Chapter 1
Combat operations

COMBAT ORDERS

Combat orders are written or oral communications used to transmit information pertaining to combat operations.

Warning Order

A warning order gives advance notice of a contemplated action or order which is to follow. Although a warning order has no prescribed format, all known elements should be included. Figure 1-1 represents a suggested format.

WARNING ORDER - Stated to alert recipients
ADDRESSEES - To whom the order pertains
SITUATION - A short concise statement of the friendly and enemy situation
TIME/NATURE OF OPERATION - Type of mission
EARLIEST TIME OF MOVE
TIME/PLACE FOR OPORD ISSUANCE
SPECIAL INSTRUCTIONS - Details of early coordination to be made rehearsals and special equipment requirements
ACKNOWLEDGE

Figure 1-1. Warning order - essential elements

Operation Order (OPORD)

The operation order sets forth the organization for combat (task organization), the situation, the mission, the commander's decision and plan of action, and the details of the execution needed to ensure coordinated action by a unit. The standard OPORD format is shown in Figure 1-2 (page 1-2).

Fragmentary Order

A fragmentary order is used to change or modify the OPORD. It normally follows the OPORD format but only includes the items to be changed or modified.

COMBAT PREPARATIONS

Tactical Reed Marches

Movement order

Movement order or briefing should include as a minimum the following:

- Enemy and friendly situation.
- Destinat ion.
- Star critical release and rally points.
- Rate of march and catch up speed.
- Support (indirect, direct and medical and communications.
- Actions on contact.
- Order of march.
- Route alternate route.
- Distance between vehicles (day - 50 - meters, night - 25 - meters).
- Departure time.
- Location of commander.
- Lead vehicle (security reconnaissance).

Rates of march

See Table 1-1 (page 1-3)

March security

Each vehicle must be assigned a sector of fire (Figure 1-3, page 1-3). Vehicle crew maintains 360° observation and an air guard.

Halts

Security is first priority on any scheduled, unscheduled or disabled vehicle halt. Two halt formations are shown in Figure 1-4 (page 1-3).

OPORD NO

REFERENCES. List any maps or documents needed to understand the order or that were used in the preparation of the order.

TIME ZONE USED THROUGHOUT THE ORDER

TASK ORGANIZATION

1 SITUATION

a. Enemy forces.

(1) Situation (enemy, weather, and terrain).

(2) Capabilities.

(3) Probable course of action.

b. Friendly forces.

(1) Mission of your parent unit.

(2) Mission of unit providing you support.

(3) Mission and/or route of adjacent units that may affect your operation.

c. Attachments and detachments.

2 MISSION

Who, what, when, where (coordinates), and why.

3 EXECUTION

a. Concept of operation. The overall plan (scheme of maneuver) for the unit and plan for fire support (refer to annex).

b. Commander's intent. How commander views the upcoming operations.

c. Subunit missions. For sections, teams, and individuals.

d. Coordinating instructions.

(1) Time schedule.

(2) Formations and order of movement.

(3) Route (primary and alternate).

(4) Movement within friendly front lines.

(5) Rally points and actions at rally points.

(6) Actions on enemy contact, at danger areas, and at the objective.

(7) Nuclear, biological, chemical (NBC) safety instructions and mission-oriented protection posture (MOPP) level.

(8) Priority intelligence requirements (PIR).

(9) Fire support (if not already discussed).

(10) Rehearsal and inspections.

(11) Debriefing (include essential elements of information (EEI), other intelligence requirements (OIR), time, and place).

(12) Annexes (other actions may be covered separately).

4 SERVICE SUPPORT

a. Supply.

(1) Rations.

(2) Uniforms.

(3) Arms and ammunitions.

(4) Captured material.

b. Transportation.

c. Medical evacuation.

d. Personnel.

e. Prisoners of war.

5 COMMAND AND SIGNAL

a. Command.

(1) Commander, leader location.

(2) Chain of command.

b. Signal.

(1) Frequencies and call signs.

(2) Pyrotechnics and signals.

(3) Challenges and passwords.

(4) Code words.

NOTES: 1. The OPORD heading items may be omitted depending on the situation.

2. Details under subparagraphs should be tailored to provide all relevant and essential information.

3. Items covered by standing operating procedures (SOP) need not be covered in the OPORD.

Figure 1-2. Format for an operation order

Table 1-1. Average rates of marches

Unit	Average Rates of March KMPH (MPH)				Days March Kilometers
	On Roads		Cross-country		
	Day	Night	Day	Night	
Foot troops	4 (2 5)	3 2 (2)	2 4 (1 5)	1 6 (1)	20-32 (12-20)
Trucks, general	40 (25)	40 (lights) 16 (blackout)	12 (7 5)	8 (5)	280 (174)
Tracked vehicles	24 (15)	24 (lights) 16 (blackout)	16 (10)	8 (5)	240 (149)
Truck-drawn artillery	40 (25)	40 (lights) 16 (blackout)	12 (7 5)	8 (5)	280 (174)
Tractor-drawn artillery	32 (20)	32 (lights) 16 (blackout)	16 (10)	8 (5)	240 (149)

NOTES: 1. This table is for general planning and comparison purposes. All rates given are variable in accordance with the movement conditions as determined by reconnaissance. The average rates include periodic rest halts.

2.. Miles per hour are listed in parentheses.

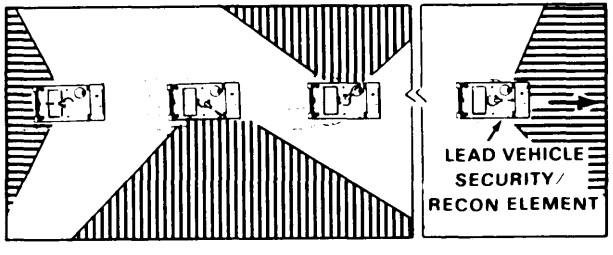


Figure 1-3. Sectors of fire

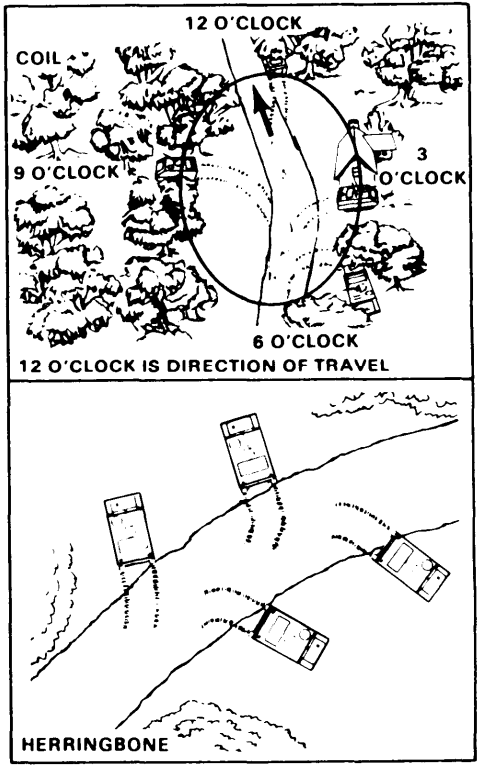


Figure 1-4. Halt formations

Bivouac and Assembly Areas

Area must be organized to provide a continuous 360° perimeter security. When any element leaves the perimeter, either shrink the perimeter or redistribute the perimeter responsibilities. Crew served weapons are the basis for the unit defense. Individual weapons provide security for the crew - served weapons and must have overlapping sectors of fire.

Selection characteristics are:

- Concealment.
- Cover from direct and indirect fire.
- Defendable terrain.
- Drainage and a surface that will support vehicles.
- Exits and entrances. and adequate internal roads or trails.
- Space for dispersion of vehicles, personnel, and equipment.
- Suitable landing site nearby for supporting helicopters.

Quartering party responsibilities are:

- Reconnoiters the area.
- Checks the area for NBC hazards.
- Checks the area for obstacles and mines then marks or removes them.
- Marks platoon and squad sectors.
- Selects a command post location.
- Selects a company trains location.
- Provides guides for the incoming unit(s) to accomplish immediate occupation.

Recommended priority of work is:

- Post local security (LP/ OP).
- Position crew served weapons (combat engineer vehicle (CEV) antitank (AT) weapons and machine guns) and chemical alarms.
- Assign individual fighting positions.
- Clear fields of fire prepare range cards and camouflage vehicles.
- Prepare hasty fighting positions.
- Install change to land line communication.
- Emplace obstacles and mines.
- Construct primary lighting positions.
- Prepare alternate and supplementary fighting positions.
- Stockpile ammunition food and water.

Recommended actions at the bivouac and assembly area are:

- Reorganization.
- Weapons check.
- Maintenance.
- Distribution of supplies.
- Rest and personal hygiene.
- Consumption of rations.

MOUNTED/DISMOUNTED OPERATIONS

Troop Leading Procedures

The eight steps of troop leading are:

1. Receive the mission.
2. Issue a warning order.
3. Make a tentative plan that will accomplish the mission.
4. Start the necessary movement.
5. Reconnoiter.
6. Complete the plan.
7. Issue orders.
8. Supervise and refine the plan.

Movement Techniques

See Figures 1-5 and 1-6 for traveling and bounding overwatches.

The dismounted squad moves with one fire team following the other. Both fire teams use the wedge formation for all movements (Figure 1-7). See Figure 1-8 for the movement formations.

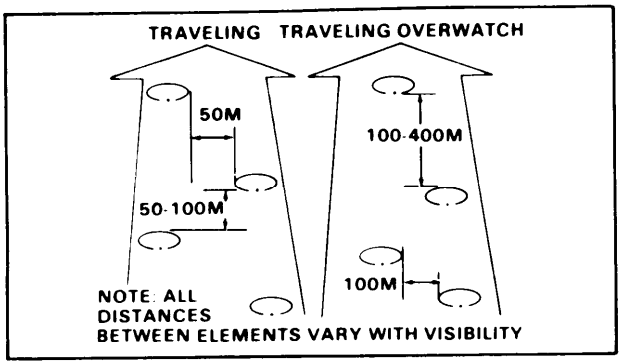


Figure 1-5. Traveling and traveling overwatch

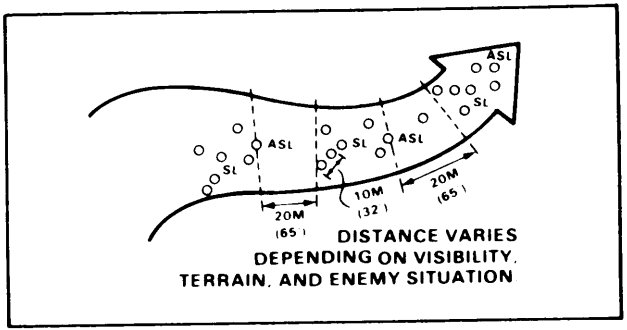


Figure 1-7. Traveling dismount elements

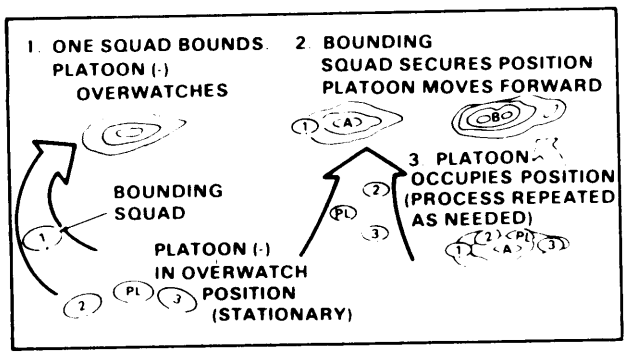


Figure 1-6. Bounding overwatch

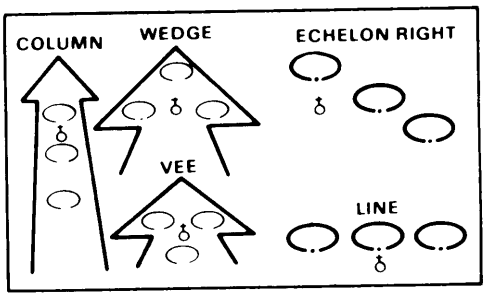


Figure 1-8. Movement formations

Job Sites Security

Prior to moving to the job site, inform everyone of warning signals, code words, and pyrotechnics. Upon arrival at job site vicinity:

- Occupy job site overwatching position.
  - Dispatch reconnaissance/minesweeping/NBC team to secure job site.
  - After the area is secured, move into area and establish hasty perimeter.
  - Establish escape routes and identify avenues of approach, LP/OPs, and crew-served weapons positions.
  - Place LP/OP and NBC alarms.
- Position crew-served, AT, and automatic weapons, and prepare range cards.
  - Divide job site into defensive sectors and assign sectors of responsibility.
- Maintain communication with parent unit.

Patrolling

The two types of patrol are reconnaissance (zone or area) and combat (ambush, security or raid). The four key principles of a successful patrol are detailed planning thorough reconnaissance positive control and all around security. The steps to follow in preparation for a patrol are:

1. Issue warning order.
2. Conduct required coordination (Figure 1 - 9).
3. Issue operation order.
4. Inspect and rehearse.

Reconnaissance patrol

Figure 1 - 10 shows the techniques used by a reconnaissance patrol. The Information should be collected following the SALUTE (size, activity, location, unit, time, and equipment) report format. The gathered information must be shared with all patrol members.

S3

- Changes in the friendly situation.
- Route selection, loading zone (LZ) selection.
- Linkup procedure.
- Transportation.
- Resupply (in conjunction with S4)
- Signal plan — callsigns, frequencies, code words, pyrotechnics, and challenges and passwords.
- Departure and reentry of friendly lines (see below)
- Other patrols patrolling in area.
- Attachment of specialized troops (demolition team, scout dog team, forward observers (FO), interpreters)
- Rehearsal areas.
  - Terrain similar to objective site.
  - Security of the area.

S3 (cont)

- Use of blanks, pyrotechnics, live ammunition.
- Fortification available.
- Time the area is available.
- Transportation.

FRIENDLY FORWARD UNIT

Patrol leader gives:

- Identification (unit).
- Size of patrol.
- Time(s) of departure and return.
- Area of the patrol's operation (if it is within the forward unit's area of operation)

Forward unit gives:

- Information on terrain.
- Known or suspected enemy positions.
- Likely enemy ambush sites.
- Latest enemy activity.

FRIENDLY FORWARD UNIT (cont)

- Detailed information on friendly positions.
- Obstacle locations.
- Fire plan.
- Support the unit can furnish, such as fire support, litter teams, guides, communications, and reaction units.
- Signal plan to include the signals to be used upon reentry, and the procedure to be used by the patrol and guide during departure and reentry.
- Location(s) of detrucking point, initial rally point, departure point, and reentry point.

ADJACENT PATROL

- Identification.
- Mission.
- Route.
- Fire plan.
- Signal plan.

ADJACENT PATROL (cont)

- Planned times and points for departure and reentry.
- Any information that either patrol may have about the enemy.

FIRE SUPPORT OFFICER (FSO)

- Mission and objective.
- Routes to and from the objective (include alternate routes)
- Time of departure and expected time of return.
- Fire plan to include targets en route to and from the objective, and fire on and near the objective.
- Communications (primary and alternate means, emergency signals, and code words)

S2

- Changes in the enemy situation.
- Special equipment requirements.

Figure 1-9. Patrol coordination checklist

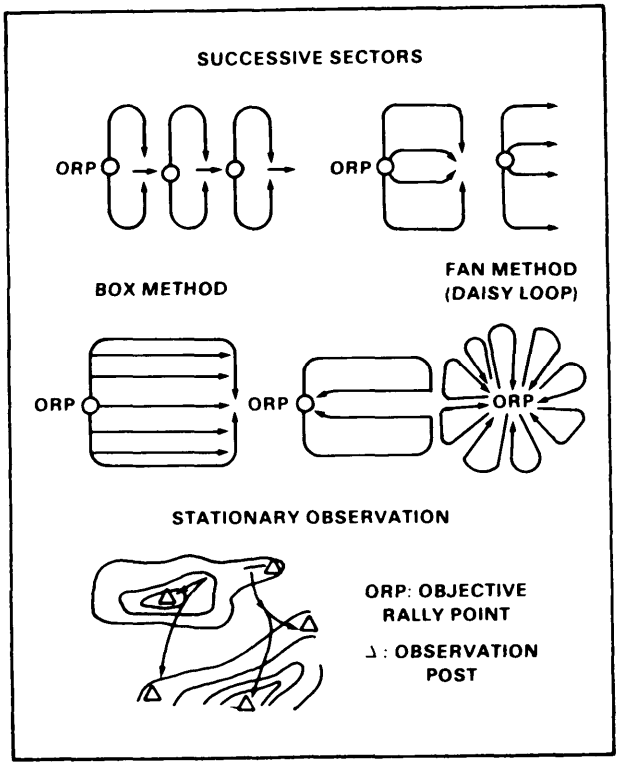


Figure 1-10. Techniques for conducting reconnaissance

Combat patrol

Ambush and security. See Figures 1-11 through 1-14 (pages 1-8 and 1-9). Key points for a successful ambush are:

- Surprise.
- Security.
- Restricted enemy movement in kill zone.
- Good fields of fires.
- Withdrawal routes for ambush force.
- Use of fire from unexpected direction.
- Cover and concealment.

Raid. Raid patrols destroy or capture personne, equipment, and/or installation. (Figure 1-15, page 1-9).

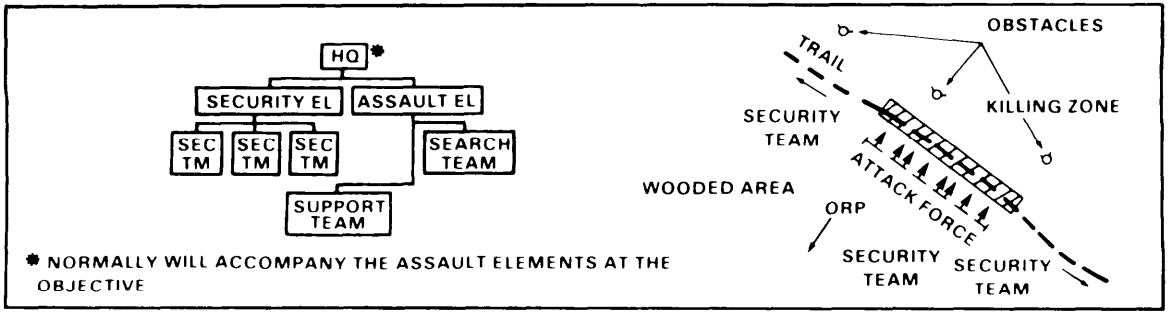


Figure 1-11. Typical organization and employment - point (linear) ambush

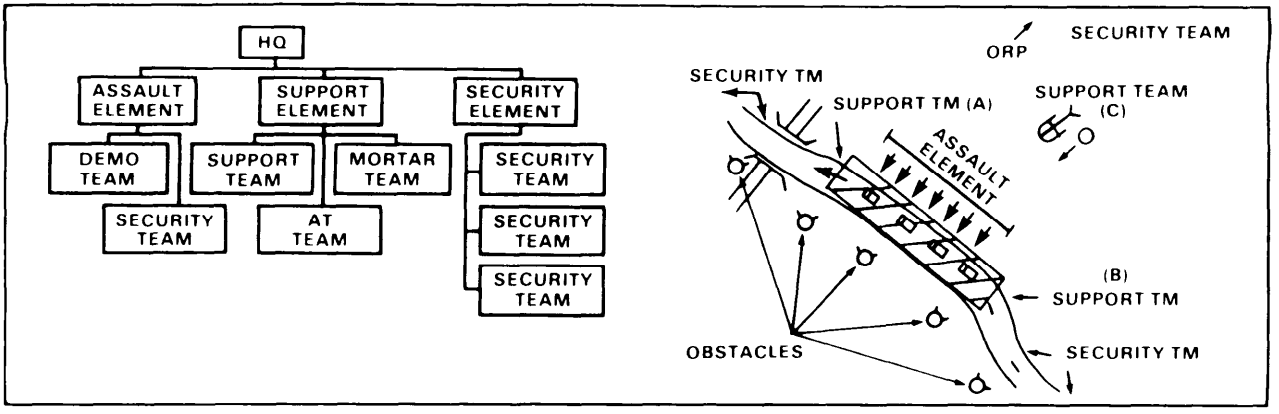


Figure 1-12 Typical organization and employment point (vehicular) ambush

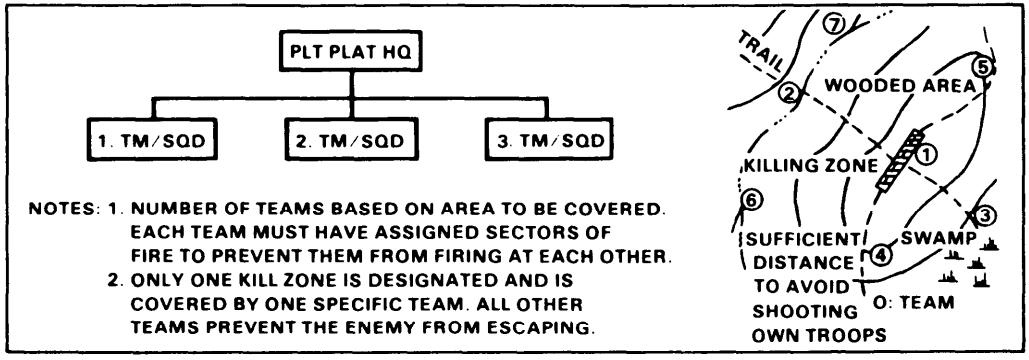


Figure 1-13. Typical organization for an area ambush

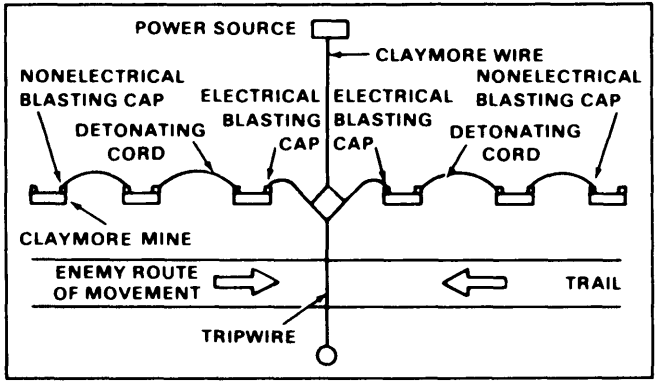


Figure 1-14. Multiclaymore mine mechanical ambush

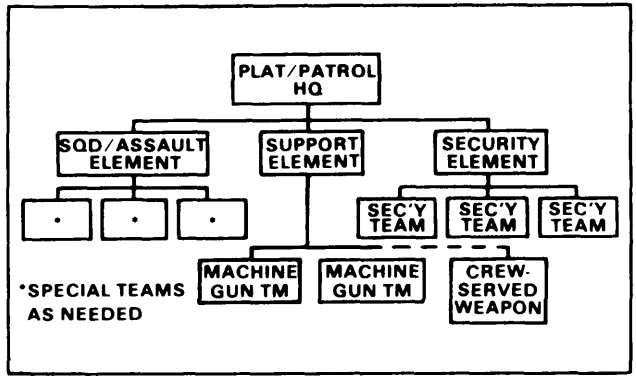


Figure 1-15. Typical organization for a raid patrol

FIRE SUPPORT PROCEDURES AND CHARACTERISTICS

Call for Fire Elements

Identification
Call signs

Warning order
Type mission adjust fire, fire for effect, immediate suppression.
Method of target location grid, polar, shift from known point.

Target location
Grid: six-digit grid
direction*
Polar: direction*
distance
vertical correction
(fire direction center must know observer location)

*Direction can be given in degrees, mils or cardinal directions.

Shift: right/left from known point
add/drop from known point
vertical correct from known point
(fire direction center must have known point)

Target description
Size, number, type. degree of protection, status

Method of engagement (optional)
Ammunition/fuze desired, sheaf corrections, high angle, danger close.

Method of fire and control (optional)
At my command, time on target, request splash.

NOTE: Direction must be given before any subsequent corrections when adjusting fires.

Target location examples

GRID COORDINATES

"F6A15, THIS IS F6A27 . . . . . Call signs of the fire direction center (FDC) and observer.
ADJUST FIRE, OVER" . . . . . Warning to alert the firing unit.
"GRID 135246, OVER". . . . . Normally, a six-digit grid is best.
"2 MACHINE GUNS FIRING . . . . . .Description of the target.
VT IN EFFECT, OVER" . . . . . Adjustment is conducted with fuze quick. Fuze variable time (VT) will be used in fire for effect.
"DIRECTION 1650, OVER." . . . . . .Must be sent before or with first correction.

POLAR COORDINATES

"F6A15, THIS IS F6A27 . . . . . .Call signs of the FDC and observer.
FIRE FOR EFFECT, POLAR, OVER" . . . . . Warning to alert the firing unit.
“DIRECTION 0250, ...Direction from the **observer** to the **target.**
DISTANCE 3500, OVER." . . . . . Distance from the **observer** to the **target.**
"25 INFANTRYMEN IN OPEN, ... Description of the target.
ICM, AT MY COMMAND, OVER." . . . . Improved capabilities missile (ICM) rounds wil be used. The observer wil command **FIRE** at the appropriate time after the FDC informs the observer that the firing unit is **READY.**

SHIFT FROM A KNOWN POINT

"F6A15, THIS IS F6A27 . . . . . Call signs of the FDC and observer
FIRE FOR EFFECT, SHIFT
BG4301, OVER" . . . . . Warning to alert the firing unit.
"DIRECTION 5470, ... Direction from the **observer** to the **target.**
LEFT 400, OVER " . . . . . The target is located 400 meters to the left of BG4301 and at the same range. (Lateral shift or range changes can be omitted when not needed.)
"25 INFANTRYMEN IN SHALLOW . . . . . Description of the target.
FOXHOLES, VT IN EFFECT OVER" . . . . . Airbursts are most effective against protected personnel without overhead cover.

Call for fire example

OBSERVER	FIRE DIRECTION CENTER
"F6A15, THIS IS F6A27, ADJUST FIRE, OVER"	"F6A27, THIS IS F6A15, ADJUST FIRE, OUT"
"GRID 563192, OVER "	."GRID 563192, OUT"
"25 INFANTRY IN OPEN, QUICK AND VT IN EFFECT, OVER "	."25 INFANTRY IN OPEN, QUICK AND VT IN EFFECT, AUTHENTICATE TANGO, FOXTROT, OVER
"'AUTHENTICATION IS ECHO, OUT"	
"DIRECTION 1930, OVER." . .	."DIRECTION 1930, OUT." "BRAVO, 4 ROUNDS, OVER."
"BRAVO, 4 ROUND, OUT." . . .	."SHOT, OVER."
"SHOT, OUT."	
"ADD 200, OVER	"'ADD 200, OUT." "SHOT, OVER."
"SHOT, OUT."	
"DROP 100, OVER."	"DROP 100 OUT." "SHOT, OVER."
"SHOT, OUT."	
"LEFT 30, DROP 50, FIRE FOR EFFECT, OVER."	."LEFT 30, DROP 50, FIRE FOR EFFECT, OUT." "SHOT, OVER."
"SHOT, OUT."	"ROUNDS COMPLETE, OVER."
"ROUNDS COMPLETE, OUT. "	
"END OF MISSION, INFANTRY DISPERSED, ESTIMATE 15 CASUALTIES, OVER"	."END OF MISSION, INFANTRY DISPERSED, ESTIMATE 15 CASUALTIES. OUT. "

Adjustments

The adjustments that may be needed to obtain round on target are spotting, lateral, and range.

Spotting

Is where round lands in relation to target, such as short or long and number of mils right or left of target. Example of spottings short 40 right or long 50 left.

Lateral correction (right/left)

Adjust the lateral shift from impact to observer target (OT) line in meters. Corrections of 20 meters or less will be ignored until firing for effect.

$W = Rm$ W = Lateral shift correction in meters
m = mils between burst and target
R = OT factor = target range (to nearest 1,000 meters)

$$\frac{\text{target range}}{1{,}000}$$

NOTE: If target range is less than 1,000 meters, round to nearest 100 meters.

Range correction (up/down)

Mechanical time fuze only. Initial range shift correction is used to bracket target. (Table 1-2).

Range deviation

See Figure 1-16.

Table 1-2. Target bracketing

DISTANCE TO TARGET	CHANGE
Less than 1,000	+/- 100 meters
1,000 to 1,999	+/- 200 meters
2,000 or greater	+/- 400 meters

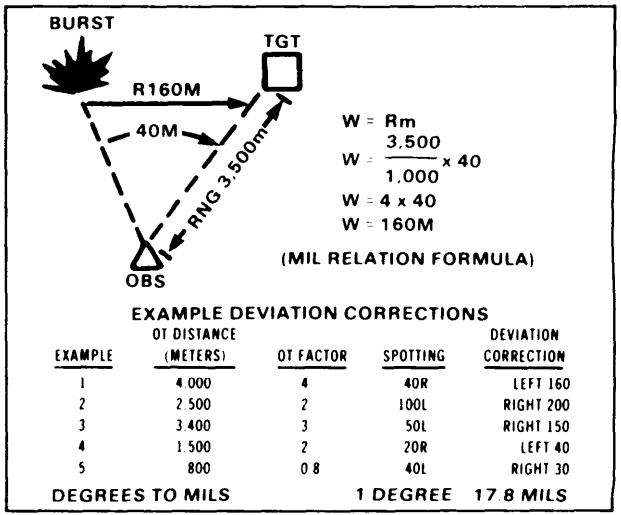


Figure 1-16. Adjusting field artillery fires

Angle estimation

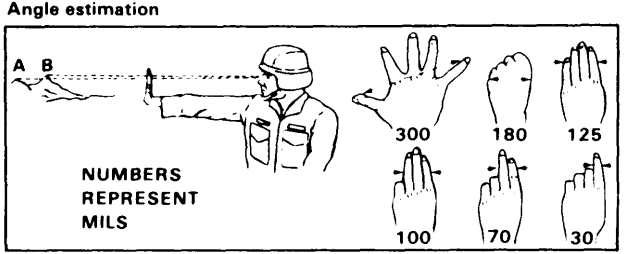


Figure 1-17. Hasty method for estimating angle in mils

Quick Smoke

When using quick smoke consider the wind speed, wind direction, smoke duration required, and other friendly units in the area:

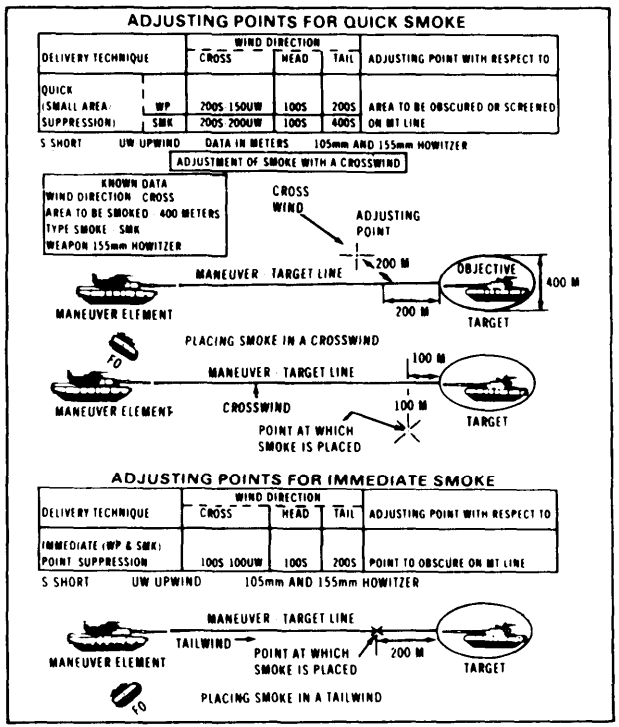


Figure 1-18. Adjusting points for quick smoke

Table 1-3. Artillery and mortar smoke

DELIVERY SYSTEM	TYPE ROUND	TIME TO BUILD EFFECTIVE SMOKE	AVERAGE BURNING TIME	AVERAGE OBSCURATION LENGTH (METERS) PER ROUND WIND DIRECTION		
				CROSS	QUARTERING	HEAD/TAIL
155MM	WP	½ min	1-1½ min	100	75	50
	HC	1-1½ min	4 min	350	250	75
105MM	WP	½ min	1-1½ min	75	60	50
	HC	1-1½ min	3 min	250	175	50
107MM	WP	½ min	1 min	200	80	40
81MM	WP	½ min	1 min	100	60	40

Table 1-4. Artillery and mortar flares

TYPE WEAPON/ROUND	RANGE (METERS)	ILLUM TIME (SEC)	CONTINUOUS ILLUM (RD PER MIN)	DIAMETER OF ILLUM AREA (METERS)	CANDLEPOWER
81MM/M301A3	3.300	75	2	1.100	500.000
107MM/M335A2	5.500	90	2	1.500	850.000
105MM/M314	8.500	60	2	1.000	600.000
155MM/M118	11.600	60	2	1.000	500.000
155MM/M485	14.000	120+	1	2.000	1.000.000

EXAMPLE

QUICK SMOKE

"M6J41 this is B5T36 adjust fire fire for effect, over"
"Grid BS (612^{AF}327) (6122^{FFE}3275) direction 1600, over"
"Enemy observation post HC smoke in effect, over"

Table 1-5. Fire support equipment characteristics

1. Ammunition

TYPE	TYPICAL TARGETS
HE	personnel, light armor, crew weapons
HEAT/HEP-T (105 only)	light armor, light skin vehicle
ICM	personnel, light armor, light skin vehicle
DPICM (dual purpose)	all targets
APERS (105 only)	personnel
WP	vehicles, fuel/ammo stores (Also used as quick smoke.)
smoke	screening
ILLUM	night/darkness
copperhead	armor, point targets
RAP (rocket assist)	long range area targets
Scatterable mines (ADAMS/RAAMS)	mines, area denial (long and short duration)
nuclear	
chemical	

2. Fuzes

TYPE	TYPICAL TARGETS
impact (quick)	surface targets
delay	cratering, heavily wooded
mechanical time	dug-in, defilade positions
proximity (VT)	dug-in, defilade positions
concrete piercing	bunkers

3. Weapon system maximum ranges

WEAPON	RANGE
81MM mortar	4,595M
4.2-inch mortar	6,840M
105MM	11,500M
	15,100M w/RAP
155M (self propelled)	18,100M
	24,000M w/RAP
155MM (towed)	18,150M
	30,000M w/RAP
8 inch (203MM)	22,900M
	30,000M w/RAP
MLRS	+30,000M

Chemical Agents

Table 1-6. Chemical agents characteristics and defense

TYPE OF AGENT	HOW NORMALLY DISSEMINATED	MEANS OF DETECTION	SYMPTONS IN SOLDIER	EFFECT ON SOLDIER	RATE OF ACTION	INDIVIDUAL		PROTECTION REQUIRED	U.S. AGENTS EQUIVALENT	
						FIRST AID	DECONTAMINATION		SYMBOL/NAME	FIELD CHARACTERISTICS
NERVE	Aerosol or vapor	Automatic chemical agent alarm and chemical agent detector kits to detect vapors and aerosols; chemical agent detector paper to detect liquids	Difficult breathing, drooling, nausea, vomiting, convulsions, and sometimes dim vision.	Incapacitates; kills if high concentration is inhaled.	Very rapid by inhalation; slow through skin	Give nerve agent antidote injection. Artificial respiration may be necessary.	Nonpersistent. None needed	Protective mask and protective clothing.	GA/Tabun CB/Sarin GD/Soman	Colorless
	Liquid droplet			Incapacitates; kills if contaminated skin is not decontaminated rapidly.	Delayed through skin; more rapid through eyes.		Persistent. Flush eyes with water. Decontaminate skin using M258A1 Kit.		VX Thickened G-agent	
BLISTER	Liquid droplet		Mustard, nitrogen mustard-no early symptoms. Lewisite, mustard-lewisite-searing of eyes and stinging of skin. Phosgene oxime-irritation of eyes and nose.	Blisters skin; is destructive to respiratory tract; can cause temporary blindness. Some agents sting and form wheals on skin.	Blistering delayed hours to days, eye effects more rapid. Mustard lewisite and phosgene oxime very rapid.	None	Flush eyes with water. Decontaminate skin with M258A1 Kit or wash with soap and water.	Protective mask and protective clothing.	HD/Mustard HN/Nitrogen Mustard L/Lewisite HL/Mustard Lewisite CX Phosgene Oxime	Pale yellow droplets Dark droplets Dark, oily droplets Dark, oily droplets Colorless droplets
BLOOD	Vapor (gas)		Convulsions and coma.	Incapacitates; kills if high concentration is inhaled.	Rapid	Mask. Artificial respiration may be necessary.	None	Protective mask.	AC/Hydrogen cyanide CK/Cyanogen chloride	Colorless
CHOKING	Vapor (gas)		Coughing, choking, nausea, and headache.	Damages and floods lungs.	Immediate to 3 hours.	For severe symptoms, avoid movement and keep warm.	None	Protective mask.	CG/Phosgene	Colorless

MEANING OF LINE ITEMS IN NBC REPORTS

LINE	NUCLEAR	CHEMICAL AND BIOLOGICAL	REMARKS
A	Strike serial number.	Strike serial number.	Assigned by division NBC Center.
B	Position of observer.	Position of observer.	Use grid coordinates (or place).
C	Direction of attack from observer.	Direction of attack from observer.	Direction measured clockwise from grid north or magnetic north (state which) in degrees or mils (state which).
D	Date-time group for detonation.	Date-time group for start of attack.	Zulu time.
E	Illumination time.	Date-time group for end of attack.	Zulu time (second).
F	Location of area attacked.	Location of area attacked.	Use grid coordinates (UTM or GEOREF) or place name. State whether location is actual or estimated.
G	Means of delivery.	Kind of attack.	State whether attack was by artillery, mortars, multiple rockets, missiles, bombs, or spray.

LINE	NUCLEAR	CHEMICAL AND BIOLOGICAL	REMARKS
H	Type of burst.	Type of agent/ height of burst.	Estimate height of burst. Specify air, surface, or unknown for nuclear. State whether it was a ground or air burst for chemical.
I	NA	Number of munitions or aircraft.	If known.
J	Flash-to-bang time.	NA	Use seconds.
K	Crater present or absent and diameter.	Description of terrain and vegetation.	Nuclear: Send in meters. Chemical: Sent in NBC 6.
L	Cloud width at H+5.	NA	State whether measured in degrees or mils.
M	Stabilized cloud top or cloud bottom angle at H+10, or cloud or bottom top height.	Enemy action before and after attack. Effect on troops.	Nuclear: State whether angle is measured in degrees or mils, or whether height is measured in meters of feet.
N	Estimated yield.	NA	Sent as KT.
O	Date-time group for contour lines.	NA	Used when contours are not plotted at H+1.

LINE	NUCLEAR	CHEMICAL AND BIOLOGICAL	REMARKS
P	Radar purposes only.	NA	
PA	Coordinates of external contours of radioactive cloud.	Predicted hazard area.	Chemical: If windspeed is 10 kmph or less, this item is 010 the radius of the hazard area in km.
PB	Downwind direction of radioactive cloud.	Duration of hazard.	Nuclear: State whether direction is in degrees or mils. Chemical: In days.
Q	Location of reading.	Location of sampling and type of sample.	Chemical: State whether test was air or liquid.
R	Dose rate.	NA	State in cGyph. See sample NBC 4 for terms associated with this line.
S	Date-time group of reading.	Date-time group contamination detected.	State time initial identification test sample or reading was taken.
T	H+1 date-time group.	Date-time group of latest contamination survey of the area.	NBC 5 and NBC 6 reports only.

Figure 1-19. Line item definitions

MEANING OF LINE ITEMS IN NBC REPORTS							
LINE	NUCLEAR	CHEMICAL AND BIOLOGICAL	REMARKS	LINE	NUCLEAR	CHEMICAL AND BIOLOGICAL	REMARKS
U	1000-cGyph contour line.	NA	Plot in red.	ZA	NA	Significant weather phenomena.	See CDM for explanation of codes.
V	300-cGyph contour line.	NA	Plot in green.	ZB	NA	Remarks.	Include any additional information.
W	100-cGyph contour line.	NA	Plot in blue.	ZI	Effective wind speed.	NA	3 digits (kmph).
X	20-cGyph contour line.	Area of actual contamination.	Plot in black for nuclear, yellow for chemical.		Downwind distance of zone I.		4 digits (hundreds of meters).
Y	Direction of left and right radial lines.	Downwind direction of hazard and windspeed.	Direction: 4 digits (degrees or mils).		Downwind distance of zone II.		4 digits (hundreds of meters).
			Windspeed: 3 digits (kmph or knots).		Cloud radius.		3 digits (hundreds of meters).
Z	Effective wind speed.	NA	3 digits (kmph or knots).				
	Downwind distance of zone I.		3 digits (km or Nm).				
	Cloud radius.		2 digits (km or Nm). If windspeed is less than 8 kmph, this line contains only the 3-digit radius of zone I.				

Figure 1-19. Line item definitions (continued)

NBC 1 (OBSERVER'S REPORT)			
LINE	NUCLEAR	CHEMICAL	BIOLOGICAL
B	NB062634	LB200300	LB206300
C	90 Deg Grid		
D	201405Z	201405Z	200410Z
E		201412Z	20G414Z
F		LB206300 Est	LB206300 Act
G	Aircraft	Bomblets	Aerial Spray
H	Surface	Nerve. V. Air Burst	Unknown
J	60 Sec		
L	15 Deg		
M			

NOTE: Line items B, D, H and either C or F should always be reported, other line items may be used if the information is known.

NBC 2 REPORT (EVALUATED DATA)			
LINE	NUCLEAR	CHEMICAL	BIOLOGICAL
A	A024	B002	C001
D	201405Z	200945Z	201395Z
F	LB187486 Act	LB126456 Act	LB206300 Act
G	Aircraft	Bomblets	Unknown
H	Surface	Nerve. V. Air Burst	Unknown
N	50		
Y		0270 Deg. 015 kmph	
ZA		518640	

NOTES: 1. This report is normally based on two or more NBC 1 reports. It includes an attack location and, in the case of a nuclear detonation an evaluated yield.

2. Refer to the chemical downwind message to determine cloud cover significant weather phenomena and air stability.

NBC 3 REPORT (IMMEDIATE WARNING OF EXPECTED CONTAMINATION)		
LINE	NUCLEAR	CHEMICAL
A	A024	B002
D	201405Z	201415Z
F	LB187486 Est	LB560750 Act
H		Nerve. V. Air Burst
N	50	LB556751
PA		LB559754
		LB632774
		LB610794
		LB558747
PB		In attack area 2-4 days
		In hazard area 1-2 days
Y	02720312	0270 Deg. 015 kmph
Z	01902505	
ZA		518640
ZI	010. 0017. 0028. 007	

NOTES: 1. If the effective windspeed is less than 8 kmph, line Z of the NBC 3 (nuclear) consists of three digits for the radius of zone I.

2. If the windspeed is less than 10 kmph, line PA of the NBC 3 (chemical) is 010 which is the radius of the hazard area.

3. Line ZI is used for NUCWARN reports. When line ZI is used, line Z is not used

Figure 1-20. NBC reports

NBC 4 REPORT (RECONNAISSANCE, MONITORING, AND SURVEY RESULTS)		
LINE	NUCLEAR	CHEMICAL
H		Nerve, V
Q	LB123987	LB200300, Liquid
R	35	
S	201535Z	170610Z

NOTES: 1. Line items H, Q, R, and S may be repeated as often as necessary.
2. Radiation dose rates are measured in the open, with the instrument 1 meter above the ground.
3. In line R, descriptive words such as initial, peak, increasing, decreasing, special, series, verification, or summary may be added.
4. If readings are taken inside a vehicle or shelter, also give the transmission factor.

NBC 5 REPORT (AREAS OF ACTUAL CONTAMINATION)		
LINE	NUCLEAR	CHEMICAL
A	A0012	B005
D		200700Z
H		Nerve, V, Air Burst
S		201005Z
T	201505Z	201110Z
U		
V	ND651455	
	ND810510	
	ND821459	
	ND651455	
W	ND604718	
	ND991686	
	ND114420	
	ND595007	
X		ND206991
		ND201576
		ND200787
		ND206991

NOTE: This report is best sent as an overlay, if time and the tactical situation permits.

NBC 6 REPORT (DETAILED INFORMATION ON CHEMICAL OR BIOLOGICAL ATTACKS)	
LINE	CHEMICAL OR BIOLOGICAL
A	B001
D	200945Z (May)
E	200950Z (May)
F	LB200300, Act
G	Artillery
H	Nerve, V, Air Burst
I	20 rounds
K	Mostly small houses and barns, elevation 600 meters
M	Attack received as counterfire, enemy bypassed on right flank of attack area
Q	Liquid ground sample taken by detection team in attack area
S	201005Z (May)
T	201110Z (May)
X	As per overlay
Y	Downwind direction 0090 degrees, windspeed 010 kmph
ZB	This is the only chemical attack in our area to date

NOTES: 1. This report is submitted only when requested.
2. This report is completed by battalion and higher NBC personnel. It is in narrative form, giving as much detailed information as possible for each line item.

Figure 1-20. NBC reports (continued)

Alarms, Signals, and Warnings

Alarms and signals

Table 1-7. Alarms and signals

TYPE	CHEMICAL/ BIOLOGICAL	NUCLEAR
Vocal	Gas or Spray	Fallout
Sound	Succession of short signals — Metal to metal — Short horn blasts — Interrupted warbling siren	
Visual	Fists over shoulder or posted signs	
Audio/Visual	M8 or M8A1	

Mission-Oriented Protection (MOPP) Levels

Table 1-8. MOPP levels

MOPP LEVEL	OVERGARMENT	OVERBOOTS	MASK/ HOOD	GLOVES
0	Readily Available	Readily Available	Carried	Readily Available
1	Worn*	Carried	Carried	Carried
2	Worn*	Worn	Carried	Carried
3	Worn*	Worn	Worn*	Carried
4	Worn Closed	Worn	Worn Closed	Worn

*Overgarment and/or hood worn open or closed based upon the temperature.

Friendly warnings

See Figure 1-21 for warnings and Figure 1-22 for protection requirements for friendly nuclear strikes.

CHEMWARN (FRIENDLY CHEMICAL STRIKE)

A	AF002Chem
D	028030Z
F	PG560750
G	Artillery Ground Burst
H	Nonpersistent Nerve
PA	PG556751
	PG559754
	PG632774
	PG610694
	PG558747
Y	0015 Deg, 15 kmph

NOTE: A CHEMWARN message is plotted like an NBC 3 (chemical) report.

CHEMWARN FORMAT

LINE	MEANING	REMARKS
A	Strike serial number or code word.	Indicate this is a chemical attack.
D	Date-time group of attack.	Only the date and time of the attack given. This should be encoded.
F	Location of attack.	Grid coordinates of center of attack. If attack is spread over a large area, a series of coordinates may be given to indicate the center of mass of the attack. This should be encoded.
G	Delivery means.	Tell how delivered and how disseminated.
H	Type of agent.	Classify agent by physiological effect and duration of effectiveness.
PA	Attack area and predicted hazard area.	When windspeeds are 10 kmph or less this line will be 010, which is the radius of hazard area in km. When windspeeds are greater than 10 kmph, 6-digit coordinates will be given.
PB	Duration of hazard.	In days.
Y	Downwind direction. Windspeed.	4 digits in degrees or mils (state which). 2 digits in kmph.

Figure 1-21. Friendly NBC warnings

NUCWARN (FRIENDLY NUCLEAR STRIKE)

LINE	MULTIPLE	SINGLE
A	Lamp Post	AC002
D	162025Z-162155Z	270915Z-270930Z
F2	PA613423	
	PA616515	
	PA655523	
	PA631450	
	PA625413	
F3	PA602403	011 PA215154
	PA605536	
	PA672552	
	PA642472	
	PA673442	
H	3 Surface	Surface
I	22	

NOTE: If the burst is to be a surface burst, an NBC 3 (nuclear) report (containing line Z1) should be prepared for separate transmission.

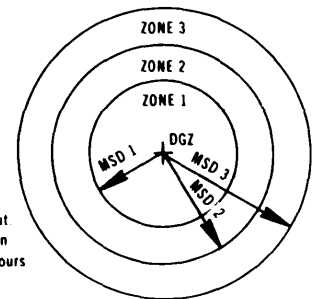
NUCWARN FORMAT

LINE	MEANING	REMARKS
A	Target number or code.	Use target number, such as AF001, for single attack. Use code, or nickname such as Hot Candle, for multiple attacks.
D	Date-time groups.	Single: Date and time attack will begin and the date and time attack will end. Multiple: Date and time attack will begin and date and time when all bursts will be complete. This line should be encoded.
F1	Minimum safe distance 1 (MSD 1) and location of single attack.	If all troops are outside MSD 3, only F3 is transmitted. This line should be encoded. Multiple: Appears as a series of coordinates that define an MSD box plotted around the MSD for each burst in the group. Single: Distance in meters from ground zero to the edge of zone 1, followed by grid coordinates for attack location.
F2	MSD 2.	Same as F1 except information pertains to MSD 2.
F3	MSD 3.	Same as F1 except information pertains to MSD 3.
H	Type and number of bursts (surface or subsurface only).	If there is any chance the strike will be a surface or subsurface burst this line is sent.
I	Number of bursts.	For multiple bursts only.

Figure 1-21. Friendly NBC warnings (continued)

PROTECTION REQUIREMENTS FOR FRIENDLY NUCLEAR STRIKE

AREA	NEGLIGIBLE RISK TO	ZONE OF WARNING	PROTECTION REQUIREMENT
DGZ to MSD 1	NA	1	Evacuate all personnel.
MSD 1 to MSD 2	Warned, protected personnel.	2	Personnel in buttoned-up tanks or foxholes with overhead cover.
MSD 2 to MSD 3	Warned, exposed personnel.	3	Personnel prone on ground with all skin covered.
MSD 3 and beyond	Unwarned, exposed personnel.	NA	No protective measures except dazzle.



SIGNIFICANCE OF PREDICTED FALLOUT ZONES

Exposed, unprotected people may receive the following doses from fallout.
Zone I—Immediate operational concern
More than 150 cGy within 4 hours
Zone II—Secondary hazard.
Less than 150 cGy within 4 hours
More than 50 cGy within 24 hours
Outside the predicted area—
No more than 50 cGy in 24 hours
No more than 150 cGy for an indefinite period

Figure 1-22. Protection for nuclear strikes

NBC WEATHER/WIND MESSAGES

EFFECTIVE DOWNWIND MESSAGE

ZULU	DDTTTT	DATE-TIME GROUP WINDS WERE MEASURED (ZULU)
ALFA	dddsss···	Over 0 thru 2 KT
BRAVO	dddsss···	Over 2 thru 5 KT
CHARLIE	dddsss···	Over 5 thru 30 KT
DELTA	dddsss···	Over 30 thru 100 KT
ECHO	dddsss···	Over 100 thru 300 KT
FOXTROT	dddsss···	Over 300 thru 1 MT
GOLF	dddsss···	Over 1 thru 3 MT

NOTES: 1. The first three digits (ddd) give the effective wind direction, in degrees, from grid north.
2. The second three digits (sss) give the effective wind speed in kilometers per hour.
3. The last three digits (···) give the expanded angle in degrees.

CHEMICAL DOWNWIND MESSAGE

CDM

110500 Zulu	110600 Zulu
I Corps	
WHISKEY	120010 418742
XRAY	125919 416742
YANKEE	130005 518642

NOTES: 1. CDM is only valid for 6 hours.
2. Area affected may be a mapsheet number or an area such as I CORPS.
3. Lines WHISKEY, XRAY, and YANKEE each contain coded weather information. Line WHISKEY is only valid for the first two hours, line XRAY for the next two hours, and line YANKEE for the last two hours.

HOW TO READ THE WEATHER INFORMATION IN A CHEMICAL DOWNWIND MESSAGE

WHISKEY 120 010 4 18 7 4 2

Downwind direction in degrees (120)

Wind speed in kmph (010)

Air stability code (4)
- 1 = very unstable (U)
- 2 = unstable (U)
- 3 = slightly unstable (U)
- 4 = neutral (N)
- 5 = slightly stable (S)
- 6 = stable (S)
- 7 = very stable (S)

Temperature code (18)

Code	Temp
05	5°C
04	4°C
03	3°C
02	2°C
01	1°C
00	0°C
51	-1°C
52	-2°C
53	-3°C
54	-4°C
55	-5°C

Humidity code (7)
- 0 = 0 - 9%
- 1 = 10 - 19%
- 2 = 20 - 29%
- 3 = 30 - 39%
- 4 = 40 - 49%
- 5 = 50 - 59%
- 6 = 60 - 69%
- 7 = 70 - 79%
- 8 = 80 - 89%
- 9 = 90 - 99%

Cloud cover code (4)
- 0 = Sky less than half covered by clouds
- 1 = Half the sky covered by clouds
- 2 = More than half the sky covered by clouds

Significant weather phenomena code (2)
- 3 = Blowing snow or sand
- 4 = Fog, ice fog, or thick haze
- 5 = Drizzle
- 6 = Rain
- 7 = Light rain or snow
- 8 = Showers of rain, snow, hail or a mixture
- 9 = Thunderstorm

Figure 1-23. NBC downwind messages

CORRELATION FACTORS FOR RESIDUAL RADIATION

ENVIRONMENTAL SHIELDING VEHICLES	LOCATION OF SURVEY METER	CORRELATION FACTOR
M1 Tank		20
M60 Tank	Turret, rear top	25
	Turret, front	53
M2 IFV	Chassis, near driver	23
M3 CFV		9.1
M113 APC	Directly in front of driver on front wall	9.1
		3.6
	Near first squad member on left facing forward	3.6
M109 SP howitzer	Near driver, left side	3.5
	Rear, right side	3.4
M88 Recovery vehicle	Commander position	6.9
M577 Command post carrier	Near driver, right side	3.2
	Rear, left side	2.5
M551 Armored recon abn assault vehicle	Near driver, right side	4.6
TRUCKS		
¼-ton		1.3
¾-ton		1.7
2-½-ton		1.7
4-ton to 7-ton		2
STRUCTURES		
Multistory building		
Top floor		100
Lower floor		10
Frame house		
First floor		2
Basement		10
UNDERGROUND SHELTER (3-foot earth cover)		5,000
FOXHOLES		10

TRANSMISSION FACTORS FOR RESIDUAL RADIATION

ENVIRONMENTAL SHIELDING	TRANSMISSION FACTOR (FT)
VEHICLES	
M1 Tank	0.04
M60 Tank	0.04
M2 IFV	0.2
M3 CFV	0.2
M113 APC	0.3
M109 SP howitzer	0.2
Sgt York gun	0.02
M548 Cargo vehicle	0.7
M88 Recovery vehicle	0.09
M577 Command post carrier	0.3
M551 Armored recon abn assault vehicle	0.2
M728 Combat engr vehicle	0.04
TRUCKS	
¼-ton	0.8
¾-ton	0.6
2-½-ton	0.6
4-ton to 7-ton	0.5
STRUCTURES	
Multistory building	
Top floor	0.01
Lower floor	0.1
Frame house	
First floor	0.6
Basement	0.1
URBAN AREA (in open)	0.7*
WOODS	0.8*
UNDERGROUND SHELTER (3-foot earth cover)	0.0002
FOXHOLES	0.1

$$\text{Transmission factor (TF)} = \frac{\text{Inside dose rate (ID)}}{\text{Outside dose rate (OD)}} \quad \text{or} \quad \text{OD} = \frac{\text{ID}}{\text{TF}} \quad \text{or} \quad \text{ID} = \text{TF} \times \text{OD}$$

*These factors do not apply to ground survey dose rates

Figure 1-24. Correlation and transmission factors

NBC Markers

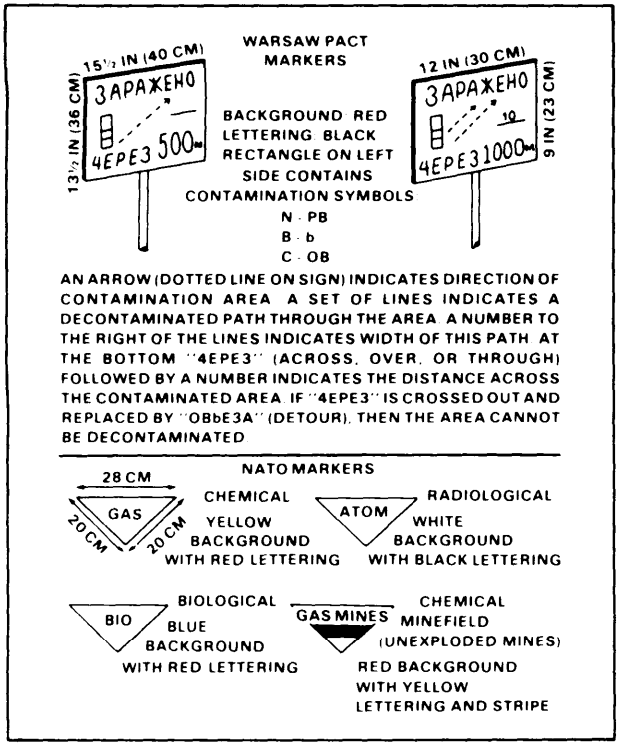


Figure 1-25. NBC markers

Unmasking Procedures

With detector kit

Use a Chemical Agent Detector Kit (M256) to test for the presence or absence of chemical agents. After determining the absence of agents, use the following steps to check for chemical agent symptoms.

- Unmask two or three individuals for five minutes and then remask.
- Examine in a shady area for chemical agent symptoms for 10 minutes.
- Unmask remainder of troops if no symptoms appear.

NOTE: Bright light will cause contraction of the pupils which could be erroneously interpreted as a nerve-agent symptom.

Without detector kit

Use the following steps for field expedient unmasking:

- Select two or three individuals to take a deep breath, hold it then break the seal on the masks. Keep their eyes wide open for 15 seconds. Clear the masks and reestablish the seal.
- Wait for 10 minutes. Watch for symptoms.
- If no symptoms develop, break the seal of their mask and have them take two or three breaths. Clear and reseal the masks.
- Observe for symptoms for 10 minutes. If no symptoms were observed, unmask same individuals for five minutes and remask.
- Observe them another 10 minutes for possible symptoms If no symptoms develop in 10 minutes, the group can safely unmask.

Remain alert for the appearance of any chemical agent symptoms.

Unit Performance Degradation

Table 1-9. Engineer company degradation factors

MAJOR FUNCTION	DESCRIPTION	WORK-LOAD	TIMES REQUIRED TO ACCOMPLISH FUNCTIONS			
			WITHOUT PROTECTIVE CLOTHING	WHILE IN MOPP4		
				@20°F (-7°C)	@50°F (10°C)	@85°F (29°C)
Secure site	Organize work area.	Light	15 min	15 min	15 min	25 min
Reconnaissance	For obstacle locations, time from start till ready to order materials	Light to Moderate	45 min	45 min	45 min	105 min
	For Class 50 or more bridge (to handle tank traffic)	Light to Moderate	3 hr	3 hr	3 hr	7 hr
	For assault bridge (to cross river or ditch)	Light to Moderate	2 hr	2 hr	2 hr	6 hr
	For large gully without water	Light to Moderate	30 min	30 min	30 min	90 min
Prepare hull defilade position, per tank per digging vehicle (Note 2)	Dirt berm around tank	Moderate	30 min	30 min	30 min	90 min
Dig tank ditch, two digging vehicles in any combination	3.2M wide x 1.8M deep	Moderate	2.5 hr/ 100M length	2.5 hr/ 100M length	2.5 hr/ 100M length	about 7.0 hr/ 100M length
Minefield emplacement with M57 towed mine dispenser	300M long x 50M deep (Note 2)	Moderate	1 platoon hr	1 platoon hr	1 platoon hr	3 platoon hr
By hand	100M long x 100M deep (Note 3)	Heavy	4 squad hr	8 squad hr	12 squad hr	24 squad hr
Disable bridges	Four-lane highway Two-lane primary road	Heavy Heavy	3 squad hr 2 squad hr	6 squad hr 4 squad hr	9 squad hr 6 squad hr	18 squad hr 12 squad hr

Table 1-9. Engineer company degradation factors (continued)

MAJOR FUNCTION	DESCRIPTION	WORK-LOAD	TIMES REQUIRED TO ACCOMPLISH FUNCTIONS			
			WITHOUT PROTECTIVE CLOTHING	WHILE IN MOPP4		
				@ 20°F (-7°C)	@ 50°F (10°C)	@ 85°F (29°C)
Build abatis. 30 trees. 25 to 35 cm in diameter	40 meters deep with trees 3 meters apart	Heavy	2 squad hr	4 squad hr	6 squad hr	12 squad hr
Build road crater. average size (terrain dependent)	50M long x 25M wide x 4M deep	Heavy	2 squad hr	4 squad hr	6 squad hr	12 squad hr
Breach wire	Hasty (with bangalore torpedo-footpath wide)	Heavy	2 squad hr	4 squad hr	6 squad hr	12 squad hr
Breach minefield	Using detector/probe 8 ft wide	Heavy	1 platoon hr	2 platoon hr	3 platoon hr	6 platoon hr
	With M157 demolition snake. 90M deep. 4 to 6M wide	Heavy	2 squad hr	4 squad hr	6 squad hr	12 squad hr
Bridging	Temporary fording (Note 4)	Heavy	1 hr for equipment	2 hr for equipment	3 hr for equipment	6 hr for equipment
	Ribbon bridge (Note 5)	Heavy	5 min/bay	10 min/bay	15 min/bay	30 min/bay
	Ribbon bridge. 100-foot length under ideal conditions (Note 6)	Heavy	3 hr	6 hr	9 hr	18 hr
	Bailey bridge. 25M long. ideal conditions	Heavy	5.5 hr (7 hr in dark)	11 hr	16.5 hr	33 hr
Mine emplacement. per soldier	Antitank	Heavy	4 mines/hr	4 mines/ 2 hr	4 mines/ 3 hr	4 mines/ 6 hr
	Antipersonnel. fragmentation	Heavy	8 mines/hr	8 mines/ 2 hr	8 mines/ 3 hr	8 mines/ 6 hr
	Antipersonnel. blast	Heavy	16 mins/hr	16 mines/ 2 hr	16 mines/ 3 hr	16 mines/ 6 hr

NOTES: 1. Consists of three platoons of three squads each. Squads use one M113 (APC) and a 1 5-ton trailer. eight soldiers.

2. Requested by armor unit. Performed ahead of time. Dig hole large enough to hide tank.

3. Density of 0.5 mines/meter of front. Double times if density of 1 mine/meter of front is used.

4. Knock down banks. grade. add gravel. and so forth.

5. Ribbon bridge. Number of bays depend upon width of river. For each three bays. add 5 min for bridge erection boat.

6. Forty-two people (assume trained troops). Add 50 to 100 percent if dark. add 30 to 50 percent for bad weather. Add 20 percent if untrained troops.

Decontamination

Equipment

Use issued items whenever available for expedient decontaminations Table 1-10 shows some natural decontaminations.

Table 1-10. Natural decontaminations

(Decontaminations readily available and frequently occurring in nature)

DECONTAMINATIONS	USE	REMARKS	CAUTIONS
WATER	NUC BIO CML	Flush contamination from surface with large amounts of water.	Effective in physically removing contamination, but does not neutralize the contamination.
STEAM	NUC BIO CML	The use of steam accompanied by scrubbing is more effective than the use of steam alone.	Effective in physically removing contamination. However, contamination may not be neutralized.
ABSORBENTS (earth, sawdust, ashes, rags, and similar materials)	CML	Used to physically remove gross contamination from surfaces.	The contamination is transferred from the surface to the absorbent. The absorbent becomes contaminated and must be disposed of accordingly. Sufficient contamination to produce casualties may well remain on surfaces.

Personnel

Decontaminate personnel using the buddy system and the following procedure:

Step 1. Remove and decontaminate gear. Cover gear with super tropical bleach (STB) dry mix and brush or rub into material. Shake off excess. Set aside gear on uncontaminated surface.

Step 2. Decontaminate hood. Use M258A1 skin decontamination kit. Decontaminate exposed areas of protective mask. Use decontaminate wipe 2 first, then decontaminate wipe 1 to get rid of chances of residue from decontaminate wipes. Lift hood up off your buddy 's shoulder by grasping straps and pulling hood over head until back of head is exposed. Roll hood tightly around mask.

NOTE: Control contamination from spreading by putting all contaminated overgarments and towelettes in one pile.

Step 3. Remove overgarment. Remove buddy's jacket placing it on the ground, black side up. Remove trousers one leg at a time. Discard trousers in centralized pile to avoid contamination spread.

Step 4. Remove overboots and gloves. Cut strips off buddy's boots and pull off boots. Have buddy step onto jacket as boots are pulled off. Remove gloves. Discard boots and gloves into centralized pile.

Step 5. Put on overgarments. Open package of new overgarments. Do not touch overgarment. Have buddy dress while still standing on old overgarment (Step 3).

Step 6. Put on overboots and gloves. Open package of new boots and gloves. Do not touch them. Have buddy put on new boots and gloves. Buddy may step off overgarment once boots and gloves are on.

Step 7. Secure hood. Decontaminate your gloves using M258A1 skin decontamination kit. Unroll buddy's hood and attach straps. Buddy checks all zippers and ties on hood and overgarment to ensure they are closed.

Step 8. Reverse roles. Repeat Steps 2 through 7. Have your buddy help you through the steps.

Step 9. Dig a large hole. Place all contaminated clothing and discarded towelettes in hole and cover. Mark as contaminated area. Contaminated clothing can also be burned if slow burning fuel (kerosene or diesel fuel) is used. **DO NOT USE GASOLINE,** it burns too quickly. Commanders must warn downwind units of a possible downwind vapor hazard if burning is accomplished.

Step 10. Secure gear. Move to assembly area. If time and situation permits, unit may now perform unmasking procedure to obtain relief from protective mask.

MEDICAL PROCEDURES

Lifesaving Steps

- Open airway, restore breathing, and heartbeat.
- Stop the bleeding.
- Protect the wound.
- Prevent or treat for shock.

Cardiopulmonary Resuscitation (CPR) Procedures

See Figure 1-26

General First Aid Procedures

PROBLEM	FIRST AID
Blocked airway	Extend neck, turn head to side and clear all refuse from mouth.
Bleeding	Direct pressure on wound with sterile dressing. Elevate wound above heart. Use tourniquet as last resort.
Wounds	Expose wound, control bleeding, apply sterile dressing and treat for shock. Do not clean wound.
Fractures	Splint the break where and how it lies. Do not move patient if possible. Immobilize joint above and below fracture. Cover exposed bones or open wounds.
Shock	Lay patient on back, elevate feet, loosen clothes, and keep warm. Feed hot liquids if conscious. Turn head to side if unconscious.

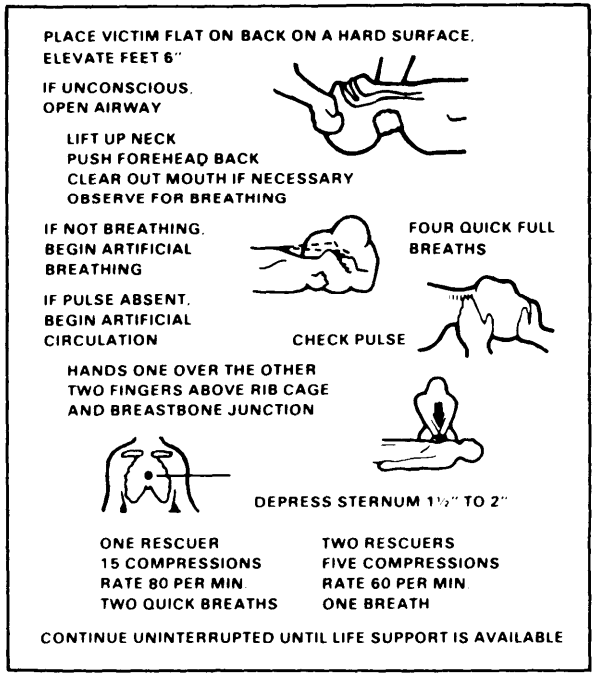


Figure 1-26. Cardiopulmonary resuscitation in basic life support

Common Wounds and Injuries

Head wound

Symptoms. If scalp wound IS not obvious, check for headaches, recent unconsciousness, blood or fluid from ears or nose, slow breathing, vomiting, nausea, and convulsions.

First aid. Leave any brain tissue as is and cover with sterile dressing. Secure dressing and maintain head higher than body.

Jaw wound

Slightly elevate head, clear the airway, control bleeding. and protect the wound. Position head to allow drainage from mouth. **DO NOT GIVE MORPHINE.** Treat for shock as needed.

Belly wound.

Leave all organs as they are and loosely place sterile dressing over them. Give no food or liquid. Leave victim on back with head turned to one side.

Chest wound (sucking)

Have victim breathe out and hold breath if possible. Seal wound airtight with plastic or foil. Cover with dry sterile dressing and secure with bandages around body. Wound must be airtight and fully covered.

Burns and Heat Injuries

PROBLEM	SYMPTOM	FIRST AID
Burns	First degree (red skin) Second degree (blistered skin) Third degree (destroyed tissue)	Do not remove clothes around burn area. Do not apply grease or ointment. Cover with sterile dressing. Give cool salt/soda water.
Heat cramps	Muscle cramps of abdomen, legs or arms.	Move person to shade and loosen clothing. Give victim large amounts of cold salt water slowly. Prepare salt water by dissolving two salt tablets or ¼ teaspoon of table salt in canteen of cool water.
Heat exhaustion	Headache, excessive sweating, weakness, dizziness nausea, and muscle cramps. Pale, cool, and moist clammy skin.	Lay person in cool shaded area and loosen clothing. If victim is conscious, have victim drink three to five canteens of cool salt water during period of 12 hours. Prepare salt water as described for heat cramps.
Heatstroke (sunstroke)	Stoppage of sweating (hot, dry skin). Collapse end unconsciousness may come suddenly or may be preceded by headache, dizziness, fast pulse, nausea, vomiting, and mental confusion.	Promptly immerse victim in coldest water possible. Add ice, if available to water. If victim cannot be immersed, move into shade, remove clothing, and keep wet by pouring water over entire body. Fan victim's wet body continuously. Transport victim to nearest medical facility at once, cooling victim's body on the way. If victim becomes conscious, give cool salt water prepared as described for "Heat cramps."

Wet or Cold Weather Injuries

PROBLEM	SYMPTOM	FIRST AID
Frostbite	Skin is white, stiff, and numb.	Cover frostbitten part of face with warm hands until pain returns. Place frostbitten bare hands next to skin in opposite armpits. If feet are frostbitten, seek sheltered area and place bare feet under clothing and against abdomen of another person. If deep frostbite is suspected, protect part from additional injury and get to medical treatment facility immediately. DO NOT attempt to thaw deep frostbite. There is less danger of walking on feet while frozen than after thawed.
Immersion foot	Soles of feet are wrinkled. Standing or walking is extremely painful.	Dry feet thoroughly and get to medical treatment facility immediately. Avoid walking if possible.
Trench foot	Numbness may be tingling or aching sensation, cramping, pain and swelling	Same as immersion foot above.
Snow blindness	Scratchy feeling in eyes	Cover eyes with dark cloth. Transport victim to medical treatment facility at once.

Stings and Bites

PROBLEM	FIRST AID
Black widow spider or brown recluse spider bite	Keep victim quiet. Place ice or freeze-pack, if available, around region of body where bite occurred to keep venom from spreading. Transport victim to medical treatment facility immediately.
Scorpion sting or tarantula bite	For ordinary scorpion string or tarantula bite, apply ice or freeze pack if available. Baking soda applied as paste to site may relieve pain. If site of sting or bite is on face, neck or genital organs or if sting is by scorpion of dangerous types found in South America, keep victim as quiet as possible and transport to medical treatment facility immediately.
Snake bite	Reassure victim and keep victim quiet. Place ice or freeze pack, if available, around region of body where bite occurred. Immobilize affected part in position below level of heart. If bite is on arm or leg, place lightly constricting band (bootlace or strip of cloth) between bite site and heart at point 2 to 4 inches above bite site. Apply band tight enough to stop blood flow near skin but NOT tight enough to stop arterial flow or the pulse. Transport victim to medical treatment facility at once. Kill snake (if possible without damaging its head) and evacuate with victim.
Bee or wasp bite	Treatment not usually required. Treat for shock if abnormal reactions occur.

Other Conditions

PROBLEM	FIRST AID
Blisters	DO NOT open blisters unnecessarily, as they are sterile until opened. If you must open blister, be cautious. Wash part thoroughly with soap and water, then apply antiseptic to skin. Sterilize a needle in the open flame of a match. Use a sterile needle, puncture blister at the edge. Use a sterile gauze pad, apply pressure along margin of blister, thus removing fluid. Place a sterile dressing over the area. DO NOT attempt self help for blisters in the center palm of hand.
Boils	DO NOT squeeze a boil, as this may drive bacteria into the blood stream and cause internal abscesses or bone infection. This is especially unwise if boil is around nostrils, upper lip, or around the eyes. In these areas the blood stream leads to brain area. Relieve discomfort from small boils by applylng warm compresses wet in Epsom salt solution (1 teaspoon salt to pint of warm water) at 15-minute intervals. DO NOT apply these compresses to facial boils unless under medical direction. If boil breaks, wipe pus away with sterile pad wet with rubbing alcohol. Work from healthy skin toward boil and pus. Apply sterile dressing over boil.
Unconsciousness	Apply lifesaving measures as appropriate. If victim remains unconscious, place on abdomen or side with head turned to one side to prevent choking on vomitus, blood, or other fluid. If victim has abdominal wound, place on back with head turned to one side. Get victim to medical treatment facility immediately. DO NOT give victim fluids by mouth while unconscious. If the victim has merely fainted, victim will regain consciousness within a few minutes. If ammonia inhalant capsule is available, break it and place under the victim's nose several times for a few seconds. If victim is sitting up, gently lay down, loosen clothing, apply cool wet cloth to face. Let victim lie quietly. Anytime a person in sitting position is about to faint, lower the victim's head between knees and hold the victim to prevent falling.

Medical Evacuation (MEDEVAC)

Precedence

URGENT	Evacuation is required as soon as possible but not later than two hours to save life, limb, or eyesight.
PRIORITY	Evacuation is required within four hours or the patient's medical condition could deteriorate to an URGENT precedence.
ROUTINE	Evacuation is required within 24 hours.
TACTICAL IMMEDIATE	The patient's medical condition is not URGENT or PRIORITY but evacuation is required as soon as possible so as not to endanger the unit's tactical mission.

Types

TYPE	USE	REMARKS
Peacetime	Actual patient	May be transmitted in plain text
Wartime	During wartime or training exercises	Must be transmitted secured or encrypted.

MEDEVAC request format

See Table 1-11 (pages 1-32 through 1-34).

Table 1-11. MEDEVAC request format

LINE	ITEM	EXPLANATION	WHERE/HOW OBTAINED	WHO NORMALLY PROVIDES	REASON
1	Location of pickup site.	Encrypt the grid coordinates of the pickup site. When using the DRYAD Numeral Cipher, the same SET line will be used to encrypt both the grid zone letters and the coordinates. To preclude misunderstanding, a statement should be made that grid zone letters are included in the message. (Unless unit SOP specifies its use at all times.)	From map	Unit leader(s)	Required so evacuation vehicle knows where to pick up casualty/patient and so that the unit coordinating the evacuation mission can plan route for the evacuation vehicle (if the evacuation vehicle must pick up from more than one location.)
2	Radio frequency, call sign, and suffix	Encrypt the frequency of the radio at the pickup site, not a relay frequency. The call sign (and suffix if used) of person to be contacted at the pickup site may be transmitted in the clear.	From CEOI	RTO	Required so that evacuation vehicle can contact requesting unit while en route to obtain additional information, such as change in situation and direction.
3	Number of patients by precedence	Report only applicable information and encrypt the appropriate amount(s) and brevity numbers. (#) - 1 - URGENT. (#) - 2 - PRIORITY. (#) - 3 - ROUTINE. If two or more categories must be reported in the same request, insert the word BREAK between each category.	From evaluation of patient(s)	Medic or senior person present	Required by unit controlling the evacuation vehicles to assist prioritizing missions when more than one is received.
4	Special equipment required	Encrypt the appropriate brevity number(s). 5 - None. 6 - Hoist. 7 - Stokes litter. 8 - Forest/jungle penetrator.	From evaluation of patient/ situation	Medic and/ or senior person present	Required so that the equipment can be placed on board the evacuation vehicle prior to the start of the mission. (NOTE: The semirigid litter is not part of unit TOE equipment and is not normally carried aboard the aircraft.)
5	Number of patients by type	Report only applicable information and encrypt the appropriate amount(s) and brevity number(s). If requesting MEDEVAC for both types, insert the proword BREAK between the litter entry and ambulatory entry. (#) - 9 - Litter. (#) - 0 - Ambulatory (sitting).	From evaluation of patient(s)	Medic or senior person present	Required so that the appropriate number of vehicles may be dispatched to the pickup site and that they be configured to carry the patients requiring evacuation.

Table 1-11. MEDEVAC request format (continued)

6	Security of pickup site (wartime)	1 - No enemy troops in area. 2 - Possibly enemy troops in area (approach with caution). 3 - Enemy troops in area (approach with caution). 4 - Enemy troops in area (armed escort required).	From evaluation of situation.	Unit leader.	Required to assist the evacuation crew in determining if assistance is required to accomplish the mission. Keep crew updated while en route.
6	Number and type of wound, injury, or illness (peacetime)	Specific information regarding patient wounds by type such as gunshot and shrapnel. Report serious bleeding, along with patient blood type, if known.	From evaluation of patient.	Medic or senior person present.	Required to assist evacuation personnel in determining treatment and special equipment needed.
7	Method of marking pickup site.	Encrypt the appropriate brevity number(s). 5 - Panels. 6 - Pyrotechnic signal. 7 - Smoke signal. 8 - Signal person. 9 - Strips of fabric or parachute. 0 - Tree branches, pieces of wood, or stones placed together. 1 - Signal lamp or flashlight. 2 - Vehicle lights. 3 - Open flame.	Based on situation and availability of materials.	Unit leader.	Required to assist the evacuation crew in identifying the specific location of the pickup. Note that the color of the panels and smoke should not be transmitted until the vehicle contacts the unit (just prior to its arrival). For security, the crew should identify the color and the unit should verify it.

Table 1-11. MEDEVAC request format (continued)

LINE	ITEM	EXPLANATION	WHERE/HOW OBTAINED	WHO NORMALLY PROVIDES	REASON
8	Patient nationality and status	The number of patients in each category need not be transmitted. Encrypt only the appropriate brevity number(s). 4 - US military. 5 - US civilian. 6 - Non-US military. 7 - Non-US civilian. 8 - EPW.	From patient	Medic or senior person present	Required to assist in planning for destination facilities and need for guards. Unit requesting support should insure that there is an English-speaking representative at the pickup site.
9	NBC contamination (wartime)	Include this line only when applicable. Encrypt the appropriate brevity number(s). 9 - Nuclear. 0 - Biological. 1 - Chemical.	From situation	Medic or senior person present	Required to assist in planning for the mission. (Determine which evacuation vehicle will accomplish the mission and when it will be accomplished.)
9	Terrain description (peacetime)	Include details of terrain features in and around proposed landing site. If possible, describe relationship of site to prominent terrain feature such as lake, mountain and tower.	From area survey	Personnel at site	Required to allow evacuation personnel to assess route/avenue of approach into area. Of particular importance if hoist operation is required.

Field Sanitation Facilities

(Refer to FM 21-10 for more details.) See Figures 1-27 for field latrines. Keep all latrines at least 100 meters away from food operation, downhill and at least 30 meters from ground water sources. Keep latrines clean and use residual insecticide to control insects. Once the latrine is full to 1 foot below surface, or is to be abandoned, remove box and spray the pit and the area within 2 feet around the pit. Fill pit with successive 3-inch layers of compacted soil. Mound the pit with at least 1 foot of dirt and spray with insecticide. Place sign on top of mound indicating type, date closed, and unit. When high water tables preclude the use of pit latrines, burn out latrines may be used. Half of a 55 gallon drum or barrel is installed under each hole in the latrine box. The drum is removed daily, fuel oil is added, and the contents are burned to a dry ash. An inch of diesel fuel is added for insect control before replacing the drum in the latrine box. Construct both hand washing facilities and shower unit (Figures 1-28 and 1-29).

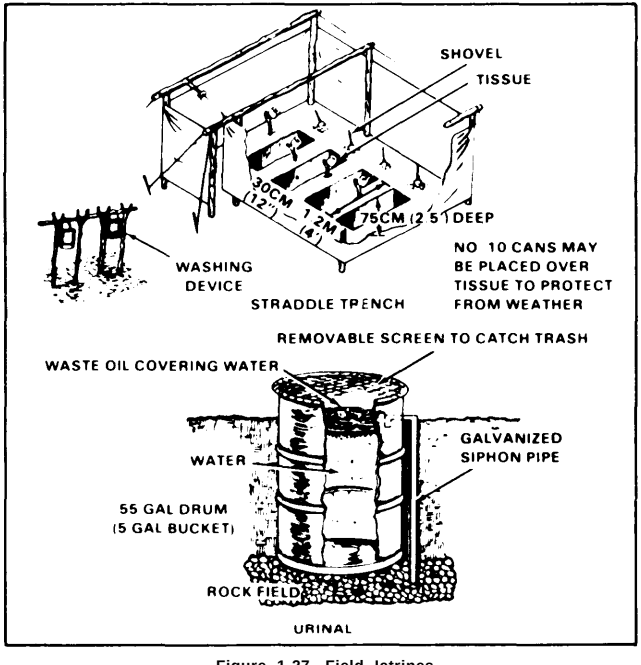


Figure 1-27. Field latrines

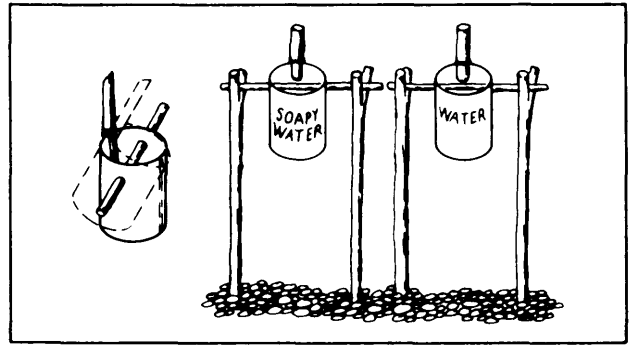


Figure 1-28. Hand-washing device, using No. 10 can

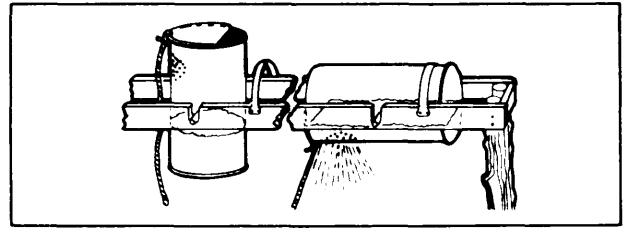


Figure 1-29. Shower unit, using metal drums

Water Disinfection and Quantity Requirements

Water disinfection

Calcium hypochlorite. The following procedure is used to purify water in a one-quart canteen with calcium hypochlorite ampules:

- Fill the canteen with the cleanest, clearest water available, leaving an all space of an inch or more below the neck of the canteen.
- Fill a canteen cup half full of water and add the calcium hypochlorite from one ampule. Stir until dissolved.
- Fill the cap of a plastic canteen half full of the solution in the cup and add it to the water in the canteen. Then place the cap on the canteen and shake it thoroughly..
- Loosen the cap slightly and invert the canteen, letting the treated water leak onto the threads around the neck of the canteen.
- Tighten the cap on the canteen and wait at least 30 minutes before using the water for any purpose.

Iodine tablets. Use one tablet per one quart canteen for clear water and two tablets per one quart canteen for cloudy water. Allow the water to stand for five minutes, shake well, allowing spill over to rinse canteen neck, and allow to stand another 20 minutes before using for any purpose.

Boiling. Bring the water to a rolling boil for 15 seconds.

Daily water requirements

Table 1-12. Daily water requirements

UNIT COMMANDER	CONDITIONS OF USE	GALLONS/DAY MILD/ COLD	GALLONS/DAY DESERT/ JUNGLE	REMARKS
Soldier	In Combat:			Eating and drinking (3 days).
	Minimum	½-1	2-3[1]	When field rations used.
		2	3-4[1]	Drinking plus cooking
	Normal	3	6[2]	and personal hygiene.
				Minimum for all purposes.
	March	2	5[2]	All purpose (does not
	Temporary camp	5		include bathing).
				Waterborne sewage
	Temporary camp	15		system and bathing.
	Semipermanent camp	30-80		
	Permanent camp	60-100		
Vehicle	Level and rolling	½-1		
	Mountainous	¼-1		
Hospital	Drinking and cooking	10/bed		Does not include bathing.
	Water waterborne sewerage	50/bed		Includes medical personnel.

NOTES: 1. For unacclimatized personnel or for all personnel when dry bulb reading exceed 105° in the jungle.

2. Maximum consumption factor is dependent upon work performed, solar radiation, and other environmental stresses.

COMMUNICATION

Tactical Communications

Tactical communication responsibilities are:

- Senior to subordinates.
- Supporting to supported.
- Reinforcing to reinforced.
- Lateral left to right if SOP or orders do not specify

Antenna Locations

For maximum reception, locate antenna as high as possible and avoid valleys. Locate antennas away from built up areas, metal obstructions, or electrical power lines.

Communication Equipment

See Tables 1-13 through 1-15 (pages 1-37 and 1-38).

Table 1-13. Communication equipment - tactical radio sets

NOMENCLATURE	FREQUENCY RANGE MHZ	RANGE IN KILOMETERS
AN/PRC-25 Series	30-75-95	8
NOTE: AN/PRC-25 Series includes AN/VRC-53 (vehicular) and AN/GRC-125 (vehicular and man-pack) and AN/PRC-25 (man-pack).		
AN/PRC-77 Series	30-75-95	8
NOTE: AN/PRC-77 Series includes AN/VRC-64 (vehicular) and AN/GRC-160 (vehicular and man-pack) and AN/PRC (man-pack).		
AN/VRC-46	30-75-95	32
AN/VRC-47	30-75-95	32
AN/GRC 106	2.0-29 999	80
AN/GRC-142	2.0-29 999	80

NOTES: 1. One each generator set, 1.5 KW DC, for operation in a static position. When AC is available a PP-2953/U (AC/DC converter) is required.
2. When used in a static operation a 1.5 KW DC generator should be used. When AC is available a PU 620 (AC/DC Converter) is required. A TSEC/KW-7 can be used for teletypewriter message security.

Table 1-14. Communication equipment - auxiliary and wire

AUXILIARY EQUIPMENT			
NOMENCLATURE	DESCRIPTION	RANGE	REMARKS
AN/GRA-39	Remoting set, used with FM radio sets	Up to 2 mi (3.2 km)	Increases flexibility of radio sets. Increases security. Radio and antenna can be exposed while operation is not.
RC-292 OE-254	General purpose stationary ground plane antenna		Used to extend the range of tactical FM radio sets. Increases range of radio sets to approximately twice the stated planning range of the radio set. Radiating and ground plane elements must be of the proper length for a particular operating frequency.
AT-964	Long wire. End-fed directional antenna		Used with tactical FM radio sets. Good for reducing the enemy's ability to conduct interception and jamming. Can extend the planning range of radio sets by double or more. Depending upon the antenna used to receive/transmit at the distant site.

Table 1-14. Communication equipment - auxiliary and wire (continued)

WIRE EQUIPMENT			
NOMENCLATURE	DESCRIPTION	RANGE	REMARKS
TA-1/PT	Sound-powered telephone in handset form	16 km	Planning range depends upon condition of wire (WD-1/TT). No batteries are required. Incoming signal is visual and adjustable audible. Telephone weighs 2¼ lb, case ⅞ lb.
TA-312/PT	Tactical field telephone	35 km	Planning range depends upon condition of wire (WD-1/TT). Batteries are required when operation is in LB position. As in local circuit to SB-22/PT. Incoming signal is adjustable audible. Has handfree operation capability. Telephone weighs approximately 9.5 lb.
SB-22/PT	Lightweight, manual (monocord) switchboard. Local battery (LB) operation.		Switchboard has 12-circuit capability, and may be expanded by "stacking" additional SB-22s. Each added SB-22 increases capability by 17 circuits, since only one operator's pack is necessary. Signaling may be audible or visual, or just visual.
SB-993-GT	Light, portable, emergency switchboard.		Switchboard has 6-circuit capability for local battery (LB) telephone lines, with an additional "circuit plug" for the operator's use. Incoming signal is visual only.

Table 1-15. RC-292 antenna configuration

Radio Set or Receiver-Transmitter	Operating Frequency (MHz)	VERTICAL					GROUND PLANE				
		Total Number of Antenna Sections Required	Type of Sections Used				Total Number of Ground Plane Sections Required	Type of Sections Used			
			AB-21/GR	AB-22/GR	AB-23/GR	AB-24/GR		AB-21/GR	AB-22/GR	AB-23/GR	AB-24/GR
RT-246/VRC	30 to 36.5	4	2	1	1	1	15	2	1	1	1
RT-524/VRC, RT-505/PRC-25, RT-841/PRC-77	36.5 to 50.5	3	1	1	1	1	12	1	1	1	1
	50.5 to 75.95	2	0	1	1	1	9	0	1	1	1

Expedient Antennas

To determine antenna length (meters), use the following:

Formula: $\frac{1}{4}$ wave = $\frac{234}{F}$; $\frac{1}{2}$ wave = $\frac{468}{F}$; full wave = $\frac{936}{F}$

Where: F = frequency in megahertz

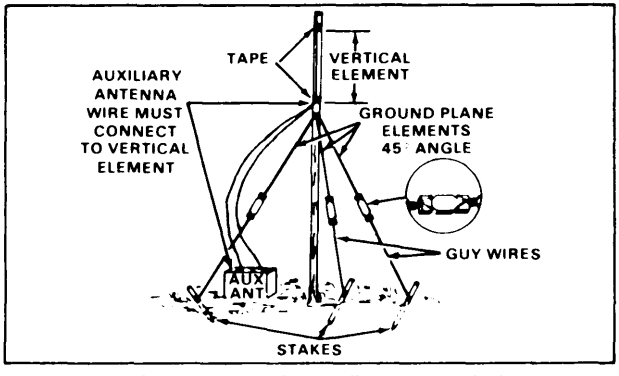


Figure 1-30. Jungle expedient antenna (FM)

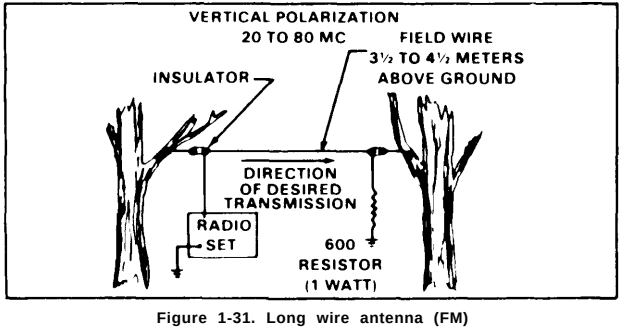


Figure 1-31. Long wire antenna (FM)

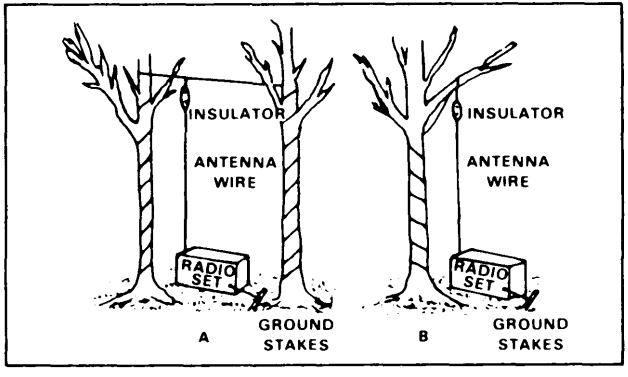


Figure 1-32. Expedient suspended vertical antennas (FM)

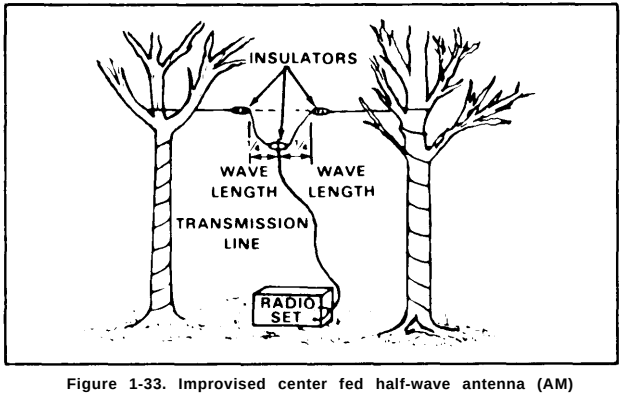


Figure 1-33. Improvised center fed half-wave antenna (AM)

Authentication

See Figure 1-34. Authentication is mandatory in the following instances.

- Imitative deception is suspected.
- Reports of initial enemy control and amplifying reports.
- Transmission ordering or ending any radio silence.
- Plain message cancelling other message.
- When receiving a classified message uncoded, such as changing frequencies and directing movements.
- When making initial radio contact, opening and closing a net, or transmitting to station under radio listening silence.
- Whenever challenged.
- When in doubt of a station's identify.

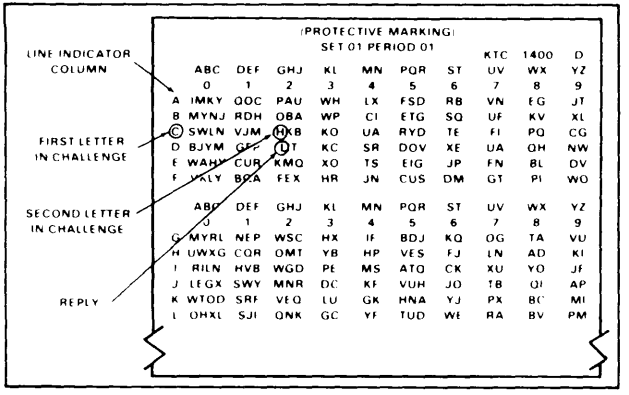


Figure 1-34. Authentication procedures

When challenging, select two random letters, except Z, before transmitting. Make sure you know what the reply should be. Transmit challenge," . . . AUTHENTICATE CHARLIE-HOTEL, OVER", receiving station must reply," . . . I AUTHENTICATE LIMA, OVER." If authentication is incorrect or the reply is not received promptly, transmit another challenge. If the next reply is incorrect or untimely, notify your supervisor, commander or Communications Electronics Operation (CEO).

NOTE: When challenge is from the last line, you must go to the first line for the reply.

Standard Radio Transmission Format

CALL
MESSAGE - This proword indicates message requires recording.
PRECEDENCE - Indicates priority of call.
TIME - Followed by date-time group.
FROM - Followed by call sign.
TO - Followed by call sign of addressee.
BREAK
TEXT - May consist of plain language code or cipher groups.
BREAK
ENDING - Must include either one of two terminating prowords.
OVER or OUT, but never both in the same transmission.
EXAMPLE: ZULU FOUR CHARLIE ONE SIX - THIS IS DELTA THREE XRAY TWO NINE - MESSAGE PRIORITY - TIME 181345Z - BREAK - FIGURES 6 STRINGERS NEEDED AT MY LOCATION ASAP - BREAK - OVER.

Visual Signals

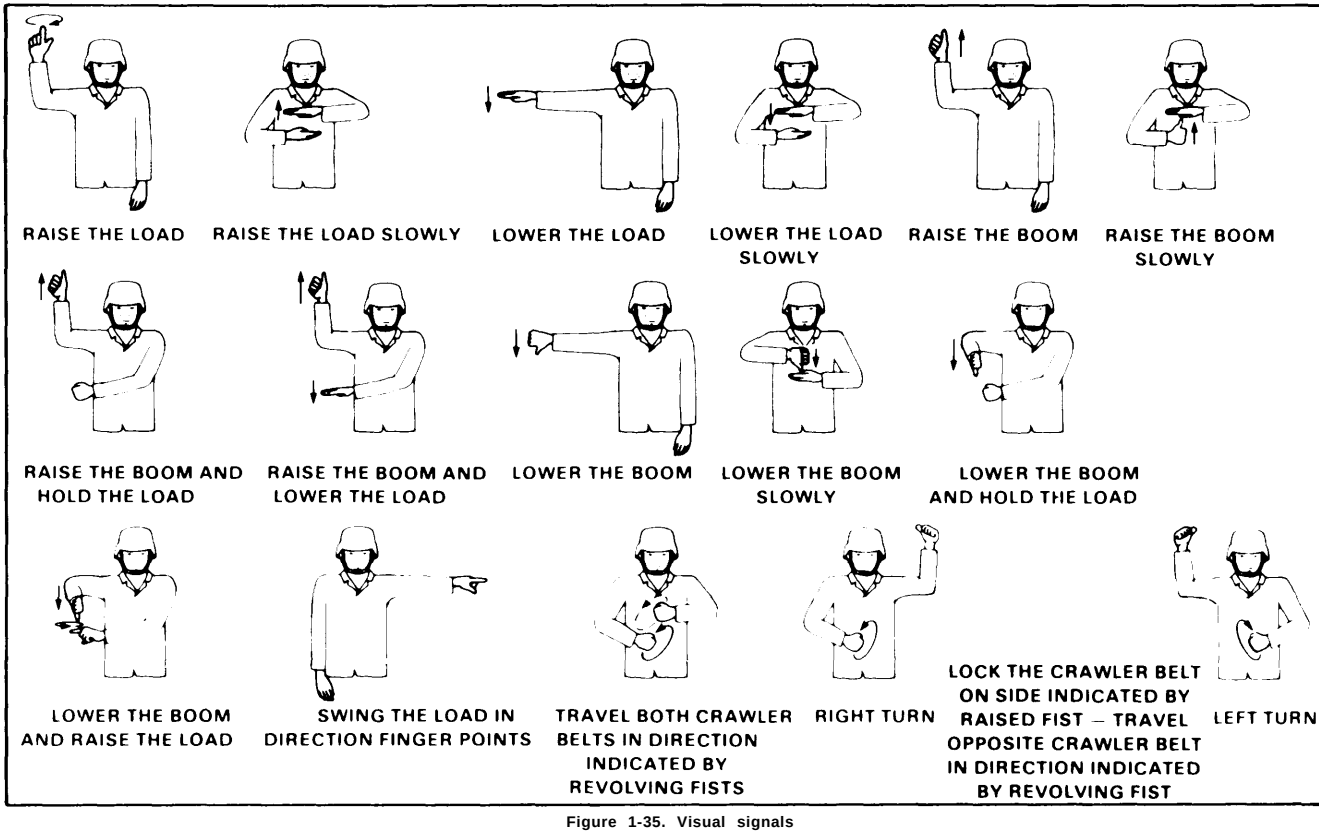


Figure 1-35. Visual signals

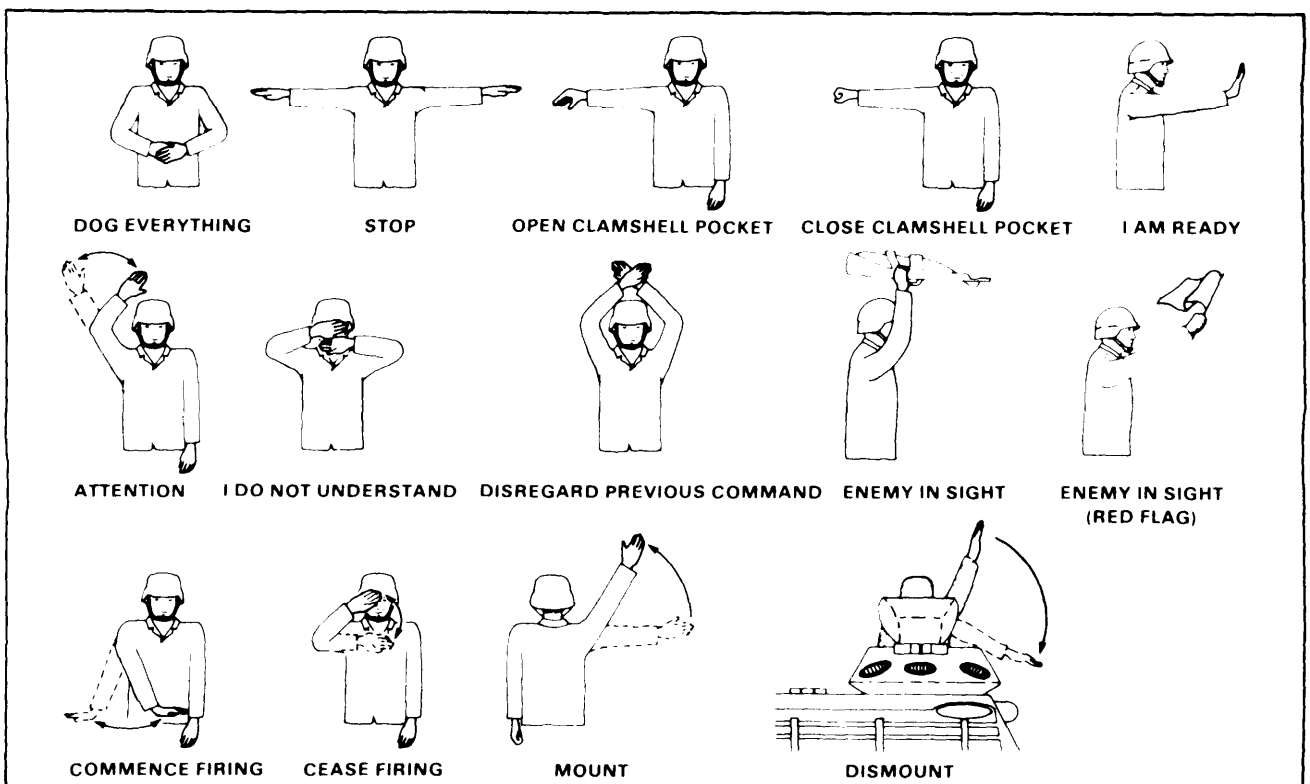


Figure 1-35. Visual signals (continued)

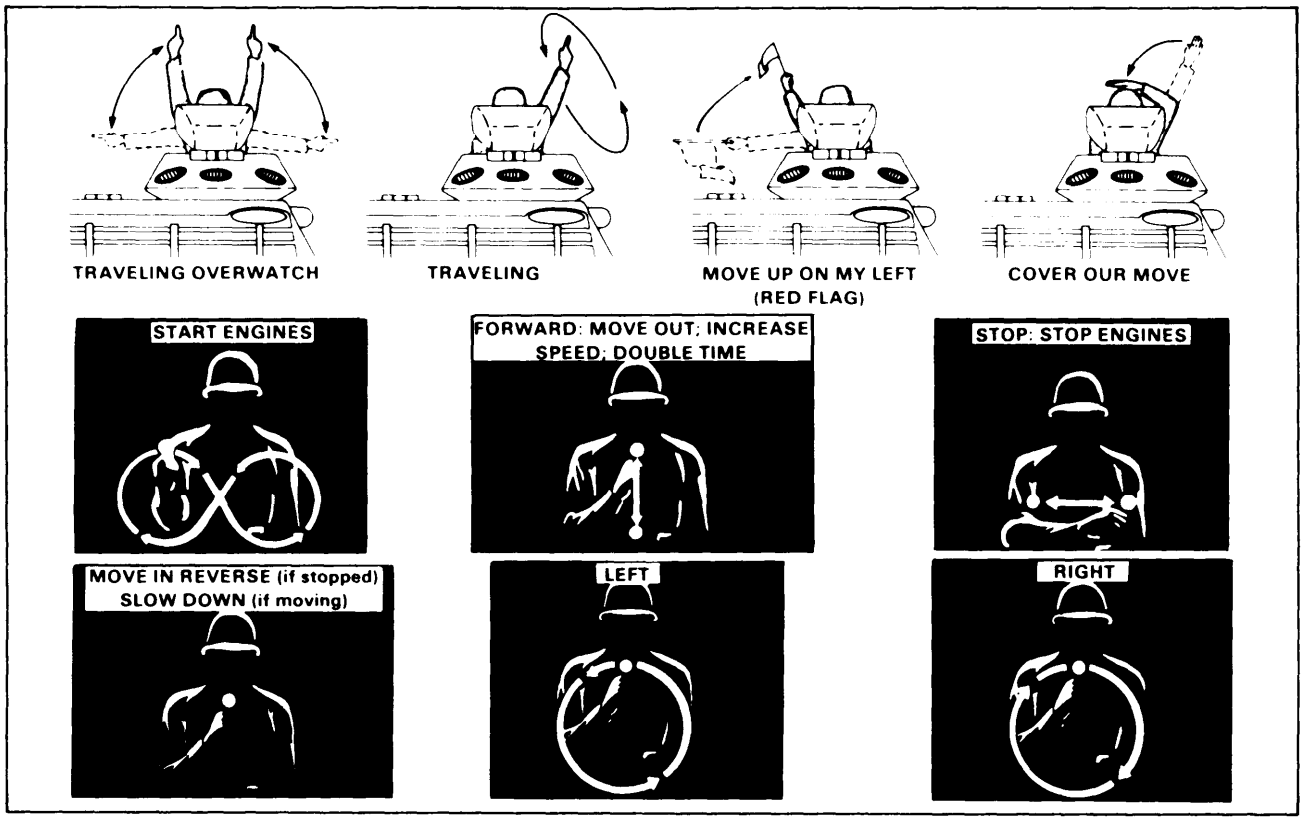


Figure 1-35. Visual signals (continued)