2 ANTENNA MAY BE FED WITH A SINGLE WIRE. THE FEED POINT IS 1/4 PERCENT OF TOTAL LENGTH, MEASURED FROM CENTER. THE RADIATION PATTERN IS BI-DIRECTIONAL (BROADSIDE) FOR FREQUENCIES BELOW 30 MC.

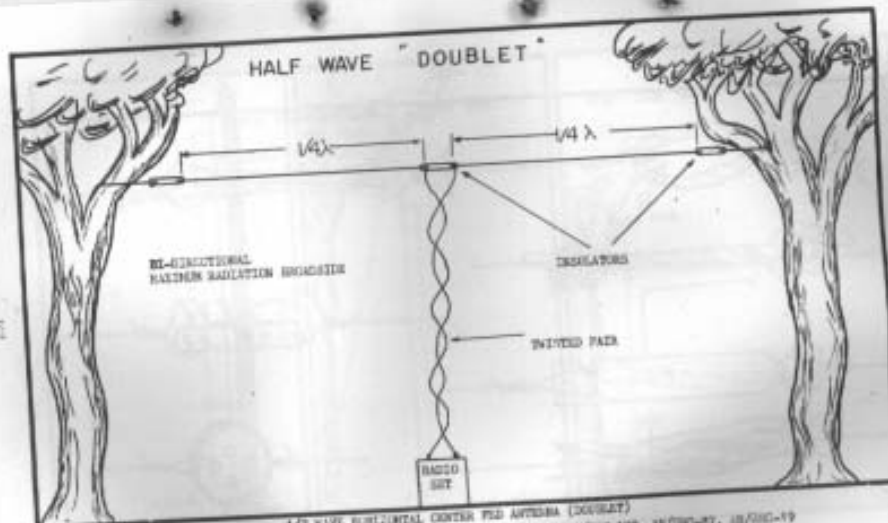
Table XI.



INVERTED "L" ANTENNA

FREQUENCY RANGE: BELOW 30 MC. DIRECTION OF TRANSMISSION:
 VERTICAL PORTION OMNI-DIRECTIONAL (RADIATES GROUND WAVE)
 HORIZONTAL PORTION BI-DIRECTIONAL (RADIATES SKY WAVE) BECAUSE

Table XII.



1/2 WAVE HORIZONTAL CENTER FEED ANTENNA (DOUBLET)

PRACTICAL FOR FREQUENCIES BELOW 30 MC. MOST COMMON BANDS: 80/280-100, 40/700-80, 20/280-30
 ADVANTAGES: HIGH ANGLE RADIATION, LONG DISTANCE COMMUNICATIONS
 DISADVANTAGES: DIFFICULT TO CONSTRUCT (REQUIRES VERTICAL SUPPORTS NEARBY TO OTHER
 STATION), POOR GROUND WAVE.

Table XIII.

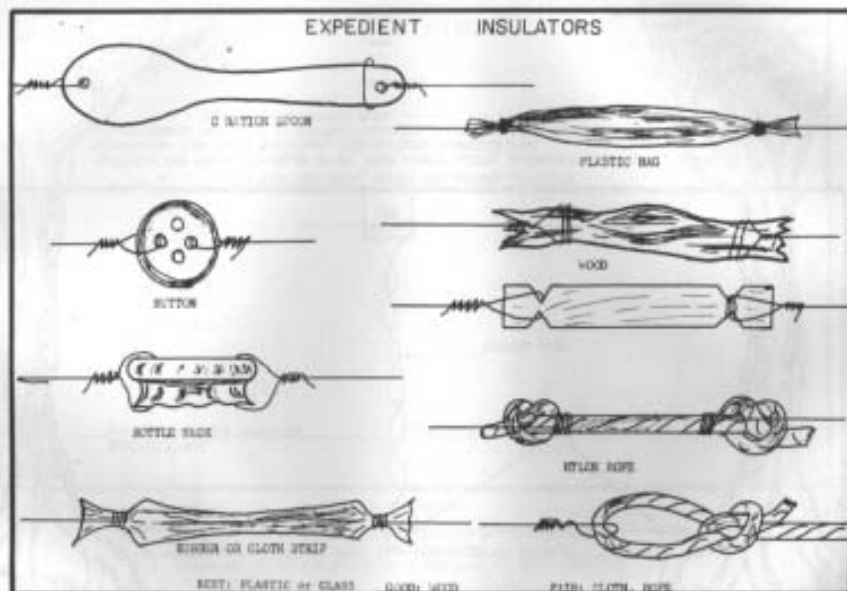
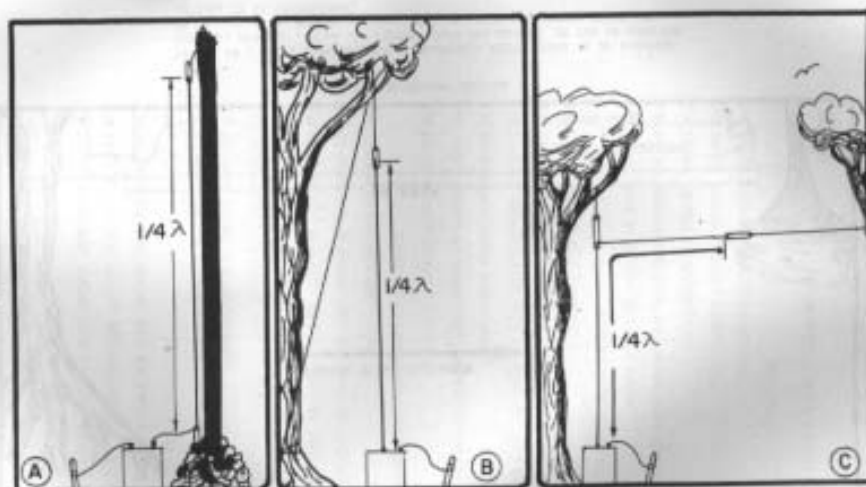


Table XIV.



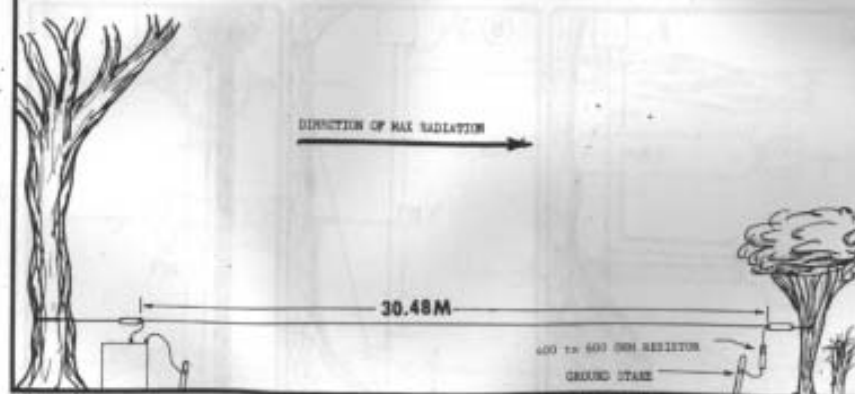
VERTICAL 1/4 WAVE ANTENNA (W1P)

THE 1/4 WAVE VERTICAL IS THE ANTENNA IN ITS SIMPLEST FORM. TRANSMISSION IS UNIDIRECTIONAL. SIMPLE CONSTRUCTION MAKES IT PRACTICAL FOR PATROLS. LIMITATIONS: AVAILABILITY OF CONVENIENT SUPPORT. NOT PRACTICAL FOR FURTHER USE WHERE 1/4 WAVE WOULD BE LONGER THAN SUPPORT AVAILABLE. NOTE: IF SUPPORT IS NOT HIGH ENOUGH, USED AS IN "C," SIGNAL WILL BE STRONGER THAN IF ONLY THE VERTICAL PORTION WERE USED.

TABLE XV.

FIELD EXPEDIENT ANTENNAS

30 TO 80 MC



FIELD EXPEDIENT ANTENNA

THE 30.48 - METER WAVE ANTENNA IS PRACTICAL WHERE THERE IS NO OVERHEAD SUPPORT. ERRECTED .61 TO .93 METERS ABOVE THE GROUND, IT CAN BE LAID OUT ON TALL GRASS OR BUSHES. WITHOUT THE RESISTOR AND GROUND STAKE THE ANTENNA IS BI-DIRECTIONAL.

Table XVI

FREQUENTLY USED REFERENCES

GENERAL

FM 24-20, FIELD WIRE TECHNIQUES
FM 24-18, FIELD RADIO TECHNIQUES
FM 31-30, 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 11-5820-292-10, RADIO SET AN/PRC-10 AND AN/PRC-10A
TM 11-5820-453-10, RADIO SET AN/GRC-87 AND AN/VRC-34
TM 11-5020, ANTENNA EQUIPMENT
TO 31R2-2TRC7-12, RADIO SET AN/TRC-7 (USAF)
TM 38-750, MAINTENANCE RECORDS

ORGANIZATIONAL MAINTENANCE MANUAL

TM 11-296, RADIO SET AN/PRC-6
TM 11-5820-292-20, RADIO SET AN/PRC-10 AND AN/PRC-10A
TM 11-5820-453-20, RADIO SET AN/GRC-87 AND AN/VRC-34
TM 11-5820-348-12P, ANTENNA EQUIPMENT RC-292
TO 31R2-2TRC7-12, RADIO SET AN/TRC-7 (USAF)
TM 11-4069, RADIO SET AN/PRC-6
TM 11-4065 and TM 11-4065A, RADIO SET AN/PRC-10 and PRC-10A

PARTS MANUAL

TM 11-5820-355-20P, RADIO SET AN/PRC-6
TM 11-5820-292-20P, RADIO SET AN/PRC-10 AND AN/PRC-10A
TM 11-5820-453-20P, 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 communications, 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 "N" 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) Net 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 "E" to SEND. (Except when using G-43/G and dry battery in which case it is placed on STANDBY.)

(e) Control "I" to correct DIAL SETTING for the frequency that the RECEIVER is calibrated on.

(f) Control "H" adjust for zero beat. (Do not close MIKE or KEY.) Apply power to set when using G-43/G hand generator.

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

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

(5) Tune the antenna.

(a) Control "A" to highest numbered position of antenna being used.

(b) Control "B" turn to line up two red dots.

(c) Control "L" to CW or PHONE for type of service desired.

(d) Press the KEY and adjust control "C" for brightest glow on control "B." (If necessary, repeat this operation after moving control "A" to the next lower numbered position.)

(e) Control "D" to PHONE, MCW, or CW for type of operation desired.

b. Interpolation. Interpolation is the mathematical process of determining the proper transmitter dial setting for frequencies that are not listed on the calibration chart of Radio Set AN/GRC-87 or AN/VRC-34. An operating frequency of 3760 kc may be placed on the transmitter dial from direct reading on the calibration chart; however, interpolation must be used to obtain the transmitter dial setting for 3769 kc.

Using 3769 kc as an example and following the steps below, the correct transmitter or dial reading can be computed.

NOTE: Following is an extract from a calibration chart, band 2. Examine the chart and locate the frequency and dial setting immediately below the assigned frequency and the frequency and dial setting immediately above the assigned frequency.

INTERPOLATION FOR TRANSMITTER DIAL SETTINGS

FREQ	/400	/20	/40	/60	/80
3600	201	241	281	319	357
3700	395	432	468	503	539
3800	574	607	641	674	706

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

EXAMPLE: Frequency listed immediately above 3760 kc
Frequency listed immediately below 3760 kc
20 kc

Table XVIII

Table XVIII (1)

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 539
Dial setting for frequency immediately below 503
36

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

EXAMPLE: (STEP 1) 20 kc = 36 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 3769 kc
Frequency listed immediately below 3760 kc
9 kc

$$9 \times 1.8 = 16.2$$

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 16.2
519.2

NOTE: All substations will tune as prescribed above. At such time as the NCS opens the net, all substations will then fine tune to the NCS or as he may direct.

Table XVIII (2)

GROUND-AIR EMERGENCY PANEL CODE

REQUIRE DOCTOR, SERIOUS INJURIES
 REQUIRE MEDICAL SUPPLIES
 UNABLE TO PROCEED
 REQUIRE FOOD AND WATER
 REQUIRE FIREARMS AND AMMUNITION
 REQUIRE MAP AND COMPASS
 REQUIRE SIGNAL LAMP WITH BATTERY AND RADIO
 INDICATE DIRECTION TO PROCEED
 AM PROCEEDING IN THIS DIRECTION
 WILL ATTEMPT TAKEOFF
 AIRCRAFT SERIOUSLY DAMAGED
 PROBABLY SAFE TO LAND HERE
 REQUIRE FUEL AND OIL
 ALL WELL
 NO
 YES
 NOT UNDERSTOOD
 REQUIRE ENGINEER
 OPERATION COMPLETED
 WE HAVE FOUND ALL PERSONNEL
 WE HAVE FOUND ONLY SOME PERSONNEL
 WE ARE NOT ABLE TO CONTINUE, RETURNING TO BASE.
 HAVE DIVIDED INTO TWO GROUPS, EACH PROCEEDING IN
 INFORMATION RECEIVED THAT AIRCRAFT IS IN THIS DIRECTION
 NOTHING FOUND, WILL CONTINUE TO SEARCH

NOTE: A SPACE OF 3.05 METERS BETWEEN ELEMENTS
WHenever POSSIBLE

Table XVIII

Characteristics of Tactical Radio Sets

RADIO SET	MODE	EMISSION	POWER OUTPUT (WATTS)	FREQUENCY (MHz)	RANGE (mi)	WEIGHT (kg)	POWER SUPPLY	REMARKS
AN/CRC-81 (AN/VRC-74)	AM	Voice CW	7 - 15	2 - 12	24 - 46	52 - 115	BA-68/BA-717 GM-35 DC-28/DC-105	TM 11-5820-453-10 Long-range Point-to-point
AN/PBC-6	FM	Voice	.25	47 - 55.4	2	2.2 - 6	BA-270/U	TM 11-6089 Short-range Point-to-point
AN/PBC-10	FM	Voice	.9	38 - 55	8	12 - 26	BA-279/U	TM 11-6085 Point-to-point Ground-to-air
AN/PBC-25	FM	Voice	1.5 - 2	30 - 75.95	8	11.4-24.7	BA-386/U	TM 11-5820-390-10 Point-to-point Ground-to-air
AN/PBC-41	AM	Voice	3	225-399	Line of sight	20 - 45	BB-451	11-5820-510-12 Ground-to-air
AN/TRG-7	AM	Voice	.4 - 1.5	100-156	24	17 - 38	BA-70 G-43	3182-2781-7-12 (USAF) Ground-to-air
AN/PBC-4	AM	Voice	.075	120-130 240-260	Line of sight	2.7 - 6	BA-1315/U	TM 11-5820-341-12P Ground-to-air (Rescue)
AN/UBC-10	AM	Voice FSK	.2	238-263	Line of sight	1.9 - 3	BA-1387/U	Not published Ground-to-air (Rescue)
AN/UBC-11	AM	Voice CW	.1	240-260	Line of sight	1.9 - 3	BA-1315/U	TM 11-5820-342-10 Ground-to-air (Rescue)
MT-1	AM	Voice	.5	30 - 40	8	2.2 - 5	(S) BA-30 12 VDC	Point-to-point (Portable)
TR-5	AM	Voice	4	30 - 40	17	1.8 - 8	12 VDC	Point-to-point (Handset)
TR-20	AM	Voice	20	30 - 40	10	9 - 20	115 VAC 12 VDC	Point-to-point (Village)
TR-25	AM	Voice CW	35	2 - 9	80	17 - 28	115 VAC 12 VDC	Point-to-point (Province)

TABLE XV

CHAPTER 6
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 its location in one of the following ways:

a. Military grid reference (map coordinates). Using the observed fire fan is an aid to locating targets in this manner. The observed fire fan is a fan-shaped protractor constructed of transparent material, covering a 1,600 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 6,000 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 OT 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 to the adjusting point is usually estimated by using every known range that can be determined 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 mil relation 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 (known) point method. The location of a target may be designated 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 numbered concentration, or any point which has been previously located either by survey or by firing. The observer computes the shift in both direction and range with reference to the OT 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 OT line; then, determine the necessary range change (nearest 100 meters) from this point on the OT 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 OT line method is not applicable; therefore, sensings are based on a given reference line instead of an OT 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 15,000 meters.
- c. 155-mm Howitzer - 14,500 meters w/new ammo 18,500 meters.
- d. 8-inch Howitzer - 18,500 meters.
- e. 175-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 sends 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.

ELEMENT

EXAMPLE

- | | |
|--|--|
| 1. Identification of observer. | 1. CO, Co. A, 1st Bn, 503 ABN Inf. |
| 2. Warning Order. | 2. Fire Mission. |
| 3. Location of target and azimuth from observer to target. | 3. Coordinates 55897
Azimuth 4340 (mils). |
| 4. Nature of target. | 4. Two machine guns, dug-in. |
| 5. Type of adjustment. | 5. Area fire or precision fire. |
| 6. Ammunition. | 6. When omitted will automatically be (HE) high explosive. |
| 7. Fuze action. | 7. When omitted will automatically be percussion. Observer can request VT or delay fuze. |
| 8. Control. | 8. Will adjust. |

39. MIL RELATION (WORM FORMULAS)

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 6,400 angles of 1 mil each. At a distance of 1,000 meters, an object 1 meter wide will measure 1 mil (m) (figure 39). Thus, mils can be changed to meters by multiplying the number of mils 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 (1)).

40. SENSINGS

- a. Range Sensing. To sense the burst with respect to a target, the observer mentally notes what he sees at the moment the shell bursts. The observer must make his sensing promptly. If the burst is directly behind the target, the burst is over, line. If the burst hides 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 doubtful. A burst not seen by the observer is sensed lost.

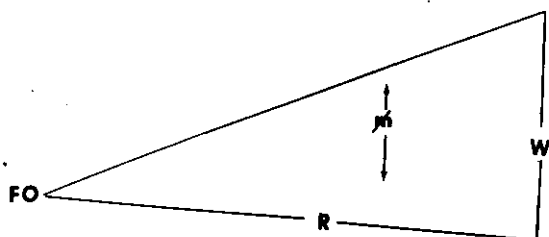


Figure 39. Worm Formula

m = Angular width of the object in mils.
 W = Width of the object in meters.
 R = Range or distance in thousands of meters.

FORMULA: $m = \frac{W}{R}$

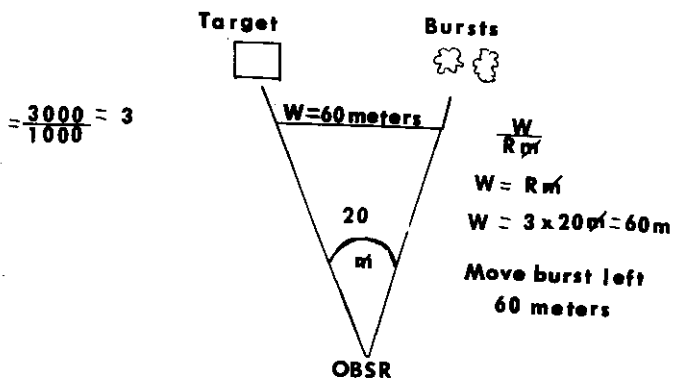


Figure 39. (1) Worm Formula

b. Deviation Sensings. The bursts of rounds are sensed for deviation as right or left (of the OT line), or line (on the OT line). A round must be sensed carefully from the center of the burst or, in the case of a volley or salvo, sensed from the center of the group of bursts. All sensings for deviation to the right (left) of the OT line are sensed (so much) right (left), and are measured in mils. For example, 40 RIGHT would mean that the observer saw and sensed the burst 40 mils to the right of the OT line.

41. BRACKETING

The basic principle in adjusting artillery fire is to bracket the target. Bracketing means to enclose the target between over and short bursts for range. For example, in bracketing a target, if 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 sensing 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 sensing of over (figure 40), 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, what are commonly referred to as deviation corrections, height of burst corrections, and range 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

43. INTRODUCTION

The information in this chapter is intended to supplement, not replace, that contained in FM 5-25, "Explosives and Demolitions," and FM 5-34 "Engineer Field Data." These field manuals, GTA 5-14, The Demolition Card, and GTA 5-21, 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 42.30 kgs per sack (0.28 cubic meters loose volume; .014 cubic meters absolute volume). Store in a dry, tight building.

(2) **Sand.** Use clean sand free of clay, soil, salts, organic matter, or foreign substances, and graded between No. 4 and No. 100 sieves; maximum passing No. 100 sieve, 8 percent.

(3) **Gravel.** Use clean gravel free of dust, clay balls, or foreign substances, and graded between No. 4 sieve, and the maximum size (usually 2.54, 3.81, 5.08, or 6.35 cm). Common fault is excess of pea gravel (.95 to .64 cm).

(4) **Crushed stone.** Use crushed stone free of excess dust, sticks, of foreign material, and graded between No. 4 sieve and maximum size.

(5) **Water.** Use clean water free of acids, alkalies, oil, and vegetable matter. If the water can be used for drinking purposes, it is acceptable for use in concrete. Sea water may be used to make concrete; however, a compressive strength reduction of 10 to 20 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 .76 cubic meters or less. Increase the time 15 seconds for each increase of .38 cubic meters of concrete. If mixing is done by hand, mix

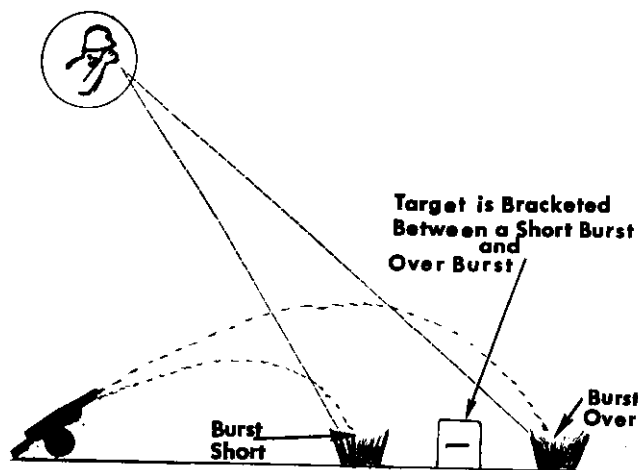


Figure 40. Bracketing.

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 3.82 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 enclosure. In no case should the temperature of the fresh concrete be above 80°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 50°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 40 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 trowel 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 10 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 110°F in the mixer.) Concrete placed at 72° to 90°F will set about twice as fast as that placed at 35° to 45°F.

c. Cement Content, Slump, and Curing.

	Cement per 138 cubic meters batch (sacks)	Slump (inches)	Moist curing time at temperatures of 70°F or over (days)
Footings, foundations, and floors	2 1/2	3	5
Pavements	2 1/2	2	10
Structural elements and bridges	3	4	10
Tanks and reservoirs	3	3	10

d. Batch Quantities and Strengths. The following tables give batch quantities and strengths for .38 cubic meters of concrete made from standard, Portland cement. Tables are based on aggregate of average grading and having a specific gravity of 2.65. Sand is assumed to weigh 40.05 kgs per .028 cubic meters (damp and loose) and to contain 5 percent free moisture. Gravel and stone are assumed to be surface dry and weigh 44.55 kgs per .028 loose cubic meter. A sack of cement weighs 42.30 kgs and has a volume of .028 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 a 7 - or 28-day strength 15 percent higher than called for. For example, if a required strength of 1,900 pounds per square inch is desired, increase this value by 15 percent to find the water-cement ratio. Thus, $1,900 \times 1.15 = 2,185$. At this value the required water-cement ratio is 7.20 and the slump is 3 inches when using 1-inch gravel.

e. Lumber Measure. Lumber quantities are expressed in feet, board measure (fbm 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 $12 \times 2/3 \times 2$ or 16 fbm.

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 road and access routes. In tactical 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.

Cement port. la. type batch (1-cu-ft socks)	Slump (inches)	Materials per ½-cubic-yard batch*						Estimated strength (lb per sq in)		Actual water- cement ratio (gal per sack)
		By volume			By weight					
		Sand (cu ft)	Grav- el (cu ft)	Added water (gal)	Sand (lb)	Grav- el (lb)	Added water (lb)	7 days	28 days	
2	4	8.6	9.3	15.2	760	920	127	1200	2000	9.75
2	3	8.7	9.5	13.6	775	940	113	1400	2300	9.00
2	2	8.9	9.7	12.0	790	960	100	1700	2700	8.25
2½	4	8.0	9.4	15.5	710	930	129	1900	2800	7.80
2½	3	8.1	9.6	13.9	720	950	116	2200	3200	7.20
2½	2	8.3	9.8	12.3	735	970	103	2500	3600	6.60
3	4	7.4	9.5	15.7	660	940	131	2500	3700	6.50
3	3	7.6	9.7	14.2	670	960	118	2800	4000	6.00
3	2	7.7	9.9	12.6	685	980	105	3200	4400	5.50
3½	4	6.9	9.6	16.0	610	945	134	3100	4400	5.57
3½	3	7.0	9.8	14.5	620	965	122	3400	4200	5.14
3½	2	7.2	10.0	12.9	635	985	108	3700	5200	4.71

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 50 percent.

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

Table XXI

2-INCH GRAVEL											
Cement per ½- cu-yd batch (1-cu-ft sacks)	Approx slump (inches)	Materials per ½-cubic-yard batch*						Estimated strength (lb per sq in)		Actual water- cement ratio (gal per sack)	
		By volume			By weight						
		Sand (cuft)	Grav- el (cuft)	Added water (gal)	Sand (lb)	Grav- el (lb)	Added water (lb)	7 days	28 days		
2	4	7.9	10.2	14.0	705	1005	117	1400	2300	9.00	
2	3	8.1	10.4	12.4	720	1025	104	1700	2700	8.25	
2	2	8.2	10.6	10.8	730	1045	90	2000	3000	7.50	
2½	4	7.4	10.3	14.3	635	1015	119	2200	3200	7.20	
2½	3	7.5	10.5	12.7	665	1035	106	2500	3600	6.60	
2½	2	7.7	10.7	11.1	680	1055	93	2800	4000	6.00	
3	4	6.8	10.3	14.5	605	1020	121	2800	4000	6.00	
3	3	7.0	10.6	13.0	615	1045	108	3200	4400	5.50	
3	2	7.1	10.8	11.4	630	1065	95	3500	4900	5.00	
3½	4	6.3	10.4	14.8	555	1030	124	3400	4800	5.14	
3½	3	6.4	10.6	13.3	570	1050	111	3700	5200	4.71	
3½	2	6.5	10.9	11.7	580	1070	98	3900	5500	4.29	

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 15 percent from volume and 5 percent from weight.

Table XXII

1-INCH STONE											
Cement per 1/2- cu-yd batch (1-cu-ft sacks)	Approx slump (inches)	Materials per 1/2-cubic-yard batch*						Estimated strength (lb per sq in)		Actual water- cement ratio (gal per sack)	
		By volume			By weight						
		Sand	Stone	Added water	Sand	Stone	Added water				
		(cu ft)	(cu ft)	(gal)	(lb)	(lb)	(lb)	7 days	28 days		
2	4	9.9	8.2	14.5	880	805	121	1400	2000	9.75	
2	3	10.1	8.3	12.9	900	820	107	1400	2300	9.00	
2	2	10.3	8.5	11.3	915	840	94	1700	2700	8.25	
2½	4	9.3	8.3	14.8	825	820	123	1900	2800	7.80	
2½	3	9.5	8.5	13.2	840	835	110	2200	3200	7.20	
2½	2	9.7	8.6	11.6	860	850	97	2500	3600	6.60	
3	4	8.7	8.4	15.1	770	830	126	2500	3700	6.50	
3	3	8.9	8.6	13.5	790	845	113	2800	4000	6.00	
3	2	9.1	8.8	11.9	805	865	99	3200	4400	5.50	
3½	4	8.1	8.5	15.4	720	840	128	3100	4400	5.57	
3½	3	8.3	8.7	13.8	735	855	115	3400	4800	5.14	
3½	2	8.5	8.9	12.2	750	875	102	3700	5200	4.71	

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

*Table is based on 5 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 XXIII

2-INCH STONE											
Cement per 1/2- cu-yd batch (1-cu-ft sacks)	Approx. slump	Materials per 1/2-cubic-yard batch*						Estimated strength		Actual water- cement- ratio (gal per sack)	
		By volume			By weight			(lb per sq in)			
		Sand (cuft)	Stone (cuft)	Added water (gal)	Sand (lb)	Stone (lb)	Added water (lb)	7 days	28 days		
2	4	9.3	9.0	13.3	830	890	111	1400	2300	9.00	
2	3	9.5	9.2	11.7	845	905	98	1700	2700	8.25	
2	2	9.7	9.4	10.1	860	925	84	2000	3000	7.50	
2 1/2	4	8.7	9.1	13.6	775	900	113	2200	3200	7.20	
2 1/2	3	8.9	9.3	12.0	790	920	100	2500	3600	6.60	
2 1/2	2	9.1	9.5	10.4	805	935	87	2800	4000	6.00	
3	4	8.1	9.2	13.9	720	910	116	2800	4000	6.00	
3	3	8.3	9.4	12.3	735	930	103	3200	4400	5.50	
3	2	8.5	9.6	10.7	750	950	89	3500	4900	5.00	
3 1/2	4	7.6	9.3	14.2	670	920	118	3400	4800	5.14	
3 1/2	3	7.7	9.5	12.6	685	940	105	3700	5200	4.71	
3 1/2	2	7.9	9.7	11.0	700	960	92	3900	5500	4.29	

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

*Table is based on 5 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 XXIV

BRIDGE CONSTRUCTION - SHEETS DATA

BRIDGE COMPONENTS OF TIMBER TRUSSLE BRIDGE *

No.	Bridge Components	Common Size or References
1	Tread	See figure 42 - Timber Trussle Bridge
2	Open-laminated deck	See figure 42 - Timber Trussle Bridge
3	Curb	15.24 x 15.24 cm., figures 42 and 43
4	Curb riser block	See figures 42 and 43
5	Handrail	See figures 42 and 43
6	Handrail post	See figures 42 and 43
7	Handrail kneebrace	5.08 x 10.16 cm., figures 42 and 43
8	End dam	Use tread material
9	Timber stringers	See figure 42
10	Steel stringers	See figure 42
11	Cap	See figure 44
12	Posts	See figure 44
13	Transverse bracing	5.08 x 25.40 or 7.62 x 32 cm., figure 44
14	Longitudinal bracing	10.16 x 15.24 or 7.62 x 20.32 cm., figure 44
15	Scabs	Use tread material
16	Sill	See figure 44
17	Footings	See figure 44
18	Abutment sill	See figure 41
19	Abutment footings	See figure 41

*See figures 41 and 44

Table XXV

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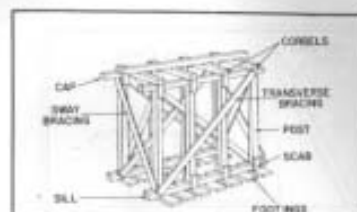


Figure 41. Timber trestle pier.

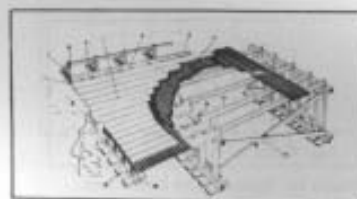


Figure 42. Timber trussle bridge.

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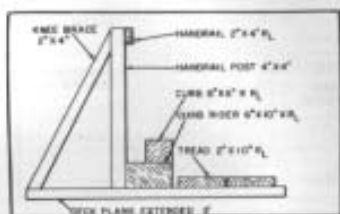


Figure 43. Curb and handrail system (minimum specifications).



Figure 44. Typical timber trestle bed.

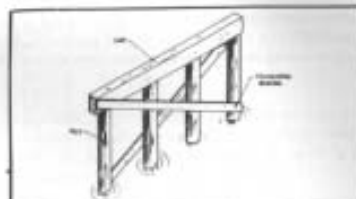


Figure 45. Pile bent.



Figure 46. Concrete slab bridge.

Required Culvert Opening, in Square Feet, Computed from Talbot's Formula				
Drainage area in acres	Mountain- ous (C 1.0)	Hilly (C 0.7)	Rolling (C 0.5)	Flat (C 0.2)
2	1.7	1.2	0.9	0.3
5	3.3	2.3	1.7	0.7
10	5.6	3.9	2.8	1.1
20	9.5	6.7	4.8	1.9
30	12.8	9.0	6.4	2.6
40	15.9	11.1	8.0	3.2
50	17.8	12.5	8.9	3.6
75	25.4	17.8	12.7	5.1
100	31.6	22.1	15.8	6.3
150	42.9	30.0	21.5	8.6
200	53.1	37.2	26.6	10.7
300	72.2	50.5	36.1	14.4
400	88.1	61.7	44.1	17.6
500	106.0	74.2	53.0	21.2
600	121.0	85.0	61.0	24.0
800	151.0	106.0	76.0	30.0
1,000	178.0	125.0	86.0	36.0
1,200	204.0	143.0	102.0	41.0
1,500	241.0	169.0	121.0	48.0
2,000	299.0	209.0	150.0	60.0
2,500	353.0	247.0	177.0	71.0
3,000	(*)	284.0	203.0	81.0
4,000	(*)	352.0	252.0	101.0
5,000	(*)	(*)	298.0	119.0
7,500	(*)	(*)	(*)	161.0
10,000	(*)	(*)	(*)	200.0
15,000	(*)	(*)	(*)	271.0
20,000	(*)	(*)	(*)	336.0

* Formula not to be used for these conditions.

NOTE: Value of C may be reduced where ponding or temporary storage is available, such as in irrigated areas or rice paddies.

Table XXVI

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 at the grade of the natural and artificial drainage channels which discharge into them. Grades of 2 to 4 percent are desirable. Velocities should not be over 2.44 meters per second nor less than .76 meters per second.

(3) Culverts should be placed wherever natural drainage channels require cross-drainage. Figure 49 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 culverts: log box and timber box. Examples of each are shown in figures 51 through 53.

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

(1) Notched, having a 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. Expedient Culverts.

(1) One culvert of this kind uses oil, gasoline, or asphalt drums. Remove their ends with detonating cord, sharp hand tools, or the pneumatic metal drum opener. CAUTION: Do not use a torch or other tools on gasoline or oil drums unless they are completely empty. Join these drums end to end by tackwelding, bolting, or wiring (figure 55).

(2) Another type of expedient culvert is also illustrated in the lower part of figure 55. It uses sandbags and pierced metal panels, the latter being placed both above and below the sandbags as shown in figure 55.

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 30.48 cm., preferably 45.72 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 fill to prevent erosion.

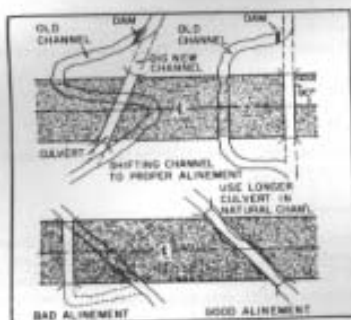


Figure 48. Alignment of culverts.



Figure 49. Spacing of ditch-relief culverts.

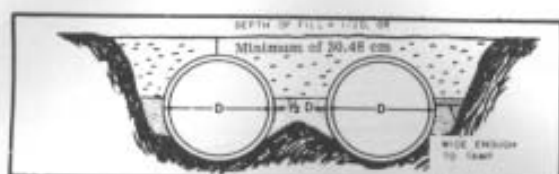


Figure 50. Spacing of multiple-pipe culvert.

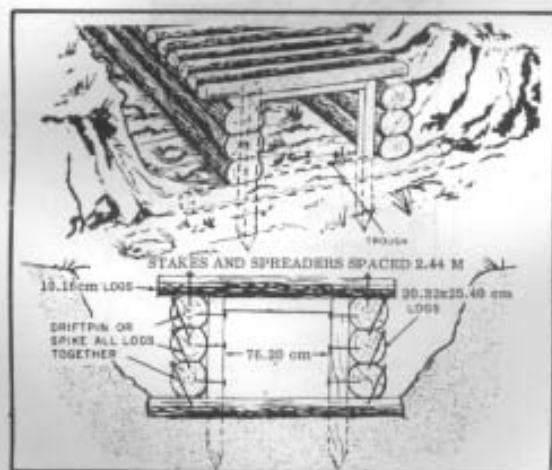


Figure 51. Log culvert, 30-inch.

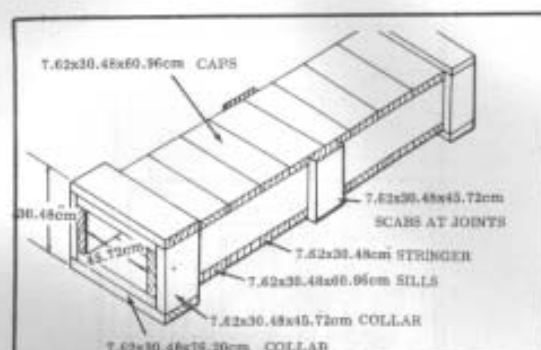


Figure 52. Timber box culvert, 18 x 12-inch.

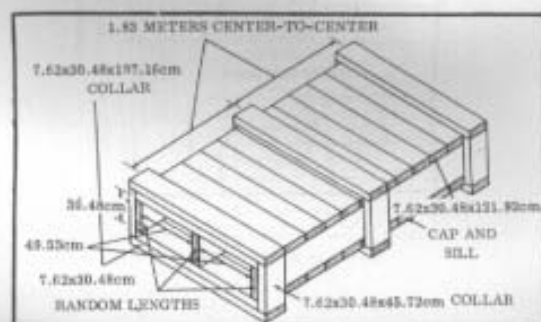


Figure 53. Timber box culvert, 18 1/2 x 12-inch.

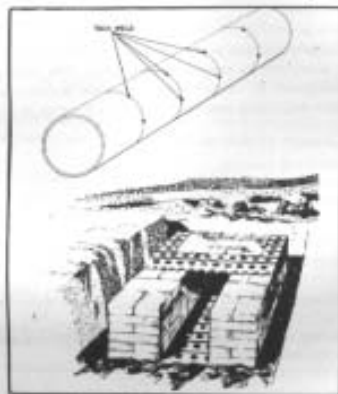


Figure 35. Expedient culverts.

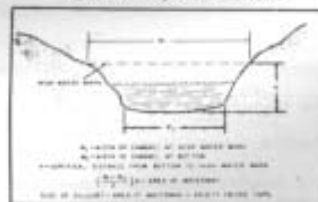


Figure 56. Hasty culvert.

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 alternates and supplementary positions.
- (j) Preparing CBR protective shelters as required.
- (k) Preparing deceptive installations in accordance with deceptive plans of higher headquarters.

h. 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.

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

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

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

(d) 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.

(e) Remove or thin out thick brush.

(f) Remove hay or grain crops by mowing.

(g) Drag away cut brush.

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

Manhours Required to Clear 100 Square Meters

Description of clearing	Tools used	#Manhours required
Medium clearing: Clearing undergrowth and trees less than 30.48 cm. in diameter	Saws, axes	3
Light clearing: Clearing small brush	Axes, brush-hooks, machetes, and hatchets	2.5

* Figures are for daylight; for work at night, increase labor by 50 percent.

Table XXVII

c. Excavation.

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

Time and Labor for Constructing Entrenchments

1	2	3	4
Type of emplacement	Excavation cu meters	No. of men working	Approx. time, hr
Crawl trench (per linear meter)	0.5	3	$\frac{1}{4}$
Standard trench (per linear meter)	1.5	3	$\frac{2}{3}$
Prone emplacement	0.7	1	1
1-man foxhole	1	1	2
2-man foxhole	1.8	2	$1\frac{1}{2}$

Table XXVIII

(2) Excavation and camouflage data for emplacements.

Excavation and Camouflage Data

	Type of emplace- ment	Area to be cam- ouflaged meters	Excava- tion, cu meters	Manhours required to construct in medium soil*
Rifle, U.S., cal. 7.62-mm, M14	Foxhole	3x3	1	2
Rifle, 7.62-mm, M14M	Foxhole	3x3	1	2
Launcher, rocket, 3.5-in.	Pit 2 Foxhole	1.5x1.5 4.5x4.5	1.5 2.7	2 4
Machinegun, 7.62-mm	Horseshoe 2 Foxhole	4.5x4.5 4.5x4.5	3.5 2.0	7 4
Mortar, 81-mm, on mount	Pit	4.8x4.8	3	6
Rifle, 106-mm, jeep-mounted	Pit	9.7x6.1	11	30

* Figures are for daylight; for work at night, increase by 50 percent.

Time pertains to average, unfrozen soil.

Table XXIX

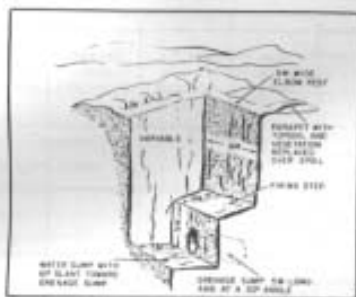


Figure 57. Open one-man foxhole.

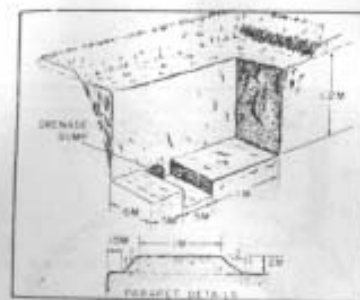


Figure 58. Open two-man foxhole.

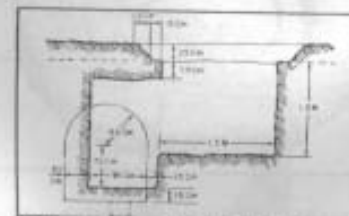


Figure 59. Two-man foxhole with half cover and adjoining shelter.

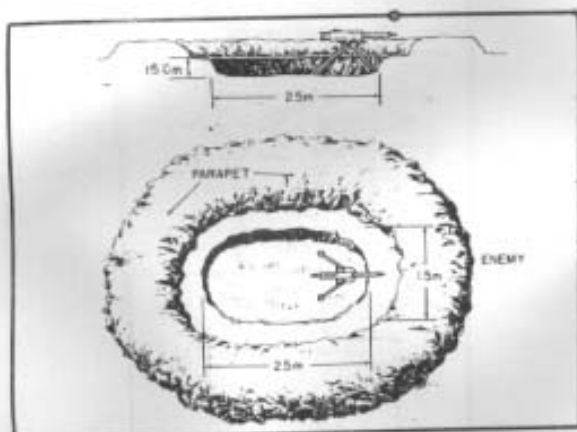


Figure 60. Plain view and cross-section of pit type emplacement for caliber .30 machine gun

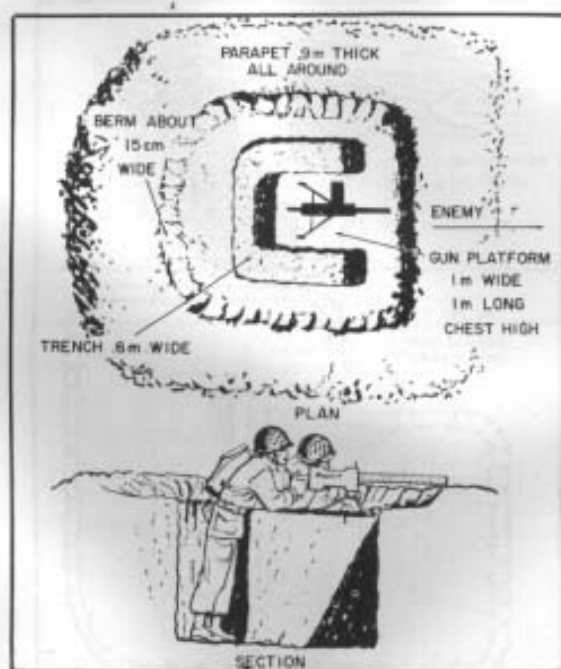


Figure 61. Completed horseshoe type emplacement

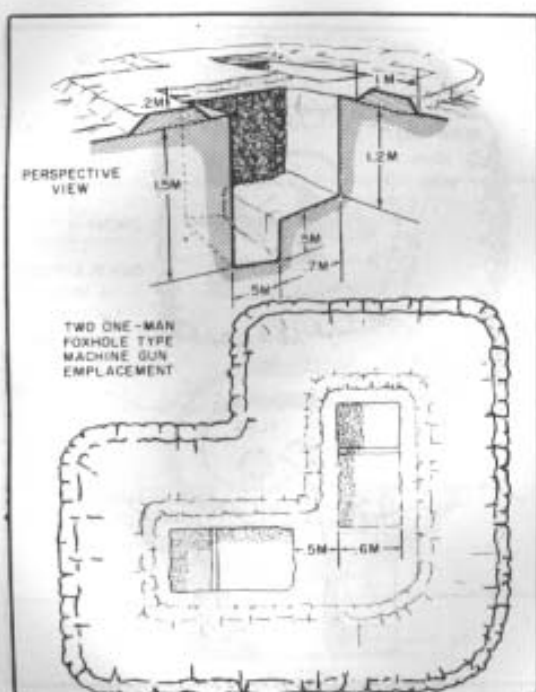


Figure 62. Machine gun emplacement

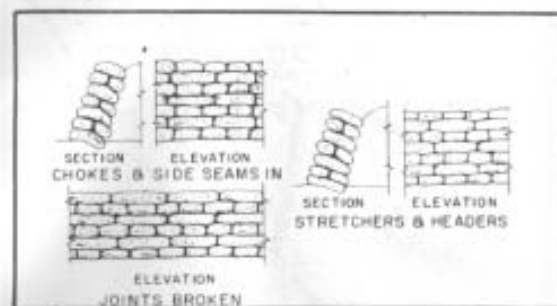


Figure 63. Retaining-wall type of revetment

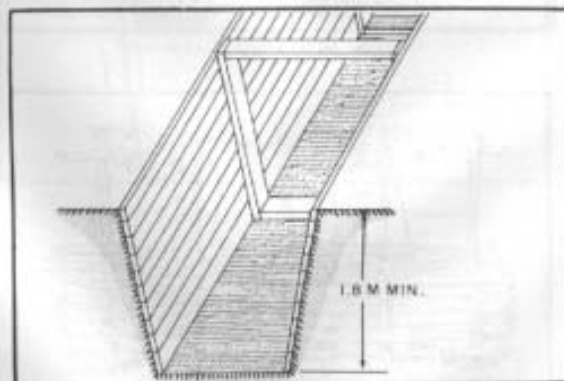


Figure 64. Facing type revetment, supported by frame

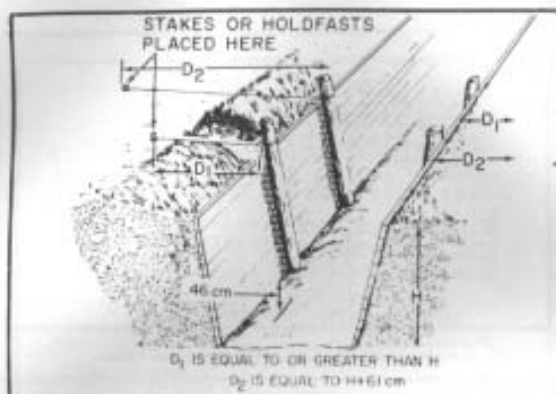


Figure 65. Method of anchoring pickets

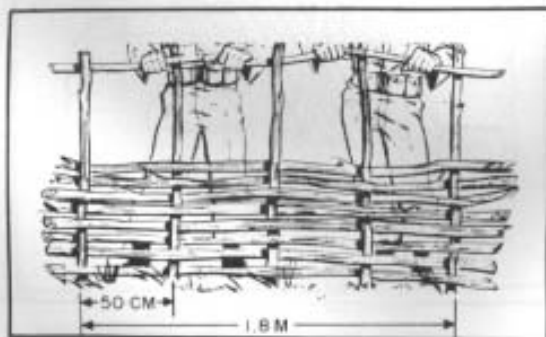


Figure 66. Making a brushwood hurdle

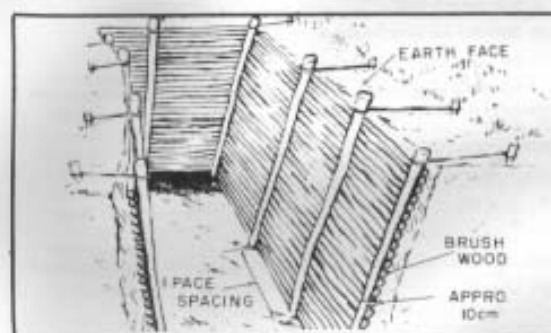


Figure 67. Continuous brushwood revetment

d. 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:

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

(b) Protective wire. Length of protective wire entanglement is 5 times the length of the front being defended. Because protective wire encircles each platoon area, the protective wire for units is 2 1/2 times the average platoon frontage, times the number of platoons.

(c) Supplementary wire. Supplementary wire in front of the FEBA to the rearmost reserve unit.

(2) Material and labor required.

(a) See table.

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

BASIC DEMOLITION FORMULAS

STEEL, STRUCTURAL:

$$P = \frac{3}{8} A \text{ (IN)} \quad K = \frac{1}{38} A \text{ (CM)}$$

STEEL, RODS, BARS, CABLES (2 INCHES OR LESS HARD CARBON STEEL):

$$P = D^2 \text{ (IN)} \quad K = \frac{D^2}{14} \text{ (CM)}$$

WOOD, EXTERNAL:

$$P = \frac{D^2}{40} \text{ (IN)} \quad K = \frac{D^2}{40} \text{ (IN)}$$

WOOD, INTERNAL:

$$P = \frac{D^2}{250} \text{ (IN)} \quad K = \frac{D^2}{250} \text{ (IN)}$$

PRESSURE:

$$P = 3H^2T \text{ (FT)}$$

METRIC PRESSURE FORMULA

NOTE: WHEN METRIC WEIGHTS AND

MEASURES ARE USED, SUBSTITUTE
BREACHING FORMULA FOR THE
PRESSURE FORMULA.

BREACHING:

$$P = R^3KC \text{ (FT)} \\ \text{(ADD 10 PERCENT IF} \\ \text{LESS THAN 50 POUNDS)}$$

$$K = 16 R^3KC \text{ (M) (ADD 10 PERCENT} \\ \text{IF LESS THAN 22.5 KG)}$$

C - TAMPING FACTOR FOR BREACHING (SEE DEMO CARD)

K - MATERIAL FACTOR FOR BREACHING

MATERIAL	R IN FEET	R IN METERS	K FACTOR
Ordinary Earth	All Values	All Values	.05
Poor Masonry, Shale, Good Timber and Earth Construction	All Values	All Values	.23
Good Masonry	Less than 3	Less than 1	.35
Ordinary Con- crete, Rock	3 to 5	1 to 1.5	.28
	5 to 7	1.5 to 2	.33
	More than 7	More than 2	.28
Reinforced Con- crete (However will not cut Reinforcing Steel)	Less than 3	Less than 1	.70
	3 to 5	1 to 1.5	.55
	5 to 7	1.5 to 2	.50

CRATERING

Deliberate:

Alternate 5 feet (1.5 M) and 7 feet (2 M) holes spaced at 5 feet (1.5 M) intervals. End holes always 7 feet deep, no adjoining 5 feet holes.

Use 40 pounds (18 kg) in shallower holes and 80 pounds (36 kg) in deeper holes. (standard 40 pound cratering charges are best.)

Hasty:

Holes of equal depth - 2.5 to 5 feet (1 to 1.5 M) spaced at 5 feet (1.5 M) intervals.

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

BRIDGE ABUTMENT DESTRUCTION

Abutments 5 feet (1.5 M) or less in thickness: (5-5-5-40 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 1/3 block of C3 or C4 for targets up to 15.24 cm in diameter; Use one-half block thickness for targets from 15.24 to 20.32 cm in diameter. Above 20.32 cm in diameter, or for alloy steel shafts, 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 nonsolid targets, such as gun barrels. These charges may be prepackaged or wrapped, providing that no more than one thickness of the wrapping material is between the charge and the target to be cut. Heavy wrapping paper on aluminum foil are excellent, and parachute cloth may be used if nothing else is available (see figure 70).

(2) Diamond charge. This charge can be used to cut hard or alloy steel, cylindrical targets of any size that would conceivably be encountered. It has reliably been used, for instance, against a destroyer propeller shaft of 43.18 cm diameter. Dimensions are as follows: the long axis of the diamond charge should equal the circumference of the target, and the points should touch on the far side. The short axis is equal to one-half the circumference. Thickness of the charge is 1/3 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 nonelectric 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 exact 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 care 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 71)

(3) Ribbon charge. To cut flat or noncylindrical steel targets the ribbon charge produces excellent results at a considerable savings in explosive. 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 1.27 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 I-Beam. Tamping 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 emplacing it. The ribbon charge is effective only against targets up to 5.08 cm thick, which effectively accounts for the great majority of flat steel targets likely to be encountered. (See figure 72)

Wire Entanglement Materials

		Approx weight, Kg	Approx length, M	Approx weight of man-load, Kg	No. carried by 1 man
Reel		47.5	366.	24	$\frac{1}{2}$
Bobbin		3.5 - 4.0	27.5	14.5 - 24.5	4-6
Standard barbed wire concertina		25	15.2	25	1
Expedient barbed wire concertina		13.5	6.1	13.5	1
Screw pickets	Long	4	1.6	16.3	4
	Medium	2.7	0.81	16.3	6
	Short	1.8	0.53	14.5	8
U-shaped pickets	Extra long	7.25	2.4	21.8 - 29.0	3-4
	Long	4.5	1.5	18.1	4
	Medium	2.7	0.81	16.3	6
	Short	1.8	0.61	14.5	8
Wooden pickets	Extra long	7.7-10.5	2.13	15.4 - 20.8	2
	Long	5.4-7.25	1.5	16.3 - 21.7	3
	Short	1.4-2.7	0.75	11.0 - 21.7	8

Table XXX

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

Type of entanglement	Pickets				Barbed wire, No. of 47.5-Kg reels ¹	No. of concertinas ⁴	Staples	Kgs of Material per lin m of entanglement ²	Man-hours to erect 300 m of entanglement ³
	Extra Long	Long	Medium	Short					
Double-apron, 4-and 2-pace		100		200	14-15			4.9	59
Double-apron, 6-and 3-pace		66		132	13-14			3.5	49
High wire (less guy wires)		198			17-19			5.9	79
Low wire, 4-and 2-pace			100	200	11			3.7	49
4-strand fence		100		2	5-6			1.9	20
Double expedient concertina		101		4	3	100	295	6.9	40
Triple expedient concertina	51	101		7	4	148	295	10.4	99
Triple standard concertina		160		4	3	59	317	7.9	30

¹ Lower number of reels 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 concertinas, man-hours are based on the use of screw pickets. When driven pickets are used, add 20 percent to man-hours. With experienced troops, reduce man-hours by one-third. Increase man-hours by 50 percent for night work.

⁴ Based on concertinas being made up in rear areas and ready for issue. One expedient concertina opens to 6-meter length, as compared with 15 meters for a standard concertina; it requires 92 meters of standard barbed wire, also small quantities of No. 16 smooth wire for ties.

Table XXXI

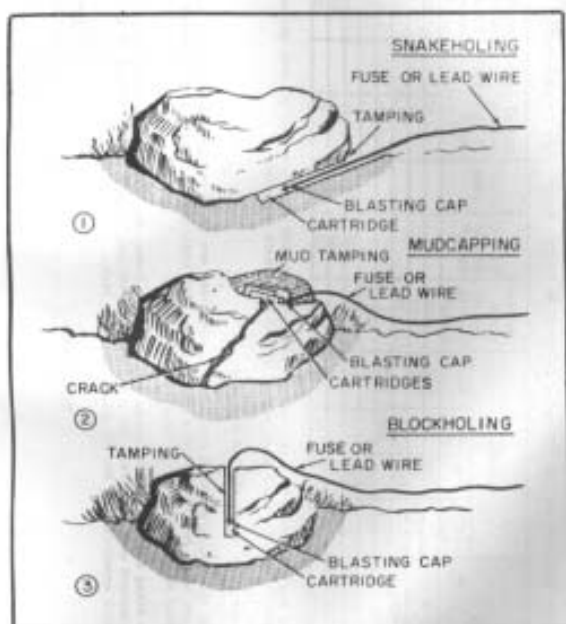


Figure 68. Methods of blasting boulders.

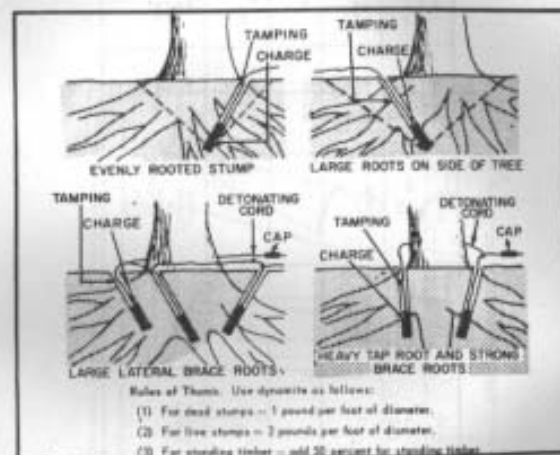


Figure 69. Stump-blasting methods for various root structures.

PRINCIPAL EXPLOSIVES OF THE WORLD

USA	BRITISH	FRENCH	GERMAN	ITALIAN	JAPANESE	RUSSIAN
TNT	TNT * TRUYL	TOLITE	PULL PULVER SPRING POW OR	TRITOL * TRI- TOL	CHA KATSUTAKU	TOL * TRYTYL
CYCLOWIT NC-114	PLASTIC EX- PLASTIC OR SP-2A		NOVOLONIN HEXODIN 6 PLASTIC RIFOLIT	PERACENE C-4	KOJITSUKUY- AKU NOVOLONITE NOJITSUTAKU	HEXODIN KAPNITIT
TEYNOL * IET- RYTOL	COMPOSITUS LF OR C, E				HELAYAKU	TEEP
BATN PERVOLITE AFETNACHIN	PETN PESTOLIN MOOD TLY (DET CORD)		*KALL-ND- SCHURK*		SHOC-I-YAKU**	LEN *DEX 1943**
AMT NITRATE ANTOL	*AMMONIAL PERMUEL (GCE)	NITRATE D'AMMONIUM *TOLITE	AMMON SALPETER	NITRATE D'AMMONIUM *SCHLIE- SER *TOLUAL AMMON	AMMON YAKU *SHONAYAKU *SHOAN *SHONAYAKU	*GEONERBY *AMMONITE *DINAMONCH *MAJISTE

*Comounded with other explosives **Not known whether this is demolition explosive or a detonating cord.

Table XXXII

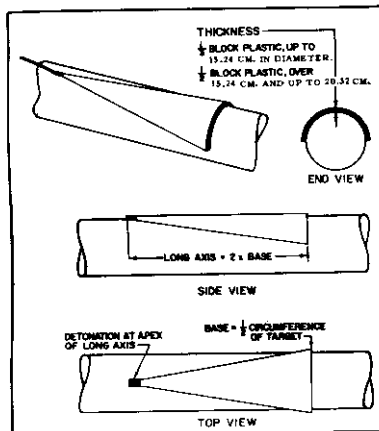
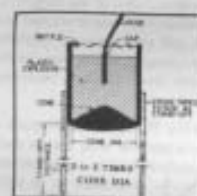
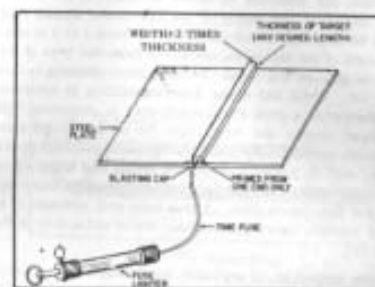
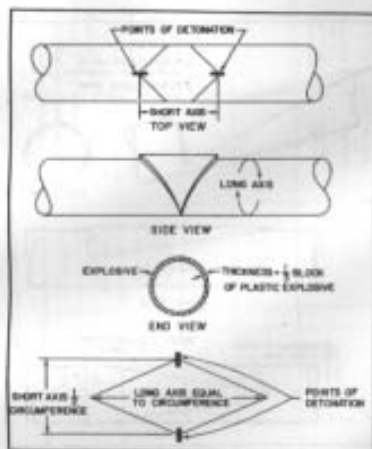


Figure 70. Saddle charge.



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

(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 booby-trapping actions. One of the simplest booby 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 Booby Trap Firing Devices. Each of the following simple booby traps can be used in conjunction with a wide variety of casualty producing charges, from the 3.5-inch rocket fired by expedient electrical means, to the bangalore torpedo primed to be detonated in an anti-personnel role.

a. 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.



Figure 74. Open loop.

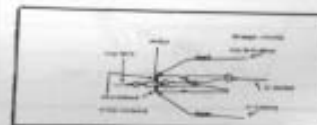


Figure 75. Clothspin.

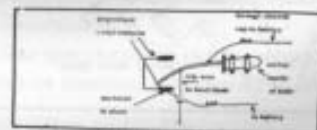


Figure 76. Knife.

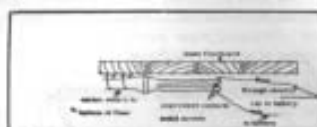


Figure 77. Floor board.

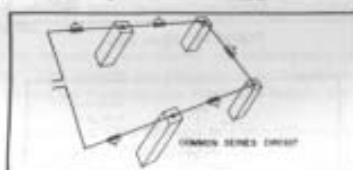


Figure 78. Common series circuit.



Figure 79. Leadfrog series circuit.

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.

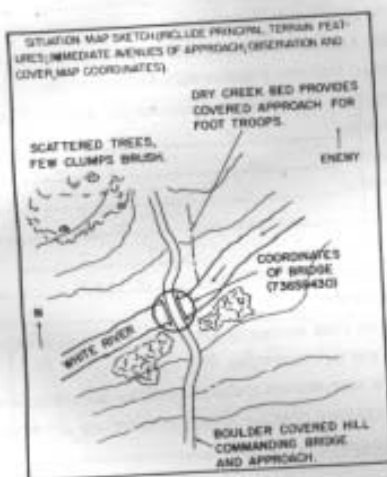


Figure 80. Situation map sketch.

CHAPTER 8 TACTICS

44. 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.
- (2) Make quick estimate of situation (as thorough as time permits).
- (3) Make preliminary plan.

b. Arrange For:

- (1) Movement of Unit. (Where, when, how?)
 - (2) Reconnaissance (select route, schedule, persons to take along, and use of subordinates).
 - (3) Issuance of order (notify subordinate leaders of time and place). (See appendix 3.)
 - (4) Coordination (adjacent and supporting units).
- c. Make reconnaissance. (Examine the ground--see a. 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.

49. 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 camouflage 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 (subparagraph 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 reentry of, friendly area(s).
 - (5) Rallying points and actions as rallying points.
 - (6) Actions on enemy contact.

- (7) Actions at danger areas.
- (8) Actions at objective.
- (9) Rehearsals and inspections.
- (10) Debriefing.
- d. Administration and Logistics.
 - (1) Rations.
 - (2) Arms and ammunition.
 - (3) Uniform and equipment (state which members will carry and use).
 - (4) Method of handling wounded and prisoners.
- e. Command and Signal.
 - (1) Signal:
 - (a) Signals to be used within the patrol.
 - (b) Communication with higher headquarters--radio call signs, primary and alternate frequencies, times to report, and special code to be used.
 - (c) Challenge and password.
 - (2) Command.
 - (a) Chain of command.
 - (b) 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 the means available to the area command, i.e. fire, 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.

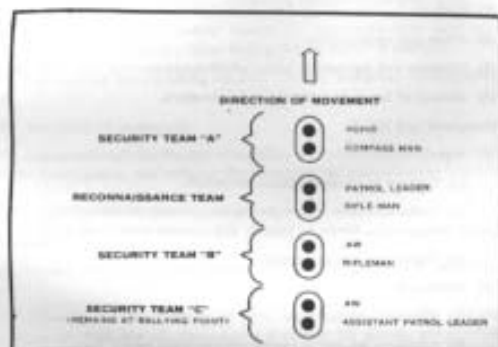


Figure 81. Location of patrol leader and assistant patrol leader information.

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) Serves 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) Divert enemy troops from other operations.
 - (4) Release friendly prisoners of war.
- b. Purposes 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.
- c. Composition 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 sentinels, 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.)
 - (3) Security element provides all-around security for the assault element to prevent enemy from leaving 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.)
- d. Characteristics of Ambush Site:
- (1) Target must be channeled.
 - (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.

e. Conduct of Raid and Ambush:

- (1) Always put 24-hour surveillance on target or objective area at time of 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 area.

53. PATROL TIPS

a. Preparation:

- (1) Make a detailed map study; know the terrain and route by memory, including features which will aid in navigation. Confirm these 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 terrain, 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 azimuth 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 rendezvous point behind enemy lines. Select an alternate rendezvous 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 test-fire all weapons before departure.
- (8) Consider terrain vegetation. Gloves may be necessary to protect hands from briars and scratches.
- (9) Consider carrying two pairs of binoculars, wire cutters, fuse crimpers, and other small items.
- (10) Carry at least two flashlights for night operations and extra batteries for them and radios.

(11) Every man should carry his canteen and poncho. Ponchos can be used to make litters, construct rafts, conceal lights, and as shelters.

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

(13) Carry individual weapons cleaning equipment on all patrols.

(14) Consider the use of scout dogs if they are available.

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

(16) Two pieces of luminous 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.

(17) Use friction tape to secure rifle swivels, sling, and other items which might rattle.

(18) Be sure to camouflage the back of your neck, behind your ears, and the back of your hands.

(19) A clear acetate sheet placed over luminous 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.

(20) Designate at least two pacers and use the average of their individual counts.

(21) Preset compasses before departing.

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

(23) 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.

(24) Take your assistant patrol leader or element leaders with you on reconnaissance.

(25) Prearrange and rehearse all signals to be used. Keep signals simple.

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

(27) Do not carry maps marked with information that might aid the enemy.

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

(29) 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 sent up 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, shelling, battle 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 its 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 luminous tape can also be used for this purpose.

(11) There are several acceptable methods of crossing roads. Whatever the method used, the basic principles of reconnaissance 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.

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

(13) If it is necessary to leave a wounded man to be picked up on your return trip, leave another man with him, if possible. 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.

(1) 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.

(2) A garrote can be used for killing a sentry or capturing a prisoner.

(3) Binoculars increase visibility at night.

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

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

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

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

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

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

(10) 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.

(11) The best nights for patrols are dark, rainy, and windy nights.

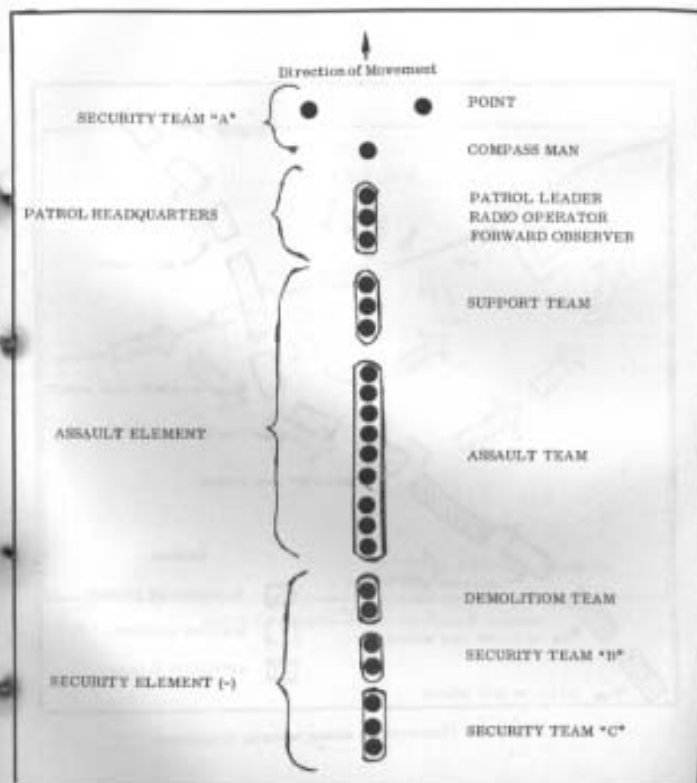
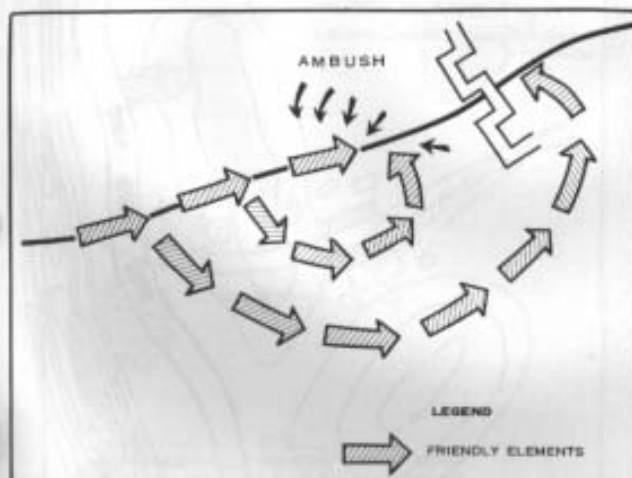
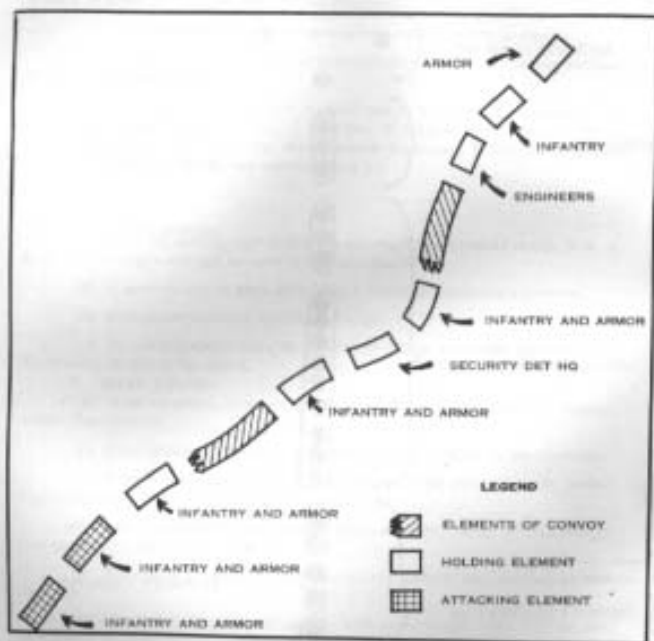


Figure 82. An example of the organization for movement of a raid force.



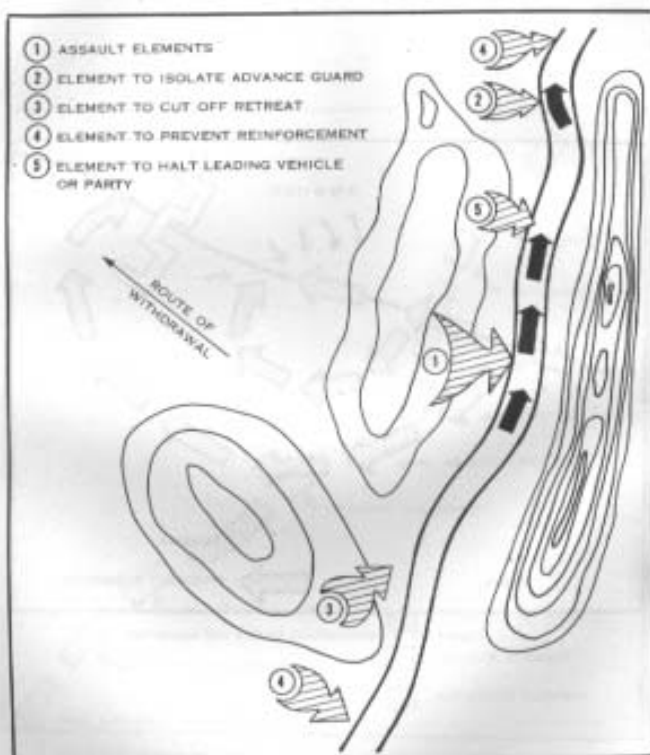


Figure 85. Type of guerrilla ambush.

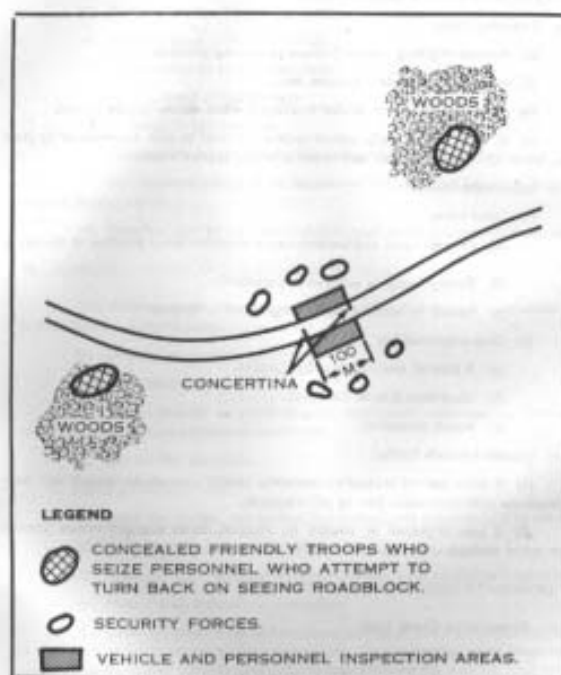


Figure 86. Physical layout of a roadblock.

54. IMMEDIATE ACTION DRILL (FOOT)

a. Freezing 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 to side determined by lead scout, 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 others position at the same time.

- (b) Enemy camp is entered unexpectedly.

- (c) Enemy is moving out of range after a "freeze."

(2) Characterized by:

- (a) A frontal assault by entire patrol.

- (b) Maximum fire to the front.

- (c) Rapid execution.

c. Counterambush Drills:

- (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 encircle ambush site.

55. 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 ambushed.

- (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.

- (a) Drive through if possible; all personnel return fire.

- (b) Sentries return fire; remainder detruck, then sentries detruck; all launch frontal attack.

- (2) Vehicles not in ambush detruck and launch counterattack on ambush.

56. 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 guerrilla.

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 secure 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.

e. In order to achieve maximum benefits, 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) Standard question forms should be used by interrogators in order to facilitate cross-checking and correlation between interrogators.

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

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

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

- (1) Assemble all villagers in a central location.
- (2) Restrict all villagers to their homes.
- (3) 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).

j. 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.

k. 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.

l. Cordon and search techniques for rural hamlets differ substantially from search techniques employed in cities.

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 undergrowth.

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

(2) If a breakout fails be alert for an attempt to exfiltrate the encirclement by one or two VC at a time. It is probable that an exfiltration attempt will occur during hours of limited visibility. If the VC successfully exfiltrate, 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; do not run blindly. Use 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 $4\frac{1}{2}$ times the length of the kite, you can determine the approximate direction of south.

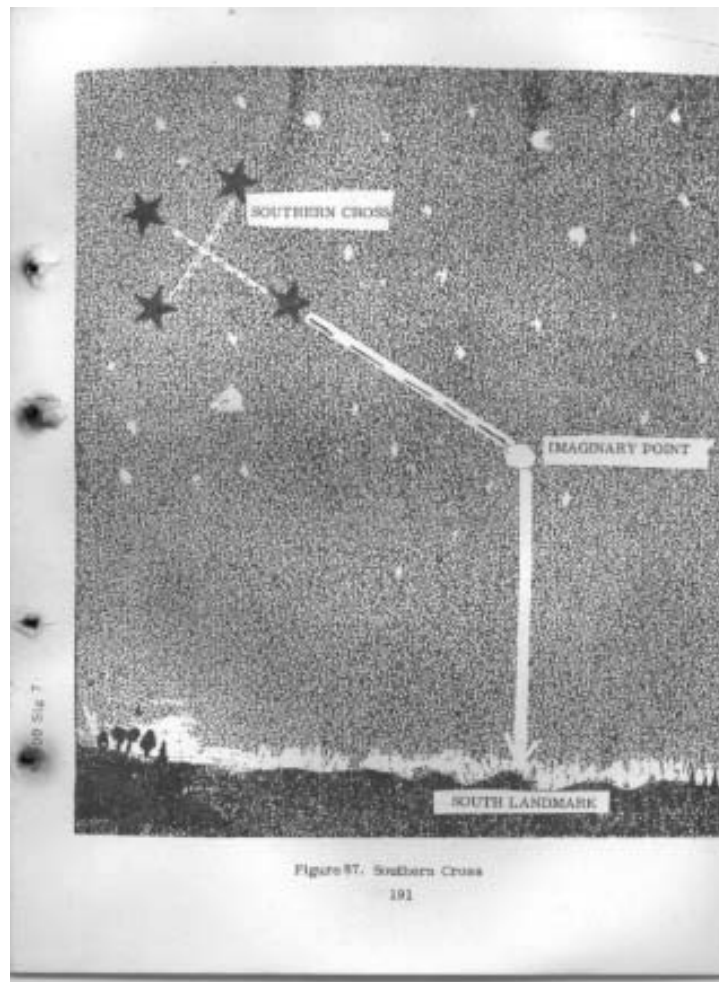
(2) Using a watch to find north: Twelve o'clock is pointed toward the sun, and halfway between 12 o'clock and the hour hand will be a north-south line.

(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 (10 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. Blundering 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



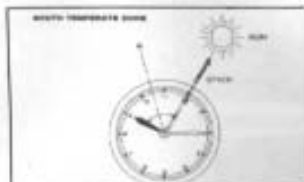


Figure 88. Using a watch to find north.



Figure 89. Finding north on a cloudy day using a watch.

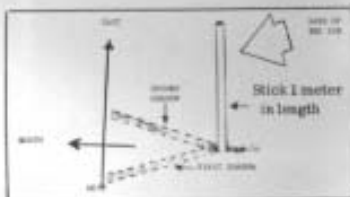


Figure 90. Shadow tip method.

travel on them. Stay alert. Natives remain on trails by preference. A few feet from the trail you are usually quite safe. Conceal yourself upon the approach of any other person until he passes or until you determine whether or not he is friendly.

e. 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 apt to be traveled more frequently than other areas.

f. Rivers or streams can make good roads but remember that the majority of native villages and encampments are on water. Rafts 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.

g. When close to known enemy locations, move right after sunset or just before sunrise when there is sufficient light to enable you to avoid enemy installations, mine fields, sentries, 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.

h. 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.

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

j. If living 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 asphyxiated by smoke.

k. The jungle provides many hiding places. You may have to use them. Bamboo thickets are excellent, because you cannot be approached without being alerted by the noise of dry bamboo.

l. 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.

28. 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.

(1) When requesting native assistance:

- (a) Show yourself and let the natives approach you.
- (b) Deal with recognized headman.
- (c) Do not approach groups.
- (d) Do not display weapons.
- (e) Do not risk being discovered by children.
- (f) Treat natives well. There is much you can learn from them.
- (g) Respect local customs and manners.
- (h) Learn all you can about woodcraft.
- (i) Take their advice on local hazards.
- (j) Never approach a woman.

(2) Before entering any strange village, whether it is friendly or not, conceal your weapons. 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.

b. Many of the jungle diseases are insect-borne. Use insect repellent freely, if available. Poisonous reptiles and large mammals of the jungle will cause few problems. Given a chance, 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. Thorns broken from bamboo or trees can be used for needles. Strips 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 hills as thorns, ants, scorpions, etc., will be encountered and make sores that may become infected. Use a walking stick to push aside vines and bushes.

c. 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 snares. Three fish hooks, their shafts tied together with their hooks pointing out, can be used on the fishline to snare fish, crabs, etc. Head nets can be used as fish nets and snares. A fish hook fastened 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.

59. SHELTER

- a. Pick a high spot when making camp. Avoid dry river beds, dead trees, and ant nests. Avoid bat caves; droppings may cause rabies.

b. Types of Jungle Shelters:

(1) A simple parachute shelter can be made by draping a parachute over a rope or vine stretched between two trees.

(2) A thatched shelter (see figure 91) can be made by covering an A-type framework with a good thickness of palm or other leaves, pieces of bark, or mats of grass. Slant the thatch shingle fashion from the bottom upward. This shelter is considered ideal since it can be made completely waterproof. After you finish your shelter, dig a small drainage ditch just outside its lane and leading downhill; it will keep the floor dry.

c. 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 small branches covered with palm leaves (see figure 92). A parachute hammock may serve the purpose. You can make a crude cover from tree branches or ferns; even the bark from a dead tree is better than nothing.

60. WATER

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

b. Many vines have water in them. The vine should be cut through. When a nick is cut in the vine about 1 meter above the original cut a potable liquid will drip out (see figure 93). Do not apply vine to lips. Avoid any vine, plant, or tree with milky juice for many are poisonous. Water can be found at the base of the leaves of palms; or in sections of dead bamboo (see figure 94). A section of bamboo placed against a tree will collect water during rain. Moisture collects under leaves in the dry season. Rub these with a cloth or other absorbent material, squeeze it into a container. At the seashore, brackish but drinkable water can be procured by digging a hole 3 meters above the high-tide line.

c. If water is scarce, travel during coolest part of day or at night. Rest during the heat of the day. By doing this, the water content of the body is conserved. (See survival time chart, figure 95.)

61. FOOD

a. 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 nutritional value in them and much danger. In villages, eat only hot food. When cold food cannot be avoided, take an anti-dysentery pill. All vegetables or fruit procured in a village or handled by natives should be peeled.

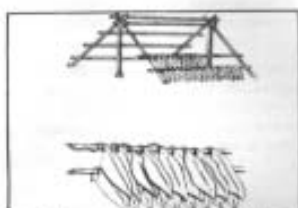


Figure 91. A-type framework.



Figure 92. Bamboo bed.



Figure 93. Extracting water from vines.



Figure 94. Bamboo joints contain water.

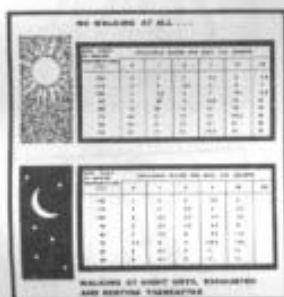


Figure 96. Survival time chart.

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 resharpen. The result will be a crude but effective tool or weapon.

c. Grasshoppers, and eggs, hairless caterpillars, larvae, and termites are good when cooked. Remove heads, skin, and intestines of snakes, rats, mice, frogs, and lizards, before cooking. Bats can be caught in cages by flailing 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 paths 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 .61 meters high. Place traps in depth of curve (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 eye sunken, for they are undoubtedly 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 strung 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 flailing 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, banana, 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 tent formation over tinder.



Figure 96. A simple deadfall using a figure 4 trigger.



Figure 97. Hanging snare.

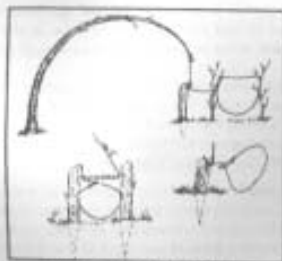


Figure 98. Fixed snare.

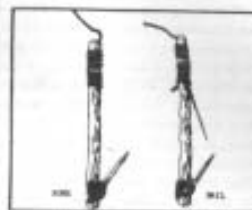


Figure 99. Improvised hooks and lines.



Figure 100. Skewer 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. Tilt the screen with the top toward you. Fibrous material soaked in insect repellent makes good tinder.

h. 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 apex 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 prepared the same way by cutting into small pieces (figures 101 and 102).



Figure 101. Pit fire.

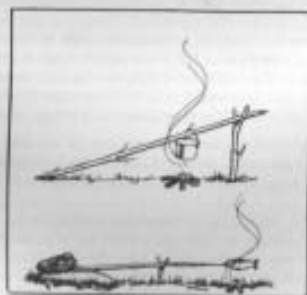


Figure 102. Simple crane.

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 practices 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 causative 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 an infecting organism. Immunity may be natural by having had the disease or artificial by having had an injection or swallowing vaccine produced from killed or weakened organisms.

65. CATEGORIES OF DISEASE

a. Respiratory diseases include the common cold, influenza, smallpox, diphtheria, meningitis, and tuberculosis. The most important of these in Vietnam is

tuberculosis. The 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 protect yourself, eat nothing which has not been thoroughly cooked; drink no water which has not been disinfected or boiled. Salad vegetables should be scalded by immersing them in boiling water for 10 seconds or by disinfecting them in chlorine disinfectant solution for 30 minutes. One package of "Disinfectant, Chlorine, Food Service" dissolved in 10 gallons of water provides a good disinfectant for this purpose. Some disease organisms are resistant to chlorine. Among these are the cysts of amoebae which produce amoebic dysentery and certain liver flukes. The flukes are acquired by eating the flesh of raw, smoked, or pickled fish. Eat only fish which has been thoroughly cooked.

66. SOURCES OF INFECTION AND DISEASE

a. Water can be the vehicle of infection for hepatitis, typhoid fever, cholera, dysentery, and many of the parasites. No water in Vietnam can be consumed in safety unless boiled or disinfected with chlorine or iodine. Water used to make ice should be treated in the same manner. Two ampules of calcium hypochlorite per 36-gallon Lyster Bag or two iodine tablets (1 if water is clear) per canteen 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 leptospirosis.

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

c. The deep fungus infections can be prevented by proper use of protective clothing and by immediate first aid 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 cleaning and drying of armpits, groin, and feet. Also, frequent changes of clothing and socks and the application of Desenex foot powder to these areas are helpful preventive measures.

d. Venereal diseases include syphilis, gonorrhea, chancroid, and lymphogranuloma inguinale and venereum. 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 webs 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 an leaves that have fuzzy 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 laying on the ground.
- (3) Leeches and ticks can be partially avoided by tying cuffs of your jacket at the wrist 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 diarrhea when no drugs are available, a tea made from boiled guava leaves or charcoal eaten with hot water will be beneficial.

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

(7) Use tourniquet, 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.

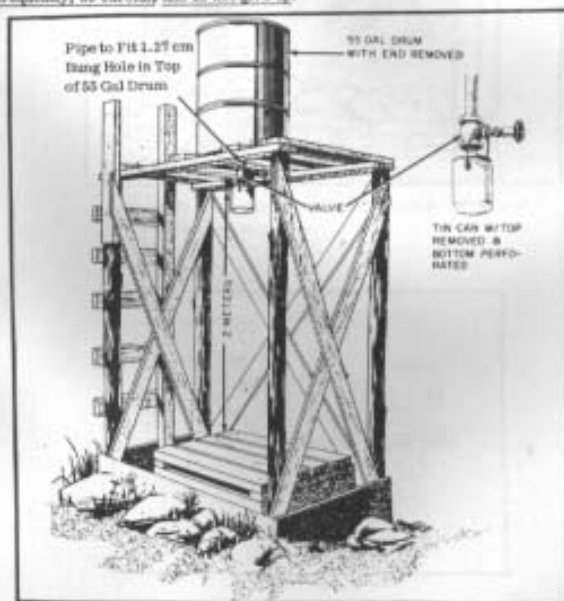


Figure 103. Shower unit, using 55-gallon drum.

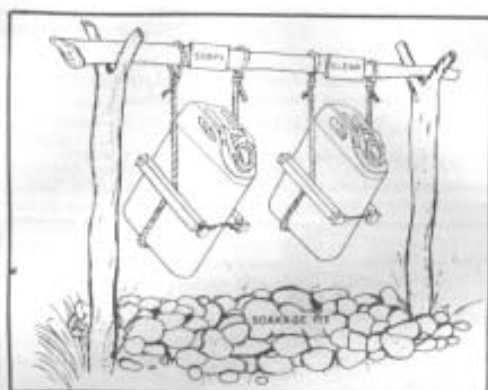


Figure 104. Handwashing device, using 5-gallon water cans.

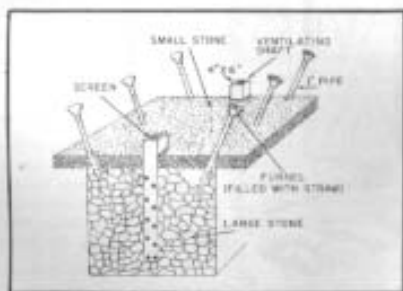


Figure 105. Pipe urinal arrangement.

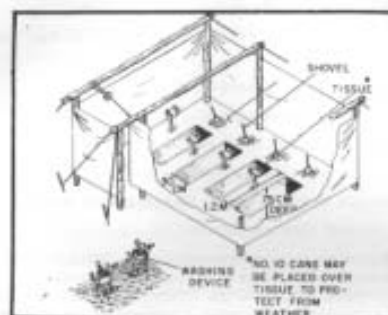


Figure 106. Straddle trench latrines for 100 men, with handwashing device.

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 regiment.
- (3) Engineer groups (which may be directly under JGS).
- (4) Nondivisional artillery battalions.
- (5) Ranger Battalions (unless attached to divisions).
- (6) Armored cavalry squadrons.

b. Each province in the division tactical area (DTA) is a subordinate military sector; province chief is also the sector commander. Sector operations and intelligence center (SOIC) reports to the division or 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 boat platoons, augmented to form boat companies consisting of eight LCVP's. Some provinces have popular forces training centers.

c. Each district 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) Missions of support organizations are to administer support to MACV elements and command U.S. Army troop units in Republic of Vietnam. A Marine helicopter squadron operates in I Corps. Second Air Division supports Vietnamese tactical concept for Vietnamese Air Force. Special Forces in Republic of Vietnam are training 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 team.

(a) Detachments to division units:

1. Regiment.
2. Battalion.
3. Support companies.

(b) Sector:

1. Sector advisor.
2. Sector intelligence advisor.
3. Intelligence NCO.
4. Civil guard advisor.
5. SCD advisor (if there is an SCD training center in the province).

69. TIPS TO ADVISORS

a. Professional Duties and Interests:

(1) Sell in-place training once units return to posts. One thousand-inch (approximately 25 meters) firing ranges are ideal for small posts to fire weapons.

(2) Spend a maximum 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 often 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 easily irritates the civilian populace. The development of a proper soldier-civilian relationship is civic action at its best.

(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 an inspection at all times. This saves the wear and tear of preparation for inspection and the disappointment that follows when it's cancelled. Do not use training time for

housekeeping matters; discourage the idea that the two of you can conspire to "eyewash" instructors.

(7) MACV advisors should have sufficient knowledge of all aspects of U.S. aid programs to counter insurgent propaganda depicting this aid 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 counterpart. Overselling yourself will arouse suspicion and delay acceptance. Time spent developing a healthy relationship will pay large dividends later on.

(3) Advising works 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 avoiding you and 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 at a later time. Don't speak rapidly or use slang. By the same token, don't speak too slowly; it will insult his intelligence.

(7) Correct the most important deficiencies 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, basing 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 seldom admit that they do not understand. Don't accept a yes answer at its face value; yes 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 planting 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. Debrief him if you have the chance.

(17) Begin preparing a folder about your advisory area and your duties as soon as you report on 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 supervisor at the next higher echelon will often be unable to visit you. He will travel with his 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 on a weekly basis 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 on at his level. Send him copies of advisory recommendations. Write up ideas you

have for winning the war or any part of it. Your writings may give people a better idea of what kind of job you are doing. You might come up with a key solution to a problem.

(19) Take time to brief supporting pilots. Take helicopter pilots along on command visits. Try to get helicopter and observation pilots included at operations 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 radioprocedure. Your division advisory team publishes its own SSI and SOL. Remember that much advisory FM radio traffic is air-ground communication. The Viet Cong are capable of intercept!

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 good will 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 incumbent government just as you do your own. This is U.S. national policy.

(5) Study your counterpart to determine his personality and background, exert 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 for a job well done. Do not become so involved with the unit that you cannot readily recognize failures.

(9) Accept invitations to Vietnamese dinners, 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 a 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 courtesies.

d. Personal Qualities and Requirements:

(1) Based upon observation and experience, U.S. advisors returning from the Republic of Vietnam have pooled their thoughts on what it takes to be an effective advisor. No doubt each one of us is most anxious to do our best in assisting our Vietnamese allies expel insurgency from 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 advisor traits, are set forth in the following paragraphs:

(a) Persevere in implementing sound advice; exercise patience and tact; 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; evince devotion to job assignment; 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 tactics; 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 indefinite commodity which is represented in the individual himself. The traits of an advisor encompasses all the traits of leadership plus the ability to adapt 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 taboo, for the religious and philosophical background of the Asian strongly opposes this type of

personality. To sell one's self, you must prove your value--an advisor must present a favorable personality in the eyes of his counterpart. This can be accomplished in due time by a gradual demonstration of your capabilities in an unassuming but firm manner. Be positive but not dogmatic 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 a problem will only result in irreparable loss of prestige.

(c) A most favorable trait is persistence, tempered 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 importance. But, the matter must be continually brought to your counterpart's attention until he is sold on taking the measures necessary to solve the problem or correct the deficiency as the case may be. The ultimate in good advising 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.

(d) Possibly the most desirable traits that you can possess as an advisor are 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 associates; however, not to the extent of obsequious behavior nor 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 tour.

e. Helpful Hints for Personnel Security. (Comments by former Mata students.)

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

(2) "Always sandbag your jeep. Also lock the hood down to help prevent 'bugging' 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; snipers especially."

(4) "If you have only one route to and from work in the combat area, vary the times 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 come to 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 canteens."

(6) "Always carry the following as a minimum for physical well-being on patrols: (1) vitamins; (2) salt tablets; (3) bouillon cubes; (4) merthiolate to put on small cuts instantly to stop infection; (5) oil and patches for weapons; and (6) during the wet monsoon season, carry an oily cloth so that during the day you can continually wipe your weapon clean to prevent instant rust."

(7) "Everyone must have an individual ditch (foxhole) and a zone 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 personnel feelings are that if you get carried away and start leading the attack, you have done your counterpart a great injustice when you get hit. 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) "The distance from the fence to your camp should be sufficient to protect you from a handgrenade (50 meters) and must be clear."

(12) "Don't walk too closely to the radio operator."

(13) "Don't swing the map or binoculars in your hand."

(14) "Should have a Special Forces emergency kit."

(15) "Don't wear a black uniform at night."

(16) "Don't do anything that has not been done by the others."

(17) "Try to use the footsteps already made by others."

(18) "Try to carry as light a load as possible."

(19) "Always test-fire a full magazine from your weapon before departing on an operation."

(20) "Don't release mine or boobytrap by yourself; mark it, and let your counterpart know about it--that's enough."

(21) "Don't worry about the food when you go to the field. Your counterpart will take care of you."

(22) 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 and control a unit. It's also the easiest way to lose it."

(2) "Do not have films developed (pictures taken by advisors) at local photo shops. Advisors, following 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 bivouac 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 alerts for his unit, camp, hamlet, 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 test-fire crew-served 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 beam."

(12) "Constantly check the PF 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 outpost, we were preparing to depart for home station when we received an intelligence report that the VC had prepared very extensive ambushes on our route. When posted 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; we started out and he transmitted a false order to go to a certain destination knowing the VC had a USOM 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 pacification operation and we had about two platoons for security."

(2) "Coordination with chopper pilots is a must for a battalion team. Most of the pilots don't have the current SOL. Also, they must switch back and forth from what they call their 'flight-following' frequency to the air-ground frequency. It's rather frustrating when they forget and you try like hell to contact them on the air-ground frequency. We operated down in Binh Lam Special Zone. The choppers came from III Corps area. They had no idea what the 23rd Division call signs were. A small point, maybe, but still important."

(3) "A program has been initiated in Darlac to reduce the excessive number of weapons surrendered to the VC without a fight. An impressive ceremony was conducted 2 January at Buon Ho to encourage combat youth and popular forces to resist VC entry. Their primary fear is lack of assistance from ARVN. Political and pep talks were given by the province chief and the commanding general. All weapons were collected and the militia were sworn to fight to the 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 supported columns."

(6) "Due to the influence of both the U.S. and the French, the leaders in Vietnam have a tendency to select 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 actions in his operation plan. Instead of objectives, have him include checkpoints and phase lines as control measures."

(7) "Train all officers to adjust artillery. This regiment has trained not only its own officers and NCO's, but all regional force and popular force officers in our area. The training paid off last week when two main force companies attacked a platoon guarding a bridge and were repulsed after a 4-hour fight, largely because artillery time-fire was brought in and properly adjusted over the position. Incidentally, overhead protection for such posts is very necessary but rarely exists. We've even gone so far as 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."

(8) "Decentralize operations. This requires some selling but it's worth the effort. The lower the level of command, down to regiment anyway, the better the intelligence; because in many cases the commanders on the ground can't reveal the source of their information for fear word will leak out and the source will lose his head. Since sources cannot be evaluated, higher levels of command frequently discount many of the valid reports they receive. Also, centralized control greatly increases reaction time, particularly in the mountains where communication is difficult."

(9) "Be careful passing through gates and crossing fences in VC areas; these are likely mine and boobytrap areas."

(10) "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."

(11) "I 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 'quartermaster style,' in a pine box."

(12) "When filling in VC trenches, put one grenade in the trench, cover it, and let some villager casually see you do it. Then tell the villager 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 redig the trenches."

APPENDIX II
USEFUL TABLES AND DATA

CONVERSION TABLE - WEIGHTS AND MEASURES

MULTIPLY	BY	TO OBTAIN
Acres	.405	Hectares
Caliber	25.4	Millimeter
Centimeters	.3937	Inches
Degrees	17.8	Mils
Fathoms	6	Feet
Feet	.1667	Fathoms
Gallons (US)	3.785	Liters
Grains	.00228	Ounces
Grams	.03527	Ounces
Hectares	2.471	Acres
Inches	2.54	Centimeters
Kilograms	2.2	Pounds
Kilometers	.6214	Miles
Knots	1.152	Miles per hour
Liters	.2642	Gallons (US)
Meters	1.094	Yards
Miles	1.609	Kilometers
Miles per hour	.8684	Knots
Millimeter	.0394	Caliber
Mils	.056	Degrees
Ounces	437.5	Grains
Ounces	28.35	Grams
Pounds	.4536	Kilograms
Temperature (C) + 17.8	1.8	Temperature (F)
Temperature (F) - 32	.5556	Temperature (C)
Yards	.9144	Meters

Table XXXIII
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AERIAL PHOTOS

Determining Scale:

Flying Height Method:

$$\text{Scale} = \frac{F \text{ (Focal length of camera in inches)}}{H \text{ (Altitude above ground in inches)}}$$

Map Distance Method:

$$\text{Scale} = \frac{FD \text{ (Photo distance in inches)}}{GD \text{ (Map distance in inches)}}$$

Point Designation Grid System:

1. Turn photo so that written data is in normal resting position.
2. Draw lines across photo joining opposite fiducial (collimating) marks.
3. Space grid lines, starting with center lines, a distance equal to 4 cm or 1.576 inches apart.
4. Number each center line 50 and give numerical values to the other lines, increasing right and up.
5. Read coordinates as any other.

MISCELLANEOUS INFORMATION

PRINCIPLES OF WAR M ass O bjective S implicity S urprise C ommand O ffensive M aneuver E conomy of forces S ecurity	REPORTING INFORMATION S ize A ctivity L ocation U nit T ime E quipment														
TERRAIN ANALYSIS C ritical O bservation C over and concealment O bstacles A venues of approach & withdrawal	PRISONERS OF WAR S earch S perate S ilence S peed S afeguarding														
INTELLIGENCE EVALUATION LEGEND. <table><tr><td>Source</td><td>Information</td></tr><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 -Unreliable</td><td>5 -Improbably</td></tr><tr><td>F -Reliability unknown</td><td>6 -Truth cannot be judged</td></tr></table>		Source	Information	A -Completely reliable	1 -Confirmed by other sources	B -Usually reliable	2 -Probably true	C -Fairly reliable	3 -Possibly true	D -Not usually reliable	4 -Doubtfully true	E -Unreliable	5 -Improbably	F -Reliability unknown	6 -Truth cannot be judged
Source	Information														
A -Completely reliable	1 -Confirmed by other sources														
B -Usually reliable	2 -Probably true														
C -Fairly reliable	3 -Possibly true														
D -Not usually reliable	4 -Doubtfully true														
E -Unreliable	5 -Improbably														
F -Reliability unknown	6 -Truth cannot be judged														

This legend should be applied to intelligence originating in the field and the evaluation sent forward with the information.

Table XXXIV
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USEFUL KNOTS

Name	Illustration	Use
Square		Join two ropes of same size. (Will not slip, but will draw tight under strain.) To end block lashing.
Double sheet bend		Join wet ropes, of unequal size, or rope to an eye. (Will not slip or draw tight under strain.)
Bowline		Form a loop. (Will not slip under strain and is easily untied.)
Timber hitch		Lifting or dragging heavy timbers. (Is more easily controlled if supplemented by half hitches.)
Clove hitch		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.)
Sheep shank		Shorten rope or take load off weak spot in rope.
Anchor knot		To fasten cable or rope to anchor.

Table XXXV

METRIC CONVERSION TABLE English-Metric Systems

	inches	centimeters
1/16	1.57	4.00
1/8	3.15	8.00
3/16	4.72	12.00
1/4	6.30	16.00
5/16	7.87	20.00
3/8	9.44	24.00
7/16	11.01	28.00
1/2	12.58	32.00
9/16	14.15	36.00
5/8	15.72	40.00
11/16	17.29	44.00
3/4	18.86	48.00
13/16	20.43	52.00
7/8	21.99	56.00
15/16	23.56	60.00
1	25.12	64.00
1 1/16	26.69	68.00
1 1/8	28.25	72.00
1 3/16	29.82	76.00
1 1/4	31.39	80.00
1 5/16	32.96	84.00
1 3/8	34.52	88.00
1 7/16	36.09	92.00
1 1/2	37.66	96.00
1 5/8	39.22	100.00
1 3/4	40.79	104.00
1 7/8	42.35	108.00
1 9/16	43.92	112.00
2	45.48	116.00
2 1/16	47.05	120.00
2 1/8	48.61	124.00
2 3/16	50.18	128.00
2 1/4	51.75	132.00
2 5/16	53.31	136.00
2 3/8	54.88	140.00
2 7/16	56.45	144.00
2 1/2	58.01	148.00
2 5/8	59.58	152.00
2 3/4	61.14	156.00
2 7/8	62.71	160.00
3	64.28	164.00
3 1/16	65.84	168.00
3 1/8	67.41	172.00
3 3/16	68.98	176.00
3 1/4	70.54	180.00
3 5/16	72.11	184.00
3 3/8	73.68	188.00
3 7/16	75.24	192.00
3 1/2	76.81	196.00
3 5/8	78.38	200.00
3 3/4	79.94	204.00
3 7/8	81.51	208.00
4	83.08	212.00
4 1/16	84.64	216.00
4 1/8	86.21	220.00
4 3/16	87.78	224.00
4 1/4	89.34	228.00
4 5/16	90.91	232.00
4 3/8	92.48	236.00
4 7/16	94.04	240.00
4 1/2	95.61	244.00
4 5/8	97.18	248.00
4 3/4	98.74	252.00
4 7/8	100.31	256.00
5	101.88	260.00
5 1/16	103.44	264.00
5 1/8	105.01	268.00
5 3/16	106.58	272.00
5 1/4	108.14	276.00
5 5/16	109.71	280.00
5 3/8	111.28	284.00
5 7/16	112.84	288.00
5 1/2	114.41	292.00
5 5/8	115.98	296.00
5 3/4	117.54	300.00
5 7/8	119.11	304.00
6	120.68	308.00
6 1/16	122.24	312.00
6 1/8	123.81	316.00
6 3/16	125.38	320.00
6 1/4	126.94	324.00
6 5/16	128.51	328.00
6 3/8	130.08	332.00
6 7/16	131.64	336.00
6 1/2	133.21	340.00
6 5/8	134.78	344.00
6 3/4	136.34	348.00
6 7/8	137.91	352.00
7	139.48	356.00
7 1/16	141.04	360.00
7 1/8	142.61	364.00
7 3/16	144.18	368.00
7 1/4	145.74	372.00
7 5/16	147.31	376.00
7 3/8	148.88	380.00
7 7/16	150.44	384.00
7 1/2	152.01	388.00
7 5/8	153.58	392.00
7 3/4	155.14	396.00
7 7/8	156.71	400.00
8	158.28	404.00
8 1/16	159.84	408.00
8 1/8	161.41	412.00
8 3/16	162.98	416.00
8 1/4	164.54	420.00
8 5/16	166.11	424.00
8 3/8	167.68	428.00
8 7/16	169.24	432.00
8 1/2	170.81	436.00
8 5/8	172.38	440.00
8 3/4	173.94	444.00
8 7/8	175.51	448.00
9	177.08	452.00
9 1/16	178.64	456.00
9 1/8	180.21	460.00
9 3/16	181.78	464.00
9 1/4	183.34	468.00
9 5/16	184.91	472.00
9 3/8	186.48	476.00
9 7/16	188.04	480.00
9 1/2	189.61	484.00
9 5/8	191.18	488.00
9 3/4	192.74	492.00
9 7/8	194.31	496.00
10	195.88	500.00
10 1/16	197.44	504.00
10 1/8	199.01	508.00
10 3/16	200.58	512.00
10 1/4	202.14	516.00
10 5/16	203.71	520.00
10 3/8	205.28	524.00
10 7/16	206.84	528.00
10 1/2	208.41	532.00
10 5/8	210.00	536.00
10 3/4	211.56	540.00
10 7/8	213.13	544.00
11	214.69	548.00
11 1/16	216.26	552.00
11 1/8	217.82	556.00
11 3/16	219.39	560.00
11 1/4	220.95	564.00
11 5/16	222.52	568.00
11 3/8	224.08	572.00
11 7/16	225.65	576.00
11 1/2	227.21	580.00
11 5/8	228.78	584.00
11 3/4	230.34	588.00
11 7/8	231.91	592.00
12	233.48	596.00
12 1/16	235.04	600.00
12 1/8	236.61	604.00
12 3/16	238.18	608.00
12 1/4	239.74	612.00
12 5/16	241.31	616.00
12 3/8	242.88	620.00
12 7/16	244.44	624.00
12 1/2	246.01	628.00
12 5/8	247.58	632.00
12 3/4	249.14	636.00
12 7/8	250.71	640.00
13	252.28	644.00
13 1/16	253.84	648.00
13 1/8	255.41	652.00
13 3/16	256.98	656.00
13 1/4	258.54	660.00
13 5/16	260.11	664.00
13 3/8	261.68	668.00
13 7/16	263.24	672.00
13 1/2	264.81	676.00
13 5/8	266.38	680.00
13 3/4	267.94	684.00
13 7/8	269.51	688.00
14	271.08	692.00
14 1/16	272.64	696.00
14 1/8	274.21	700.00
14 3/16	275.78	704.00
14 1/4	277.34	708.00
14 5/16	278.91	712.00
14 3/8	280.48	716.00
14 7/16	282.04	720.00
14 1/2	283.61	724.00
14 5/8	285.18	728.00
14 3/4	286.74	732.00
14 7/8	288.31	736.00
15	289.88	740.00
15 1/16	291.44	744.00
15 1/8	293.01	748.00
15 3/16	294.58	752.00
15 1/4	296.14	756.00
15 5/16	297.71	760.00
15 3/8	299.28	764.00
15 7/16	300.84	768.00
15 1/2	302.41	772.00
15 5/8	303.98	776.00
15 3/4	305.54	780.00
15 7/8	307.11	784.00
16	308.68	788.00
16 1/16	310.24	792.00
16 1/8	311.81	796.00
16 3/16	313.38	800.00
16 1/4	314.94	804.00
16 5/16	316.51	808.00
16 3/8	318.08	812.00
16 7/16	319.64	816.00
16 1/2	321.21	820.00
16 5/8	322.78	824.00
16 3/4	324.34	828.00
16 7/8	325.91	832.00
17	327.48	836.00
17 1/16	329.04	840.00
17 1/8	330.61	844.00
17 3/16	332.18	848.00
17 1/4	333.74	852.00
17 5/16	335.31	856.00
17 3/8	336.88	860.00
17 7/16	338.44	864.00
17 1/2	340.01	868.00
17 5/8	341.58	872.00
17 3/4	343.14	876.00
17 7/8	344.71	880.00
18	346.28	884.00
18 1/16	347.84	888.00
18 1/8	349.41	892.00
18 3/16	350.98	896.00
18 1/4	352.54	900.00
18 5/16	354.11	904.00
18 3/8	355.68	908.00
18 7/16	357.24	912.00
18 1/2	358.81	916.00
18 5/8	360.38	920.00
18 3/4	361.94	924.00
18 7/8	363.51	928.00
19	365.08	932.00
19 1/16	366.64	936.00
19 1/8	368.21	940.00
19 3/16	369.78	944.00
19 1/4	371.34	948.00
19 5/16	372.91	952.00
19 3/8	374.48	956.00
19 7/16	376.04	960.00
19 1/2	377.61	964.00
19 5/8	379.18	968.00
19 3/4	380.74	972.00
19 7/8	382.31	976.00
20	383.88	980.00
20 1/16	385.44	984.00
20 1/8	387.01	988.00
20 3/16	388.58	992.00
20 1/4	390.14	996.00
20 5/16	391.71	1000.00

Example: 4 inches x 3.05 cm

Table XXXVI

Linear Conversion (continued)

One Unit (below) ↓ Equals →	mm	cm	meters	km
mm (millimeters)	1.	0.1	0.001	0.000,001
cm (centimeters)	10.	1.	0.01	0.000,01
meters	1,000.	100.	1.	0.001
km (kilometers)	1,000,000.	100,000.	1,000.	1.

One Unit (below) ↓ Equals →	gm	kg	metric ton
gm (gram)	1.	0.001	0.000,001
kg (kilograms)	1,000.	1.	0.001
metric ton	1,000,000.	1,000.	1.

Units of Centimeters

cm	1	2	3	4	5	6	7	8	9	10
Inch	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.31	0.35	0.39

Fractions of an Inch

Inch	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2
cm	0.15	0.32	0.48	0.64	0.79	0.95	1.11	1.27
Inch	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
cm	1.43	1.59	1.75	1.91	2.06	2.22	2.38	2.54

Table XXXVII (1)

(1)
Weight Conversion - English-Metric System

	ounces	grams	ounces	grams		
grams	→	←	→	←		
pounds	→	←	→	←		
kg	→	←	→	←		
short ton(2)	→	←	→	←		
metric ton(3)	→	←	→	←		
1	1.10	0.91	2.20	0.45	0.04	28.4
2	2.20	1.81	4.41	0.91	0.07	56.7
3	3.31	2.72	6.61	1.36	0.11	85.0
4	4.41	3.63	8.82	1.81	0.14	113.4
5	5.51	4.54	11.02	2.27	0.18	141.8
6	6.61	5.44	13.23	2.72	0.21	170.1
7	7.72	6.35	15.43	3.18	0.25	198.4
8	8.82	7.26	17.64	3.63	0.28	226.8
9	9.92	8.16	19.84	4.08	0.32	255.2
10	11.02	9.07	22.05	4.54	0.35	283.5
15	17.64	14.51	33.27	7.26	0.56	433.5
20	22.05	18.14	44.09	9.07	0.71	567.0
25	27.22	22.68	55.14	11.31	1.06	850.5
30	33.07	27.22	66.14	13.61	1.41	1134.0
40	44.09	36.35	88.18	18.14	1.76	1417.5
50	55.12	45.36	110.23	22.68	2.12	1701.0
60	66.14	54.43	132.28	27.22	2.47	1984.5
70	77.16	63.50	154.33	31.76	2.82	2268.0
80	88.18	72.57	176.37	36.30	3.17	2551.5
90	99.21	81.65	198.42	40.82	3.52	2835.0
100	110.20	90.72	220.46	45.36	3.87	3118.5

Example: Convert 28 pounds to kg
 28 pounds = 20 pounds + 8 pounds
 From the table: 20 pounds = 9.07 kg and 8 pounds = 3.63 kg
 Therefore, 28 pounds = 9.07 kg + 3.63 kg = 12.70 kg

- (1) The weights used for the English system are avoirdupois (common) weights.
 (2) The short ton is 2,000 pounds.
 (3) The metric ton is 1,000 kg.

Table XXXVIII

Volume Conversion - English-Metric Systems

cu meters	→	cu ft	→	cu yd		
cu yd	→	cu ft	→	cu meters		
cu ft	→	cu yd	→	cu meters		
cu yd	→	cu ft	→	cu meters		
1	0.037	0.028	27.0	0.76	35.3	1.31
2	0.074	0.057	54.0	1.53	70.6	2.62
3	0.111	0.085	81.0	2.29	105.9	3.92
4	0.148	0.112	108.0	3.06	141.3	5.23
5	0.185	0.142	135.0	3.82	176.6	6.54
6	0.212	0.170	162.0	4.59	211.9	7.85
7	0.259	0.198	189.0	5.35	247.2	9.16
8	0.296	0.227	216.0	6.12	282.5	10.46
9	0.333	0.255	243.0	6.88	317.8	11.77
10	0.370	0.283	270.0	7.65	353.1	13.07
20	0.741	0.566	540.0	15.29	706.3	26.16
30	1.111	0.850	810.0	22.94	1059.4	39.24
40	1.481	1.133	1080.0	30.58	1412.6	52.32
50	1.852	1.416	1350.0	38.23	1765.7	65.40
60	2.222	1.700	1620.0	45.87	2118.9	78.48
70	2.592	1.982	1890.0	53.52	2472.0	91.56
80	2.962	2.265	2160.0	61.16	2825.2	104.63
90	3.333	2.548	2430.0	68.81	3178.3	117.71
100	3.703	2.832	2700.0	76.46	3531.4	130.79

Example: 3 cu yd = 81.0 cu ft

Volume: The cubic meter is the only common dimensioned unit for measuring the volume of solids in the metric system.

Table XXXIX

APPENDIX 3

FORMATS: OPERATIONS ORDERS; INTELLIGENCE ESTIMATE; AND LESSON PLAN

SAMPLE OPERATIONS ORDER

CLASSIFICATION

COPY NUMBER

ISSUING HEADQUARTER

LOCATION

DATE/TIME GROUP

OPERATION ORDER NUMBER

REFERENCES: MAPS, ETC.

TASK ORGANIZATION (IF ANY)

1. SITUATION:

a. Enemy Forces.

b. Friendly Forces.

c. Attachments and Detachments.

2. MISSION: (A concise, complete statement of the mission to be accomplished).

3. EXECUTION: (A paragraph for each element stating what they are to do.

Show attachments, if any; next, show support assignments; next, reserves; last, list any orders which pertain to two or more units; and EEL.)

4. ADMINISTRATION AND LOGISTICS: (Instructions concerning water, rations, transportation, supplies, etc).

5. COMMAND AND SIGNAL: (Matters concerning communications, command post, etc.).

ACKNOWLEDGE

(ORIGINAL COPY IS
SIGNED BY THE
COMMANDER)

ANNEXES: A OPERATIONS OVERLAY

B FIRE SUPPORT PLAN

DISTRIBUTION:

OFFICIAL:

(ADDITIONAL COPIES ARE SIGNED BY OPERATIONS OFFICER)

Sample Intelligence Estimate

(Classification)

Issuing section and headquarters¹
Place
Date and Time

INTELLIGENCE ESTIMATE NO.²

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 used in 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.

- (1) Existing situation. Include light data and either a weather forecast or forecast of climatic information as appropriate. Use appendixes for detailed information.
- (2) 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, airmobile forces, surveillance devices, communications, electronic warfare, tactical cover and deception, significant effects on personnel management, logistical support, and civil affairs operations.
- (3) Effect on our courses of action. Discuss each major course of action to accomplish the mission in the same manner as for enemy courses of action above.

b. Terrain.

- (1) Existing situation. Use graphic representations where possible. Use annexes for detailed material. Include as much information as

¹If distributed outside the headquarters, the first line of the heading is the official designation of the issuing command and the ending modified accordingly.

²Numbered successively in each calendar year.

(Classification)

(Classification)

necessary for an understanding of observation and fire, concealment and cover, obstacles, key terrain features, avenues of approach and include effects of and on each, as appropriate of nuclear fires, biological and chemical agents, etc.

- (2) Effect on enemy courses of action. Discuss in the same manner as for the effects of weather in paragraph 2a(2). 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 considered, as pertinent, in separate subparagraphs: sociology, politics, economics, psychology, and other factors. Other factors may include such items as science, materiel, transportation, manpower, and hydrography. 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 probability 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 appropriate.

c. Strength. Enemy strength in this subparagraph is categorized as committed 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) Committed forces. Includes artillery and other units in position to support the committed forces with fire, chemical, and biological warfare agents. Specify which units can deliver nuclear fires, chemical agents, etc., as appropriate. Omit if there are no committed forces.

(Classification)

Committed forces are those enemy ground units (including guerrillas, if appropriate), together with their supporting ground fire units, which are reasonably certain of being employed within a definite 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 reserves of the enemy command, comparable to that of the estimator's command, committed against our force and the reserves of higher enemy commanders are usually considered as reinforcements. If there is doubt as to whether a unit should be considered as committed forces or a reinforcement, it is considered as a reinforcement. This attributes to the enemy the maximum capability to reinforce his forces that can oppose a given friendly course of action.

- (2) Reinforcements. Include designation and location. Omit if there are no reinforcements. (Reinforcements 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 reinforcements, 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 reinforcements.)
- (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. State 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.)
- d. 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

(Classification)

(Classification)

listed as well as positive information.

- e. Peculiarities 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 strength 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, ineffectiveness, 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 ability to support his forces logistically is included if there are any apparent inabilities to do so.
 - (5) Civil affairs. An estimate of the attitude of civil populace, status of food, supply, medical facilities, and communications.
 - (6) Personalities. 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 the enemy can adopt as specific courses of action and their relative probability of adoption.

- a. Enumeration. State what, when, where, and in 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 the 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 the 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

(Classification)

(Classification)

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 subparagraph 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 analyses. 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 own higher, or lower echelons. The order of listing has no significance.

/s/ _____
G2

Annexes
Distribution
Authentication

(Classification)

Title of Lesson:

Day and Date:

Hours:

Place:

Class:

Instructor:

Assistants:

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 capitals.

(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.

- (2) Stress important items that are difficult under each main point.
2. Application: (state method and time required)
- a. Outline in detail what you are going to do.
 - (1) Arrangement of students and equipment.
 - (2) Detailed instructions.
 - b. Supervision and assistance which will be rendered (plan of conduct).
3. Examination: (state method and time required)
- a. If written, attach a copy.
 - b. If oral, write questions in your lesson plan.
 - c. If observation, describe what you will do.
 - d. If performance, outline plan of examination.
4. Review or Critique: (state method and time required)
- a. Clarify points of difficulty.
 - b. Summarize the lesson.
 - c. Reemphasize important points (safety precautions)
 - d. Strong closing statement - write out in detail.

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. Release 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 toward you with just enough lift to feel resistance and tension at the victim's shoulders. (Do not bend your elbow.) Then lower his arms to the ground.
- e. Continue this action until normal breathing is resumed by victim.



Figure 107. Pressure points.



Figure 108. Artificial respiration - mouth-to-mouth.



Figure 108. (1) Artificial respiration - mouth-to-mouth.



Figure 108. (2) Artificial respiration - mouth-to-mouth.

FIRST AID TREATMENT

AILMENT	SYMPTOMS	TREATMENT
Shock	Pale face Cold, clammy skin Rapid, weak pulse Shallow breathing	Lay patient on back. Lower head, elevate feet. Loosen clothing, keep warm. Feed hot liquids, if conscious.
Wound		Expose wound. Control bleeding. Apply sterile dressing. Treat for shock.
Fracture	Pain and tenderness Partial or complete loss of motion Deformity Swelling Discoloration	Handle with care; splint before moving. Support the limb on either side until splint is applied. Splints must be long enough to reach beyond joints above and below fracture and must be tied twice above and below break to immobilize limb. Pad all splints. Treat for shock.
Burn	First degree: Skin red, no blister. Second degree: Skin blistered. Third degree: Skin destroyed and charred.	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. Treat for shock.

Table XL

FIRST AID TREATMENT (CON'T)

AILMENT	SYMPTOMS	TREATMENT
Sunstroke (direct exposure to sun)	Flushed face Dry skin Strong rapid pulse Spots before eyes Headache High temperature	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.
Heat Exhaustion	Dizziness Nausea Pale face Cramps Cold clammy skin Weak pulse.	Move patient to shade. Treat as for shock. Give, cool water.
Snake Bite		Treat all snake bites as poisonous. Remain quite, don't move. Place constricting band between bite and heart just tight enough to distend surface veins. Cold pack - treat for shock.

Table XL (1)



Figure 108. Identifying a pit viper.

Figure 110. Not used.

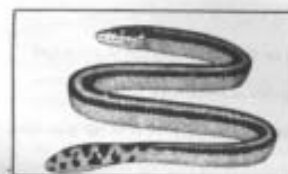


Figure 111. Sea snake.

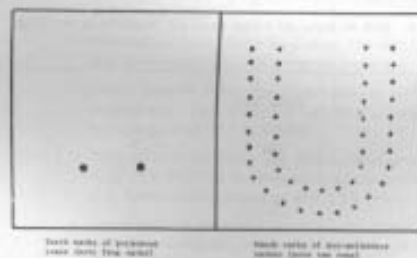


Figure 112. Teeth marks of snakes, poisonous and non-poisonous.

HOT - WET SURVIVAL INFORMATION

1. Be alert.
2. Be wary of strangers.
3. Guide on trails to friendly villages.
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 fibrous material makes good tinder.
9. Boil or treat all water used for drinking or washing.

Table XLI

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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/PF 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., Ord DSU, QM 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.
- GVN - 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 its agents or agencies.
- HED SUP PAC - Headquarters Support Activity, Saigon. Also HSAS. The U.S. Navy activity supporting the U.S. Mission in Saigon.

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Hop Tac - Sometimes called PICA for Pacification Intensification in Critical Areas. The program for priority attention to expanding the critical Saigon-Cholon base of GVN control.

HSAS - HED SUP 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 platoons 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 GVN 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.

USIS - United States Information Service. Serves U.S. interests as well as advising the Vietnamese in the information field. Also offers support to PSYOP/CA advisors.

VC - Viet Cong. Communist insurgents against the RVN government.

VIS - Vietnamese Information Service.

VN - Vietnam, Vietnamese.

VNAF - Vietnamese Air Force.

VNN - Vietnamese Navy.

VNMC - Vietnamese Marine Corps.

50900 Army-Ft. Benning, Ga. 25 Jul 67