National Défense
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B-GL-371-002/FP-001

FIELD ARTILLERY

VOLUME 2

DUTIES OF THE BATTERY COMMANDER AND THE OBSERVER

WARNING

Although not classified, this publication, or any part of it, may be exempt from disclosure to the public under the *Access to Information Act*. All elements of information contained herein must be closely scrutinized to ascertain whether or not the publication or any part of it, may be released.

Issued on the authority of the Chief of the Defence Staff
Publiée avec l'autorisation du Chef d'état-major de la Défense

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Designated Command: LFC HQ Ottawa 1998 11 30

Canada

FOREWORD

1. B-GL-371-002/FP-001, Field Artillery, Volume 2, Duties of the Battery Commander and the Observer, is issued on authority of the Chief of the Defence Staff.

2. This manual is effective upon receipt and supersedes all previous versions of B-GL-306-003/FP-001.

3. Suggestions for amendments shall be forwarded through normal channels to the Royal Canadian Artillery (RCA) School, Combat Training Centre (CTC) Gagetown, Attention: Chief Standards Officer (CSO).

TABLE OF CONTENTS

Table of Contents, *continued*

Table of Contents, *continued*

Table of Contents, *continued*

Table of Contents, *continued*

Table of Contents, *continued*

Table of Contents, *continued*

LIST OF FIGURES

List of Figures, *continued*

List of Figures, *continued*

CHAPTER 1

THE BATTERY COMMANDER AND THE OBSERVER

SECTION 1

THE BATTERY COMMANDER

FUNCTION

1. The role of the field artillery is to destroy or neutralize the enemy with indirect fire as part of the all-arms battle. Field artillery includes all artillery equipment which is used to provide surface-to-surface fire support for formations and units in the field force.

2. The Battery Commander (BC) and the forward observers are the link between manoeuvre commanders and fire support resources. The BC advises the battle group commander (BG Comd)on the employment of the available fire support assets — the objective is to optimize the use of fire support by integrating and synchronizing it with the manoeuvre commander's plan.

3. The forward observer carries out the same function at combat team level.

DUTIES

4. The main duties of the BC are:

   a. commanding the battery;

   b. advising the BG Comd on the detailed use of artillery resources, the general use of other fire support resources and the coordination of all these resources (land, sea and air);

   c. establishing and commanding the fire support coordination centre (FSCC) at battle group command post (CP);

   d. directing the fire of artillery and other fire support resources under his control;

   e. coordinating the targeting process within the battle group;

   f. deploying the forward observation officers (FOOs) and other allotted observation resources allotted;

   g. directing assigned observers to engage targets and, when necessary, engage targets directly;

   h. ensuring the sub-allocation of assigned ammunition and fire units to observers;

j. reporting tactical information to the regimental commander's (CO's) tactical CP, the regimental command post officer (RCPO) and the supported arm commander;

k. reporting hostile mortaring, shelling, bombing and nuclear strikes to the CO's tactical CP;

m. reporting all suitable potential gun areas, noted during his or her movements, to the CO's tactical HQ;

n. being prepared to act as fire support advisor at alternate brigade HQ, if required; and

p. coordinating air defence and locating artillery resources deployed in location within the supported arm commander's area of responsibility.

q. ensuring that the manoeuvre commander is cognizant of any priorities, tasks, or restrictions that have been directed in the Commander's Guidance for Fire Support.

FIRE SUPPORT COORDINATION CENTRE AT BATTLE GROUP HEADQUARTERS

5. Fire support is the collective and coordinated use of indirect fire weapons, armed aircraft, and other lethal and non-lethal means in support of a battle plan. Fire support includes mortars, field artillery, naval gunfire, attack helicopter (AH), close air support (CAS) and any other air-delivered weapons. Non-lethal means are electronic warfare (EW), illumination and smoke. The manoeuvre commander employs these means to support a scheme of manoeuvre, to mass firepower, and to delay, disrupt or destroy enemy forces in depth. Fire support destroys, neutralizes and suppresses enemy weapons, enemy formations or facilities. Fire support coordination is achieved by establishing a fire support coordination centre (FSCC) at the supported unit or formation CP.

6. At battle group level, the BC is the principal fire support advisor to the manoeuvre commander. The BC's staff consists of the BC's technician and communicators. In addition to the field artillery staff, representatives of all available fire support agencies, along with their communications equipment and staff, are based in the FSCC. When the appropriate facilities are not available at battle group level, requests for naval and immediate CAS are passed to the next higher FSCC. The FSCC is collocated with the manoeuvre commander's CP.

7. The functions of an FSCC are:

a. **Fire support planning**. Fire support planning is done in conjunction with the manoeuvre force. Fire support planning is the continual process of analyzing, allocating and scheduling fire support. The goal of fire support planning is to effectively integrate fire support into battle plans to optimize combat power.

b. **Fire support coordination**. Fire support coordination is the continual process of implementing fire support planning and managing the fire support resources available to the manoeuvre force.

c. **Fire planning**. Fire planning is the continual process of selecting targets on which fire is pre-arranged to support a phase of the manoeuvre commander's plan.

8. The following communication nets may be found in a battle group FSCC:

a. battle group command net;

b. artillery regimental command net;

c. artillery battery net;

d. Tactical air direction (TAD) net (when controlling aircraft);

e. mortar platoon net;

f. air request net (if a tactical air control party (TACP) is allotted to the battle group);

g. naval gunfire net (if allotted); and

h. air defence nets, when these elements are allotted.

9. Fire support coordination functions must be carried out at all times, even when the battle group HQ is moving. This requirement can normally be met by maintaining radio contact between the various elements of the FSCC.

TARGETING

10. Targeting provides a methodology for the execution of fire support in accordance with the priorities established by the manoeuvre commander. It is characterized by the functions of **Decide, Detect** and **Deliver**. At all levels, targeting is an all-arms responsibility. At the battle group level and below, the artillery representative will normally coordinate the targeting and will do this based on the Commander's Guidance for Fire Support.

11. The targeting process assists the commander by determining which targets are to be acquired and attacked, when they are to be acquired and attacked, and what is required to defeat the target.

12. The **decide** function is the cornerstone of the process. The high value targets (HVTs) identified during the intelligence preparation of the battlefield (IPB) process are analyzed and ranked based upon their overall worth to the enemy's operation. These HVTs are then analyzed during the wargaming process to determine which, if successfully attacked, would contribute to

the success of the friendly operation. The HVTs are then upgraded to high payoff targets (HPTs), the key in upgrading the HVTs to HPTs is the friendly force's ability to acquire the target, the required degree of accuracy, the ability to engage the target and defeat it, and the resources required. The actual execution of the targeting process at the battle group level and below will be in the form of the Commander's Guidance for Fire Support. Priority intelligence requirements (PIR) and intelligence requirements (IR) are also created.

13. The **detect** function is the execution of the collection plan determined in the decide function. The assets tasked to collect the information begin searching for the targets and IPB products shall be used in determining where to look for them.

14. The **deliver** function will outline the specifics of which weapon systems will engage targets at which time, the accuracy required of the target locations, and any possible post-attack assessment that may be required.

15. **Post-attack assessment** is always desirable, but not always possible. A post-attack assessment shall be ordered for targets whose removal is critical to the plan. The post attack assessment is used to determine casualties or vehicles destroyed and to determine what action the enemy is taking. The assessment may cause changes in battle plans or confirm them.

16. The formal targeting process will normally only be conducted down to the brigade level. However, the intent of the targeting process, and its critical elements, will be disseminated down to the battle group level and below using the Commander's Guidance for Fire Support. This guidance will vary by mission and may include the following:

a. the priorities of fire within the battle group;

b. the tasks allocated to fire support assets in priority, including critical tasks; and

c. any restrictions on fire support assets.

17. At the battle group level, the BC has the following resources to engage targets:

a. artillery units (this cannot be guaranteed);

b. the mortar platoon (if an infantry battle group);

c. the anti-armour platoon (if an infantry battle group);

d. any CAS sorties that have been passed down from higher;

e. the combat teams; and

f. other assets allotted down from higher, e.g., AH.

18. Targeting is complementary to fire planning and is designed to assist in the synchronization of the battle group's attack assets.

REHEARSALS

19. Rehearsals are a key element to the success of any plan. They improve comprehension of the plan, identify any problem areas, and show participants their responsibilities and cues for action. Wherever possible, the fire support plan shall be rehearsed in conjunction with the manoeuvre commander's plan.

20. The BC shall participate in the rehearsal conducted by the brigade commander or the fire support rehearsal conducted by the CO of the artillery regiment. The BC will advise the BG Comd to conduct a rehearsal. Whether the BG Comd conducts a rehearsal or not, the BC shall conduct a fire support rehearsal. The FOO shall recommend that the combat team commander conduct a rehearsal; furthermore, the FOO will conduct a rehearsal with any fire support elements allocated to the combat team — even if this is just the FOO party.

21. The fire support rehearsal shall include everyone involved in the fire support plan. This includes the air liaison officer (ALO), the forward observers, naval gunfire liaison officer , mortar platoon commander and anyone else implicated in the fire support plan. All participants benefit from the rehearsal by obtaining information for movement, scheduling of fire, ammunition requirements and a more complete understanding of the manoeuvre commander's plan. At the combat team level, The FOO's fire support rehearsal may be less formal.

22. The fire support rehearsal consists of a thorough review of:

a. actions to occur;

b. possible friendly initiatives;

c. possible reactions to enemy initiatives;

d. control measures; and

e. significant events that are to occur in relation to time or phases of an operation.

23. Rehearsals can be conducted using the following methods:

a. rehearsal on suitable or actual terrain;

b. model rehearsal;

c. map rehearsal;

d. sand table exercise; and

e. radio rehearsal and/or communications exercise.

DEPLOYMENT OF OBSERVATION POST PARTIES

24. The BC shall deploy observation posts (OP) parties and other observation resources in accordance with the supported arm commander's tactical plan and/or the orders of the artillery CO. When deciding how and where to deploy the OP parties, the BC must consider:

a. **Ground**. The observer must be able to observe to be useful.

b. **OP equipment**. The observer must be in a location where the target acquisition (TA) equipment can be used effectively.

c. **Enemy intentions**. The BC can determine areas of interest and decision points where the enemy must choose between different approaches. Having observation on these points helps determine enemy intentions and permits early engagement. The BC must be aware of the battle group intelligence collection plan, and must make use of any information gathered to assist in the planning of observer locations.

d. **Mounted or dismounted**.

25. The BC's deployment orders to observers shall include:

a. the tactical situation;

b. their tasks, including the identity of the troops to be supported, and their location;

c. the zone or areas over which observation must be maintained and any zones where TA observation must be kept;

d. the areas in which OPs are to be established;

e. allotment of ammunition including any restrictions on amounts or types;

f. responsibilities for firing certain targets, and the resources, conditions and trigger points associated with the targets;

g. authorized FOOs;

h. gun locations, states of readiness and the survey level of the regiment and other guns in range, and the tactical tasks of artillery units;

j. routes, timings and movement restrictions;

k. special groupings, e.g., allotment of air defence resources to the supported arm and allotment of forward air controllers (FACs) and Fire Controllers (FCs); and

m. communications instructions.

26. In mobile operations, the observer may be required to move the OP party in order to conform with the plan of the supported company or squadron commander. In such situations, the BC, rather than give a zone of observation in the orders, may indicate the area over which the observer is to gain observation as the tactical plan develops.

SECTION 2

THE OBSERVATION POST PARTY

INTRODUCTION

27. Artillery OPs are established for:

a. engagement of targets by observed fire;

b. battlefield surveillance;

c. fire planning; and

d. maintenance of liaison with the troops being supported or in whose area the OP is situated.

28. The party manning an OP will usually consist of:

a. an observer

b. an assistant, an OP technician;

c. sufficient artillery personnel to drive and maintain the party's vehicles (an OP vehicle and rover) and to provide communications; and

d. additional personnel as required.

29. The basic equipment of an OP party includes:

a. a means of communication with the guns and the supported arm;

b. a means of observation (including binoculars, the night observation device long range (NODLR) and TA equipment);

c. a means of measuring bearings and distances (the prismatic compass and the laser range-finder);

d. a protractor;

e. a map or gridded photograph of the area to be observed; and

f. Tabular firing tables (TFTs) for the weapons available to him.

30. The OP party must be capable of being completely self-reliant since it is often separated from its parent unit for protracted periods. All members of the party must be able to conduct fire

missions, operate the communications (equipment), drive the vehicles and carry out maintenance of equipment.

31. The OP party normally moves by vehicles, but must be so organized that it can operate, at short notice, separated from its vehicles. Procedures must therefore be developed by each party for tactical movement by foot, vehicle, or helicopter.

32. **Forward observation officer** . The main duties of the forward observation officer (FOO) are:

a. acting as fire support adviser and coordinator to the supported arm commander at combat team level;

b. establishing an OP and observing a zone or an area of terrain as ordered by the BC;

c. engaging targets;

d. reporting tactical information to the BC, battery CP and supported arm as required;

e. reporting hostile mortaring, shelling, bombing and nuclear strikes to the BC and battery CP;

f. reporting to the BC and battery CP on the suitability of potential gun areas noted during deployments; and

g. performing command duties as detailed by the BC

SELECTION OF AN OP

33. The OP shall be located to provide the best possible view of the zone or area to be observed. It will also provide:

a. command of the ground being occupied by the supported troops;

b. cover from ground and air observation, including a covered approach to the OP;

c. high performance operation of radio and other electronic equipment used by the party;

d. conformity with the local defence pattern of the supported troops; and

e. an OP base, i.e., a small area to serve as a maintenance base and vehicle park, close to the OP and hidden from enemy observation.

34. During mobile operations, movement will usually be by tactical bounds. To keep in close touch with the fluid situation, the observer shall attempt to remain physically close to the

supported arm commander, but this requirement must not negate the necessity for the observer to perform the prime task, the observation and engagement of targets. Ideally, any tactical movement will be covered by a second observer who would remain in a static OP on the ground affording a good view of the manoeuvre area and from where a fire plan may be controlled, modified and adjusted when necessary while in progress.

35. It must be emphasized that a static OP is deployed as part of an overall observation plan and the responsibility for its deployment is the BC, not the supported arm commander. However, the FOO must be available to advise the supported arm commander on fire support matters.

OCCUPATION

36. The method of occupying an OP varies considerably with the type of operation. Whether the occupation is to be carried out hastily during mobile operations or deliberately during static operations, the following factors must be considered:

a. the tactical situation, including the degree of urgency — in most situations speed is of the utmost importance and it is essential that an observer in communication with the guns be positioned as early as possible;

b. the availability of a covered approach to the OP; and

c. the proximity to which vehicles can be brought to the OP.

37. **Mechanized operations**. During mechanized operations, the protection and mobility afforded by the armoured personnel carrier (APC) must be fully exploited so that targets can be engaged with observed fire. By the use of covered approaches, the APC can be manoeuvred into hull-down positions that provide observation of target areas. Since the prismatic compass is ineffective when used in or near armoured vehicles, bearings must be determined by the use of the map or protractor fan, if available, prominent ground features and binoculars. During mobile operations, circumstances may make it necessary to occupy an OP on foot, perhaps for only a short period of time. In this situation, the vehicles shall be located under the nearest available cover, the OP occupied rapidly, and the targets engaged or activity observed. The party must be prepared to evacuate the OP as quickly as possible and continue the operations.

38. **Occupation of a static OP**. It is normal to occupy a static OP on foot, leaving the vehicles parked at the OP base. In this type of occupation, the following factors must be considered:

a. Great care must be taken to avoid disclosing the position of the OP during its occupation. Such disclosure compromises not only the OP but also the troops in its vicinity. When the OP is to be occupied for an extended period, occupation is take place during periods of poor visibility or at night, providing the tactical situation permits.

b. Concealment and camouflage must be of a very high standard. The OP must be organized so that from the moment of occupation, all work can be hidden from enemy view. Normally, the OP must be sufficient size to accommodate the observer, an assistant and a communicator. The observer must be able to issue orders to his communicator and see the signals pad without movement. Where sufficient concealment is difficult to obtain, the observer may have to dispense with any assistance and operate the communications alone.

c. Wherever possible, the OP base shall be sited on the main approach to the OP so that control can be exercised over the movement of visitors. Good concealment and camouflage of the base will ensure that work may be carried out without undue exposure.

INITIAL ACTION ON OCCUPATION

39. The observer's aim is to cause every round to be effective and thus minimize the time and ammunition expended in adjusting fire. Proper and thorough preparation will do much toward accomplishing this aim.

40. Immediately on occupying an OP, the observer will:

a. plot the OP and the zone of observation on the map, and send its location to the BC and to the gun position;

b. check communications;

c. select one or two prominent points visible from the OP and plot them on the map to assist in orientation;

d. set up the target map;

e. to facilitate subsequent engagement of targets, establish the location of various points throughout the zone of observation by a study of map and ground. This silent zone identification will sometimes be confirmed by the observation post technician (OP Tech);

f. double check with the OP Tech who has completed steps "a" to "e" at the same time;

g. ensure that the OP Tech sets up the Laser Range-Finder (LRF) and orients it; orientation and fixation of the LRF shall be done as soon as possible and shall be as precise as time and the tactical situation will permit;

h. ensure that, once set up, all other TA means are set up; these shall be independently checked by the OP officer;

j. begin preliminary planning of a target list; and

k. confirm target locations from previously issued targets.

41. As soon as information is available, the following shall be plotted on the map (although it must be noted that in some circumstances it may be unwise to carry a map marked with this information):

a. the positions of forward troops, boundaries and other fire support coordination measures;

b. recorded targets, located or suspected hostile guns and mortars, etc.; and

c. the positions of fire units, together with arcs of fire and maximum planning range.

THE OBSERVER'S MAP

42. Rapid map spotting of targets will be facilitated by making the following preparations to the observer's map:

a. **Numbering grid lines**. Grid lines shall be numbered in heavy pencil in bold, clear figures along all four boundaries of the area of interest.

b. **Marking contours**. Selected contours shall be emphasized with pencil and altitudes shall be renumbered clearly to expedite identification of ground features.

c. **Layering**. If time permits, the usefulness of a map may be improved by lightly colouring the areas enclosed by successive contour lines. Different colours shall be used for variations in altitude, with the darkest colour being used for the highest ground and a gradual progression of dark to light colours employed as the contour levels descend. This process has the effect of emphasizing very sharply the heights and depressions of the ground, but may obscure detail.

d. **Arcs**. When targets map forms are not available, a framework of range and bearing arcs, centred at the OP, may be used for plotting targets in the same manner as with the fan on a target map.

THE TARGET MAP

43. The target map consists of:

a. a normal map; and

b. a target map overlay.

44. The target map is a device for recording information about targets and prominent features in the zone of observation. The following details shall be recorded:

a. easily recognizable reference points;

b. marking rounds;

c. registration points;

d. previously engaged targets; and

e. likely targets.

45. **Target map overlay**. The target map overlay consists of a single sheet of transparent plastic upon which is printed a semi-circular fan and a data block (Figure 1-1). The fan has range arcs every 500 metres from a range of 1000 to 5000 metres. The perimeter of the fan is graduated in 20-mil intervals with accentuated lines at 100-mil intervals. The data block, adjacent to the fan, has space for the records of 20 targets.

SER	TGT NO	DESCRIPTION	DIR	DIST	GRID	ALT	F
1		TRAIL OVER HILL	3310	1300	628142	1250'	
2	ZP 1641	RIGHT PITS	4260	800	623150	1250'	
3		NEEDLE TREE	2800	3200	642125	1250'	
4		PIMPLE BALD	3000	2400	634130	1250'	
5		DOG-LEG FEATURE	3930	2000	617138	1250'	
6		ROAD JUNCTION	3980	2900	609133	1250'	
7	ZP 1642	LEFT PITS (POLE)	2740	4300	648115	1275'	
8		TWIN CRATERS	3130	4400	632109	1250'	
9		WOODEN TOWER	3350	6000	623094	1250'	
10	ZT 4000	BURNT-OUT TANK	3820	3700	609124	1250'	
11		CONCRETE BUNKER	4320	5000	585131	1225'	
12							

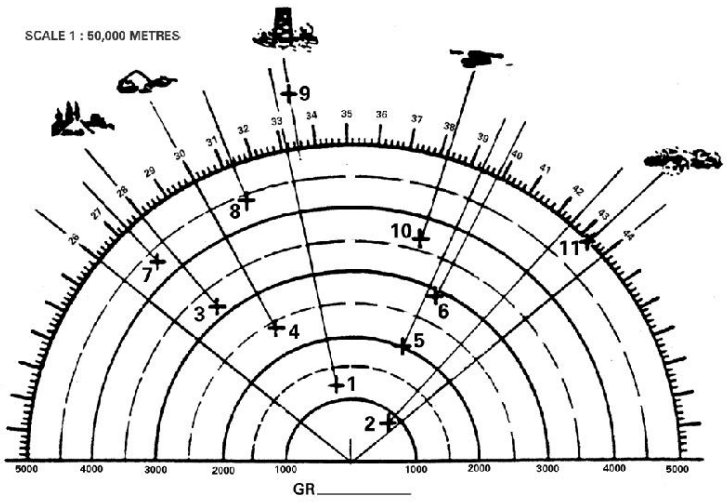


Figure 1-1: A target map overlay

46. **Plotting**. Targets and reference points are plotted on the fan with a cross. Direction is indicated by a line drawn from the cross to the directional arc. Crosses are numbered to correspond to entries in the data block. Sketches can be added to aid in reading the fan.

47. **Use**. The grid reference of, and direction to, any point in the zone of observation may be rapidly obtained from its relationship to the nearest recorded point on the target map overlay.

SILENT ZONE IDENTIFICATION

48. Silent zone identification is the process of obtaining, without firing, data which will assist the observer in the engagement of targets. It consists of a systematic examination of the zone of observation, in conjunction with the map, and the recording of relevant data. It is carried out as soon as possible upon occupation and in the following sequence:

a. orient the map, and locate and identify main features on the ground;

b. locate on the ground and on the map the position of our own troops and any known or suspected enemy locations;

c. identify on the ground the zone of observation, the range limits of the guns and the general bearings of fire;

d. select several points throughout the zone of observation which can be used in the indication of targets — the bearing and distance from the OP, and the grid reference of each point shall be recorded; and

e. determine the angle T and zone for these points in relation to batteries that are liable to engage targets; and

f. determine locations of crest lines and areas of dead ground.

49. Information obtained from silent zone identification shall be recorded on the target map and checked by the artillery technician. The use of the laser range-finder can greatly assist in the conduct of the silent zone. It is usually beneficial if the FOO conducts silent zone without the laser, while the OP Tech uses the laser range-finder. When using the laser range-finder, it is very important to consider the current emission control (EMCON) situation and the location of friendly troops.

50. The observer shall continue to improve and record his or her knowledge of the zone throughout the occupancy of the OP.

ZONE IDENTIFICATION BY FIRING

51. Unless restrictions have been imposed on firing, the observer may confirm the silent zone identification and ensure correct orientation by firing marking rounds at various points. Each round shall be directed to gain information about a particular area of the zone rather than an individual target. This can be important in poorly mapped areas.

THE AIR PHOTOGRAPH

52. The air photograph is a valuable aid to the observer, particularly in badly mapped terrain or in mobile operations when large scale maps are not available. Wherever possible, oblique and vertical photographs of the area of observation shall be studied by the forward observer before an operation.

53. The two main sources of air photographs for the artillery are as follows:

g. **Air OP**. The tactical helicopter squadron is capable of taking low and high obliques. It can take vertical photographs, but its capability in this respect is limited by the need to fly directly over the area. Air OP photographs are usually available to the forward observer on short notice.

h. **Reconnaissance aircraft and drones**. A wide variety of both oblique and vertical photographs, often composed as mosaics, are available. Under certain conditions, mosaics can be used in lieu of maps.

SECTION 3

OBSERVING, RECORDING AND REPORTING

OBSERVATION

54. Although the methods of effecting observation in mobile and static operations differ, the following considerations apply to both:

a. At night, surveillance, TA and night observation devices shall be used, if available, and within restrictions imposed by the tactical plan. Arrangements shall be made to ensure information is passed to the FOO from the operators of devices deployed by the supported arm.

b. A knowledge of enemy weapon deployment practices will assist in establishing the location of enemy positions.

c. Enemy positions may be detected through changes in the light or texture of certain areas. In areas where the prevailing colours are dark, very careful examination may be necessary to observe enemy activity. Slight activities, e.g., changes of camouflage or a flash of light reflected from binoculars, will often draw attention to areas that require more thorough examination.

d. It is often difficult to recognize familiar objects because of the scale at which they appear. For example, at long ranges or in mountainous country an anti-tank gun will appear deceivingly small. A comparison to a nearby object of known size will assist in establishing the size of the object under observation.

e. The best results are obtained by a systematic examination of the zone from flank to flank beginning with the foreground, followed by the middle distance and then the background.

55. **Mobile operations**. During mobile operations, the speed of movement considerably limits the opportunity for continuous observation of areas of interest. Wherever possible, an observation and movement plan shall be made in conjunction with the supported arm commander, before the operation. Ideally, this plan shall be made from an OP which covers the approaches to the enemy position. If this is not possible, it may be made using air photographs or maps. After receiving orders for a mobile operation, the observer:

a. determines the area over which observation must be gained;

b. divides this area into segments in accordance with the movement plan of the supported arm;

c. completes a detailed map study and selects OPs which will cover the areas;

d. selects covered routes from OP to OP and completes a time appreciation to determine the feasibility of covering the operation with one observer — it is

desirable to have two observers, so that they may be leap-frogged, but an adequate plan can usually be made using only one;

e. selects and marks on his map prominent landmarks which will assist in the orientation at each OP;

f. marks recorded targets, tactical controls and agreed reference points on his map;

g. determines how he will occupy each OP; and

h. considers the location of batteries likely to be used and the implications of zones and angle T for each OP.

56. **Static OP**. Observation from a static OP must be continuous. All members of the OP party will take their turn on a roster basis in order to maintain a close surveillance over the zone. Personnel carrying out surveillance duty shall be replaced approximately every two hours. Tours of duty shall be overlapped sufficiently for the relieving observer to be briefed on the situation and, if observation is being carried out during darkness, for his eyes to become adjusted. The communications shall be manned continuously.

RECORDING AND REPORTING OF INFORMATION

57. An important task of the artillery observer is prompt and accurate recording and reporting of tactical information. When there is considerable activity, it will not be practicable to report all incidents as they occur. Information likely to be of immediate value is reported without delay; other information is recorded and reported at intervals as ordered. The following shall be reported as they occur:

a. movement of own troops, so that safety may be ensured when targets are engaged;

b. a description of each target engaged and the result of the engagement — the former being sent as part of the call for fire and the latter on conclusion of the fire mission;

c. hostile shelling, mortaring, air, nuclear and toxic attack, by use of the appropriate report, i.e., SHELREP, MORTREP, BOMREP, Nuclear Reports or TOXREP; and

d. any important or unusual enemy activity or movement.

58. **Recording of Information**. All information obtained is recorded in the OP log. A sample extract from such a log is shown in Figure 1-2.

DATE	TIME	EVENT	ACTION	REMARKS
9 Jul	1005	3 APCs moving west along rd 4467 — entered wood at 443673.	BC info.	
	1045	D Coy req wood 4567 blinded while 10 Pl moved fwd 200 m.	Smk fired 1100 hrs. BC info.	Smk effective.
	1135	10 Pl now at 451664	BC and CP info.	
	1205	Shelling 400 m WEST of OP.	SHELREP sent 1208 hrs.	

Figure 1-2: A sample extract from an OP Log

THE PANORAMA

59. A panorama is a drawing of a view seen from an OP. Artillery panoramas are useful for two purposes:

a. as an aid to an artillery commander for briefing or indicating targets for observed fire to his subordinates — such a panorama need only show a few prominent reference points drawn clearly and unmistakably; and

b. as an aid to observation during periods of reduced visibility as an alternative to the target map, e.g., smoke, haze, twilight, etc, and to assist in identification of features by moonlight and artificial means.

60. The method of preparing a panorama is fully covered in A-PD-318-008/ PT-001 (CFP 318(8)), *Military Training, Maps, Field Sketching and Compasses*.

BOMREPS/SHELREPS/MORTREPS

61. These reports (Figure 1-3) must be forwarded as quickly as possible after enemy action commences. Ideally, three reports are required from each observer when shelling or mortaring lasts for more than a few minutes:

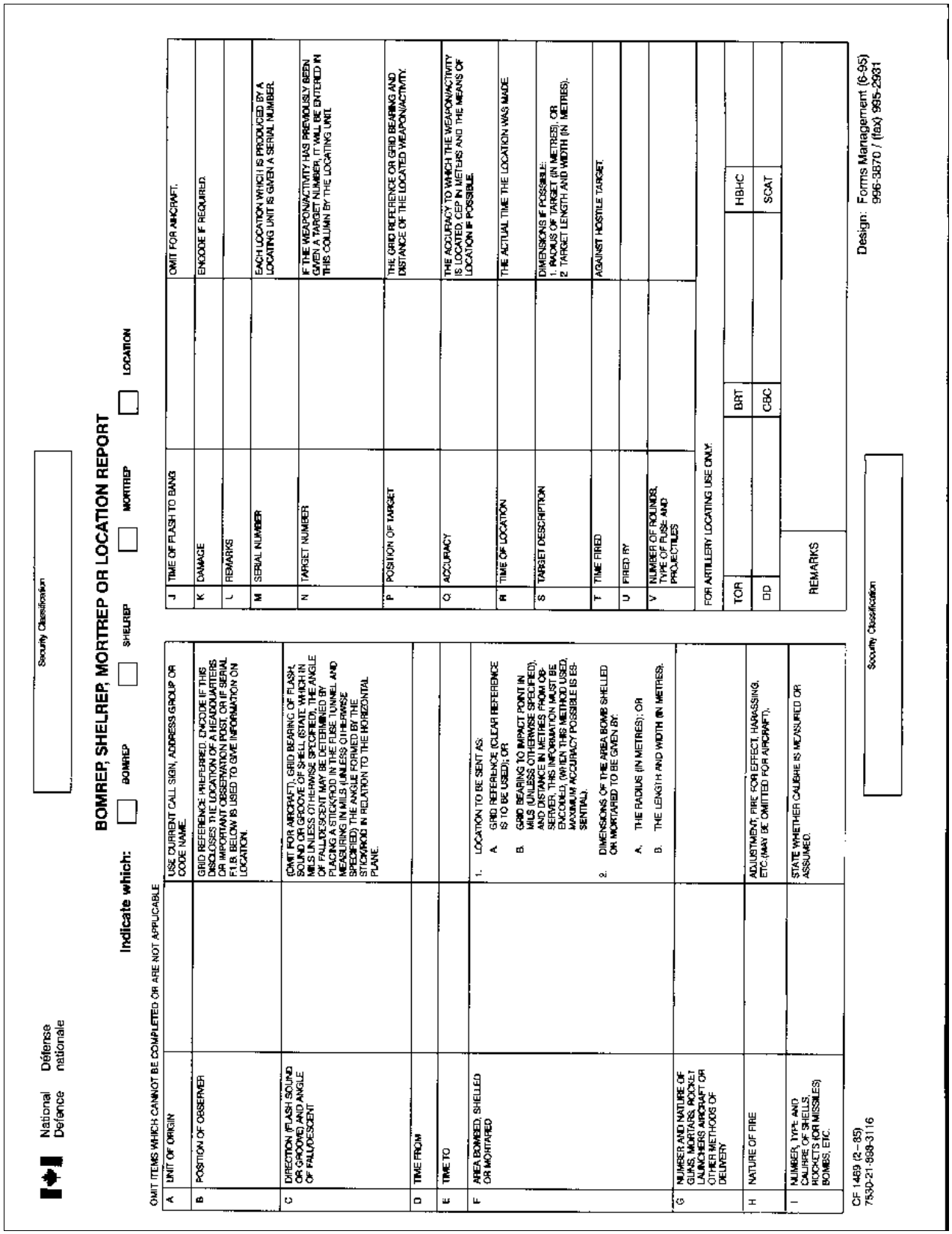
a. A SHELREP shall be sent as soon as the shelling starts, perhaps only containing time and bearing, to permit the artillery intelligence staff to alert all relevant sources of information.

b. A second SHELREP may be sent a few minutes later to indicate what is being shelled and how heavily. In this case, Serial E of the form shall read “continuing”.

c. The last SHELREP is sent when the firing has stopped, to summarize the incident as fully and as accurately as possible.

62. The calibre and type of gun or mortar firing can be judged roughly from the sound and appearance of the shell bursts, and definite information can be obtained from fragments and unexploded shells or bombs.

63. Whenever possible, the observer shall include a statement on the calibre and type of weapon in the report and will subsequently forward any fragments to the artillery intelligence staff with a note giving the time and location of impact. The fuze, shell, base, rotating bands in the case of guns, and the bomb fins of mortars, are particularly valuable for this purpose.



National Défense / Defence nationale

Security Classification

BOMREP, SHELREP, MORTREP OR LOCATION REPORT

Indicate which: ☐ BOMREP ☐ SHELREP ☐ MORTREP ☐ LOCATION

OMIT ITEMS WHICH CANNOT BE COMPLETED OR ARE NOT APPLICABLE

A	UNIT OF ORIGIN	USE CURRENT CALL SIGN, ADDRESS GROUP OR CODE NAME.
B	POSITION OF OBSERVER	GRID REFERENCE PREFERRED. ENCODE IF THIS DISCLOSES THE LOCATION OF A HEADQUARTERS OR IMPORTANT OBSERVATION POST, OR IF SERIAL F1.B. BELOW IS USED TO GIVE INFORMATION ON LOCATION.
C	DIRECTION (FLASH, SOUND OR GROOVE) AND ANGLE OF FALL/DESCENT	(OMIT FOR AIRCRAFT). GRID BEARING OF FLASH, SOUND OR GROOVE OF SHELL (STATE WHICH IN MILS UNLESS OTHERWISE SPECIFIED). THE ANGLE OF FALL/DESCENT MAY BE DETERMINED BY PLACING A STICK/ROD IN THE FLASE TUNNEL AND MEASURING IN MILS (UNLESS OTHERWISE SPECIFIED) THE ANGLE FORMED BY THE STICK/ROD IN RELATION TO THE HORIZONTAL PLANE.
D	TIME FROM	
E	TIME TO	
F	AREA BOMBED, SHELLED OR MORTARED	1. LOCATION TO BE SENT AS: A. GRID REFERENCE (CLEAR REFERENCE IS TO BE USED); OR B. GRID BEARING TO IMPACT POINT IN MILS (UNLESS OTHERWISE SPECIFIED), AND DISTANCE IN METRES FROM OBSERVER. THIS INFORMATION MUST BE ENCODED. (WHEN THIS METHOD USED, MAXIMUM ACCURACY POSSIBLE IS ESSENTIAL). 2. DIMENSIONS OF THE AREA BOMB SHELLED OR MORTARED TO BE GIVEN BY: A. THE RADIUS (IN METRES); OR B. THE LENGTH AND WIDTH (IN METRES).
G	NUMBER AND NATURE OF GUNS, MORTARS, ROCKET LAUNCHERS, AIRCRAFT OR OTHER METHODS OF DELIVERY	
H	NATURE OF FIRE	ADJUSTMENT, FIRE FOR EFFECT, HARASSING, ETC. (MAY BE OMITTED FOR AIRCRAFT).
I	NUMBER, TYPE AND CALIBRE OF SHELLS, ROCKETS (OR MISSILES) BOMBS, ETC.	STATE WHETHER CALIBRE IS MEASURED OR ASSUMED.

J	TIME OF FLASH TO BANG	OMIT FOR AIRCRAFT.
K	DAMAGE	ENCODE IF REQUIRED.
L	REMARKS	
M	SERIAL NUMBER	EACH LOCATION WHICH IS PRODUCED BY A LOCATING UNIT IS GIVEN A SERIAL NUMBER.
N	TARGET NUMBER	IF THE WEAPON/ACTIVITY HAS PREVIOUSLY BEEN GIVEN A TARGET NUMBER, IT WILL BE ENTERED IN THIS COLUMN BY THE LOCATING UNIT.
P	POSITION OF TARGET	THE GRID REFERENCE OR GRID BEARING AND DISTANCE OF THE LOCATED WEAPON/ACTIVITY.
Q	ACCURACY	THE ACCURACY TO WHICH THE WEAPON/ACTIVITY IS LOCATED, CEP IN METERS AND THE MEANS OF LOCATION IF POSSIBLE.
R	TIME OF LOCATION	THE ACTUAL TIME THE LOCATION WAS MADE
S	TARGET DESCRIPTION	DIMENSIONS IF POSSIBLE: 1. RADIUS OF TARGET (IN METRES); OR 2. TARGET LENGTH AND WIDTH (IN METRES).
T	TIME FIRED	AGAINST HOSTILE TARGET.
U	FIRED BY	
V	NUMBER OF ROUNDS, TYPE OF FUSE AND PROJECTILES	

FOR ARTILLERY LOCATING USE ONLY:

TOR		BRT		HB/HC	
DD		CBC		SCAT	
REMARKS					

Security Classification

CF 1469 (2-85)
7530-21-898-3116

Design: Forms Management (6-95)
996-3870 / (fax) 995-2931

Figure 1-3: BOMREP/SHELREP/MORTREP/LOCREP

SECTION 4

CLEARANCE OF FIRES

INTRODUCTION

64. One of the most important jobs for observers is to ensure that friendly fire does not land on friendly positions. The battlefield is a very chaotic environment. The dust, smoke, fires and troop movement make it difficult to positively identify all friendly locations. Thus, it is essential that artillery observers take positive measures to clear fire across unit boundaries and within their own sectors.

65. Fire support coordination measures are designed to permit the rapid engagement of targets while minimizing the probability of fratricide. Any fires over boundaries or that conflict with fire support coordination measures must be positively cleared by the observer conducting the fire mission.

66. The clearance of fires is done between observers on the regimental net; permitting all the CPs to hear it. The procedure is outlined below:

a. An observer, Observer A, identifies a target across a boundary or any other type of fire support coordination measure.

b. Observer A initiates the call for fire; placing At My Command (AMC) in effect.

c. Observer A contacts the appropriate observer, Observer B, and advises of the call for fire, including the CP the call for fire was sent to, the grid and description of the target. Observer B clears the fire with the manoeuvre commander concerned and then gives or rejects the clearance to fire. Observer B will address the clearance message to Observer A and to the CP that the call for fire was sent to:

(1) if the clearance is across a brigade or higher boundary, the initial observer will pass the clearance through the chain of command to the Operations Officer (Ops O) who in turn passes it to the Ops O of the appropriate artillery unit,

(2) if necessary, the FOO can pass the clearance message through the BC, and

(3) if the Command Post Officer (CPO) notices that the call for fire crosses a boundary or fire support coordination measure, he must ensure that clearance has been conducted before firing. If necessary, the CPO shall direct the observer to contact the appropriate clearing authority.

d. If Observer B clears the fire, Observer A continues with the mission. Otherwise, the initial observer will terminate the mission. The CP will not order FIRE until the clearance of fires has been received from the second observer.

This method permits concurrent activity to continue, thereby minimizing the loss of time required to contact the second observer. It also ensures that no rounds will be fired until the fire has been positively cleared.

CHAPTER 2

TARGET ENGAGEMENT

SECTION 1

INDICATION OF TARGETS TO THE OBSERVER

GENERAL

1. It is the observer's responsibility to:

   a. identify the location, type and size of the target;

   b. fully understand what the engagement of the target is to achieve; and

   c. know the locations of friendly troops that may be endangered or affected by the engagement.

2. The method used to indicate a target to an observer will depend upon whether the person indicating the target is with the observer or is at some distance away.

3. When personal contact is possible, any of the following methods may be used:

   a. the vertical clock code;

   b. laying an optical instrument on the target;

   c. reference to a target map, an air photograph or a map; or

   d. a tracer round fired from a direct fire weapon.

VERTICAL CLOCK CODE

4. A vertical clock code is used to describe the location of objects by referencing from a common known point on the ground as shown in Figure 2-1.

5. Imagine that a clock face is suspended vertically with its centre on the known reference object with 12 o'clock vertically above it. A reference to an object or target can then be given in terms of the clock hour on which it lies and the angle in mils from the centre of the clock to the object measured along the hour line. For example, Figure 2-1 can be indicated as follows: "REFERENCE LONE PINE, RIGHT FOUR O'CLOCK, 75 MILS, SMALL HOUSE," or "REFERENCE LONE PINE, DOWN SIX O'CLOCK, 25 MILS, SMALL HILL."

6. When personal contact is not possible, targets must be indicated by a grid reference or by reference to known ground objects. For this reason the observer and the supported arm

commander shall familiarize themselves with the ground in each other's presence and agree on common reference points. Targets may then be indicated from these reference points using cardinal points and distances. For example, "REFERENCE CROSSROAD, NORTH 400 M, 3 TANKS DUG IN." If a reference point cannot be established, a number of marking rounds may be fired to serve as a reference point(s), or the target may be indicated by firing smoke or tracer from a direct fire weapon towards it.

7. When using either vertical clock code or cardinal points it is important to:

   a. begin at an easily identifiable object or point;

   b. keep the next reference point within the correct view of the binoculars (i.e., try to move by 100-mil bounds); and

   c. fully describe each reference point, object or the target.

8. All targets must be checked back by the observer by:

   a. using the target as a reference point and giving a reference, other than the original reference point, to a prominent object close to the target; or

   b. describing some unmistakable feature of the target, e.g., "SMALL HOUSE HAS RED DOOR AND GREEN ROOF."

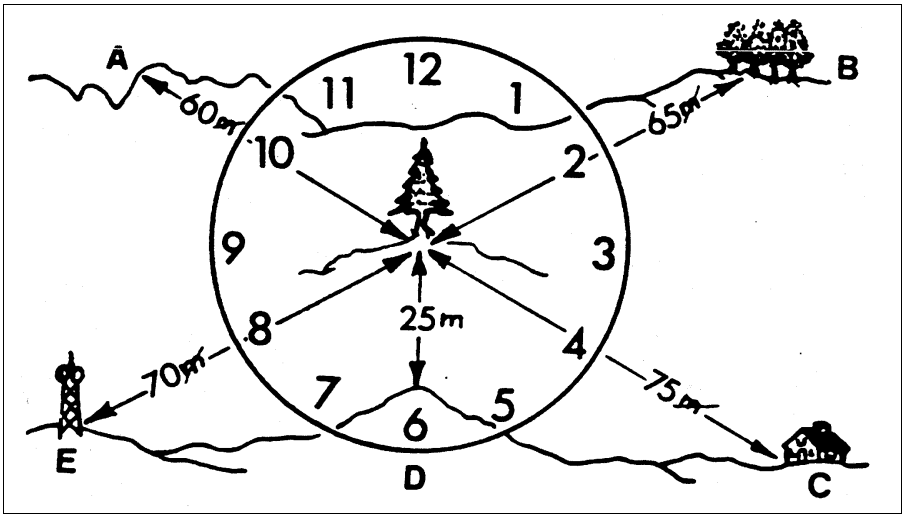


Figure 2-1: The vertical clock code

SECTION 2

PLANNING A FIRE MISSION

BASIC TYPES OF FIRE MISSIONS

9. There are two basic types of fire missions as discussed below:

a. **Observed fire missions**. Missions which are observed throughout the engagement with an observer adjusting fire as necessary.

b. **Unobserved fire missions**. Missions which cannot be observed and are engaged solely by prediction. They are always opened at Fire for Effect (FFE). They include such missions as Harassing Fire (HF) and Counterbattery (CB), and may include recorded targets and Defensive Fire (DF) tasks.

10. Whenever the target can be seen by an observer, the time permits, and the achieving of surprise is not a factor, engagement shall be conducted as an observed fire mission in order to ensure an effective engagement. The accuracy of unobserved fire missions is dependent upon the exactness of:

a. target location;

b. fixation and orientation of the guns;

c. meteorological data and the application of corrections for non-standard conditions; and

d. calibration of the guns.

11. **Effects of fires**. The desired effect of fire support on a target has to be decided by the manoeuvre commander. There are three types of fire:

a. **Suppression**. Suppression of a target limits the ability of enemy personnel to perform their mission. Firing High Explosive (HE), shells with Variable Time (VT) fuzes reduces the combat effectiveness of personnel and armoured targets by creating apprehension or surprise and causing tanks to button up. Smoke is used to blind or confuse. The effect of suppressive fires usually lasts only as long as the fires are continued. This type of fire is used against likely, suspect, or inaccurately located, enemy firing units. It can be delivered by small delivery units or means, and requires little ammunition.

b. **Neutralization**. Neutralization of a target knocks the target out of the battle temporarily. Casualties of 10 percent or more will neutralize a unit. The unit will become effective again when the casualties are replaced and damage is repaired. Neutralization fires are delivered against targets located by accurate map reading,

by indirect fire adjustment, or by a TA device. The assets required to neutralize a target vary according to the type and size of the target and the weapon-ammunition combination used.

c. **Destruction**. Destruction puts the target out of action permanently. Thirty percent casualties or materiel damage inflicted during a short time span normally renders a unit permanently ineffective. Direct hits are required to destroy hard material targets. Targets must be located by accurate map reading, by indirect fire adjustment, or by a TA device. Destruction usually requires a large amount of ammunition from many units. Use of artillery weapons for destruction of armoured or dug-in targets is not normally economical. However, artillery precision guided munitions (PGMs) and advanced munitions, such as search and destroy armour (SADARM), may destroy the target without wasting time or ammunition.

CATEGORIES OF TARGETS

12. Targets engaged by observed fire may be divided into five categories:

a. fire missions against personnel;

b. fire missions against equipment and field defences;

c. illumination missions;

d. indication; and

e. fire missions to obtain gun and survey data.

13. **Fire missions against personnel**. The aim is to stop or prevent the enemy from taking effective action against our own forces. The methods available for achieving this aim are as follows:

a. **Neutralization**:

(1) Complete neutralization is achieved by firing rounds (usually HE) onto known enemy positions. It is best to fire a heavy concentration of FFE, followed by rounds at an interval, this keeps the enemy neutralized for a longer period of time than a heavy concentration of FFE on its own. For example, a battery (105mm) firing seven rounds FFE into an area 50 metres by 50 metres will, statistically, achieve complete neutralization for the period of time that the rounds are falling, say one to one and one-half minutes. However, there is no way of determining the additional period of time, after the rounds have stopped landing, that the enemy will still be neutralized. This depends on the morale and state of training of the enemy. Assuming that there will always be this additional period of neutralization, a more economical method of achieving the aim will often

be to fire rounds of FFE with an interval; e.g., if a battery (105mm) fires two rounds followed by five rounds FFE 30 seconds into an area 50 metres by 50 metres, rounds will land over a period of two and one-half to three minutes. For the same ammunition expenditure as in the first example, the period of neutralization is two to two and one-half times longer.

(2) Partial neutralization may be achieved by:

(a) blinding the enemy with smoke,

(b) firing HE into suspected enemy positions,

(c) denying the enemy the use of an area, e.g., defiles, gaps in minefields, crossroads, etc., by firing HE or scatterable mines at it, and

(d) making tanks and APCs close down and damaging ancillary equipment.

b. **Harassment**. The irregular engagement of known or suspected enemy positions. It is usually planned at brigade or divisional level for a 24-hour period.

c. **Attrition**. The infliction of casualties, either by killing or wounding. This can be achieved by HE, particularly during the first few seconds of a mission before the enemy has time to take evasive action.

d. **Demoralization**. The reduction of the enemy's will to fight. This may also be the result of the cumulative effects of neutralization, harassment and attrition.

14. **Fire missions against equipment and field defences**. The purpose of engaging these targets is to destroy or damage the enemy's equipment or defences. This is best achieved by direct fire weapon systems or artillery in the direct fire role. However, it may be achieved by indirect fire using terminal guided munitions (TGM) or destruction mission procedure. Destruction missions demand large calibre weapons, comparatively large ammunition expenditure and often a considerable amount of time.

a. A fire mission against equipment may be completed by:

(1) direct fire using special anti-tank projectiles or HE,

(2) indirect fire from large calibre guns,

(3) indirect fire using terminally guided munitions,

(4) indirect fire using dual purpose improved conventional munitions (DPICM), or

(5) employing scatterable mines in conjunction with any of the above or supported arm, direct fire weapons.

b. A fire mission against constructed field defences may be completed by firing HE delay, concrete piercing ammunition or TGM.

15. **Illumination missions**. Illumination is the provision of light at night:

a. to enable observation and surveillance of the enemy;

b. to enable observation and adjustment of fire;

c. to facilitate movement of friendly forces;

d. to neutralize enemy night observation devices; and

e. to harass the enemy by interfering with freedom of movement.

16. Illumination may also be used as a mark round.

17. **Indication**. Indication is the marking of a target, objective or feature or a zone on the ground. It may also be used as a method to indicate a phase of an operation, achievement of an objective or the zone of observation in poorly mapped areas.

18. **Fire missions to obtain gun and survey data**. The aim of these missions is to improve the accuracy of target locations, particularly in poorly mapped areas, and to produce corrections necessary to compensate for non-standard conditions. These fire missions are achieved through the use of:

a. adjustment for coordinates;

b. adjustment for gun data;

c. registration and laser registration missions;

d. laser point missions; and

e. witness point missions.

THE APPRECIATION AND PLAN

19. Before engaging a target, the observer must make a quick appreciation of the situation and, from it, formulate a plan. Once the plan has been made, it shall not be changed during the engagement unless circumstances alter radically.

20. **Aim**. The aim of the engagement must be clearly understood, whether it is undertaken on the initiative of the observer, or at the request of the supported arm. It is usually possible to express the aim in terms of the category into which the target falls.

21. **Factors**. The main factors affecting achieving the aim of a fire mission are;

a. **Time available**. This is often the most important factor. It will influence the degree of adjustment, the degree of accuracy warranted, and in some instances, the number of guns to be used in the engagement. The observer must appreciate the ability of the enemy to take evasive action, the tactical requirements of the supported troops, and the characteristics of the weapons being used.

b. **Position of own troops**. The relative positions or movements of our own troops will influence the degree of adjustment and the type of ammunition to be used. For reasons of safety, the observer may have to resort to the DANGER CLOSE procedure.

c. **Ground**. The ground in the vicinity of the target will influence the selection of:

(1) the position of the opening round(s),

(2) the number of guns to be used in adjustment,

(3) the size of the long bracket,

(4) the ammunition,

(5) the trajectory (high or low angle), and in some cases

(6) the charge.

d. **Nature, size and attitude of the target**. The size of the target, its attitude, its ability to move and the protection it affords the enemy will influence:

(1) the choice of ammunition, including fuze (see Figures 2-2 and 2-3),

(2) the number and the calibre of guns,

(3) the degree of adjustment and the number of guns used for adjustment and for FFE, and

(4) the method of distributing the FFE on the target.

e. **Weather**. The weather prevailing or likely to prevail at the time of the FFE may dictate the choice of ammunition.

f. **Visibility**. The visibility will influence the number of guns to be used in adjustment and, in some cases, the ammunition.

g. **Ammunition available**. The quantity and type of ammunition available, in conjunction with the required duration of the engagement, will influence the nature of ammunition, the number of guns, and the quantity of ammunition to be used.

TYPE OF TARGET	CALIBRE OF GUNS	PROJECTILE	FUZE/ FUZE ACTION	REMARKS
PERSONNEL in open	All	HE, ICM apers	VT, Q, Time	ICM is best. Best shock effect achieved by deducing accurate target location and opening with FFE. MT ammunition used only as a last resort due to the inaccuracies of the fuze (Note 1).
Dug in	All	HE, WP	VT, Time, delay, delay ricochet	Airburst most effect; WP causes personnel to evacuate trenches. Delay can be used to cave in the walls of holes.
in dugouts, e.g., caves	All (preferably 155mm or larger)	HE	Delay, CP	(Note 4)
ARMOURED VEHICLES	All (preferably 155mm or larger)	HE, WP, DPICM, TGM	VT, Time, Q	105mm HE not effective against armour; however, could inflict casualties on exposed crews and accompanying troops. (Notes 1 and 2).
SOFT SKINNED VEHICLES	All	ICM, HE, WP	Q, VT, Time	Halted: Notes 1, 2, 3. Mobile: Notes 2, 3.
FORTIFI-CATIONS	All (preferably 155mm or larger)	HE, TGM	Delay, CP	Order highest practical charge (Note 4).
BUILDINGS	All	HE, WP, TGM	Q (wooden) CP, Delay (masonry)	Masonry: Note 4.
BOATS	All	HE, ICM	Time	Airburst against personnel manning boats; destruction by direct fire.
BRIDGES	All (preferably 155mm or larger)	HE	Q, CP Delay	Knock out bridge supports by destruction mission if at all possible.
SUPPLY IN-STALLATIONS	All	HE, WP	Q, VT, Time	Notes 1, 3.

Notes: 1. Area is neutralized with HE projectile (airbursts if practical); surprise is essential to produce casualties.
2. Material remaining in the area shall be attacked for destruction by using appropriate projectile and fuze.
3. WP projectiles shall be combined with HE when the target contains inflammable material and the smoke will not obscure adjustment.
4. HE fuze quick is fired at intervals to clear away camouflage, earth cover and rubble.

Figure 2-2: Ammunition selection guidelines

h. **Surprise**. The observer shall endeavour to achieve the greatest degree of surprise consistent with the efficient execution of his task. In some cases it may be desirable to open with FFE.

j. **Range capability**. The range capabilities of current equipment with HE and illuminating ammunition are listed in Figure 2-4.

k. **Commander's guidance for fire support**. This will provide the commander's guidance on the priorities, tasks and restrictions for fire support.

27. After considering these factors, the observer will make an engagement plan covering the points discussed in the remaining paragraphs in this section.

TARGET EFFECTS TABLES, ADJUSTED ARTILLERY FIRE

PERSONNEL IN OFFENSIVE POSTURE

%CAS	DESTROY			NEUTRALIZE			SUPPRESS		
BTY MSN	**HE**	**VT**	**DPICM**	**HE**	**VT**	**DPICM**	**HE**	**VT**	**DPICM**
TGT 50m RAD	17	8	**3**	12	**5**	**2**	7	**4**	**E**
100	22	10	**4**	17	7	**3**	9	**4**	**E**
150	28	13	**5**	27	10	**3**	12	7	**E**
200	U	24	7	U	16	**4**	20	10	**2**
250	U	U	9	U	26	**6**	U	13	**4**

REGT MSN	HE	VT	DPICM	HE	VT	DPICM	HE	VT	DPICM
TGT 50m RAD	**5**	**3**	**E**	**3**	**2**	**E**	**E**	**E**	**E**
100	7	**4**	**E**	**4**	**2**	**E**	**2**	**E**	**E**
150	10	**5**	**2**	**6**	**3**	**E**	**3**	**2**	**E**
200	U	8	**3**	10	**4**	**E**	**6**	**3**	**E**
250	U	U	**5**	U	**6**	**3**	10	**5**	**E**

PERSONNEL IN DEFENSIVE POSTURE

%CAS	DESTROY			NEUTRALIZE			SUPPRESS		
BTY MSN	**HE**	**VT**	**DPICM**	**HE**	**VT**	**DPICM**	**HE**	**VT**	**DPICM**
TGT 50m RAD	U	16	**3**	U	**5**	**E**	8	**E**	**E**
100	U	20	**4**	U	**6**	**E**	12	**1**	**E**
150	U	25	**6**	U	10	**2**	26	**3**	**E**
200	U	U	8	U	15	**2**	P	7	**E**
250	U	U	12	U	27	**5**	P	11	**1**

REGT MSN	HE	VT	DPICM	HE	VT	DPICM	HE	VT	DPICM
TGT 50m RAD	U	**2**	**E**	**6**	**E**	**E**	**E**	**E**	**E**
100	U	**4**	**E**	9	**E**	**E**	**1**	**E**	**E**
150	U	**6**	**E**	P	**3**	**E**	**5**	**E**	**E**
200	U	U	**1**	10	**6**	**E**	7	**E**	**E**
250	U	U	**2**	U	**10**	**E**	P	**3**	**E**

Notes: **U** = Unattainable **E** = Excessive
Figure represents RPG in FFE, Figures higher than 7 shall be avoided if possible.
Numbers indicated in the tables are training examples only and are 155mm.

Figure 2-3: Target effects tables - Adjusted artillery fire against personnel in offensive and defensive postures

RANGE CAPABILITIES OF CURRENT EQUIPMENT

EQUIPMENT	HE MAXIMUM RANGE (m)	HE MINIMUM RANGE (HIGH ANGLE) (m)	ILLUMINATION MAXIMUM RANGE (m) (see Note)
105mm C1A1	11000	1900	8700
155mm M109A4	Ch 8: 18100 Ch 7: 14800	2738 3100	Ch 8: 17500 Ch 7: 14000
81mm Mor (Note)	4780	199	4570
LG1 C3	M1: 11500 ERG 2: 18300	2055 2000 (approx)	9100 9100
NOTE: Ranges will vary with TFTs on hand.			

	105mm M314A2E1 (A3) Proj	155mm M485 Proj	81mm BOFOR Proj
1. Height of illuminant ignition.	750 m	600 m	250 m
2. Rate of descent.	10 m/sec	5 m/sec	2.5 m/sec
3. Duration of illumination.	60 sec	120 sec	35 sec
4. Diameter of illumination.	800 m	1000 m	600 m
5. Candlepower.	450,000	1,000,000	900,000

Figure 2-4: Range capabilities

THE NATURE AND NUMBER OF GUNS

23. The main factor considered in choosing the nature and number of guns to be used is the nature and size of the target. For material damage and casualties against troops in strongly built positions, accurate guns of a medium or heavy calibre are best. Against lightly protected or exposed troops, the lighter calibres are more efficient. A larger number of small shells, especially when fired in a short time from many guns, causes more casualties and often has a greater morale effect than a few large shells. On large targets, a greater effect is achieved by using more guns because of the characteristic dispersion of the fire of many guns on the same target, and the fact that the punishment to the target is given in a short space of time, thus reducing the effectiveness of enemy evasive action. For guidance, Figure 2-5 gives the approximate area covered by concentrations fired from different sized units.

SIZE OF CONCENTRATION FIRED BY A FIRE UNIT

SIZE OF CONCENTRATION (DIAMETER)	FIRE UNIT
100 - 150 m	one battery
200 m	two batteries
250 - 300 m	four batteries
350 - 400 m	two or more regiments

Figure 2-5: Size of concentrations fired by various fire units

24. Armoured fighting vehicles (AFVs) are relatively immune to complete immobilization by indirect artillery fire because of their protective armour and speed. Although attacks by AFVs may sometimes be broken up by massed artillery fire, the main aim of such fire is to hinder their deployment and effectiveness by forcing them to button-down, by restricting their freedom of movement and resupply, and by generally reducing their capabilities, e.g., damaging ancillary equipment on the outside of the AFVs. A large number of guns will give the best results, particularly when firing a mixture of white phosphorus (WP) and high explosive super quick (HE SQ) or DPICM and remote anti-armour mine system (RAAMS). TGM can be used to detroy individual AFVs with great accuracy.

NATURE OF AMMUNITION

25. Apart from fire missions for which special ammunition such as coloured smoke or illuminating is required, the choice lies among the various types of HE and smoke. The characteristics of the most common shell and fuze combination are given in the succeeding paragraphs.

26. **HE shell with impact fuze**:

a. **HE quick**. This is the standard and most commonly used type of ammunition. It bursts immediately on impact, causing splinters to fly close to the ground and inflicting casualties upon troops in the open and damage to equipment in the open or in shallow cover. It is commonly used for neutralization and DF, and is normally used to adjust most types of fire missions.

b. **HE delay**. This is the same fuze and shell combination as HE quick with the fuze set to burst at a delay of 0.05 seconds after impact. It is used for the penetration of light earthworks or lightly armoured vehicles. On hard level ground, at a high charge and low elevation, it may be made to ricochet off the ground to produce a low airburst. It may be used as an aid to adjusting fire as it produces in conditions of poor visibility, a more visible burst for the OP.

27. **HE shell with airburst fuze**. Airburst shells produce a downward fragmentation which is effective against troops in open trenches or behind steep cover where they cannot be effectively engaged by ground bursts. Airburst shells are also effective against troops in the open and are better than ground burst shells on rough or soft ground. The effect on morale is greater than that of ground burst shells. Airburst shells will burst on impact if the fuze mechanism fails to detonate them in the air. The limitations on the use of two types of airburst fuze are as follows:

a. **Time fuzes**. Variations in the fuze performance may make it necessary to adjust the height of burst (HOB). This has the effect of limiting its usefulness when surprise must be achieved or when the HOB cannot be adjusted by observation. Time fuzes in high angle fire may produce erratic HOBs because of the more pronounced effect of the fuze probable error. The highest possible charge shall be used when firing time fuzes.

b. **Variable time (VT) proximity fuzes**. The sensitivity of the fuze may cause premature bursting when the angle of fall is small or when the area around the target has a high radio reflectivity, e.g., wet or marshy ground. Dense foliage, because of its height and reflectivity, or heavy clouds may increase the HOB. The best results are achieved when the angle of fall is steep and, for this reason, proximity fuzes function more satisfactorily in high angle. Proximity fuzes are usually preferable to time fuzes because of their consistency of HOB. Care must be exercised when firing VT over occupied crests. The lowest possible charge shall be used when firing VT fuzes.

28. **HE shell with concrete piercing fuze**. Concrete piercing fuzes are used with HE shells to penetrate reinforced earthworks, large buildings, etc. HE fuze quick is used for adjustment and fuze concrete piercing set to delay for FFE. HE fuze quick may be used to cut through a parapet or earth covering, or to ensure sufficient cratering has been effective to prevent ricochet of the concrete piercing fuze.

29. **Base ejection (BE) smoke**. A BE smoke shell is a carrier shell fitted with a time fuze. On functioning, the canisters are ignited and ejected from the rear of the shell, falling to the ground approximately along the trajectory of the shell. Each canister emits a persistent dense hexachloreothane (HC) smoke for approximately three minutes. The smoke density builds up slowly, downwind from the point of origin, until it becomes of sufficient height and width to be effective. BE smoke is used mainly for neutralizing enemy positions by denying observation. Under suitable conditions, a given number of smoke rounds can neutralize a much larger area than the same number of HE rounds. Because of the extent of its effect, the use of smoke must often be coordinated with higher headquarters and flanking troops. The main limitations of BE smoke are as follows:

a. **Tactical**. It reduces the effectiveness of aimed fire and observed indirect fire only, including that directed at night by the use of night observation devices using natural light.

b. **Logistical**. The number of shells carried is usually small.

c. **Weather**. Under certain weather conditions, particularly in high winds, its use is not feasible.

d. **Terrain:**

(1) **Mountainous or hilly terrain**. Its effectiveness may be severely hampered by a tendency of the smoke to gather in low lying areas and of the canisters to roll to the bottom of steep slopes.

(2) **Soft or boggy ground**. On soft or boggy ground, the canisters may bury themselves to such a depth that they produce little or no smoke.

(3) **Hard or rocky ground**. On hard or rocky ground, the canisters may bounce and become abnormally scattered, thus producing an insufficiently dense screen.

(4) **Deep snow**. The heat of the burning canister will melt the snow. If the snow is more than 12 to 15 cm deep, the water thus formed may extinguish the canister.

e. **Troop safety**. Hexachloroethane is an acute local irritant which can be extremely dangerous. When heated to decomposition, it emits highly toxic phosgene. Excessive exposure may result in chemical burns to the skin and respiratory system. Respirators shall be worn by troops moving through large concentrations of this type of smoke.

f. **Surveillance and target acquisition (STA) equipment**. Most thermal imagers and battlefield surveillance radars can "see" through BE smoke.

30. **White phosphorus (WP) smoke**. WP smoke shells are fitted with a fuze which detonates on impact. The particles of phosphorus compound emitted from the shell burn rapidly when coming into contact with the atmosphere, producing a large dense white cloud. WP may be used for screening, inflicting casualties, marking targets and starting fires. It has a good neutralizing effect, particularly when mixed with HE against troops lightly dug in, behind low cover, or in the open. The impact fuze with the WP shell may be set to DELAY to afford penetration of a lightly protected target, e.g., a wooden-frame house. The main limitations of WP smoke are as follows:

a. **Tactical**. It prevents aimed fire and observed indirect fire only, including that directed at night by the use of night observation devices using natural light. It is marginally effective against thermal imagery devices.

b. **Logistical**. The number of shells carried is usually small.

c. **Weather**. Smoke produced from WP smoke shells tends to rise vertically. This, known as pillaring, is caused by updraughts produced by the heat of the burning phosphorus. It is more pronounced when the winds are calm, or when it is very cold.

d. **Terrain:**

(1) **Soft or boggy ground**. If the phosphorus compound buries itself in such terrain, it will not be exposed to the air and will therefore produce less smoke.

(2) **Deep snow**. The heat of combustion may melt the snow, thus extinguishing the burning phosphorus. An added hazard in both this situation and that above, is that if the phosphorus is exposed to the air at some subsequent date, it will burn, producing smoke and starting fires.

(3) **Dry ground**. The incendiary result may outweigh any advantage gained from the presence of the smoke.

e. **STA equipment**. Most thermal imagers and battlefield surveillance radars can "see" through WP smoke.

31. **Illuminating**. The illuminating shell is a carrier shell fitted with a mechanical time (MT) fuze. The shell contains a canister of illuminating composition which is fitted to a parachute. When the shell is activated at the optimum HOB, an area approximately 800 to 1000 metres in diameter is illuminated for about 60 to 120 seconds, depending on the projectile in use. In fog, low cloud, or smoke, varying effects may be achieved which may increase or decrease the effectiveness of the illumination. Illumination shells may be used for a number of purposes, the most common of which are:

a. illumination of areas of suspected enemy movement;

b. observation of artillery fire at night;

c. harassment of enemy positions and installations;

d. provision of illumination as a means of navigation for the supported arm's activities;

e. mark missions.

32. **Dual purpose improved conventional munitions (DPICM)**. The most commonly used is the DPICM. This ammunition was used extensively during the Gulf War. It is highly effective against troops and light vehicles. It works well against troops who are dug in without overhead protection, and also has significant capabilities against heavy armoured forces.

33. **Family of scatterable mines (FASCAM)**. For RAAMS, the most important factors are the considerable time required to emplace the mines and the high level of command (often division) at which authority to fire them is usually held. FASCAM fire missions will usually be adjusted using DPICM. Mine delivery is controlled by the engineers.

CHOICE OF LOW OR HIGH ANGLE FIRE AND CHARGE

34. The choice of high or low angle fire is made by the observer. Low angle is normally used primarily because of its shorter time of flight and the smaller probable error for any given range. High angle is only used when an intervening crest precludes the use of low angle or when a steeper angle of fall is desired.

35. The observer may select the charge when it affects the safety of friendly troops.

DISTRIBUTION OF FIRE ON THE TARGET

36. The factors which affect the distribution of fire on the target are the size and shape of the target, the time available, and the extent to which control can be exercised during FFE.

37. Unless the observer decides otherwise, or conventions apply, the guns are fired at circular radius. The computing device will compensate for the relative positions of the guns in the battery.

38. Fire may also be distributed over targets by:

a. converging the guns;

b. directing individual guns at different parts of the target;

c. directing different fire units at different parts of the target;

d. moving the fire from one part of the target to another in FFE; and

e. distributing the fire of guns or fire units along a line (linear target).

ADJUSTMENT

39. It is essential that the observer make a clear adjustment plan and not depart from it. The matters on which decisions must be made are as follows:

a. **Number of guns**. A single gun is normally used to adjust fire. However, more than one gun may be used when:

(1) the procedure calls for it,

(2) visibility is poor,

(3) the possibility of confusion with rounds from another fire unit exists, or

(4) the observer has poor command of the ground.

b. **Adjusting point**. The adjusting point is the point at which the adjusting gun is directed and must be clearly understood within the party. Normally, the adjusting point is taken as the centre of the target, but in some circumstances, this may not be so; e.g., to achieve surprise or for smoke screens.

c. **Degree of adjustment**. The degree to which adjustment is carried out depends on:

(1) the aim of the fire mission,

(2) the nature of the target,

(3) the number of guns to engage,

(4) the time available, and

(5) the importance of gaining surprise.

FIRE FOR EFFECT

40. The number of guns to be used and the duration of FFE must be decided before the call for fire is made. The principles to be observed when the aim is neutralization with HE are:

a. adequate number of rounds must fall in the target area;

b. FFE, to be most effective, shall be applied in bursts at varying intervals with the greatest possible weight of fire being brought to bear on the target during the first three minutes of the engagement - stereotyped methods must be avoided; and

c. whenever observation of FFE is possible, fire must be carefully watched and every attempt made to render it more effective.

41. In determining the nature and the intensity of FFE, the observer must consider the tactical requirement, the Commander's Guidance for Fire Support and the supply of ammunition.

42. The methods to calculate the amount of FFE for smoke and illuminating ammunition are shown in Chapter 3.

RECORDING THE TARGET

43. As a principle, any target that is likely to be re-engaged shall be recorded. For a large target, if batteries have been adjusted separately onto different parts of the target, and it is desired to have this same pattern retained for subsequent re-engagements, each battery must be told to record a different target number, and the whole regarded as a group of targets.

SECTION 3

DIRECTING GUNS ONTO THE TARGET

INDICATING TARGETS TO THE GUNS

44. In the call for fire, the observer must indicate the target location to the CP so that firing data for the first round can be determined. The methods which may be used are discussed in the following subparagraphs. The observer shall choose the method most likely to place opening rounds on or close to the target.

a. Grid coordinates

(1) A six-figure grid reference may be used for observed fire missions, e.g., GRID 123456. The location of the target shall be established as accurately as possible by one of the following methods:

(a) reference to the target map or a known object on the ground, or

(b) plot the line observer-target (OT) on the map, find the location of the target at the estimated distance from the observer to the target. The bearing must be measured as accurately as possible with a compass or another instrument.

(2) An altitude is normally ordered by the observer. Metres are understood unless otherwise stated.

b. **Target number or known point**. This is the best method when all CPs concerned have a record of the target, e.g., "ZT 1242" or "REGISTRATION POINT 1".

c. **Target grid correction from a recorded target or known point:**

(1) When a target that is to be engaged is located at a direction not exceeding 500 mils from the line observer-recorded target, the location of the target may be ordered to the guns by a target grid correction from the recorded target. This method is valuable when the targets to be adjusted are in close proximity or when, because of the situation, the terrain, or the maps in use, an accurate grid reference of the target cannot be established. The following information must be included in the orders to the guns:

(a) a reference to the recorded target or known point,

(b) target grid correction(s) using the direction to the target to be engaged, and

(c) an altitude correction, if any.

(2) A complete example is: "FROM ZP 1462. DIRECTION 1340. RIGHT 100, ADD 400. UP 50".

d. **Polar coordinates:**

(1) If the observer's location is known by the CP, a target may be ordered to the guns by giving an OT direction and distance. This is the quickest method of accurately engaging a target, and is the most suitable when the NODLR and laser are being used to acquire targets. This method may be used when the observer's location is accurately known, but a reference to the target cannot be made. Included in the order to the guns must be:

(a) the direction OT (nearest 10 mils),

(b) the distance OT (nearest 1 metre), and

(c) an altitude correction, if any.

(2) An example of this method of indication is: "DIRECTION 2560. DISTANCE 1500. DOWN 50".

ADJUSTING FIRE - TARGET GRID PROCEDURE

45. Adjustment is the process of obtaining, by firing, the correct gun data for the engagement of the target. The method used to adjust fire onto a target is called target grid procedure. It is based on superimposing a horizontal grid, oriented along a reference line, about the centre of the target. See Figure 2-6.

46. Adjustments to fire are made in relation to the target and the reference line. When a round lands to the right of the reference line, a left correction is ordered and vice versa. When a round lands beyond the target, a drop correction is ordered and vice versa. The corrections are ordered as RIGHT, LEFT, ADD, or DROP, followed by the amount of the correction, e.g., RIGHT 180, DROP 400. If the observer has a positive indication that a round is both right or left and over or short of the target, he shall order a double correction, e.g., "LEFT 80, DROP 400"; in this case the LEFT/RIGHT correction is ordered first.

47. From the target grid corrections ordered by the observer, the bearing and range to be applied by the guns are calculated in the CP. Note that in the example in Figure 2-6 the observer's correction of RIGHT 80, DROP 200 results in the gun being directed slightly to the right and the range being shortened.

48. **Direction**. This is the grid bearing, to the nearest 10 mils, of the reference line in relation to which the observer will apply target grid corrections. The reference line will usually be the line OT, but in certain circumstances, the observer may select an arbitrary reference line such as

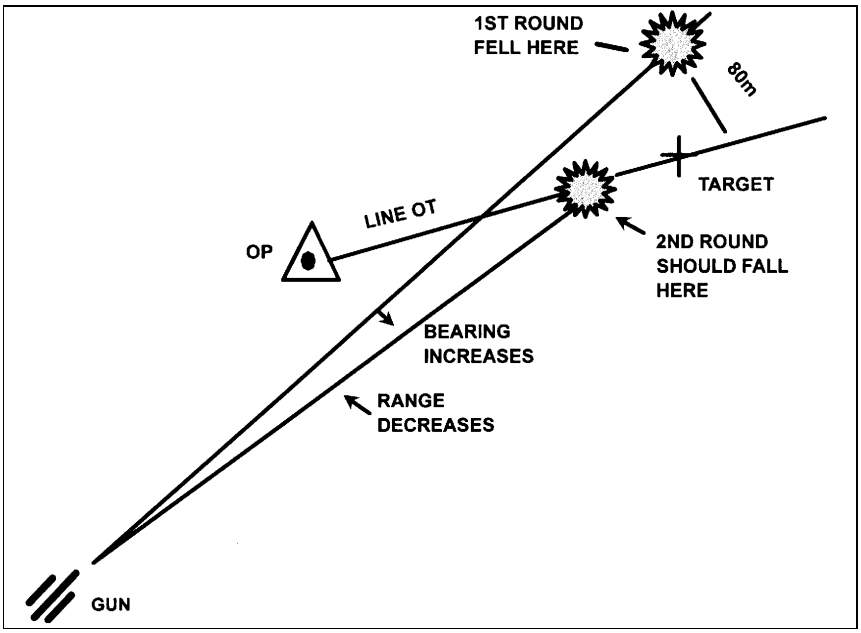


Figure 2-6: Application of a target grid correction to gun data

the line GT (gun-target), a line representing a ground feature, or a cardinal point. See Figure 2-7. In the case of a mission being adjusted by a motion sensing target acquisition radar (MSTAR), the direction shall always be 6400. An air OP may send a direction using degrees (Magnetic **North**). By convention air OPs use the line GT.

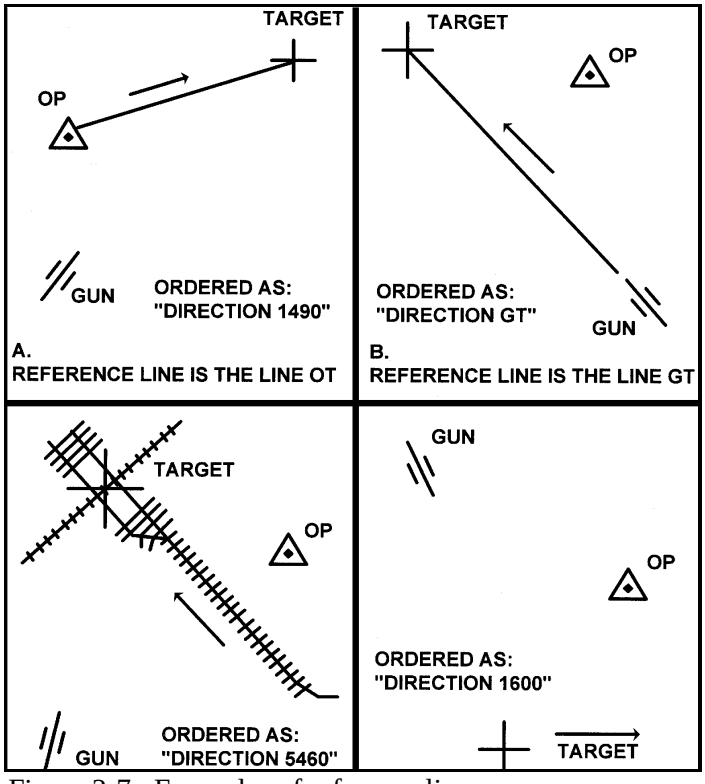


Figure 2-7: Examples of reference lines

49. **Left and right corrections**. The lateral displacement of a round from the line OT can normally be measured by subtension and an accurate correction applied. Unless there is a positive indication which will allow a double correction, the observer's first concern will always be to adjust the fire onto this line. The amount of this correction is determined as follows:

a. **Angular measurement**. The two most common methods of measuring angles at the OP are the use of the following:

(1) **Optical devices**. Instructions on the measurement of angles with optical devices, such as binoculars, are given in B-GL-306-008/FP-001.

(2) **Hand span**. A person's hand extended at arm's length can be used to measure angles. The approximate angular values for an average man's hand are shown in Figure 2-8. Observers must establish the subtension values for their own hands by comparison with an optical instrument.

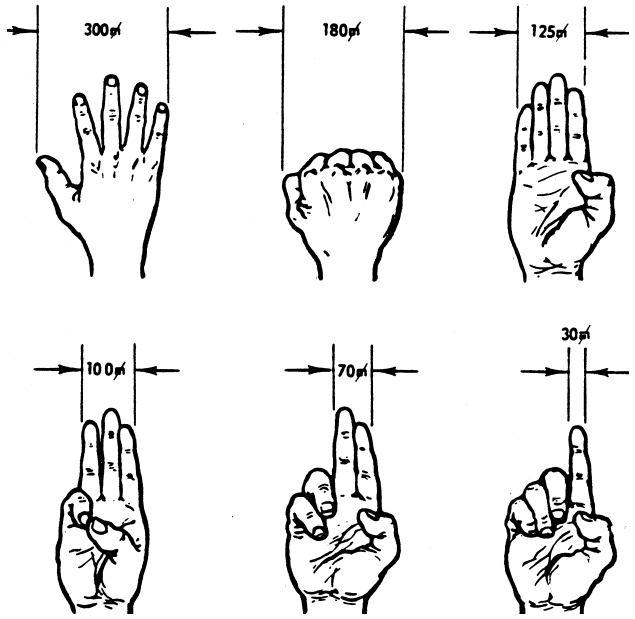


Figure 2-8: Using the hand for angular measurement

b. **Converting the angular measurement to metres**. The angular measurement by which a round falls to the left or right of the target is converted to metres by multiplying the angle by the OT factor and ordering the result to the nearest 10 metres. This factor, established by the observer before the first round is fired, is the distance OT in thousands of metres; e.g., if the distance OT is 1500 metres, the OT factors equals 1.5. Therefore, where the round falls 80 mils left, and the OT factor is 1.5, the correction (80 x 1.5 = 120.0) is ordered as RIGHT 120. A large add or drop correction normally makes a recalculation of the factor necessary. See Figure 2-9.

50. **Correcting along the reference line:**

a. Unless the observer can use a distance measuring instrument such as a laser range-finder, the target location will be established by bracketing it with plus and minus rounds. The first correction, or long bracket, must be large enough to ensure achievement of a bracket. The long bracket shall be 200, 400, 800 or, in

extreme cases, 1600 metres. It is better to be bold and order too long a bracket than to “creep” towards the target wasting both time and ammunition.

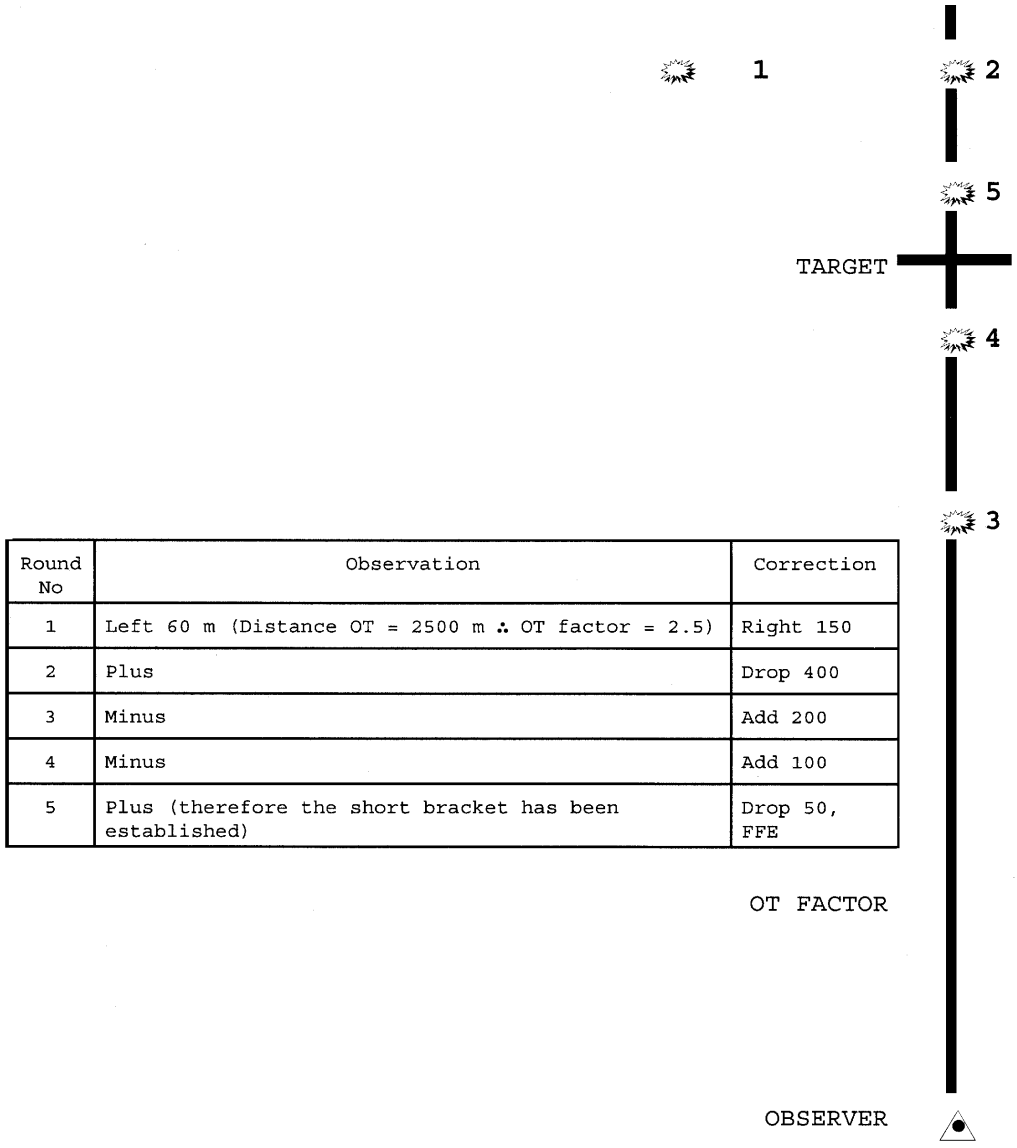
b. The long bracket is successively halved until a short bracket or a target round is achieved. The short bracket for various fire missions is:

(1) battery or less - 100 metres,

(2) regiment - 200 metres, and

(3) above regiment- 400 metres.

c. When a short bracket is achieved, FFE is ordered at the split of the short bracket and corrected for line if required. See Figure 2-9.



Round No	Observation	Correction
1	Left 60 m (Distance OT = 2500 m ∴ OT factor = 2.5)	Right 150
2	Plus	Drop 400
3	Minus	Add 200
4	Minus	Add 100
5	Plus (therefore the short bracket has been established)	Drop 50, FFE

Figure 2-9: Diagram of the adjustment process

ADJUSTMENT USING THE LASER RANGE-FINDER

51. The laser range finder (LRF) is an aid to shooting. Its use will speed up the adjustment process and reduce ammunition expenditure. The LRF shall be used whenever possible, but the observer must always be prepared to use other adjustment procedures if the LRF cannot be employed.

52. **Adjustment Procedure**. Adjustment of fire with an LRF is conducted as follows:

a. The observer identifies and indicates the target to the assistant who reads back the target.

b. While the observer determines the bearing and distance to the target from the target map, the assistant lases the target.

c. The assistant reports the laser distance and bearing and the observer checks for gross error against the map data, (checking limits 20 mils and 200 metres).

d. The fire mission is then sent to the guns using the polar coordinates procedure.

e. The assistant lases and reports the distance and bearing of the burst.

f. The observer calculates the bearing and estimates the distance to the burst as a double check.

g. The data is sent as the correction with the appropriate orders for FFE.

h. The mean point of impact (MPI) of the FFE is adjusted as required.

THE TARGET ROUND

53. When a round is observed to hit the target during adjustment, the information from that round is accepted as the equivalent of a split of the short bracket and adjustment is terminated.

54. Special care must be taken in accepting a round as a target round. When adjusting onto an area target, a round must not be accepted as being on the target unless the near edge of the target area is clearly visible in front of the dust and smoke and the far edge clearly beyond it. With a small target, a round may be taken as a hit if a portion of the target is seen to fly off, or if, after the dust has cleared, the target is seen to have changed in appearance. When the target is a solid object, a direct hit will often produce an orange flash. If in doubt, data must be confirmed.

ADJUSTING THE MEAN POINT OF IMPACT IN THE FIRE FOR EFFECT

55. The MPI may be adjusted onto the target by ordering corrections during FFE. Because of the splinter pattern, rounds on the forward edge of the target are much more effective than those on the rear edge. Small corrections during FFE shall be avoided as the time required for execution may jeopardize the neutralizing effect of the fire.

SECTION 4

OBSERVATION OF FIRE

COMMAND OF THE GROUND

56. The fundamental principle of observation of fire is to act only on positive information. Corrections based on doubtful information lead to confusion and failure. The amount of information which can be obtained from a round depends on the view commanded from the OP. See Figures 2-10 and 2-11. When the command is good, it is easy to see where the round falls in relation to the target and the observer shall not hesitate to use double corrections.

57. Care must be taken to observe the point of burst correctly. The observer must be looking at the area where the round is expected at the time the round arrives and must immediately assess its position. First impressions are best; delay frequently results in an unsound observation because the smoke from the round will have drifted and the observer will tend to imagine what he has not seen.

58. When establishing the verified short bracket required for destruction procedures, deductions as to whether a round is plus or minus must be based only on positive information. When the zone of fire observed is large and the command is poor, it may be necessary to fire several rounds before the required number of positive observations can be made.

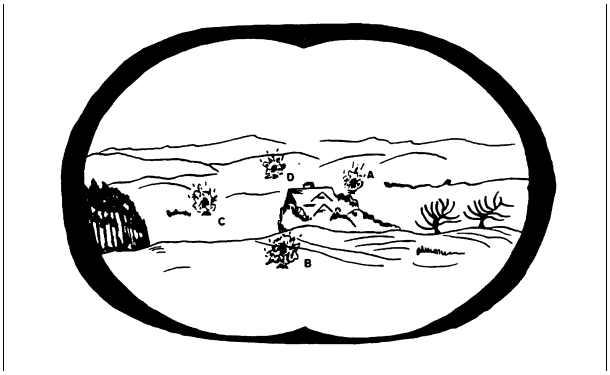


Figure 2-10: View from an OP with good command

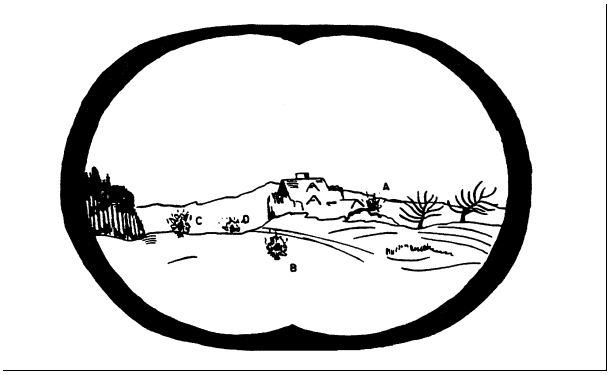


Figure 2-11: View from an OP with poor command (round C is clearly left of the target, but it is impossible to tell if it is beyond or short of the target)

ZONE OF ANGLE T

59. Because of the zone of the gun, rounds fired at identical gun data may be observed to impact in separate locations. This problem must be appreciated by the observer when ordering corrections. The width of the zone is not substantial, but the length is large enough to warrant consideration during observation of fire.

60. The observable length of the zone is dependent on the angle to the line of fire from which the observer is making his observations, i.e., angle T in Figure 2-12. The observable length increases as angle T increases from 0 to 1600 mils, as illustrated in Figure 2-13. If angle T is 300 mils or less, the length of zone seen is small enough that its effect on the observation of corrections will be negligible and can be disregarded.

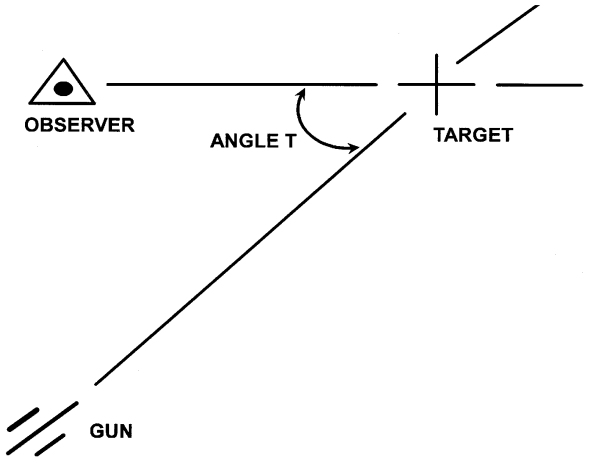


Figure 2-12: Angle T

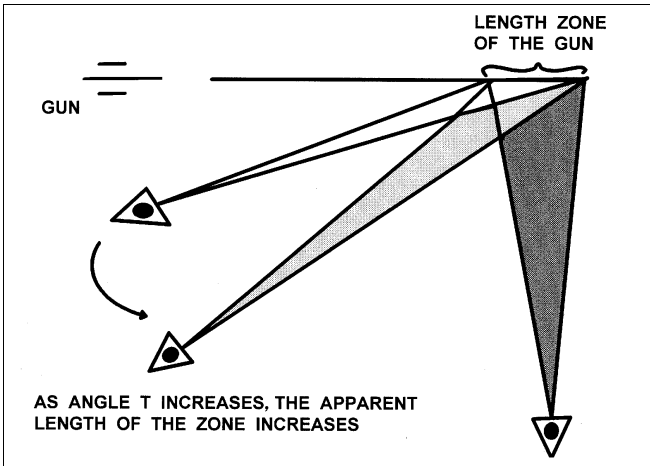


Figure 2-13: Effect of various angles T

61. If angle T is over 300 mils, the line OT is considered to have width as shown in Figure 2-14, and rounds that burst within the width of this lane must be initially accepted as being on the line OT. As the adjustment progresses, final corrections for line can be made, based on the evidence of additional rounds. The following facts may be used as a guide in determining the width of the lane OT:

a. At angle T of 500 mils, half the length of zone of the gun is apparent to the OP; at approximately 900 mils, three-quarters of the length zone is apparent; approaching 1600 mils, full zone is apparent.

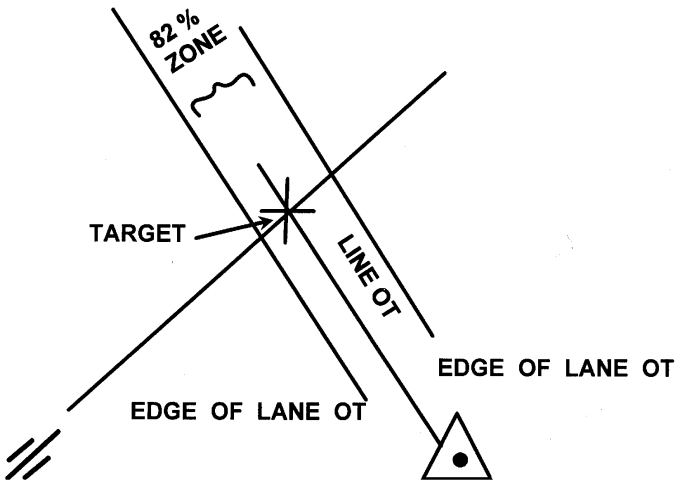


Figure 2-14: Diagram illustrating the lane OT

b. In practice, the 82 percent length zone, i.e., four probable errors, is used as the basis of calculation since this zone will encompass the majority of the rounds which may be observed.

62. The following example illustrates a simple method of determining the width of the lane when angle T is greater than 300 mils.

Equipment	→ 155mm howitzer, SP M109A4
Range	→ 9000 m (approximately)
Charge	→ 6W
Angle T	→ 500 mils (approximately)
From Firing Tables 1 PE_r	→ 25 m
ˆ the 82 percent zone	→ 4 H 25 = 100 m
The apparent length zone	→ 1/2 H 100 = 50 m

ˆ The lane OT is 50 m wide, or 25 m on each side of the line OT.

63. An 82 percent zone/time of flight (TOF) table is useful for such a calculation.

EFFECT OF SLOPE

64. In hilly or mountainous country, adjustment orders may not achieve the desired correction because of the slope of the ground. This effect is particularly noticeable when:

a. there is a substantial angle T and the ground slopes steeply towards or away from the observer; or

b. there is a small angle T but the ground slopes across the bearing of fire (line GT).

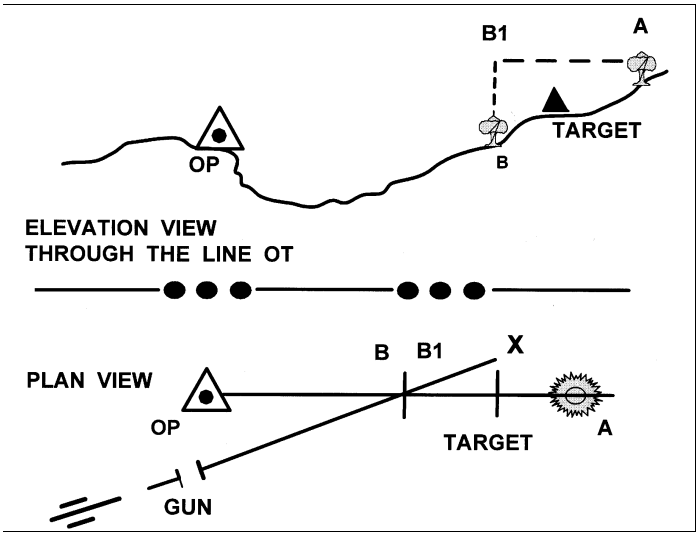


Figure 2-15: The effect of slope

65. The effect of slope is shown in Figure 2-15. It must be remembered that target grid corrections take effect in the horizontal plane through the altitude ordered. Thus the drop correction intended to move the round from A to B results in the gun being directed at B1 which is vertically above B on the line OT. The round carries on along the trajectory through B1 until it strikes the ground at X, which is left of the line OT.

66. It is emphasized that this effect is of little consequence in normal undulating country, but where there are steep and extensive slopes, the observer may be misled during the final stages of adjustment. Under such circumstances, consideration shall be given to:

a. ordering a new altitude; or

b. ordering DIRECTION GT and adjusting the MPI using single rounds in FFE or adjusting with three or more guns.

67. The effect of slope, combined with the zone of the gun in use and the angle T produce a variety of effects in mountainous country. Some of these are illustrated in Figures 2-16 to 2-20 inclusive.

a. **Guns firing toward and over the observer.** (Figures 2-16 and 2-17). The first round falls at S1 and DROP 400 is ordered. Because the correction is applied in the horizontal plane, the round is directed at B1 instead of B and will therefore fall at S2 and not at B.

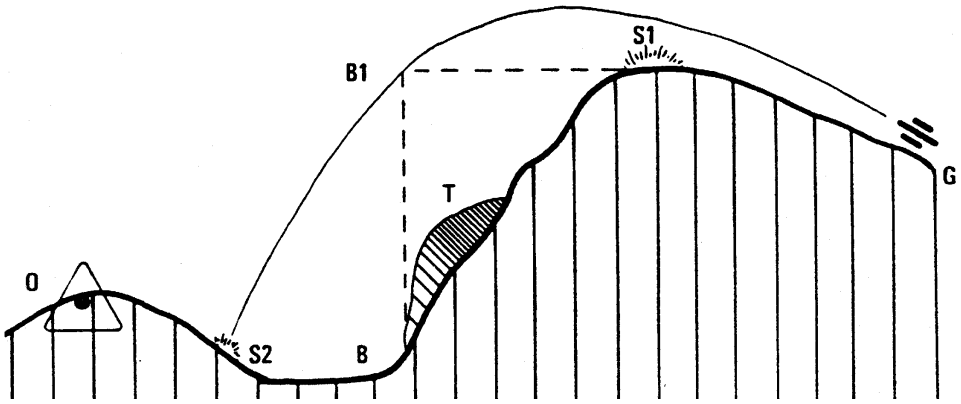


Figure 2-16: Guns firing toward the observer

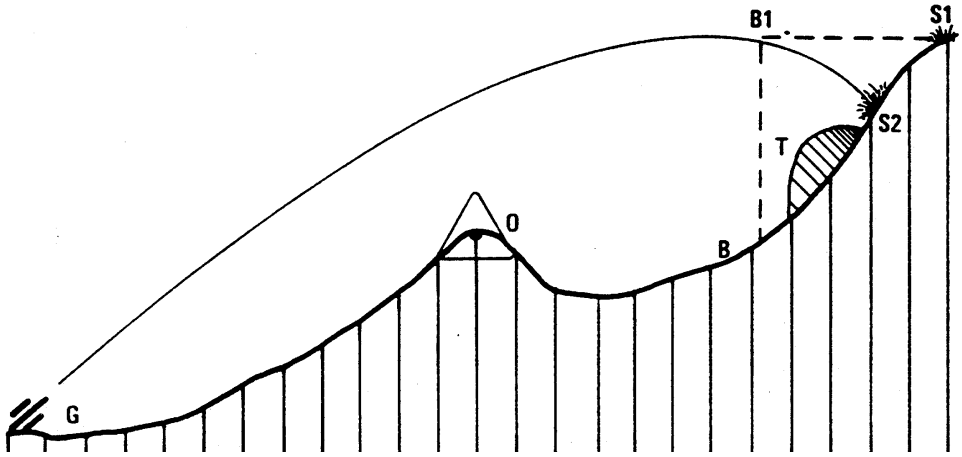


Figure 2-17: Guns firing over the observer

b. **Angle T, slope and zone combined**. (Figures 2-18 and 2-19) The first round falls at S1 and RIGHT 200 is ordered. Due to the slope, the round lands at S2. A further RIGHT 100 is ordered to try and bring the round onto the OT line. However, zone and the correction ordered combine to carry the round over the slope. After S3, an add correction shall be ordered and a small line correction may be ordered later when the zone effect becomes more apparent.

c. **Ground sloping across the bearing of fire**. (Figure 2-20) The first round falls at S1 and RIGHT 200 is ordered. Due to slope, the round will pass through B1 instead of B and fall on the reverse slope, unobserved.

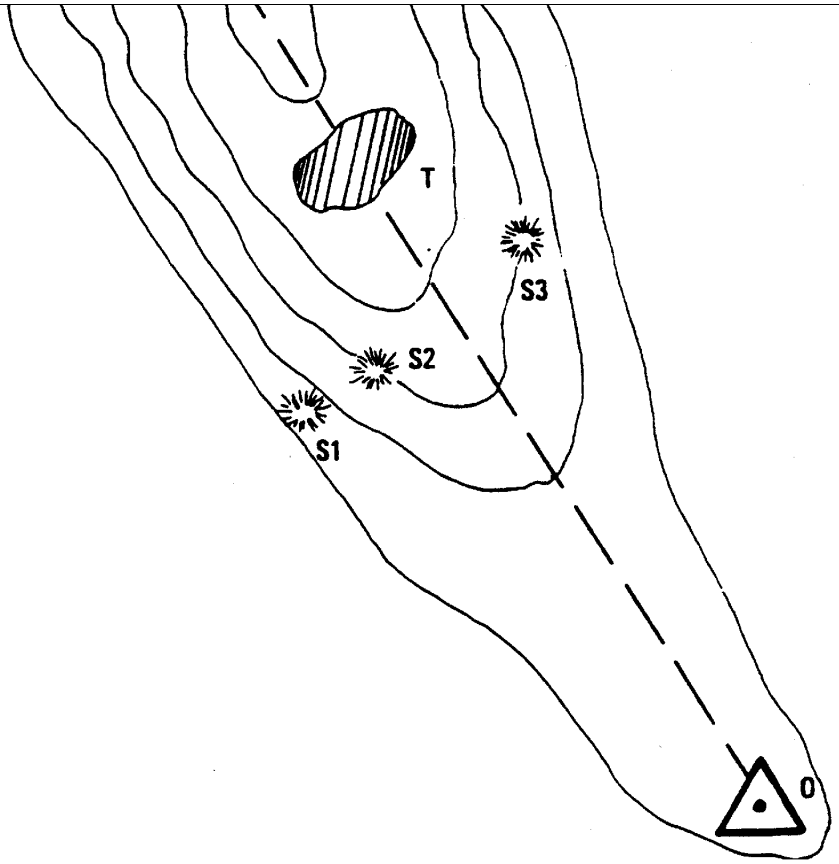


Figure 2-18: Combined effects (plan view)

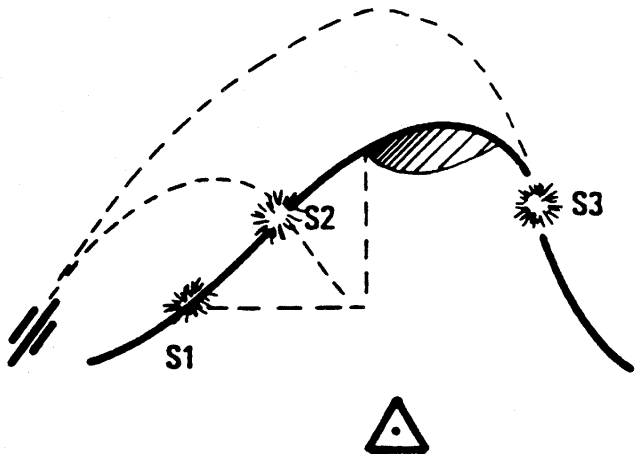


Figure 2-19: Combined effects (section view)

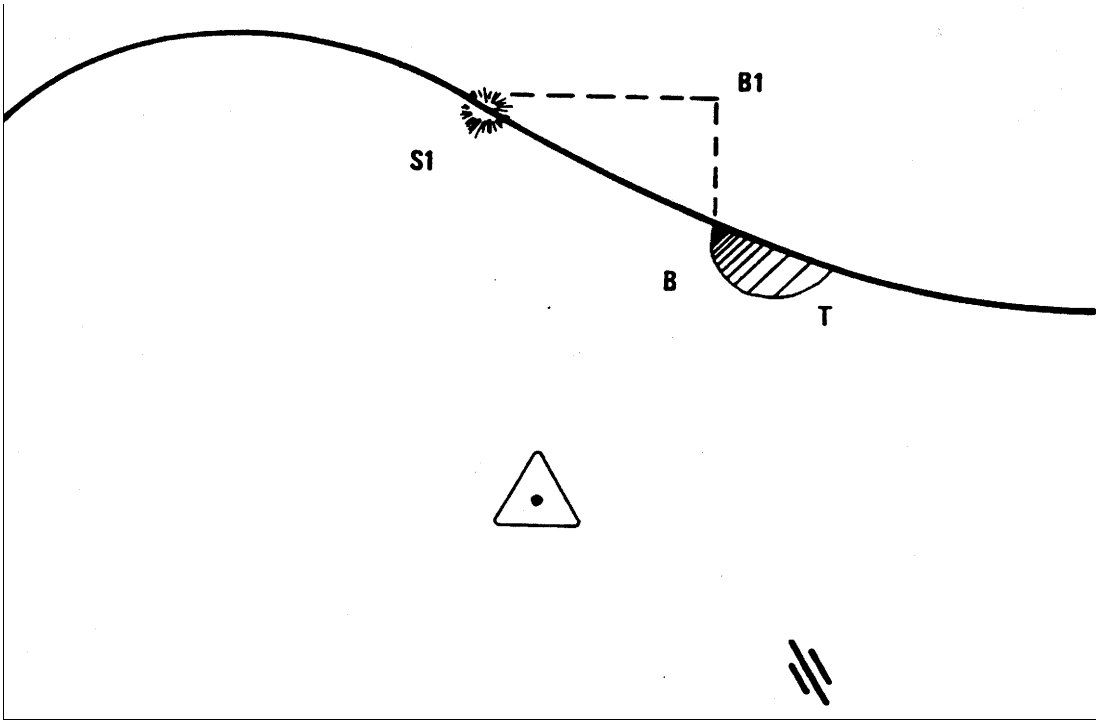


Figure 2-20: Ground sloping across the bearing of fire

68. As a general rule for the first round, on slopes of 800 mils or greater, the measured correction is to be doubled to move the round uphill and halved to move it downhill the required amount. Subsequent corrections shall be done using normal bracketing procedures. Smaller slopes have proportionately less effect, though similar to above. For example, the first round lands short and the observer decides that ADD 400 shall be ordered. It is doubled and ADD 800 is sent. From this point onwards, the usual bracketing procedure is followed. The next correction would be DROP 400 (if the round was plus).

GUIDES TO OBSERVING FIRE

69. **Observing the initial round(s)**. To ensure seeing the initial round(s), the area of observation around the target shall be divided between the observer, the assistant and the communicator, the target being inclusive to both the officer and the technician. Binoculars are of assistance in observing fire, but because of their restricted field of view, the observer normally uses the naked eye to see the first round land. Other optical instruments, such as telescopes and periscopes, are likewise of little use in the initial stages of observing fire. Consider dead ground and trees when attempting to detect the initial round(s). The sound from the burst may assist in determining the initial correction to cause the second round to impact in a visible area.

70. **Smoke or dust**. Under suitable conditions, the drift of the smoke or dust from a shell burst may indicate whether a round that was off the line OT, was beyond or short of the target, or it may reveal the whereabouts of a round which has landed out of sight. It may also indicate the direction and strength of the wind in the target area.

71. **Poor visibility**. When the visibility is poor, the observer may require more than one gun during adjustment, at least for the opening rounds; in extreme cases it may be necessary to fire smoke. Under certain conditions, e.g., frozen ground or high winds, HE delay is of assistance as the dust thrown up by the burst tends to linger and gives a better indication of the location of the burst. Often the naked eye will detect a burst more easily than binoculars.

72. **Other units firing into the same area**. When other units are firing into the same area the observer may find that ordering "REPORT SPLASH, AT MY COMMAND," or using more than one gun in adjustment, may assist in the identification of his rounds. Another option is to use a different type of ammunition with which to adjust.

UNOBSERVED ROUNDS

73. **Causes.** The four main causes of unobserved (lost) rounds are:

a. dead ground;

b. poor visibility;

c. other units firing into the same area; and

d. duds.

74. **The lost round drill**. When a round is lost, the procedure is as follows:

a. the observer reports LOST to the assistant;

b. if the assistant has observed the burst has been observed, the appropriate correction to the guns is ordered and the observer is advised where the round burst and where the next round is expected to fall; and

c. if the burst has not been observed, the assistant reports LOST. The observer then decides on a course of action which will result in an observed round, i.e., a change of ammunition, an increase in the number of guns, or a target grid correction.

75. **Dead ground**. Careful study of the map shall ensure that the target indication sent to the guns will not place the round in dead ground. When a round does fall in dead ground, the observer shall send a correction based on:

a. knowledge of the ground and the bearing of fire;

b. the sound of the burst or the shell in flight; and

c. smoke from the burst which may eventually appear.

SECTION 5

CALLS FOR FIRE BY THE SUPPORTED ARM

GENERAL

76. In many instances a call for fire will originate on the supported arm's net. The observer must know the procedures followed by other arms and be capable of editing the orders and passing them to the CP in the proper form.

CALL FOR FIRE

77. The call of fire from the supported arm will include the following:

a. **Warning order**. This order is sent on the supported arm net, e.g., "G11 THIS IS 13A. FIRE MISSION OVER".

b. **Target location**. The supported arm will point out the target to be engaged by any of the following methods:

(1) grid reference, e.g., GRID 578672,

(2) if a reference point is available (i.e., one either known to both the supported arm and the observer, or visible and recognizable to both), it may be used to point out the target, e.g.:

(a) "REFERENCE RED BARN, SOUTHEAST ALONG TRACK 200 METRES, 2 BMPS IN HULL DOWN POSITION", or

(b) "REFERENCE TARGET AP1234, DIRECTION 0500 (always mils unless otherwise stated), R200 A400, INFANTRY PLATOON WITH ATGM DUG IN WITH OVERHEAD COVER",

(3) if no convenient reference point is available, the supported arm may request that a group of rounds or a smoke round be fired to provide a reference point, and then indicate the target using the group of rounds or smoke, e.g.:

(a) "MARK BY SMOKE, REFERENCE POINT IN SQUARE 4927", or

(b) "REFERENCE SMOKE, NORTHWEST 300M, DEAD TREE",

(4) a direction and distance may be given if the supported arm's call sign location is known, e.g., "DIRECTION 4800, DISTANCE 1500 3x T72S ADVANCING SOUTH", and

(5) the supported arm may fire smoke or tracer and give the location of the target in relation to such fire.

c. **Direction**. Grid bearing in mils (unless stated otherwise).

d. **Description of target**. As detailed as possible.

e. **Type of fire required**. This part of the call for fire will tell the observer what is to be done to the target, including any requirement for special ammunition, e.g., "NEUTRALIZE WITH SMOKE, NEUTRALIZE" or "DESTROY".

f. **Time/duration of fire for effect**. This is the time at which the supported arm wishes FFE to begin and the duration of such fire, e.g., "(NEUTRALIZE) AS SOON AS POSSIBLE FOR FIVE MINUTES", or "(NEUTRALIZE WITH SMOKE) FOR THREE MINUTES AT H PLUS 2".

78. Example of a complete call for fire:

"FIRE MISSION
GRID 176578
DIRECTION 0300
PLATOON IN WOOD WELL DUG-IN. RADIUS 100
NEUTRALIZE AS SOON AS POSSIBLE FOR FIVE MINUTES"

79. **Target identified**. When the target is identified, the observer will report "TARGET IDENTIFIED" to the supported arm and carry on with the adjustment of fire and the application of FFE.

80. **Target not identified or cannot be observed:**

a. If the target cannot be identified, the observer will report "TARGET NOT IDENTIFIED, SEND CORRECTIONS" to the supported arm, who will then send the necessary orders, through the forward observer to the guns to adjust fire onto the target. Once the first effective round is adjusted, the supported arm will report "ON TARGET". The forward observer then orders "FIRE FOR EFFECT" specifying the number of guns and type of ammunition based on the supported arms description of the target and intent.

b. It is possible that the forward observer may be located where the target cannot be observed. In such a situation, the forward observer reports "CANNOT OBSERVE" to the supported arm. The procedure will then be the same as for TARGET NOT IDENTIFIED.

c. If at any point during the mission the target is positively identified, the observer will report "TARGET IDENTIFIED" to the supported arm and take over the completion of the mission. On taking over the mission, the forward observer may be required to order a new direction to the CP.

d. If the target cannot be observed, the forward observer shall keep the supported arm advised of the state of the fire mission including:

(1) munitions in FFE,

(2) quantity of FFE, and

(3) any other pertinent details.

CHAPTER 3

CONDUCT OF FIRE MISSIONS

SECTION 1

INTRODUCTION

GENERAL

1. This chapter sets out the procedures used in the engagement of all types of targets. As it is impossible to provide ready-made solutions for every problem which might arise, the observer must be prepared to adapt the fire mission procedures outlined to meet prevailing circumstances. The more experienced the observer, the greater the ability to modify the procedure to suit a particular situation. Inexperienced observers, however, must exercise caution in this respect until they fully understands the principles and procedures involved.

PRINCIPLES

2. For the efficient application of the procedures in this chapter, the observer must have a complete knowledge and understanding of the observation fire techniques covered in Chapter 2, and of fire discipline and communications procedures which are given in CFP 306(4).

3. During the conduct of fire missions, the observer must ensure that a sense of urgency exists at the OP and at the gun position. To achieve this, the observer must develop a simple and logical plan for the engagement. The observer must execute this plan firmly, giving orders in a clear and concise manner. This plan must cover the five stages through which a fire mission is normally conducted:

a. initial call for fire is sent;

b. adjustment, if required, is carried out to the degree appropriate for the type of target and the time available;

c. FFE is opened;

d. target is recorded, if required; and

e. fire mission is terminated.

4. The OP party must develop its own internal drills stressing teamwork and concurrent activity. The basic procedures and drills which are carried out at the OP for each stage of a fire mission are described in the following paragraphs. The observer's initial sequence of orders is shown at Figure 3-1.

Ser	OBSERVER'S INITIAL SEQUENCE OF ORDERS
(a)	(b)
1	Observer's identification
2	Warning order
3	Location of target
4	Direction
5	Description of target
6	Type of engagement
7	Trajectory
8	Ammunition
9	Distribution of fire
10	At my command
11	Method of adjustment or orders for FFE
NOTE: Obligatory orders are underlined.	

Figure 3-1: Observer's sequence of initial orders

INITIATION OF THE FIRE MISSION

5. **Action by the observer**. The observer shall prepare for the engagement of a target by:

   a. identifying the target, making a quick estimate, and giving a warning order to the gun position, e.g., "1, THIS IS 12, FIRE MISSION";

   b. when applicable, confirming the target with the originator to ensure exact identification;

   c. indicating the target to the assistant;

   d. determining and passing to the gun position:

      (1) the location of the target,

      (2) the direction (if adjustment is to be carried out), i.e., the grid bearing of the reference line in relation to which he will order target grid corrections, and

      (3) a description of the target;

   e. sending to the CP, as required, orders concerning:

      (1) the type of engagement,

      (2) the trajectory,

      (3) the ammunition,

      (4) the distribution of fire; and

(5) when to fire.

f. giving orders for adjustment or FFE;

g. confirming with the assistant the OT factor, angle T (and, if required because of the size of angle T, estimating the width of the lane OT) and time of flight; and

h. instructing the assistant to observe a specific area in order to assist in detecting the opening rounds.

6. **Action by the observer's assistant**. The observer's assistant shall aid the observer in the preparation for opening fire by:

a. identifying the target and independently determining its location and direction as a verification against gross error;

b. ascertaining the OT factor, the angle T, the zone of the gun, and the time of flight; and

c. observing the target area as ordered.

ADJUSTMENT

7. **Action by the observer**. The observer shall adjust the fire to the degree appropriate to the type of engagement, amending the direction and the OT factor when necessary.

8. **Action by the signaller and technician**. The signaller shall report "SPLASH" to the observer and technician five seconds before shells are expected to land. The technician must continuously watch for gross error, and aid the observer in every possible way.

FIRE FOR EFFECT

9. **Action by the observer**. The observer shall apply FFE to the target by:

a. ordering the number of rounds to be fired;

b. distributing the fire over the target as necessary; and

c. continuing FFE until the aim of the fire mission has been achieved.

10. **Action by the observer's assistant**. The assistant shall continue to aid the observer as in paragraph 8 above.

TERMINATION OF THE ENGAGEMENT

11. **Action by the observer**. The observer shall order the target to be recorded (as required), terminate the engagement (by ordering "END OF MISSION"), and report the results of the engagement.

12. **Action by the observer's assistant**. The observer's assistant shall ensure the signaller enters a record of the fire mission in the OP log and, on receipt of the report TARGET RECORDED, make an appropriate entry on the target map.

SECTION 2

AREA NEUTRALIZATION WITH HIGH EXPLOSIVE

INTRODUCTION

13. The neutralization of an area with HE is the most common type of artillery engagement. Its procedure is the basis for all other missions. It is undertaken in situations where the enemy is actively interfering, or is likely to interfere, with the operations of our forward troops. For effective neutralization a quick engagement is normally required.

HIGH EXPLOSIVE POINT DETONATING

14. **General**. HEPD is the basic shell and fuze combination for adjustment and for FFE against targets.

15. **Procedure**. (See Figure 3-2)

SER	OBSERVER'S INITIAL SEQUENCE OF ORDERS (NOTE)	EXAMPLES	
		HE	TIME
(a)	(b)	(c)	(d)
1	Observer's identification	2 THIS IS 22	2 THIS IS 21
2	Warning order	FIRE MISSION BATTERY	FIRE MISSION BATTERY
3	Location of target	GRID 158346 ALTITUDE 100	GRID 169463 ALTITUDE 140
4	Direction	DIRECTION 1240	DIRECTION 1440
5	Description of target	MACHINE GUNS IN RAVINE RADIUS 25	MORTARS DUG IN 150 BY 100 ATTITUDE 5850
6	Type of engagement	ADJUSTING ZP 2230	
7	Trajectory	HIGH ANGLE	
8	Ammunition	3 ROUNDS	TIME IN EFFECT 6 ROUNDS
9	Distribution of fire	CONVERGE	
10	At my command	AT MY COMMAND	
11	Method of adjustment or order for FFE	2 GUNS ADJUST FIRE	ADJUST FIRE
NOTE: Obligatory orders are underlined.			

Figure 3-2: Examples of an observer's orders for area neutralization

a. **Adjustment**. Adjustment is carried out until a short bracket is achieved or a target round is observed. FFE is ordered at the split of the short bracket or at the data which produced the target round. At the split of the short bracket, it is often advisable for the observer to establish the MPI of the fire unit by ordering "ONE ROUND FIRE FOR EFFECT".

b. **FFE**. After the MPI has been adjusted, the target shall be engaged with FFE until the aim of the engagement has been achieved.

c. **Termination of the engagement**. At the termination of the engagement, the observer shall order the target recorded, if required, and end the fire mission by ordering "END OF MISSION" followed by the results of this engagement.

HIGH EXPLOSIVE (HE) AIRBURST

16 The types of HE airburst ammunition are:

a. **HE mechanical time (MT)**. The time fuze is mechanical with a clock-work mechanism. Detonation is controlled by a fuze setting. The HOB is less constant than that achieved with the VT fuze because of the probable error of its mechanism; therefore, it is normal to adjust the fuze length. Fuze settings can be predicted under certain circumstances, such as when other time targets have recently been fired and a correction based on experience has been calculated.

b. **HE variable time (VT)**. The VT fuze is an electrical, battery-powered, proximity fuze. Fuzes currently in service will detonate 7 metres above the target, although this may change depending upon the fuze used. The HOB is constant for a given angle of fall, over a given type of terrain; the greater the angle of fall the lower will be the HOB. Controlled Variable Time (CVT) is identical to VT except that there is a time setting on the fuze which prevents it from being armed until it is approximately three seconds from the point of impact. CVT, unlike VT, is not susceptible to premature bursting caused by intervening crests and radio interference until the last three seconds of the time of flight. It is used to reduce the possibility of jamming or premature bursting over friendly troops.

17**.** **Use of impact fuzes during adjustment**. During the process of adjustment to a short bracket, and before adjustment with airburst, HEPD is normally used. Although this is done primarily to conserve the relatively small number of airburst fuzes usually carried, it also offers the advantage of better observation of the fall of shot during the adjustment phase. The airburst fuze is used at the split of the short bracket or when a target round has been observed.

18. **Procedure**. The observer shall conduct a fire mission with HE airburst in the same manner as with HE, allowing for the difference in ammunition as follows:

a. **Call for Fire**. The observer shall normally send an estimate of the rounds to be used at FFE, e.g., "TIME IN EFFECT, EIGHT ROUNDS; VT IN EFFECT, FIVE ROUNDS"; see Figure 3-2. This order allows the firing unit to prepare the necessary ammunition.

b. **Adjustment with MT fuzes**. At the split of the short bracket, or on observing a target round, the observer shall order "TIME REPEAT." On receipt of this order, the CP will order three guns in adjustment converged with HE time. The observer

shall adjust the mean HOB of the three airbursts to 20 metres (optimum HOB) by ordering up or down corrections in multiples of 10, e.g., "UP 20, DOWN 10". If the initial rounds of time ammunition burst on impact, a correction of "UP 40" will usually be sufficient to produce airbursts. Ideally, adjustment ceases when there occurs one ground burst and two air bursts. However, the observer can cease the adjustment if the weapons effects produced meet the observer's aim.

c. **Adjustment with VT fuzes**. No adjustment, other than that of the MPI, is needed for VT fuzes.

d. **FFE:**

(1) If, at FFE with HE airburst, the rounds are off the target but at the correct HOB, a normal target grid correction to place the rounds on the target shall be ordered.

(2) If, at FFE using HE MT, the HOB is incorrect, the observer shall correct the HOB in the same manner as in adjustment, by ordering up or down corrections.

(3) If, at FFE using HE VT, the rounds all burst on impact, the observer shall order a shortening of the fuze by one second, e.g., "SHORTEN 1.0," and will continue to shorten the fuze by one second increments until airbursts are achieved.

HIGH ANGLE FIRE

19. **GENERAL**. High angle fire is fire delivered at elevations greater than 800 mils. It will often be required when guns fire out of a deep defile, from built-up areas, from woods, or over high terrain features and when targets are located directly behind hill crests, in jungles, or in deep gullies or ravines.

20. The observable differences between low and high angle fire are that, in the latter, probable errors are slightly larger and times of flight considerably longer.

PROCEDURE

21. The observer shall include the order HIGH ANGLE in the call for fire (Figure 3-3).

22. **Airburst Fuzes**. The most consistent fuze for HE airburst at high angle is the VT fuze. The effect of the fuze probable error of time fuzes is much greater in high angle than in low angle fire.

23. **Recoil Pits**. When towed guns are to be fired in high angle, recoil pits may have to be prepared depending on the characteristics of the guns. As these pits will normally be dug for the primary arc of fire only, the observer shall study the map to see if it is likely that targets requiring engagement with high angle fire outside this arc will be required. If so, the observer

shall send a warning order to the guns in the following form: “PREPARE FOR HIGH ANGLE AT GRID ____”. This warning will avoid delay at the time of engagement.

24. **Splash**. By convention, during high angle missions, the CP shall report “SPLASH” to the observer five seconds prior to the burst of the round(s).

OBSERVER’S ORDERS
FIRE MISSION BATTERY
GRID 217168
ALTITUDE 20
DIRECTION 2340
MORTAR POSITION
RADIUS 100
HIGH ANGLE
VT IN EFFECT, FIVE ROUNDS
ADJUST FIRE

Figure 3-3: Example of an observer’s orders for a high angle mission, using VT

REGIMENTAL AND HIGHER FIRE MISSIONS

25. **General**. The procedure for a regimental or higher fire mission is similar to that for a battery fire mission as described earlier. The differences for these higher missions lie in:

a. the authority, or lack of it, of the observer to order the engagement and the weight of fire;

b. the weight of fire; and

c. the procedures for controlling the fire of several independently deployed fire units.

26. Corrections that are to be applied by one fire unit only are prefixed with the call sign for that fire unit.

27. **Divisional and higher fire missions**. The Staff Officer 2 Artillery Operations (SO2 Arty Ops) at Divisional Artillery Headquarters (Div Arty HQ) shall control the fire of regiments on divisional and higher fire missions in the same manner as RCPO controls regimental fire missions.

28. Two distinct levels of authority to order divisional and higher fire are vested in observers. These are ordinary observer and authorized observer.

29. **Ordinary observer**. An ordinary observer is one who has not been given any special authority to engage targets with fire units other than the battery. To engage a target with other fire units, permission must be obtained from the artillery CP concerned. For example; if Call Sign (C/S) 11 initiates a battery mission and 1 is not available, the mission is passed to the RCPO. The RCPO decides which fire unit, if any, will respond to the call for fire.

30. Depending upon the description of the target and the availability of guns and ammunition, the CP requested may direct some or all of its fire units to engage the target. The ordinary observer in calling for fire may indicate the fire units and the type and amount of ammunition desired, but this is treated as a request and is subject to the approval of the appropriate HQ/CP. RCPOs and the divisional CPOs (DCPOs) must bear in mind, however, the realities of the observer's situation; modifications or denials must never be arbitrary, and fire support is to be provided if possible.

31. **Authorized Observer**. An authorized observer is one who has been given a special allocation of fire units, ammunition, and target numbers, usually for a specific operation. The authorized observer shall issue orders to the RCPO directing the fire units to engage, and the type and amount of ammunition to be fired.

32. A call for fire from an authorized observer is treated as an order, and the fire will be provided in the manner desired unless it is impossible, (e.g., VT is ordered and none is available on the position) or the authority is exceeded (e.g., the observer uses up the allotted ammunition or calls for more rounds of FFE than was authorized). In this latter case, those orders which exceed his authority may be treated in the same manner as those received from an ordinary observer and may be modified by the appropriate artillery HQ/CP if necessary.

PRIORITY OF FIRE

33. An observer who has been granted priority of fire is treated like an authorized observer. If the observer is a BC, the FOOs working for that BC are also treated as authorized.

REGIMENTAL FIRE MISSION — ORDINARY OBSERVER

34. The ordinary observer shall direct his orders to the regimental CP. However, the batteries shall acknowledge the observer's orders on the regimental ring net and make preparations to fire. They shall not fire on the observer's call for fire unless directed to do so by the RCPO. The first round will not be fired until the RCPO has designated a battery to carry out adjustment. The RCPO will send a message to the observer to indicate units to fire, the number and type of rounds, and a target number.

Ser	OBSERVER'S ORDERS	RCPO ORDERS	REMARKS
1	∅, CC 1 THIS IS 11; FIRE MISSION REGIMENT	∅, FIRE MISSION REGIMENT	∅ reads back
2	GRID 452 362; DIRECTION 1220: COMPANY POSITION RADIUS 200: DELAY IN EFFECT 10 ROUNDS: AT MY COMMAND ADJUST FIRE.	GRID 452 362: DIRECTION 1220: COMPANY POSITION RADIUS 200: DELAY IN EFFECT 10 ROUNDS: AT MY COMMAND ADJUST FIRE.	∅ reads back

Ser	OBSERVER'S ORDERS	RCPO ORDERS	REMARKS
3		11 AND CC 1, THIS IS ∅, REGIMENT 10 ROUNDS ZT 1230	∅ sends to observer and batteries
4	REGIMENT 10 ROUNDS, ZT 1230		FOO reads back
5		2 READY 28	2 reports ready then ∅ sends to FOO
6	2 READY 28; CANCEL AT MY COMMAND; 2 ADJUST FIRE.	CANCEL AT MY COMMAND; 2 ADJUST FIRE.	∅ reads back

Figure 3-4: Regimental fire mission — ordinary observer

REGIMENTAL FIRE MISSION — AUTHORIZED OBSERVER

35. An authorized observer directs orders to the RCPO. The authorized observer can select the adjusting battery, if desired. If the observer does not designate the adjusting battery, it will be designated by the RCPO. This procedure allows the RCPO to coordinate the fire mission, permitting the observer more of an opportunity to observe and advise.

SECTION 3

AREA ENGAGEMENT WITH DUAL PURPOSE IMPROVED CONVENTIONAL MUNITIONS

GENERAL

36. The call for fire and the procedure for adjustment of dual purpose improved conventional munitions (DPICM) are the same as for the basic HEPD mission except as noted in paragraph 32 of Section 2, Chapter 3; see Figure 3-5.

1 THIS IS 11	Initial fire order
FIRE MISSION BATTERY	
GRID 976 529	
DIRECTION 2410	
ATTACK POSITION	
RADIUS 200	
DPICM IN EFFECT	
3 ROUNDS	
ADJUST FIRE	
LEFT 100 DROP 400	Adjustment
ADD 200	
DROP 100 FFE	
END OF MISSION	End of mission
MANY CASUALTIES	Mission report
SOME VEHICLES BURNING	
REMAINDER MOVING WEST	

Figure 3-5: Observer's order for a DPICM engagement

37. **Procedures at the observation post**:

a. **Ammunition**. The ammunition order is DPICM.

b. **Adjustment**. Adjustment is usually carried out with HEPD. During adjustment with a battery or regiment, the short bracket is 200 metres. Due to the size of the effects pattern, line corrections of less than 50 metres and range corrections of less than 100 metres are not made.

c. **FFE**. The target shall be engaged with FFE until the aim of the engagement has been achieved. Because of the reliability of the round, no adjustment for HOB is usually required. The standard HOB is 265 to 470 metres; the minimum HOB correction is 50 metres. There are no specific rules for correcting the HOB. The observer must determine if the HOB is correct based upon experience and observation of the target. Some guidelines are:

(1) if a large number of duds are observed, or the effects pattern is too small, the observer shall give an UP correction. The UP correction is not to exceed 100 metres and shall be given in 50-metre intervals; and

(2) an HOB that is too high is normally not critical except that it may not give uniform coverage over the target area, particularly in severe weather conditions.

38. **Registration**. Some DPICM have a self-registration mode. To obtain registration data for firing artillery-delivered mines, use the procedure for HE registration missions except a DPICM in the self-registration mode is used throughout.

SECTION 4

FIELD ARTILLERY-DELIVERED SCATTERABLE MINES

INTRODUCTION

39. Field artillery-delivered scatterable mines can play an important part in denying the enemy mobility on certain areas of the battlefield. The actual employment doctrine, staffing procedures and associated tactics are found in B-GL-306-001/FP-001, Artillery in Battle, Field Artillery, Volume 1, *Command, Control and Employment*. Of the three categories of missions: planned, opportunity or in conjunction with other munitions; the BC and observers shall only be concerned with the target of opportunity missions. These missions will be fired using short self-destruct mines of the Remote Anti-Armour Mine System (RAAMS). Rapid response is vital. Based on current US practice, opportunity minefields are fired in a standard 400 m x 400 m module at a single aim point (the aim point is the centre point of the proposed minefield).

40. Employment authority of scatterable mines with short self-destruct times (24 hours or less) is normally held at the divisional or brigade level. Authority to engage targets of opportunity with scatterable mines shall be addressed in the fire support annex to the formation operations order.

ACTION BY THE OBSERVER

41. The procedure includes:

a. **Ammunition**. RAAMS with short or long fuze will be ordered as the ammunition.

b. **Adjustment**. The adjustment is usually carried out with HEPD until the short bracket is achieved. During adjustment with a battery or a regiment, the short bracket is 200 metres. Due to the size of the effects pattern, line corrections of less than 50 metres and range corrections of less than 100 metres are not to be made. Once the short bracket has been achieved, ONE ROUND FFE is ordered using DPICM. The observer can make the required corrections to the fall of shot and go into FFE using RAAMS. DPICM is used during the final stages of adjustment since the projectiles are ballistically similar. Furthermore, registration data derived from a DPICM registration can be used in firing RAAMS.

c. **FFE**. The observer will order sufficient rounds in FFE to achieve the required density. Tables will be issued indicating the number of rounds necessary to achieve the required density.

42. An example of an observer's orders for a target of opportunity is shown at Figure 3-6.

1 THIS IS 11;
FIRE MISSION BATTERY;
GRID 5723 8619;
ARMOURED INFANTRY BATTALION IN OPEN, MOVING WEST;
5 ROUNDS RAAMS SHORT;
AT MY COMMAND;
FFE;
FIRE;
END OF MISSION MINEFIELD 400 X 400;CENTRED ON GRID 575 861.

Figure 3-6: An example of an observer's orders for a scatterable minefield

SECTION 5

ILLUMINATION

INTRODUCTION

43. The illuminating projectile is a carrier type, fitted with a time fuze and containing an illuminating canister attached to a parachute. When the shell is activated at the optimum HOB and under ideal conditions, an area of approximately 800 to 1000 metres in diameter is illuminated for about 60 to 120 seconds, for 105mm and 155mm projectiles respectively.

44. The following rules apply when using illuminating ammunition:

a. **Target Grid Corrections**. Due to the characteristics of illumination, corrections of less than 200 metres are not worthwhile.

b. **HOB**. The proper HOB will allow the illuminating flare to stop burning just before it strikes the ground. When the HOB is too low, the correction is determined from the length of time (in seconds) that the flare burned on the ground, multiplied by the rate of descent in metres per second. Up or down corrections for HOB are ordered to the nearest 50 metres.

45. Orders for an operation will contain a white light policy and instructions for coordination of illumination.

46. When authorized, illumination must be carefully applied to avoid compromising friendly positions or interfering with flanking units. Liaison through FSCCs will likely be necessary.

47. Illuminating ammunition may be fired using any distribution of fire. To ensure maximum effectiveness, however, the special procedures below are normally used.

THE ILLUMINATION MISSION

48. Purely illumination missions shall follow the standard format. See Figure 3-7

49. Adjustment shall be carried out using a single gun firing illuminating ammunition.

50. The spread of rounds over a target is 400 metres for 105mm, and 500 metres for 155mm. The following methods may be ordered for distribution of fire:

a. **Lateral spread**. Two guns are fired simultaneously at a lateral spread on each side of the target in relation to the gun line. Some NATO nations may refer to this as DEFLECTION SPREAD.

b. **Range spread**. Two guns are fired simultaneously at a range spread plus and minus of the target, in relation to the gun line.

c. **Diamond illumination**. Four guns are fired simultaneously at a lateral and range spread on each side and plus and minus of the target.

d. **One (or two) gun illumination**. One or two guns are directed at a single point of origin.

51. The observer shall adjust onto the centre of the area to be illuminated.

52. **FFE:**

a. The observer may order "CONTINUOUS ILLUMINATION, ____ ROUNDS, FIRE FOR EFFECT" , along with an interval.

b. If these orders are not coupled with an interval, the CP will automatically determine an interval which will be one half of the burning time of the illuminant in use.

OBSERVER'S ORDERS	NOTES
1 THIS IS 12	
FIRE MISSION FOUR GUNS	
GRID 128346. ALTITUDE 500, DIRECTION 4820	
SUSPECTED ASSEMBLY AREA.	
ILLUMINATION, 12 ROUNDS. (Note 1)	1. The number of rounds is only an estimate; it is based on the burning time and the length of time illumination is required.
DIAMOND ILLUMINATION. ADJUST FIRE.	
RIGHT 200. ADD 400. UP 50.	
AT MY COMMAND. FIRE FOR EFFECT 30 SECONDS. (Note 2)	2. Both range and lateral range spread are applied (500 metres for M485 series projectiles).
FIRE	
CEASE LOADING. (Note 3)	3. This ensures that the guns are not left loaded with illuminating ammunition if all 12 rounds are not needed to be fired.
END OF MISSION. ILLUMINATION EFFECTIVE. NO VISIBLE TROOP MOVEMENT.	

Figure 3-7: Example of an observer's initial orders for an illumination mission using the diamond method of distribution of fire

COORDINATED ILLUMINATION

53. The coordinated illumination procedure is used to illuminate a target so that it may be engaged with other types of ammunition at the same time. It is usually conducted with one gun firing illuminating ammunition while another gun is adjusting with HE. The gun firing the illuminating ammunition is normally fired at an ordered interval ahead of the gun firing HE so that the target will be illuminated when the HE round bursts. On occasion, the observer may order the illuminating gun to provide continuous illumination.

54. **Procedure**:

a. **Call for Fire**. The observer shall follow the basic procedure except that illuminating ammunition will be ordered in adjustment. See Figure 3-8.

OBSERVER'S ORDERS	NOTES
2 THIS IS 21	
FIRE MISSION BATTERY.	
GRID 245362. ALTITUDE 120. DIRECTION 1210.	
MACHINE GUNS, RADIUS 50.	
ILLUMINATION IN ADJUSTMENT, VT IN EFFECT. 10 ROUNDS, ADJUST FIRE.	
ADD 400. UP 50.	
(Adjustment with illuminating ammunition continues)	
DROP 200. COORDINATED ILLUMINATION 30 SECONDS. (Note 1)	1. The grid reference to be used for HE is the same as initially ordered.
ADD 400. (Note 2)	2. Following the order COORDINATED ILLUMINATION, the illuminating gun ignores all orders not prefixed by its number.
1 ROUND FIRE FOR EFFECT.	
CANCEL COORDINATED ILLUMINATION. FIRE FOR EFFECT. (Note 3)	3. The observer may order CANCEL COORDINATED ILLUMINATION followed by FIRE FOR EFFECT if he wishes all guns to engage with HE.
END OF MISSION. MACHINE GUNS STOPPED FIRING.	

Figure 3-8: Example of an observer's initial orders for a coordinated illumination procedure

b. **Adjustment**. The illuminating gun shall be adjusted first. The desired position of the illuminating point with reference to the target will depend on the ground and wind conditions in the target area. The point of burst shall be adjusted until the flare illuminates the required area without dropping between the observer and the target. Once the illuminating point has been determined by adjustment, the observer shall either:

(1) order COORDINATED ILLUMINATION with an interval (i.e., the interval between the firing of the illuminating gun and the other gun or guns, calculated by subtracting the HE time of flight from the time elapsing between the report of SHOT and the time to best illumination),

(2) use COORDINATED ILLUMINATION coupled with AMC to control the firing of the guns, or

(3) order COORDINATED ILLUMINATION coupled with CONTINUOUS FIRE with an interval to the illuminating gun and adjust the HE in the normal manner. (If no interval is ordered the CP will use an interval based on half the burning time of the illuminant in use.)

c. **FFE**. The observer shall order FFE in the normal manner. If the illuminating gun is to be included in the FFE, the order CANCEL COORDINATED ILLUMINATION or CANCEL CONTINUOUS ILLUMINATION must be given. Otherwise this gun shall continue to fire illuminating rounds, either coordinated with the first round of each amount of FFE ordered to the other guns or at the interval given, if" CONTINUOUS ILLUMINATION has been ordered.

55. **Conventions between the observer and the gun position officer (GPO).** On receipt of the call for fire the GPO shall:

a. select an illuminating gun, normally from the flanks of the guns engaged in the fire mission, if the observer does not designate one; and

b. commence the HE adjustment on the executive order COORDINATED ILLUMINATION;

c. fire the initial HE round at:

(1) the grid reference specified in the observer's initial sequence of orders,

(2) a target grid correction ordered as "COORDINATED ILLUMINATION LEFT 200 ADD 400." This target grid correction is applied to the target location ordered in the initial call for fire, or

(3) a new grid ordered as "COORDINATED ILLUMINATION, GRID___," where during adjustment of the illumination, the observer identifies that the initial grid was incorrect.

56. **NOTE**. If the observer desires the initial round of illuminating ammunition to be fired at a point different from the grid reference ordered, a target grid correction is to be included in the initial sequence, e.g., **"**GRID 139459. DIRECTION 1400. ILLUMINATION A800**"**.

SECTION 6

THE PROPAGANDA SHELL

INTRODUCTION

57. Artillery shells may be used for the distribution of propaganda leaflets. Orders for this type of fire mission will originate from a higher HQ and will include:

a. the area to be covered; and

b. the amount of ammunition to be expended.

58. As a guide, 25 rounds of 105mm propaganda shell will normally be adequate for the coverage of an area 500 m H 500 m. Each shell holds about 500 leaflets, 10 cm H 20 cm.

PROCEDURE

59. The area to be covered will dictate the number of guns required and the procedure to be used. Generally:

a. use one gun for an area about 100 metres in diameter;

b. use two guns with appropriate individual corrections for an area about 500 metres in diameter; and

c. use four guns with appropriate individual corrections for an area about one grid square in size.

60. The distance between points shall not be less than 400 metres, although this may have to be varied because of the meteorological conditions. The observer shall adjust the point of dispersion upwind by a distance of 10 times the wind velocity in knots.

61. The HOB is 100 metres, however, this may also be changed to compensate for meteorological conditions.

SECTION 7

SNIPING GUNS

GENERAL

62. A special procedure using a single gun is sometimes used to destroy small targets by direct or close indirect fire, e.g., pillboxes, road blocks, fortified OPs, or fortified anti-tank guns.

63. An observer will be required if the mission involves indirect fire. While the gun will often be accompanied by an officer or non-commissioned officer (NCO) to carry out this role, the OP party may be tasked for the observation of fire.

64. **During the Mission:**

a. Corrections to the bearing and elevations will be ordered by the observer in mils, following the normal rules for adjustment of fire (i.e., correct for line, then bracket for range).

b. Adjustment is carried out until a target round is achieved.

c. FFE is ordered with any necessary corrections.

d. Confirmation is obtained from the originator of the task that the mission has been completed to satisfaction, and then the mission is ended.

SECTION 8

MOBILE TARGETS

GENERAL

65. The mobile target is not specified as a special type of engagement in the call for fire. The description of the target, therefore, must be sufficient to indicate that the observer is engaging a target that is moving or likely to move. The engagement of a mobile target follows the basic procedure; however, the requirement for speed often precludes the use of the normal adjustment procedure. The engagement may be carried out by the use of bold corrections during FFE to get the fire onto the target. Any orders which will cause delay, such as "CONVERGE", are to be avoided.

66. **Ammunition**. The moving target and the target likely to move are discussed separately since they require different treatment. DPICM, HEPD or HE VT may be used for both types of targets. HE MT is not recommended except when an accurate predicted fuze setting can be determined, since adjusting for the correct HOB will likely cause the target to move before effective fire can be brought to bear.

67. **Adjustment**. If, through familiarity with the zone, the observer has reason to believe that an accurate opening grid reference can be established, the engagement shall begin with one round FFE. If adjustment is essential, it must be kept to a minimum. During the engagement of a moving target, the bearing of the line OT may change significantly; if it changes by more than 500 mils a new direction shall be ordered. If the reference line is a ground feature, a change in direction will not be necessary.

68. **Target Likely to Move**. For maximum effect, the initial FFE against a target which is stationary, but which is likely to move when fired at, shall be synchronized by the use of AT MY COMMAND or TIME ON TARGET (TOT). Two suggested procedures are:

a. **Directing the first round at the target**. Great care must be taken to ensure that the opening grid reference is as accurate as possible. The observer shall open the fire with one round of FFE and be prepared to bring subsequent fire to bear before the target has the opportunity to move and to order a correction as soon as the target moves.

b. **Adjusting off the target**. Adjustment shall be carried out on a point far enough away from the target to avoid alerting it, and thus prompting it to move, and then a correction shall be used to bring FFE onto the target. The adjusting point must be one from which an accurate correction to the target can be established.

69. **Moving Targets**. When engaging a moving target, bold corrections must be used to compensate for the speed of the target and the time between bursts of fire. The following methods may be used.

a. When it is evident that the target will shortly reach a point which is either a recorded target or can be accurately located on the map, the observer may give the complete call for fire using AT MY COMMAND and withholding the order FIRE until the appropriate moment (Figure 3-9).

b. In circumstances other than those in subparagraph a above, fire shall be opened at the position the target is expected to reach by the time the first rounds arrive.

OBSERVER'S ORDERS
3 THIS IS 31, FIRE MISSION BATTERY; GRID 162 789, ALTITUDE 100; DIRECTION 0420; FOUR TROOP CARRYING VEHICLES MOVING EAST; AT MY COMMAND; ONE ROUND FIRE FOR EFFECT;

Figure 3-9: Example of an observer's sequence of orders for a mobile target

70. **Calculation**. The distance a moving target will travel depends upon the speed it is travelling. At a speed of 10 mph (16 kph) a vehicle will travel 5 metres in one second. The formulas to be used, expressed graphically at Figure 3-10, are shown below:

a. $$1.10 \times \left(\frac{\text{DISTANCE in metres}}{\text{TIME in sec}} \right) = \text{SPEED in metres per sec}$$

b. to convert metres per sec to km per hour:

$$\frac{\text{SPEED in metres per sec} \times 36}{10} = \text{SPEED in km per hour}$$

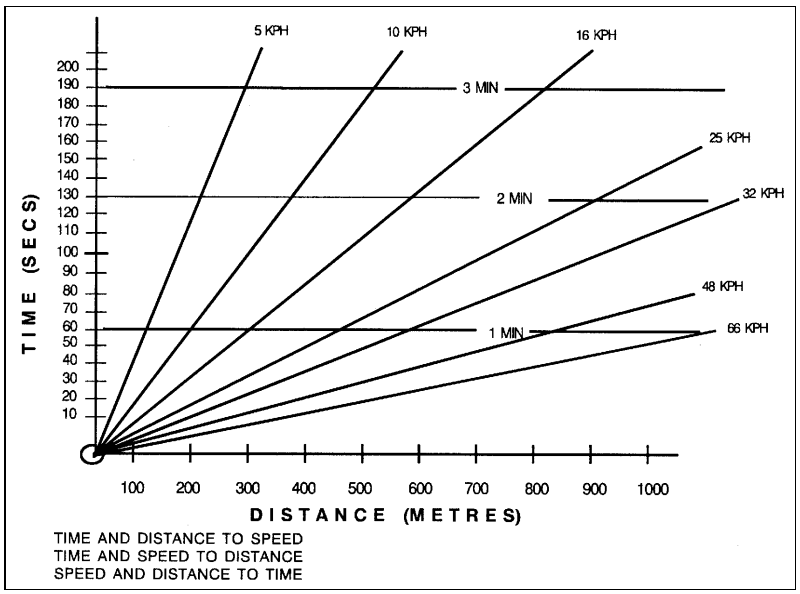


Figure 3-10: Moving target travel, graphical solution

SECTION 9

ENGAGING TARGETS CLOSE TO FRIENDLY TROOPS

GENERAL

71. By definition, a close target is any target within 600 metres of our own troops. (When firing 175mm guns and 203mm howitzers with lines of fire parallel to the line of our own troops, this distance shall be 800 metres. See Figure 3-11.)

72. The engagement of close targets might endanger friendly troops because of unavoidable inaccuracies, particularly for the first rounds of a mission and during adjustment, and because of the dispersion and splinter patterns of the shells. The procedure selected by an observer to engage any particular close target will be based on the urgency of the mission and the degree of risk involved. Under some conditions, the basic area neutralization procedure will be quite suitable. Under other conditions, the more cautious and precise DANGER CLOSE procedure described in the following paragraphs may have to be used. This procedure reduces the risk to own troops but takes more time and ammunition than the normal procedure. If the target is very close to own troops, and within the safe distance for the equipment being used, the supported arm commander must personally approve the fire mission.

73. The observer must be prepared to advise the supported arm commander on the danger from engaging any target based on the following considerations:

a. location and nature of target;

b. time available;

c. disposition and protection of friendly forces;

d. zone of the guns;

e. ammunition available;

f. splinter distance;

g. state of survey; and

h. availability of corrections for non-standard conditions.

74. If the friendly forces are within the minimum safe distance of the target as described in paragraph 71 above, the mission cannot be completed until the supported arm commander, advised by the observer, has decided on one of the following courses:

a. withdraw the troops to a safe position;

b. accept the risk of rounds landing on the position; or

c. have the observer adjust the MPI onto a point near the target, relying on the zone of the gun to cause some rounds to fall on target during FFE. The point chosen shall be on the line GT and must be within twice the probable error in range (2 PE_R).of the target.

75. **Minimum safe distances — guns**. The zone of the gun combined with the shape of the splinter zone normally forms an ellipse lying across the line of fire (see Figures 3-11 and 3-12). The width of the ellipse is caused by the splinters and is usually greater than the length caused by the zone of the gun. The length, along the line of fires varies with the range. The minimum safe distance is the combination of this ellipse plus a buffer zone of not less than 25 metres. It can be calculated as follows:

a. **Troops at right angles to line of fire**. In this case (or within 200 mils of being at right angles) the safe distance is 25 metres plus 8 PE_R (Z + A in Figure 3-11).

b. **Troops parallel to line of fire**. In this case (or within 200 mils of being parallel) the safe distance is 25 metres plus the splinter distance (S + A).

c. **Troops oblique to line of fire**. The safe distance in this case is the larger of the two figures calculated above.

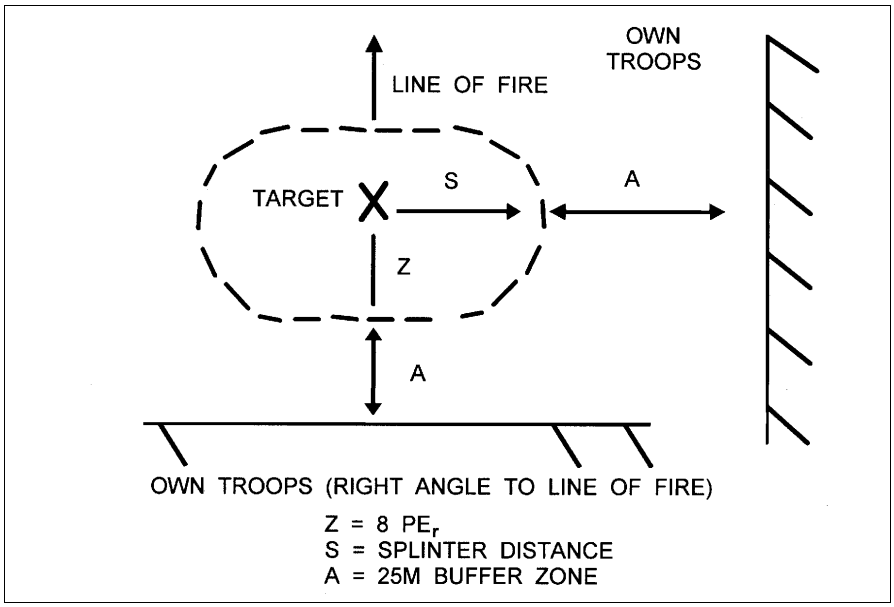


Figure 3-11: Illustration of safe distances

Ser	EQUIPMENT	SPLINTER DISTANCE
(a)	(b)	(c)
1	105mm	250 m
2	81mm and 4.2 in Mor	250 m

3	155mm	350 m
4	175mm	700 m
5	203mm (8 in)	700 m
NOTE These splinter distances may be halved when firing close to protected troops.		

Figure 3-12: Splinter distances

76. **Safe distance - mortars**. The zone of the mortar is larger than that of a gun, and, because of the dispersion pattern and the shape of the trajectory, the splinter zone normally forms an ellipse lying along the line of fire as opposed to that described for guns above. When planning a target, the following must be considered (See B-GL-317-009/PT-001, Weapons, Volume 9, *81mm Mortar*, for details.):

a. **Safety limit**. 200 metres from forward troops.

b. **Bedding-in**. A further 200 metres if mortars are not bedded in;

c. **Wind direction and speed**. A further 100 metres for each 10 mph (9 kts) of wind blowing toward the forward troops (maximum 30 mph/26 kts); and

d. **Wet conditions**. Rounds can be expected to fall short during inclement weather, extend the total safe distance calculated by 10 percent. Use caution when engaging at less than 10 x 82 percent zone.

DANGER CLOSE PROCEDURES

77. The gun or guns required to neutralize the target are adjusted onto the target by creeping to minimize the danger to our own troops.

78. The following orders are always included in the initial sequence:

a. **Target Location**. A target grid correction is sent with the target location to ensure that the first round in adjustment is 600 metres from our own troops; i.e., for a target 300 metres away, "GRID 654 231, DIRECTION 4880, ADD 300".

b. **Type of Engagement**. "DANGER CLOSE."

79. The observer shall commence adjustment from a point not closer than 600 metres to the friendly troops. The observer shall not attempt to bracket the target, but creep towards it with corrections that are considered safe. The observer shall adjust individual guns onto the target using BATTERY RIGHT/LEFT at a distance of 400 metres from friendly troops and will then continue adjustment in 50-metre increments, using the gun whose fall of shot is closest to friendly troops. The procedure is modified only on the authority of the supported arm commander. See Figure 3-13.

Ser	OBSERVER'S ORDERS	NOTES
(a)	(b)	(c)
1	1 THIS IS 11	
2	FIRE MISSION BATTERY	The target requires a battery for neutralization and is 200 metres from the friendly troops.
3	GRID 785 566 ALTITUDE 120 DIRECTION 1670 ADD 400 3x BMPs WITH 1x T60 DUG IN	A target grid correction is ordered to ensure that the first round lands 600 metres from the friendly troops.
4	ADJUSTING ZP 1240, 1 T64 DUG IN DANGER CLOSE ADJUST FIRE	
5	DROP 200 BATTERY RIGHT 1 ROUND FIRE FOR EFFECT	The CPO will fire a circular distribution of fire, unless otherwise ordered.
6	NUMBER 1 LEFT 50, NUMBER 2 DROP 50	Corrects individual guns, adjusts with closest gun from circular fall of shot.
7	NUMBER 4 ADJUST FIRE	
8	DROP 50	
9	DROP 50	
10	DROP 50	On target.
11	3 ROUNDS FIRE FOR EFFECT	
12	RECORD AS TARGET _____ END OF MISSION	

Figure 3-13: An example of a battery fire mission using DANGER CLOSE procedure

AMMUNITION OTHER THAN HE

80. **Airburst**. VT shall be used when firing over friendly troops to minimize the occurrence of short airbursts along the line GT. When a time fuze is used, the observer shall adjust for fuze length on a point no closer than 300 metres to friendly troops. Fuze Probable Errors (PEs) must be considered when calculating minimum safe distance. Airburst can be employed very close to own troops providing ample overhead protection is available.

81. **Smoke WP**. This projectile shall be fired using the same procedure as HEPD.

82. **Smoke BE**. These projectiles do not require close target procedures, although the danger of falling base plates must be considered.

SECTION 10

QUICK ACTIONS

INTRODUCTION

83. A quick action is a rapid deployment ordered when a fire unit is not in action and circumstances require a speed of deployment that will not permit normal procedures. Fire is normally directed and controlled by a forward observer using indirect fire methods.

PROCEDURE

84. The procedure is the same for an area neutralization except that the observer shall order ACTION immediately followed by the initial orders for the engagement.

85. Due to the rapid deployment and the method of determining the initial data for guns, the observer must be prepared for the likelihood of the first round being some distance from the target.

SECTION 11

LINEAR FIRE MISSIONS

GENERAL

86. When it is necessary to engage a target of specified length and attitude but with little depth, e.g., a defile, road, railway cutting or embankment, or a long forward edge of a wood, the linear target procedure may be used. As its name implies, this procedure distributes fire evenly along a straight line. Figure 3-14 shows the minimum number of batteries needed to effectively engage targets of various lengths.

Ser	LENGTH (metres)	NUMBER OF 105MM HOW BTYS	NUMBER OF 155MM HOW BTYS
(a)	(b)	(c)	(d)
1	200	1	1
2	300	2	1
3	400	3	2
4	500	3	3

Figure 3-14: Fire units required for linear targets of various lengths

87. **Procedure**. The observer shall send the location of the centre of the target in his initial orders, and shall specify the target length (preferably to the nearest 100 metres for the sake of simplicity) and its attitude to the nearest 50 mils. The observer shall indicate the special procedure required by ordering LINEAR as the distribution of fire and shall adjust onto the central point. The observer may often find it advisable to order AT MY COMMAND. The orders for the engagement of a linear target by a battery are shown in Figure 3-15.

OBSERVER'S ORDERS
2 THIS IS 21
FIRE MISSION BATTERY
GRID 124 836, ALTITUDE 640
DIRECTION 2450
ASSEMBLY AREA 200
ATTITUDE 1850
EIGHT ROUNDS
LINEAR
ADJUST FIRE

Figure 3-15: Example of an observer's initial orders for the engagement of battery linear fire mission

SECTION 12

ENGAGING TARGETS USING SMOKE

GENERAL

88. Smoke is used primarily for the neutralization of positions by blinding the enemy and screening the activities of our own troops. In addition, WP may be used for inflicting casualties or starting fires.

89. Smoke (coloured or white) may also be used:

a. for marking;

b. as an aid to observation; and

c. to enhance the neutralizing effect of HE.

90. Of the two types of smoke shell, BE and WP, BE normally produces the more effective smoke screen after the initial build-up of smoke. WP may be the best choice when quick results are required.

91. This section is concerned with the procedure for screening or blinding an area with smoke. When used for other purposes, smoke is fired using the same procedure as for HEPD.

BASE EJECTION (BE) SMOKE SHELL

92. The BE smoke projectile is a carrier shell fitted with an MT fuze to burst the shell in the air. When the shell bursts, the canisters are ejected from the base and at the same time ignited. The canisters follow the original trajectory fairly closely and emit a dense and narrow stream of smoke after hitting the ground. This stream flows downwind and, as it moves, spreads out in height and width, as shown in Figure 3-16. For a certain distance from the point of origin, there is no screening effect since the smoke cloud is not of sufficient height, nor width, but at a measurable distance from the point of fall an effective cloud is formed which persists until the smoke thins out or rises.

93. There is little tendency for the smoke to pillar unless there are strong upward currents of air. In temperate climates, such as in Northern or Central Europe, the smoke clings to the ground, often rising no more than 50 feet; it follows the contours of the ground to some extent and gathers in valleys. In such climates, the standard length of the effective cloud, i.e., the distance AC in Figure 3-16, allows a considerable margin of safety and can be relied upon in all conditions; the only decision to be made is on the rate of fire required, which depends upon the atmospheric conditions at the time of engagement.

94. The conditions of the ground may effect the canisters as follows:

a. On hard or rocky ground, the canister may bounce, causing an abnormal spread, mostly along the line fire. This may be alleviated in part by raising the height of ejection- generally UP 50 will suffice.

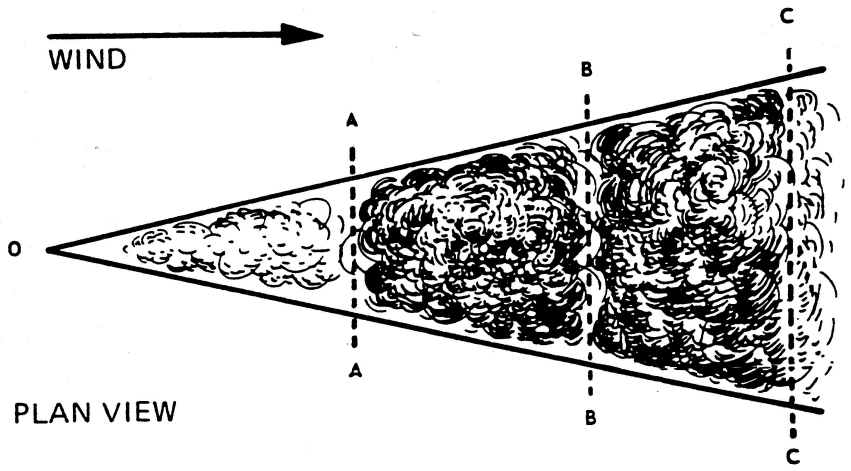
b. On very soft or boggy ground, the canisters may bury themselves and produce little or no smoke.

c. When the ground is covered with more than four or five inches of snow, the heat of burning will melt the snow thus extinguishing the canister.

d. On steep hills or in mountainous areas, canisters may roll downhill, completely or partially, ruining the desired effect.

WP SMOKE

95. The WP smoke shell has an explosive filling and a PD fuze. When it bursts, the filling produces an extremely hot, dense ball of smoke. The great amount of heat generated when the shell explodes gives WP smoke a strong tendency to pillar. If a point of origin is fed at a suitable rate of fire, the successive clouds of smoke become, at some distance downwind, long enough to unite into a continuous cloud. See Figure 3-16.



DETAIL	DIMENSIONS			
	105MM AMMUNITION		155MM AMMUNITION	
	BE	WP	BE	WP
OA — Point of origin to point where smoke is effective.	75 m	50 m	75 m	50 m
AC — Length of effective cloud.	300 m	200 m	400 m	300 m
Width of cloud at B at distance OB.	50 m at 250 m	30 m at 200 m	75 m at 350 m	50 m at 200 m
Time to form an effective cloud.	1-2 min	1 min	1-2 min	1 min
Total duration of burning.	3 min	30 secs	4 min	30 secs

Figure 3-16: Detail and Dimension for a cloud produced by a single round of BE and WP smoke ammunition

96. Even for temperate climates, it is not possible to give a standard length of effective cloud, since the length varies greatly with the weather. In dry, still air, it is unlikely that any effective screen will be obtained. The rates of fire in favourable conditions are about three times those for BE smoke of the same calibre.

97. WP will sometimes set fire to dry flammable material such as grass, heather, scrub, or wooden buildings. Rounds bursting among troops will cause phosphorus burns to the skin.

THE EFFECTS OF WEATHER ON SMOKE

98. The effects of weather on the performance of smoke are similar in nature, though different in magnitude, for both WP and BE smoke. Their principal influence is on the rate of fire needed to ensure continuous screening.

99. **Wind strength**. A strong wind disperses the smoke quickly, and therefore entails a high rate of fire. On the other hand, if there is little or no wind, the smoke may thin out by natural dispersion before it has been effectively carried downwind, and the effective length of screen from one point of origin may then be reduced. The best wind is a steady one of about five to nine knots. The direction of the wind affects only the positioning of the points of origin of the smoke and is dealt with in paragraph 104 of this section.

100. **Humidity of the atmosphere**. Smoke disperses more rapidly in a dry atmosphere, therefore, low humidity entails a high rate of fire.

101. **Turbulence of the atmosphere**. Turbulence is caused by hot air rising from the ground and disturbing the atmosphere. It causes smoke to drift irregularly, "windows" develop, and when it is severe, causes pillaring. Turbulence is expressed as high, moderate or low. High turbulence occurs on calm sunny days, overcast days give moderate turbulence, and low turbulence occurs on clear nights and for about one hour before sunset or after sunrise, when the sky is clear and wind light. The greater the turbulence, the greater the rate of fire required. High turbulence, in conjunction with low humidity, may prevent effective smoke from being produced (see Figure 3-18, wind nine knots; dry, bright sun). When wind strength exceeds nine knots, turbulence is always considered moderate.

102. **Sources of weather information**. Weather conditions can be estimated by the observer from the behaviour of the dust and smoke within his zone of observation. The smoke from observed HE rounds, particularly those fired in adjustment for the smoke screen, will give the best indication. Some assistance may be obtained from the line zero data in the meteorological message. The Beaufort Scale of Winds (Figure 3-17) is an aid in estimating wind strength.

DESCRIPTIVE TERM	SPEED RANGE		SPECIFICATION FOR ESTIMATING SPEED
	MPH	KNOTS	
(a)	(b)	(c)	(d)
Calm	less than 1	less than 1	Smoke rises vertically.
Light Air	1-4	1-3	Direction of wind shown by smoke drift but wind

DESCRIPTIVE TERM	SPEED RANGE		SPECIFICATION FOR ESTIMATING SPEED
	MPH	KNOTS	
(a)	(b)	(c)	(d)
			vanes do not move.
Light Breeze	4-7	4-6	Wind felt on face; leaves rustle, ordinary vane moved by wind.
Gentle Breeze	8-12	7-10	Leaves and small twigs in constant motion; wind extends light flag.
Moderate Breeze	13-18	11-16	Raises dust and loose paper; small branches are moved.
Fresh Breeze	19-24	17-21	Small trees in leaf begin to sway; crested wavelets form on inland water.
Strong Breeze	25-31	22-27	Large branches in motion; whistling heard in telephone wires.
Near Gale	32-28	28-33	Whole trees in motion; inconvenience felt in walking against wind.
Gale	39-46	34-40	Breaks twigs of trees; generally impedes progress.
Strong Gale	47-54	41-47	Slight structural damage occurs, e.g., to roofing shingles, TV antennae, etc.
Storm	55-63	48-55	Seldom experienced inland; trees uprooted; considerable structural damage occurs.
Violent Storm	64-72	56-63	Very rarely experienced, accompanied by wide-spread damage.
Hurricane	Above 72	Above 64	

Figure 3-17: The Beaufort scale of winds

103. **Rates of fire**. Figure 3-18 shows the rates of fire required in various weather conditions.

EQPT		WIND SPEED (KNOTS)	RAINY			OVERCAST			DRY/SUNNY		
			3	9	15	3	9	15	3	9	15
105mm	WP	RATE OF FIRE	3	4.5	6	3	6	7.5	9	18	9
	BE	(RDS PER GUN)	1	1.5	2	1	2	2.5	3	6	3
155mm	WP	PER MINUTE	1.5	1.5	3	1.5	3	4.5	4.5	9	4.5
	BE		0.5	0.5	1	0.5	1	1.5	1.5	3	1.5

Figure 3-18: Rates of fire required for smoke engagement under various weather conditions

POSITIONING THE POINT(S) OF ORIGIN

104. Careful positioning of the point(s) of origin of the smoke is necessary if full advantage is to be taken of the amount of effective smoke which each gun can produce. The factors which determine the positioning of points of origin are:

a. the area to be blinded, i.e., the ground occupied by the enemy from whom our own activities are to be hidden;

b. the area to be screened, i.e., the positions or area of operations of our own troops; and

c. the direction of the wind (the strength of the wind affects only the rate of fire).

105. The areas to be blinded and screened will be indicated on the ground or map by the supported arm commander or by the artillery commander ordering the mission. The direction of the wind is obtained by the observer.

106. Using Figure 3-19 as an example, it can be seen that the belt of smoke must extend across DEFG and be effective between X and Y. Normally, XY should be positioned close to the area to be blinded, so that the smoke causes maximum inconvenience to the enemy and minimum inconvenience to our own troops, but not so close as to allow the enemy to move through it and engage friendly troops. There are occasions when the belt of smoke should be close to the area to be screened, e.g., when the latter is smaller that the area to be blinded.

107. From Figures 3-19 and 3-20 it can be seen how the direction of the wind affects the positioning of the points of origin.

a. **Flank wind**. A flank wind blows from within 500 mils of the line XY. The first point of origin of the smoke must be upwind of X (or Y, depending on wind direction) by a sufficient distance (OA in Figure 3-16) to ensure that the cloud is effective by the time it reaches X. When unsure about the actual position of the MPI or the position of X, the observer must ensure that the upwind point of origin is sufficiently distant from X to allow for this uncertainty. The distance between successive points of origin will correspond to the effective length of the cloud from one point of origin (distance AC in Figure 3-16).

b. **Oblique wind**. An oblique wind blows from within 501 to 900 mils of the line XY. It will be blowing diagonally towards or away from the enemy. The first point of origin must be upwind of the line FG. The line of the points of origin must be parallel to XY and on the upwind side of it. The distance between points must be from one-quarter to two-thirds the effective length of the cloud for one point of origin, depending upon the direction of the wind.

c. **Following wind**. A following wind blows from within 901 to 1300 mils of the line XY. When the wind is blowing directly from the area to be screened to the area to be blinded, no point of origin need be outside the lines DE and FG. The line of the points of origin will be upwind of the line XY by the distance (OB in Figure 3-16) at which the effective width of the cloud from one point of origin occurs. The distance between points is the effective width of the cloud from one point of origin (distance BB in Figure 3-16).

d. **Head wind**. A head wind also blows from within 1301 to 1600 mils of the line XY, but towards the area to be screened. When the direction of the wind is from the enemy towards friendly troops, the engagement is unlikely to be successful

because of the inconvenience caused to friendly troops by the smoke drifting among them. If the mission is undertaken, the points shall be positioned as for a following wind, except that they have to be on the enemy side of the line XY and, in fact, often inside the area to be blinded.

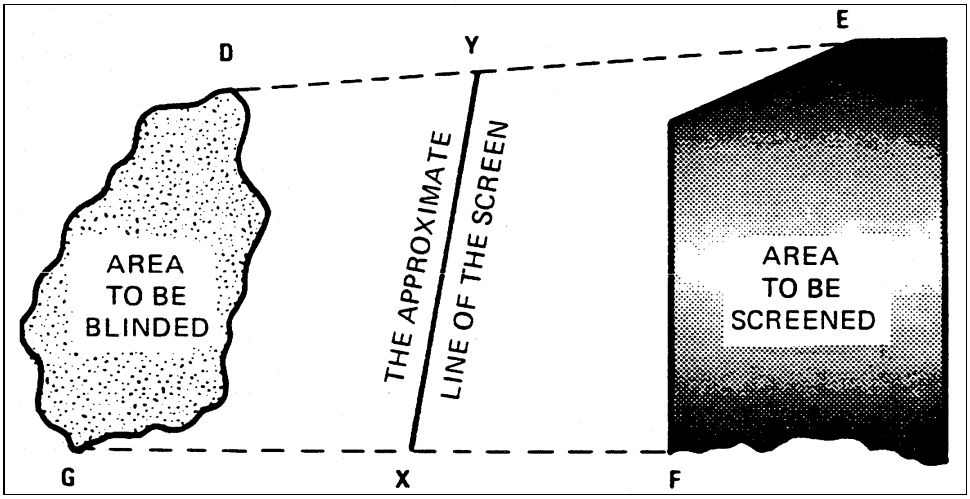


Figure 3-19: Diagram of the area to be blinded and the area to be screened

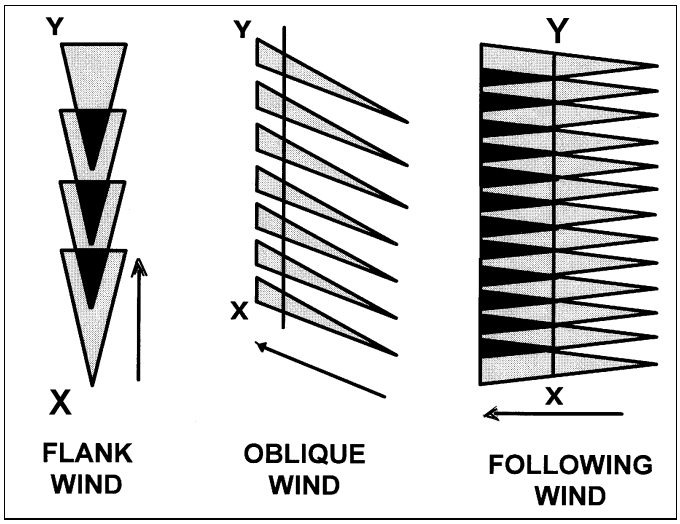


Figure 3-20: Diagram showing the position of the points of origin for various wind directions

TYPES OF SMOKE FIRE MISSIONS

108. **Procedure**. There are two separate procedures used for smoke missions:

a. the quick smoke procedure; and

b. the deliberate smoke procedure.

109. **The quick smoke procedure**. This method simply produces a quick screen from one or more guns firing with a circular radius. It will usually be satisfactory when smoke is required quickly over a relatively small area, the observer is in the area to be screened, and when the wind is from a flank. In many situations the fire of one or two guns will suffice. If the fire of more than one battery is required, it is normal to use the deliberate smoke procedure. The rates expressed in Figure 3-18 are for a single gun, feeding point of origin, and are divided by the number of guns in the missions to determine the firing rate.

110. **The deliberate smoke procedure**. This procedure requires a more deliberate approach than the previous one. It is often used as part of a fire plan and must always be used when a large screen is required. Guns are directed at individual points of origin along the screen.

PLANNING THE ENGAGEMENT

111. The principles of planning the use of smoke described in the following paragraphs refer in detail to the deliberate smoke engagement. Planning for the quick smoke engagement follows similar, although simpler, lines.

112. **Information required**. When planning a smoke screen, the observer shall obtain the following information:

a. From the supported arm commander:

(1) the area to be blinded,

(2) the area to be screened,

(3) the time at which the screen is to be effective — in order to build up, FFE must be ordered to start up to two minutes before the screen is to be effective, and this must be made clear to the supported arm,

(4) the duration of the screen,

(5) whether the supported arm commander agrees to testers being fired,

(6) the alternative HE task and whether it is the artillery officer or the supported arm commander who will make the decision to adopt this alternative, should the need arise, and

(7) the location of the supported arm commander.

b. From local observations or artillery sources:

(1) the strength of the wind,

(2) the direction of the wind, and

(3) other atmospheric conditions.

113. **Feasibility**. The observer must first decide whether the screen is technically possible and whether sufficient guns and ammunition are available. This part of the plan is carried out in two steps as follows:

a. **Step 1**. The observer draws a diagram similar to that in Figure 3-19 and marks on it the direction of the wind, the upwind point of origin, and the line of the points of origin. From this sketch the observer decides how many points of origin and hence how many guns are required.

b. **Step 2**. Taking into consideration the effects of the prevailing weather, he estimates the rate of fire and the resulting ammunition expenditure. As the smoke requires one to two minutes to form an effective screen, the observer must order his first rounds before the screen is required. After firing has ended, the smoke will normally remain effective for one minute; thus, firing may cease one minute before the end of the period during which smoke is required. Therefore, the total duration of firing will be one minute longer than the required duration of the screen, e.g., if a screen is required from H+5 to H+15, firing shall start at H+3 and may end at H+14; i.e., for a 10 minute screen, the guns must fire for 11 minutes. The required duration is multiplied by the rate of fire in rounds per gun per minute (RPG/PM) as estimated using Figure 3-18, and two additional RPG for build-up are added. The resulting figure represents the number of RPG required for the screen, and is the number that will be ordered in the initial orders for the fire mission; e.g., ”SMOKE IN EFFECT, 12 ROUNDS”. If the required rate of fire is faster than the maximum rate for the equipment in use, the observer will double the number of guns to engage, and halve the rate of fire (per gun). The prospects for a successful engagement under these conditions are not good.

114. **Adjustment**. The observer shall adjust onto the upwind point of the screen. No great accuracy is required, provided that the subsequent screen will be at the required distance upwind and will blind the desired area. Corrections of less than 100 metres shall not be used. Adjustment shall normally be carried out using HE quick in order to conserve smoke ammunition, to achieve surprise, and to avoid prematurely obscuring the area.

115. **Testers**. The use of smoke testers will jeopardize surprise and possibly have an adverse effect on the success of the tactical operation; their use must be cleared with the supported arm commander. When testers are used, the observer shall specify the gun to be fired, e.g., “NUMBER 4 ONE ROUND FIRE FOR EFFECT”.

116. **Control**. Given the circumstances in which smoke screens are required, friendly troops normally cannot move until the screen is effective. In many circumstances, it will be desirable for the observer to report to the supported arm commander that the guns are ready to fire and then to await his request to engage the target.

117. **Future Engagement**. The screen may be required as soon as the guns can be ready, or it may be part of a fire plan which will not be fired until some time later. These two cases correspond respectively with the immediate neutralization shoot and with the adjustment of a target for future engagement with HE. In the latter case, the observer cannot be confident that the weather will not change after adjustment, rendering the screen ineffective; the need thus arises for an alternative HE task. Adjustment for the screen, therefore, shall be carried out as late as possible.

CORRECTIONS DURING FFE

118. **Target Grid Corrections**. Corrections shall be given during FFE only if they are essential, since they tend to disrupt firing. It is, however, virtually impossible to alter the layout of a deliberate smoke screen, i.e., the attitude and distance between points once FFE has begun. If a correction is given, the observer shall recommence FFE with the two rounds FFE to build up the screen again, followed by the unexpended rounds of the original FFE, but care must be taken to complete the screen at the agreed time.

119. **Altering the Rate of Fire**. As the time required to implement an order for an increase in the rate of fire may be considerable, the original rate ordered shall be generous. The density of the screen must be carefully observed; if it becomes evident that the rate of fire is excessive, with a resulting waste of ammunition, the observer shall either:

a. increase the interval and order CEASE LOADING at the appropriate time; or

b. take specific guns out of the engagement, e.g., "NUMBER 4 CEASE LOADING".

PROCEDURE FOR THE QUICK SMOKE ENGAGEMENT

120. The quick smoke engagement is carried out using the basic area neutralization procedure. The smoke may fail to provide enough screening and thus it is usually necessary to arrange an alternative HE task. The principles of the quick smoke procedure also apply when coloured smoke is required for signals or target indication.

121. **Procedure**. The observer makes a plan, including the rate of fire and number of rounds required per gun, and decides where to place the adjusting point. The engagement is then conducted using the basic procedure except as follows:

a. **Call for fire:**

(1) An estimate of the number of rounds to be used at FFE shall always be ordered, e.g., "WP IN EFFECT, EIGHT ROUNDS" or, when smoke is to be used in adjustment, "WP, EIGHT ROUNDS." See Figure 3-21.

(2) HEPD shall normally be ordered for adjustment.

b. **Adjustment**. Accurate adjustment will rarely be necessary. One or two rounds will usually suffice to establish the area where the smoke rounds are to be placed.

c. **FFE**. The observer shall always order an interval for FFE except for the first two rounds which are required to initially build up the screen as quickly as possible; e.g., "TWO ROUNDS, FOLLOWED BY SIX ROUNDS FIRE FOR EFFECT, 40 SECONDS" (three rounds are fired before the interval is applied). If it is essential that a target grid correction be ordered during FFE, fresh build-up rounds must be ordered in the same manner.

OBSERVER'S ORDERS
1, THIS IS 12, FIRE MISSION FOUR GUNS; GRID 126374, ALTITUDE 500; DIRECTION 1280; BLINDING TROOPS IN BUILDINGS, RADIUS 200; WP, EIGHT ROUNDS; ADJUST FIRE;

Figure 3-21: Example of an observer's initial orders for a quick smoke engagement using WP

PROCEDURE FOR THE DELIBERATE SMOKE ENGAGEMENT

122. The deliberate smoke procedure is used when the area to be blinded has a longer frontage than can be covered by the fire of a battery using the quick smoke procedure. Guns are directed at different points of origin that are placed in line.

123. **Procedure:**

a. The procedure for conducting a deliberate smoke engagement is similar to that used for a quick smoke engagement, except that the observer must give orders for the distribution of fire. See Figure 3-22. This shall be done by ordering, in the call for fire:

(1) the number of guns to take part, i.e., the number of points,

(2) the order DELIBERATE SMOKE,

(3) the length of the screen, and

(4) the attitude of the screen to the nearest 50 mils.

b. Adjustment is carried out onto Point One, i.e., the upwind point of origin. Again, no great accuracy is required.

c. As with quick smoke missions, orders for FFE must include an interval except for the first two rounds.

124. **NOTES**: For long screens requiring more than one battery, the RCPO shall assign points to the individual batteries.

a. When engaging with BE smoke:

(1) for ground burst, order UP 100 until proper ejection is achieved; and

(2) if ejection of canisters is overly high causing canisters to fall short, order "DOWN 50."

b. When the rate of fire required exceeds the maximum rate of the guns, two or more guns will be directed at each point of origin.

OBSERVER'S INITIAL ORDERS	NOTES
(a)	(b)
FIRE MISSION FOUR GUNS. (Note 1)	1. This indicates the number of guns to take part and hence the number of points to be engaged. 2. This is the grid reference of the upwind point of origin (Point 1). The adjusting gun is directed at this point.
GRID 123456. (Note 2) ALTITUDE 520. DIRECTION 5240.	
BLINDING DISMOUNTED INFANTRY. RAD 200. SMOKE IN EFFECT 15 ROUNDS.	
DELIBERATE SMOKE 300. ATTITUDE 1250.	
ADJUST FIRE.	

Figure 3-22: Example of an observer's initial orders for the engagement of a deliberate smoke mission

SECTION 13

DESTRUCTION

INTRODUCTION

125. The destruction of a target by artillery fire is normally accomplished through the use of medium or heavy guns firing HE with a delay or concrete piercing fuze. The target is usually small, e.g., a pillbox, bunker, small building, or dug-in tank. This section is concerned with the destruction of targets by indirect fire.

126. When using the destruction procedure, only one gun is employed. Adjustment is carried out until a verified short bracket is achieved, and then FFE is applied in small groups until the target is destroyed.

VERIFIED SHORT BRACKET

127. The verified short bracket is a small range bracket which has been verified by the observation of two plus and two minus rounds. The verified short bracket is 25 metres unless the probable error in range (PE_R) is over 25 metres, in which case the verified short bracket is 50 metres. The GPO shall report to the observer when the PE_R is greater than 25 metres.

128. Whenever a target round or contradiction is obtained, it must be supported by a plus and minus round separated by not more than twice the verified short bracket:

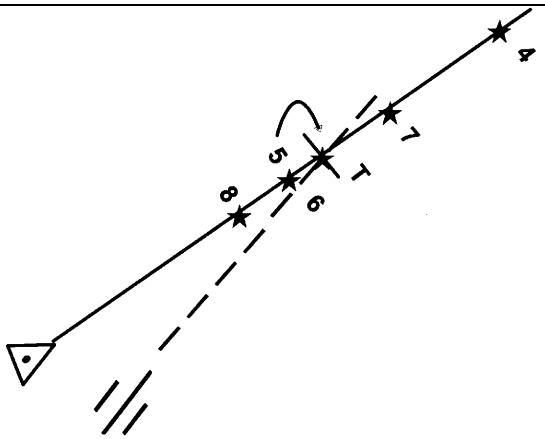
a. a target round counts as a plus and a minus round; and

b. a contradiction occurs when a plus round and a minus round are produced using the same gun data. For example, a round lands just short of the target, the observer orders REPEAT to attempt to verify the short bracket. If the round lands plus of the target, this would be considered a contradiction.

OBTAINING A VERIFIED SHORT BRACKET USING A DIRECTION OTHER THAN GUN TARGET (GT)

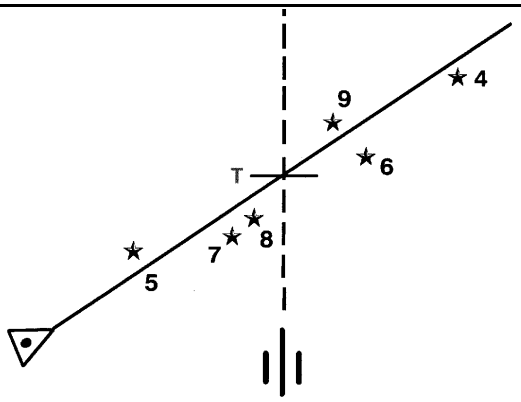
129. When the angle T is under 300 mils, normal adjustment procedure is used to obtain a verified short bracket. See Figure 3-23.

130. When the angle T is over 300 mils, and the 100-metre bracket has been split, adjustment for line is ordered when three rounds indicate a bias and normal procedure is used to adjust the range for a verified short bracket. See Figure 3-24.



ROUND	OBSERVATION		ORDERS	NOTES
	LINE	RANGE		
(a)	(b)	(c)	(d)	(e)
4	-	PLUS	DROP 100	
5	TARGET		REPEAT	
6		MINUS	ADD 25	To confirm top of verified short bracket.
7	-	PLUS	DROP 50	To confirm bottom of verified short bracket.
8	-	MINUS	ADD 25 3 RDS FFE	Target rounds confirmed by rounds 7 and 8 separated by twice the verified short bracket. FFE may be opened.

Figure 3-23: Establishing a verified short bracket (small angle T, target round and PE_R less than 25 metres)



ROUND	OBSERVATION		ORDERS	NOTES
	LINE	RANGE		
(a)	(b)	(c)	(d)	(e)
4	-	PLUS	DROP 100	100-metre bracket.
5	-	MINUS	ADD 50	
6	RIGHT	PLUS	DROP 25	
7	RIGHT	MINUS	REPEAT	To confirm bottom of verified short bracket.
8	RIGHT	MINUS	LEFT 10 ADD 25	Line correction for bias. Add 25 to confirm top of verified short bracket.
9	-	PLUS	DROP 10 3 RDS FFE	Verified short bracket established and FFE may be opened.

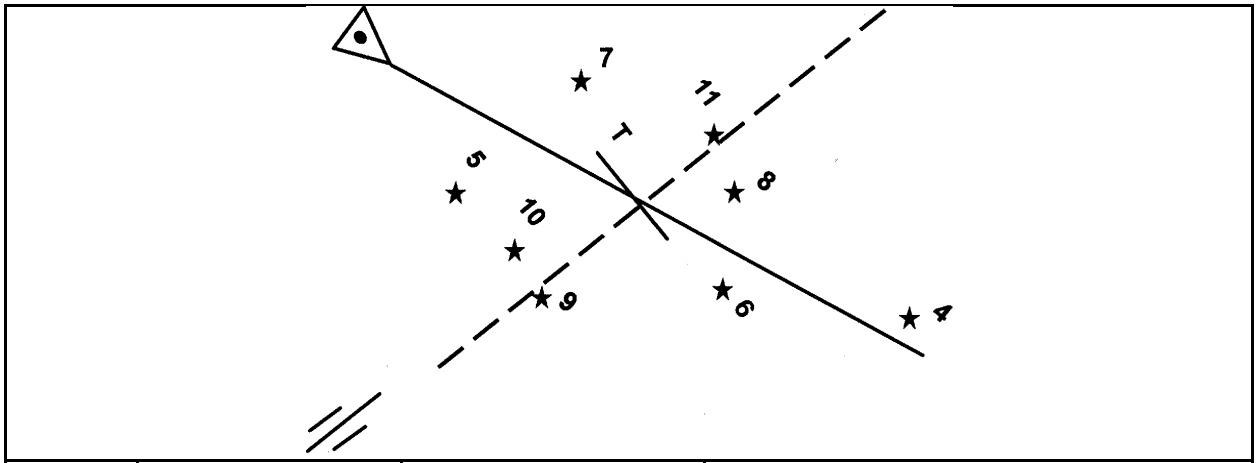
Figure 3-24: Establishing a verified short bracket (large angle T and direction other than GT)

OBTAINING A VERIFIED SHORT BRACKET USING DIRECTION GT

131. If the target is very small it may be desirable to obtain the verified short bracket using DIRECTION GT. This method is an alternate to the normal method and may be used at the discretion of the observer.

132. When the angle T is under 300 mils, normal adjustment procedure is used and DIRECTION GT is ordered after the split of the 100-metre bracket.

133. When the angle T is over 300 mils (Figure 3-25) the observer shall bracket for both line and range using the following procedure:



ROUND	OBSERVATION		ORDERS	NOTES
	LINE	RANGE		
(a)	(b)	(c)	(d)	(e)
4	-	PLUS	DROP 100	
5	-	MINUS	ADD 50	Normal short bracket is split. Further observations are relative to Direction GT.
6	RIGHT	?	DIRECTION GT LEFT 40	Start bracketing for line across Line GT.
7	RIGHT	?	RIGHT 20	The bracket is progressively split until it is the amount 1 mil subtends at Range GT.
8	?	PLUS	DROP 50	Start bracketing for range.
9	?	MINUS	REPEAT	To confirm bottom of bracket.
10	?	MINUS	ADD 25	To confirm top of bracket.
11	?	PLUS	DROP 10 3 RDS FFE	Verified short bracket established and FFE may be opened.

Figure 3-25: Establishing a verified short bracket (large angle T and direction OT)

a. order DIRECTION GT after the split of the 100-metre bracket;

b. obtain a 40-metre line bracket;

c. split the 40-metre line bracket progressively until:

(1) a target round is obtained, or

(2) a contradiction is obtained on the line GT, or

(3) the size of the bracket is the amount one mil subtends at the range GT; and

d. bracket for range until a verified short bracket is obtained.

PROCEDURE BY THE OBSERVER

134. The order DESTRUCTION is included in the initial sequence as the type of engagement. See Figure 3-26.

135. The following orders may be included in the ammunition order of the initial sequence:

a. DELAY IN EFFECT; or

b. CONCRETE PIERCING IN EFFECT.

136. The observer may use DIRECTION GT.

137. The observer shall obtain a verified short bracket in adjustment before ordering FFE.

138. **FFE**. FFE is ordered in groups of three rounds at the split of the verified short bracket, rounded off to the nearest 10 metres, or the data which produced a target round or contradiction. If this correction cannot be applied to the sights of the gun, the GPO will inform the observer. A correction of one-half the verified short bracket will be made to the next order for FFE when all three rounds in a group produce a bias. An interval that will permit accurate and consistent laying shall be ordered with each method of FFE.

OBSERVER'S ORDERS
1, THIS IS 12, FIRE MISSION ONE GUN; GRID 723 459. ALTITUDE 400. DIRECTION 1680; BUNKER; DESTRUCTION; CP IN EFFECT, 10 ROUNDS; ADJUST FIRE.

Figure 3-26: An example of an observer's initial orders for a destruction mission

SECTION 14

REGISTRATION

GENERAL

139. The aim of registration is to determine, by shooting, the corrections required to map bearing and map range to compensate for the total effects of non-standard conditions, i.e., weather, equipment, ammunition, and survey errors. In general, the corrections obtained from a registration mission are more valid than those derived from a meteorological message, because the former compensates for all non-standard conditions.

140. Both high and low angle fire may be used for registration, except that in high angle fire it is not practical to use HE time. A registration conducted at high angle will be of limited value because of the comparatively small area covered by one charge; e.g., for the 155mm Howitzer SP M109A4, the range covered by charge 4, white bag, is only 4300 metres.

141. The RCPO shall normally control the implementation of the registration policy of the regiment, detailing to the batteries:

a. the approximate location of the registration point or points;

b. the time at which registration will take place;

c. the method of registration; and

d. the charges and the types of ammunition to be used.

142. The GPO shall inform the BC of the requirement for registration. The BC shall then order one of the observers to conduct the registration and in conjunction with the GPO select the registration point.

143. When sufficient meteorological or registration data is not available to ensure accurate fire during a fire plan, an artillery commander may decide to carry out a registration. The order will specify:

a. the observer;

b. the location of the registration point;

c. the time of the mission;

d. the method of registration;

e. the charges and the types of ammunition to be used; and

f. the type of guns to be used.

144. The registration point shall be located as close to the target area as tactical requirements will permit. The following limits are used by the guns for the application of corrections obtained from registrations:

a. **Range**. 2000 metres plus and minus of the map range to the registration point.

b. **Bearing**. 500 mils left and right of the bearing of the adjusting gun to the registration point.

c. **Altitude**. Between the registration point and the target area — no limitation.

TIME REGISTRATION

145. Occasionally, it may be necessary to conduct a time registration. The following factors must be considered:

a. the limited amount of time ammunition available; and

b. the fact that the fuze correction of the moment (C of M) is adjusted automatically based on the results of each time mission engaged.

METHODS

146. There are two methods of registration, either of which may be conducted using airbursts or ground bursts.

a. **Adjustment onto a fixed point**. Normal adjustment procedures are followed using FIRE MISSION THREE GUNS. Upon breaking the 50 metre bracket, FFE is ordered to adjust the MPI onto the known coordinates, (the registration point).

b. **Fixation of the mean point of impact / mean point of burst (MPI/MPB)**. A single gun is fired at constant gun data. The MPI or MPB is fixed by the accurate observation of three usable rounds, using either two observers viewing the fall of shot from different positions, i.e., cross observation, or a radar set measuring bearing and distance to the bursts.

REGISTRATION BY ADJUSTMENT ONTO A FIXED POINT

147. This method is the most common one used by an observer since his own position does not need to be accurately fixed.

148. **Procedure**. See Figure 3-27.

a. Three guns converged are used to conduct the mission.

SER	OBSERVER'S ORDERS	NOTES
(a)	(b)	(c)
1	1, THIS IS 11; FIRE MISSION THREE GUNS; GRID 6392 4789; ALTITUDE 600; DIRECTION 4790; REGISTRATION; HE FOLLOWED BY TIME; ADJUST FIRE;	
2	RIGHT 70, ADD 200.	
3	DROP 100.	
4	ADD 50 1 ROUND FIRE FOR EFFECT. (Note 1)	1. The fire for effect in Serial 4 all impacted minus of the registration point.
5	ADD 50. REPEAT (Note 2)	2. Rounds at Serial 5 all impacted plus of the registration point.
6	RECORD AS REGISTRATION POINT ONE AT DROP 25	
7	TIME. ADJUST FIRE. (Note 3)	3. Fired at DROP 25.
8	UP 40 REPEAT	
9	RECORD AS TIME REGISTRATION POINT ONE. END OF MISSION. (Note 4)	4. The correct HOB was achieved in Serial 9.

Figure 3-27: Example of the observer's orders for a registration on a fixed point with HEPD and HE time

b. When the registration point is known by the GPO, the observer may order the target location as REGISTRATION POINT (number). If it is not known by the GPO, the observer shall order the grid reference to eight figures.

c. REGISTRATION will be ordered as the type of engagement.

d. CONVERGE is used by convention.

e. It is not necessary to include a target description.

f. Adjustment shall be carried out using one gun until a 100-metre bracket has been obtained, then "ONE ROUND FIRE FOR EFFECT" is ordered at the split of the short bracket.

g. Both limits of the short bracket (50 metres) will be verified; however, the registration point is ordered recorded at any time when two rounds are plus and one minus, or vice versa.

h. Should an ADD 50 produce all plus rounds and a DROP 50 all minus rounds, the observer may order "RECORD AS REGISTRATION POINT __AT ADD/DROP 25". Statistically, the 25-metre correction need not be fired; however, when also

conducting a TIME REGISTRATION, its opening rounds will be fired at that data.

j. The correction to fuze length may be determined when the MPI is correct by ordering TIME, ADJUST FIRE, measuring the MPB of the three bursts, and correcting the MPB to the required height of burst as shown in Figure 3-28

Ser	OBSERVATION	MPB LOCATION	CORRECTION
(a)	(b)	(C)	(D)
1	3 rounds graze	Below point of graze	Up 40
2	2 rounds graze 1 round air	Below point of graze	Up 20
3	2 rounds air 1 round graze	Correct	None, unless graze burst obviously incorrect then correct MPB
4	3 rounds air	Above point of graze	Correct MPB to 20 metres

Figure 3-28: Determining corrections to MPB

REGISTRATION OF AN MPI/MPB BY VISUAL CROSS-OBSERVATION

149. **General**. This method may be used as an alternative to the use of radar when the MPI or MPB method of registration is being carried out. Air bursts or ground bursts may be used. It is based on intersection, i.e., the fixation of an unknown point by observations taken at known points. Two observers are required. They must each have an optical instrument which has been fixed and oriented on the same grid as the gun to be used. The most suitable instrument is the BC's Telescope M65; however, an aiming circle or LRF will give satisfactory results. The observers will thereafter be referred to as OP1 and OP2.

150. **Conduct:**

a. The observer's positions must be surveyed on the same grid as the guns, and their accurate grid reference passed to the CP.

b. When communications are established with both the observers, the GPO shall indicate the area in which the registration is to be conducted. The observers in consultation with each other will select an appropriate point within the designated area, and OP1 will send the eight-figure grid reference of this point to the GPO or individual bearings to it from OP1 and OP2.

c. The point chosen shall be in such a location that the triangle formed by it and the two OPs is as close to being equilateral as possible. The angle OP1 — REGISTRATION POINT — OP2 must not be less than 150 mils. See Figure 3-29.

d. The GPO shall order OP1 to report vertical angle and both OPs to report when they are ready to observe. When the observers receive orders or reports from the GPO, OP1 shall read back and OP2 shall acknowledge.

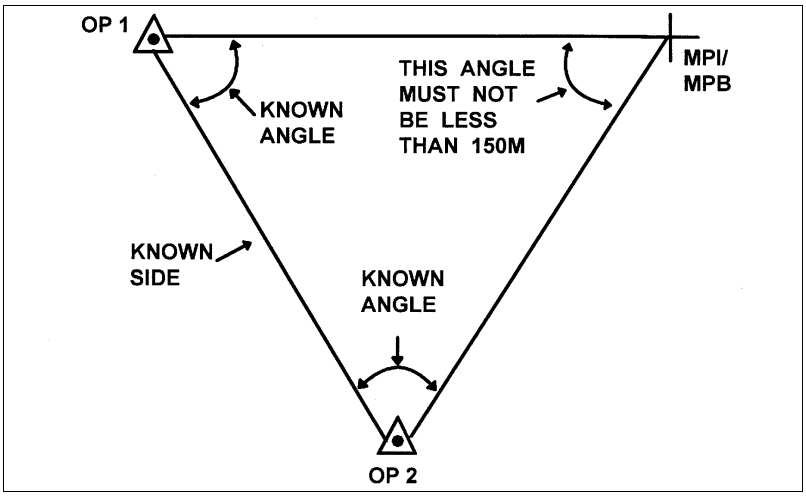


Figure 3-29: Layout of OPs and registration point for cross-observation

e. When the observers have reported "READY TO OBSERVE SIGHTING ROUND", and the gun has reported "READY", the GPO shall give the order FIRE.

f. Each observer shall lay the centre of the reticules of their instruments on the point of impact of the first round. They shall not change the orientation or elevation of their instrument again during the mission. (If this sighting round falls well outside the target area, OP1 may order a correction and a new sighting round will be observed. No great accuracy is required for this correction.).

g. The GPO shall then order the firing of successive rounds, each observer reporting after each round the bearing observed, and OP1 reporting the angle of sight. These values are determined using the instrument scales and the reticle pattern. If a round was not usable, REPEAT shall be ordered. A round is not usable if either observer considers that the burst is at the extreme end of the zone of the gun.

h. When three usable rounds have been observed, the observers shall each determine the mean of the three bearings they have recorded, and OP1 shall determine the mean of the vertical angles. Both these means shall be reported to the GPO as a check on his computations.

j. If the originator's orders specified that fuze C of M must also be determined, the following additional step shall be carried out using OP1 only. The GPO shall fire single rounds of HE time after raising Quadrant Elevation (QE) by 20/R until the MPB of three rounds fired at the same data is 20 metres above the registration point as adjusted by the observer.

k. The GPO shall order "RECORD AS REGISTRATION POINT _____. END OF MISSION."

REGISTRATION WITH LASER RANGE-FINDER

151. Registration missions are conducted to determine, by firing, the total correction for non-standard conditions including the observer's laser range-finder (LRF). A registration may be done quickly and efficiently utilizing the laser, provided the observer has been fixed and oriented. The following procedure is to be used:

a. An initial adjusting round is fired and lased.

b. The correction is ordered, with BATTERY RIGHT/LEFT ONE ROUND FIRE FOR EFFECT and an interval as a method. Each round is then lased.

c. If the distance from target centre to the computed MPI of the three rounds is greater than 25 metres, a correction coupled with REPEAT is ordered.

d. The target shall be recorded when the MPI is within 25 metres of the registration point.

OBSERVER'S ORDERS
1, THIS IS 11, FIRE MISSION 3 GUNS; DIRECTION 1510; DISTANCE 4650, UP 20 MILS; REGISTRATION POINT 1, ADJUST FIRE; DIRECTION 1530; DISTANCE 4690, BATTERY RIGHT; 10 SECONDS, 1 ROUND FFE; RECORD AS REGISTRATION POINT 1; END OF MISSION.

Figure 3-30: Example of an observer's initial orders registration with the LRF

REGISTRATION WITH GROUND SURVEILLANCE RADAR

152. With the introduction of ground surveillance radars like the Motion Sensing Target Acquisition Radar (MSTAR), the Canadian artillery can now use these devices to increase the accuracy of artillery fire. Since the radar itself is accurately located using global positioning instruments with P(Y) code which have an accuracy of less than 10 metres, the requirement for a known position for the target is irrelevant. The procedure used for this is based on that stipulated in B-GL-306(4), although in simplified form, since the MSTAR is simpler to use than a counter-weapon radar. Thus, the following procedure will be used:

a. fire mission three guns is sent and an eight-figure grid is used;

b. the direction ordered is 6400;

c. an initial adjusting round is fired and the cursor of the radar display is placed over the splash symbology and the correction is determined;

d. the exact correction is sent to the guns as displayed by the radar (e.g., L128 A429) together with one round FFE;

e. the observer watches the impact of the fire for effect on the radar display, and ensures that the MPI is superimposed upon the grid ordered. If the rounds are off target, then the corrections from the MPI to the target will be sent along with the order to repeat; and

f. when the rounds are on target, then the observer will order "RECORD AS RADAR REGISTRATION POINT ___ . END OF MISSION. ADOPT RADAR REGISTRATION POINT ____ ."

SECTION 15

WITNESS POINT PROCEDURE

GENERAL

153. A procedure known as the witness point procedure may be used to determine differences which have occurred in meteorological conditions. The procedure entails the re-engagement of a point previously engaged. On completion of the first engagement, the target and its associated gun data are recorded. On completion of the second engagement, the gun data are again recorded; the differences in gun data between the two engagements represent the changes which have occurred in meteorological conditions since the first engagement. The change in gun data can be applied to any target which was also engaged at the time of the first engagement of the witness point, provided it is within registration limits.

154. In effect, the witness point procedure is a modified form of registration. It is used for the re-engagement of previously adjusted targets to achieve surprise or when observation, i.e., air observation, which was available at the time of the registration or initial engagement is no longer available.

155. No survey information is required for witness point procedure; therefore, it is useful in poorly mapped country or in the early stages of deployment.

156. When a high order of target fixation is possible, registration is generally to be preferred to the witness point procedure. Registration does not require the previous recording of targets, and it produces more generally applicable information.

157. Witness point procedure may also be used in high angle fire.

PROCEDURE

158. Immediately after the original engagement of a target, a separate point, known as the witness point, is adjusted. When several targets are being adjusted, e.g., a fire plan, or a group of defensive fire (DF) targets, the adjustment of the witness point shall be carried out midway in the adjustment of the targets in order to minimize the effects of changing meteorological conditions. The fired data of the targets and of the witness point are recorded. The term WITNESS POINT is included in the call for fire under type of engagement and again in the orders for the recording of the target, e.g., "RECORD AS WITNESS POINT ZT 5362." See Section 16 of this chapter.

159. As closely as possible in time before the re-engagement of the target(s), fire is again adjusted onto the witness point. The fired data of the second engagement are then compared with those of the first.

LIMITATIONS

160. The target(s) and witness point must be adjusted and subsequently engaged by the same battery, firing from the same position, using the same charge and ammunition on all targets.

161. The target(s) must be within registration limits of the witness point.

162. The batteries which apply the witness point correction must be on a common grid or have engaged the witness point.

SECTION 16

LASER POINT MISSIONS

GENERAL

163. Laser point missions are conducted to determine corrections for non-standard conditions to be applied to a specific group or series of targets that meet registration criteria, less projectile and propellant types. The method of adjustment is the decision of the observer based on visibility. Laser point corrections shall not normally be circulated above regimental level.

164. When adjusting more than one fire unit, the observer has two choices:

g. if all batteries are within registration parameters, the observer can adjust one battery onto the laser point and then have that battery circulate the data and see check rounds from the other batteries; or

h. adjust and record each battery individually onto the laser point. This gives the greatest guarantee of accuracy and allows better flexibility.

165. **Selection of the laser point**. It is be emphasized that while having the laser point as one of the targets in a fire plan is desirable, it is not essential. The first priority for the selection of a laser point must be good command of the ground near the lasing point so that time will not be wasted lasing rounds which are obstructed by terrain or dead ground.

166. **Type of engagement**. Where the target description does not specify this clearly, LASER POINT shall be stated with the type of engagement, e.g., "ADJUSTING LP ZP 4601".

167. **Numbering laser points**. Laser points will be allocated a number by the observer from the allotted target block to identify it for future use, e.g., "RECORD AS LP 4601". In some instances, the observer may choose to adjust a target for future engagement as a laser point. If so, the observer will indicate that intentions by ordering "RECORD AS LP ZP 4601."

168. If the observer cancels a target record which has also been recorded as a laser point, the laser point remains. Similarly, if the observer cancels the laser point, the target record remains unless specifically cancelled. Examples of each circumstance are as follows:

a. laser point cancelled by CANCEL LP 4601;

b. target record cancelled by CANCEL ZP 4601; and

c. both laser point and target record cancelled by CANCEL LP ZP 4601.

169. **Cancellation of a laser point**. A laser point shall be cancelled under the following circumstances:

a. on receipt of the order CANCEL LP 4601;

b. when the battery moves; and

c. change of grid.

170. An example of such a mission follows:

Ser	OBSERVER'S ORDERS	REPORTS
1	FM REGT 3 GUNS DIR 1080, DIST 3420, UP 20 COY DUG IN RAD 200 ADJ LP ZT 4601 1 ADJ FIRE	1 SHOT
2	DIR 1080, DIST 3500, AMC 1 RD FFE	CC1, READY
3	1 FIRE	1 SHOT
4	1 RECORD AS TGT, 2 FIRE	2 SHOT
5	2 RECORD AS TGT, 3 FIRE	3 SHOT
6	3 DIR 1090, 3 DIST 3480 3 1 RD FFE, 4 FIRE	4 SHOT, 3 READY
7	4 RECORD AS TGT, 3 FIRE	
8	3 RECORD AS TGT	
9	ADOPT LP ZT 4601, EM	

Figure 3-31: Example of the observer's orders for a laser point mission

APPLICATION OF LASER POINT

171. Only the observer who originated a particular laser point shall order its adoption. The GPO will no longer select and apply the correction automatically. To adopt a laser point, the observer shall order ADOPT LP 4601. The laser point is then in effect until cancelled or by ordering CANCEL ADOPT LP 4601.

172. If the observer wishes a particular laser point applied to a group of targets, for instance during a fire plan, ADOPT LP 4601 FOR IRON FIST shall be ordered If the LP is outside the appropriate limits, the GPO shall inform the observer of this fact. Upon cancellation of the fire plan, application of the laser point lapses.

APPLYING LASER POINT PROCEDURE TO SURVEILLANCE AND TARGET AQUISITION EQUIPMENT

173. Due to the narrow field of view of many observation devices, use of these devices for the adjustment of artillery fire may be impractical. One way to increase the success of a fire mission using these devices is to employ the laser point procedure.

174. This procedure can be applied to all observation devices that have pointing accuracies of 20 mils or better and are capable of measuring distance. These systems include the following:

a. night observation device long range (NODLR) with goniometer;

b. light armoured vehicle (LAV) reconnaissance turret sighting systems;

c. LAV reconnaissance STA optics (either mast or tripod mounted); and

d. future observers target acquisition system equipment.

PROCEDURE

175. The following procedure will be applied:

a. if possible, during daylight hours, any boresighting between optical and thermal instruments will be done using objects that are ideally at the same range as the target area;

b. a laser point mission will be conducted prior to last light;

c. the laser point will be adopted;

d. targets will be engaged using polar coordinates procedure using the applicable STA device; and

e. the laser point will remain in effect until new meteorological data is adopted, or if the guns move.

176. Providing this procedure is applied, the guns do not move, and the meteorological conditions do not change, then the FOO can use the STA equipment with an increased likelihood of success.

SECTION 17

ADJUSTMENT FOR FUTURE ENGAGEMENT

INTRODUCTION

177. Adjustment for future engagement is undertaken so that subsequent FFE may be more accurately applied than by unobserved predicted fire.

178. Two situations may arise that will determine the procedure to be used.

a. **Adjustment to determine current gun data**. This procedure is carried out to determine, by firing, the gun data necessary to engage the target within the current meteorological period.

b. **Adjustment to determine coordinates**. This procedure is carried out to determine, by firing, the coordinates of the target for circulation to other fire units.

ADJUSTMENT TO DETERMINE CURRENT GUN DATA

179. **Number of guns**. Ideally, all the guns that will eventually engage the target at FFE shall be used during adjustment. It will not always be possible to use all the guns during adjustment and the number of guns (Figure 3-32) to be used will depend upon:

Ser	SIZE OF FIRE UNIT TO ENGAGE AT FFE	NUMBER OF GUNS TO BE USED DURING ADJUSTMENT			
		ADJUSTING BATTERY		OTHER FIRE UNITS	
		OPTIMUM	MINIMUM	OPTIMUM	MINIMUM
(a)	(b)	(c)	(d)	(e)	(f)
1	BATTERY	6	3	-	-
2	REGIMENT, OR TWO OR MORE BATTERIES IN A REGIMENT	6	3	ALL GUNS	3 GUNS PER BATTERY
3	DIVISION OR ABOVE	6	3	ONE BATTERY FROM EACH REGIMENT	3 GUNS FROM ONE BATTERY FROM EACH REGIMENT

Figure 3-32: Guide for determining the number of guns for adjustment for current gun data

a. availability of guns and ammunition;

b. time available;

c. degree of importance of the target to the tactical plan;

d. the state of survey;

e. the size and shape of the target;

f. the proximity of our own troops to the target at the time FFE will be applied; and

g. the degree of surprise desired in FFE.

180. Procedure by the observer

a. **Call for fire**. The call for fire shall be ordered in the normal manner except for the following:

(1) the observer may specify in the warning order the exact number of guns required from each fire unit, e.g., "FIRE MISSION REGIMENT. CALL SIGNS 2 AND 3, THREE GUNS."

(2) the observer shall indicate the type of engagement by specifying one of the following:

(a) ADJUSTING (target number),

(b) ADJUSTING WITNESS POINT (target number), or

(c) ADJUSTING LASER POINT (target number).

b. **Conduct of adjustment**. See Figure 3-33. The adjustment shall be carried out in the normal manner until a suitable short bracket or target round is obtained. The observer shall then order each participating fire unit to fire one round in adjustment or FFE depending upon the nature of the target and the number of guns required from each unit. When adjusting with more than one fire unit, each fire unit, in sequence, shall be adjusted onto the target, ordered to record the target and then give END OF MISSION. If the fire units are being adjusted onto different points in the target area, a different target number will be assigned to each point.

ADJUSTMENT TO DETERMINE COORDINATES

181. This procedure shall be used when it is necessary to determine accurate coordinates of the target for circulation to other fire units. These fire units may later determine predicted gun data using the current registration or meteorological corrections at the time of engagement. The size of the fire unit to adjust the target will be three guns.

182. Procedure by the Observer. See Figure 3-34.

a. **Call for fire**. The call for fire shall be ordered in the normal manner except that the observer shall:

(1) indicate the type of engagement by specifying "ADJUSTING (target number)", or

(2) order "CONVERGE."

b. **Conduct of adjustment**. The observer shall use one gun for adjustment until a 100-metre bracket or a target round is obtained, and then use the remaining guns to adjust the MPI employing registration procedures. The target will be recorded at a correction of ADD/DROP 25.

Ser	OBSERVER'S ORDERS	RCPO'S REPORTS	NOTES
(a)	(b)	(c)	(d)
1	∅, CC1, THIS IS 19 FIRE MISSION REGIMENT 2 AND 3, THREE GUNS (Note 1)		1. The mission is being conducted by an authorized observer with a three-battery regiment. Six guns are required from the adjusting battery and three guns from each of the other batteries.
2	GRID 452 362, ALTITUDE 320, DIRECTION 1220		
3	COMPANY POSITION, RAD 200		
4	ADJUSTING ZT 5621 (Note 2)		
5	1 ADJUST FIRE	1 SHOT 2	2. The observer gives the target number to be used when the target is recorded.
6	ADD 200	1 SHOT	
7	DROP 100, 1 ONE ROUND FIRE FOR EFFECT.	1 SHOT ROUNDS COMPLETE	
8	1 RECORD AS TARGET, 1 END OF MISSION.	(Note 3)	3. All rounds land in the target area.
9	2 ONE ROUND FIRE FOR EFFECT.	2 SHOT (Note 3)	
10	2 RECORD AS TARGET, 2 END OF MISSION.		
11	ONE ROUND FIRE FOR EFFECT.	SHOT (Note 4)	4. C/S 3 is the only fire unit remaining on the mission.
12	ADD 100, REPEAT.	SHOT (Note 5)	5. All rounds land in the target area.
13	RECORD AS TARGET, END OF MISSION.		

Figure 3-33: Example of a regimental fire mission, adjustment for gun data

Ser	OBSERVER'S ORDERS	GPO'S REPORTS	NOTES
(a)	(b)	(c)	(d)
1	1, THIS IS 11, FIRE MISSION THREE GUNS; GRID 7651 4314; ALTITUDE 200; DIRECTION 4820; ADJUSTING ZT 1364; CONVERGE, ADJUST FIRE.		
2		SHOT 2, 26	One gun adjusts fire
3	RIGHT 50 DROP 400.	SHOT	
4	ADD 200.	SHOT	
5	DROP 100.	SHOT	
6	ADD 50, 1 ROUND FIRE FOR EFFECT.	SHOT, RC	All rounds plus
7	DROP 50, REPEAT.	SHOT, RC	All rounds minus
8	RECORD AS TARGET AT ADD 25, END OF MISSION.		

Figure 3-34: Example of a fire mission to determine coordinates

CHAPTER 4

NON-ARTILLERY FIRE SUPPORT

SECTION 1

ARMOURED FIGHTING VEHICLES AND DIRECT FIRE EQUIPMENT

GENERAL

1. Armoured fighting vehicles (AFVs) and other direct fire equipment are seldom formally included in fire plans; the supported arm commander normally retains them under his own control. Artillery advisors must be aware of their characteristics so that they can advise on how their fire can best be coordinated to complement that from other sources. Thus, the 2000-metre plus range of the 25 mm cannon may be used to neutralize small targets, and the 84mm Short Range Anti-Armour Weapon (Medium) (SRAAW(M)) may be used to provide illumination.

2. AFVs are most valuable in this role because of their indirect fire capabilities; however, the following characteristics must be given special consideration when planning the use of their fire:

a. limited ammunition stowage — dumping may be necessary;

b. fixed charge;

c. high rate of fire;

d. flat trajectory (at short range);

e. types of projectiles available for each weapon systems;

f. state of survey; and

g. short barrel life (although barrels are easily and quickly changed in the field).

SECTION 2

INFANTRY MORTARS

GENERAL

3. Fully effective indirect fire support can only be achieved when the resources of both guns and infantry mortars are efficiently integrated into the tactical plan. This objective can be met if all artillery OPs and mortar platoon fire controllers (MFCs) are completely conversant with the other arm's characteristics and experienced in calling each others' fire.

ORGANIZATION

4. The connecting link between guns and mortars is the FSCC at battle group headquarters; calls for mortars by OPs, or artillery fire by MFCs will be channelled through it. Indirect fire nets will be used for these calls; infantry command nets will only be used if no other means are available.

5. While mortar platoon organizations may vary from battalion to battalion, they are all established similarly with two MFCs and eight medium mortars, which are divided into two groups of four. The platoon has all the necessary mobility and communications to enable it to function efficiently as a part of the battle group.

INFANTRY MORTARS

6. Mortars have the following characteristics relative to guns (see Figure 4-1):

   a. high angle fire;

   b. longer time of flight; and

   c. higher rate of fire.

FIRE DISCIPLINE

7. Canadian mortars use Canadian artillery fire discipline. The only exception is that the splash report is not sent.

FIRE MISSIONS

8. Normal target grid procedure is used for the engagement of targets. FFE is entered at the split of the 100-metre bracket.

9. The required rates of fire for smoke missions with 81mm mortars are approximately the same as for 105mm howitzers. It should be noted that red phosphorus (RP) is extremely ineffective and planning figures are to be doubled.

10. The 81mm mortar illuminating bomb produces light for about 30 seconds. HOB is 250 metres. The illuminated area has a diameter of 600 metres.

EQUIPMENT	TYPE OF AMMUNITION	MAXIMUM RANGE	RATES OF FIRE	REMARKS
81mm Mortar (US Ammo)	HE	3500	Expressed as Rate 1 etc.	Basic load, approximately 120 rounds of mixed types; 80% HE, 10% Smk, 10% Illum; 25 VT fuzes.
	RP	2100	Slow - R4 Normal - R8 Rapid - R12	
81mm Mortar (UK Ammo)	Illum	2100		
	HE	4450	As Above	As Above
	RP	4450		
	Illum	3300		
60mm Mor	HE	800	Normal 18	Hand-held. Integral to rifle platoons rather than the mortar platoon.
	RP	800	Rapid 25	
81mm Mor	HE C70A1	4782	As for US ammo	
	Illum C105	5367		
	Smk C106	5425		

Figure 4-1: Mortar statistics

11 Recent developments in mortar ammunition have resulted in a wide variance of projectile maximum range. As a result, it is best to utilize the firing tables provided with each lot of ammunition when planning for the employment of infantry mortars.

RECORDED TARGETS

12 Blocks of target numbers will be allotted to the mortar platoon by the affiliated battery as required. The prefix ZM is usually used.

13 Copies of all target lists will be given to the mortar platoon by the BC at the FSCC. Since the platoon does not have the facilities for maintaining data for large numbers of targets, the FSCC will determine which ones will be kept current. However, the platoon can normally keep current all targets within range.

EMPLOYMENT

14. The BC must be ready to give advice on the deployment of both MFCs and mortars. The mortars are to be deployed so that their fire complements the coverage of the artillery. They shall be able to fire into any part of the battle group area which can be reached by only a few guns, and they shall be able to reinforce available artillery fire during an advance or withdrawal.

15. It is not normal for one unit to use mortar fire support from a neighbouring unit. However, on some operations, such as those undertaken by light formations where little additional support is available, this extra mortar firepower may be extremely valuable to assist in a battle group tactical plan. Such supporting fire will be arranged on an FSCC-to-FSCC basis, with the concurrence of both supported arm commanders.

SECTION 3

NAVAL GUNFIRE SUPPORT

GENERAL

16 Naval gunfire support (NGS) is required to replace artillery support initially in amphibious operations or to reinforce artillery in coastal operations. In either case, the navy retains responsibility for command and control. Naval gun fire shall be requested only when targets cannot be adequately engaged by field artillery or aircraft.

17. Spotters (observers) may be attached to the supported unit for the purpose of controlling naval gunfire — this will often be the case when working with allies. For purely Canadian formations, FOOs will be given this task.

18. The abbreviated procedures shown in this chapter are based on ATP 4 (B*), Allied Spotting Procedure For Naval Gunfire Support*. Personnel specializing in NGS must be thoroughly familiar with this reference.

CHARACTERISTICS

19. **Advantages:**

a. **Mobility**. Within the limits imposed by hydrography, a firing ship may be positioned for the best support of the troops. This ability to manoeuvre allows the selection of the most favourable line GT, and is an important factor when planning for the support of widely separate beaches.

b. **Rate of fire**. The large volumes of fire which can be delivered in a relatively short period of time is a distinct advantage when delivering neutralization fire. This high rate of fire is due to power loading and mechanical hoisting equipment. In some of the newer ships the entire process from magazine to muzzle is completely automatic.

c. **Fire control equipment**. Precision fire control equipment permits accurate fire, both direct and indirect, to be delivered in support of the landing force or forces ashore. Fire can be delivered while the ship is either under way or at anchor.

d. **Variety of guns**. A variety of guns, varying from 3-inch to 16-inch, may be available to permit selection of the type best suited to the mission.

e. **Ammunition**. The different types of projectiles and fuzes available in most of the guns permits selection of the optimum combination for the engagement of the target.

f. **High velocity**. The high muzzle velocity of the naval gun makes it suitable in the direct fire role for the penetration and destruction of targets, particularly those presenting an appreciable vertical face.

20. **Disadvantages:**

a. **Communications**. All communications between the ship and the shore are dependent on radio. This single means of communication is susceptible to interruption by equipment limitations, EW and unfavourable atmospheric conditions.

b. **Changing line GT**. When the ship is firing while under way, the line of fire may change relative to the Forward Edge of the Battle Area (FEBA). Under certain conditions, this can cause cancellation of the fire mission because of the danger to friendly troops or due to intervening ground which will not permit engagement of the targets.

c. **Ammunition capacity**. Magazine capacity of fire support ships is limited. While a relatively high percentage of total ammunition is made available for gunfire support, some must be retained for protection against air or surface attack.

d. **Hydrography**. Unfavourable hydrographic conditions such as shallow waters, reefs, shoals, etc., may force the firing ship to take an undesirable firing position with respect to the target area. The presence of mines may dictate initial firing positions farther from the target area than desirable.

e. **Weather and visibility**. Bad weather and poor visibility make it difficult to determine ship position by visual means.

21. **Other characteristics**. The following characteristics of naval gunfire are advantageous in some respects, but disadvantageous in others:

a. **Flat trajectory**. The relative flat trajectory of the naval gun results in accuracy which is essential for destruction missions. This flat trajectory, however, is unsuitable for the attack of targets in defiladed positions, and restricts the attack of targets close to the FEBA when the line GT passes over friendly troops.

b. **Dispersion pattern**. The long narrow range pattern is particularly effective when fire can be brought to bear upon the long axis of the target. It allows fire to be brought close to friendly troops when the line GT parallels the line of troops. However, the dispersion pattern also reduces the degree of closeness to which fire may be safely delivered when the line GT is not parallel to the front lines and may endanger friendly troops if the ship is firing while under way.

CHARACTERISTICS OF NAVAL GUNS AND AMMUNITION

22. Because of the possible differences in ship configuration and changes in armament, the type and number of guns and the ammunition capacity of each ship should be determined early in any operation. This information is normally given in the operation order placing ships in support of land units and formations.

23. Naval gun nomenclature stipulates both barrel size and length. Thus for a 5"/54 gun, 5 inches is the diameter of the bore (land to land) and 54 is the barrel length in calibres. Statistics on common naval guns are given in Figure 4-2.

24. Naval guns can fire armour-piercing, HE, WP, and illuminating ammunition. Fuzes available are: base and point (quick and delay) detonating, mechanical time, and proximity.

GUN		MAXIMUM HORIZONTAL RANGE (metres)	VERTICAL RANGE (metres)	RATE	
				RAPID	SUSTAINED
(a)		(b)	(c)	(d)	(e)
3"/50		12740	9100	45	20
3"/70		17600	16600	90	60
5"/54		26500	15600	40	20
MK 42	5"/54	23500	15500	18	12
M39	6"/47	21000	7500	10	10
	8"/55	27000	8000	4	3
76mm		12700	-	80	NA

NOTES:
1. RAPID - the maximum rate of fire which can be maintained for a five minute period.
2. SUSTAINED - the maximum rate of fire which can be maintained for an extended period (1 to 1-1/2 hours).
3. 76mm equipped units not normally assigned NGS missions except in extraordinary circumstances.

Figure 4-2: Naval gun characteristics

ALLOCATION OF FIRE SUPPORT SHIPS

25. Ships are allotted in the same way as artillery units. When ships are placed in DS or in support of a formation or unit, the selection of targets, the timing of fire on the targets, the specification of the lines of fire (when consistent with safe navigation), and the adjustment of fire are functions of the supported formation or unit.

26. The Naval Officer in Tactical Command (OTC) commands the fire support ships from the Supporting Arms Coordination Centre (SACC) in the command ship, and allots tasks to ships in response to requests for NGS.

COMMUNICATIONS

27. Special radios may have to be provided to either the ships or the land troops in order to establish communications. This point must be clarified early in the planning stages for an operation and coordinated by the combined arms headquarters.

28. **Nets**. Specific naval gunfire communications nets (Figure 4-3) are established as follows:

a. **Naval gunfire control net**. The OTC uses this net to control and coordinate all NGS agencies. This net includes all fire support ships, designated headquarters ashore and spotters (observers). The net enables the OTC to:

(1) assign fire support ships to spotters,

(2) relieve or reassign fire support ships,

(3) pass on information and intelligence affecting NGS,

(4) receive shore requests for support, and

(5) request the services of an airborne spotter.

b. **Naval gunfire ground spotting net**. A ground spotter who is assigned to a support ship uses this net to call for and adjust naval gunfire. The ground spotter calls the assigned ship to establish the net.

c. **Naval gunfire airborne spotting net**. This net is the equivalent of the previous one for an airborne spotter.

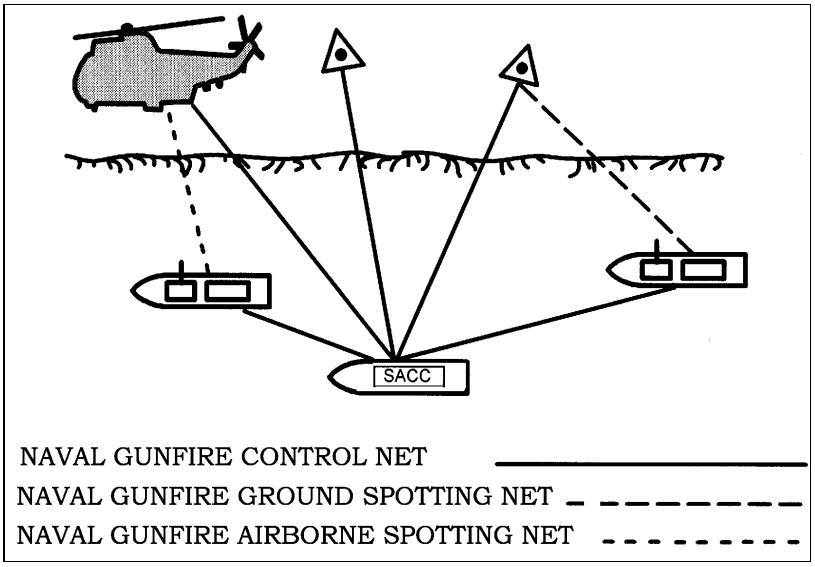


Figure 4-3: Naval gunfire nets

29. **Call signs and frequencies**. The call signs and frequencies for spotters, Liaison Officers (LOs) and fire support ships will be detailed in the operation order. It is essential that each naval gunfire spotter, LO and ship be furnished with a list of call signs and frequencies assigned to all naval gunfire forces.

REQUEST FOR FIRE SUPPORT

30. A request for naval gunfire by ordinary ground spotters will be passed to the SACC on the naval gunfire control net using the form in Figure 4-4; the letter sequence must be followed.

In response to such a request, the SACC will allot the fire of a support ship using the form given in Figure 4-5, addressed to both the spotter and the ship concerned. An example of this procedure is given in Figure 4-6.

A	Target number
B	Task (location and description)
C	Time and duration
D	Position of forward troops
E	Special instructions

Figure 4-4: NGS request form

A	Target number
B	(Ship's call sign) work with (spotter's call sign)
C	Circuit (spotting frequency)
D	Voice/CW
E	Estimated volume of fire required
F	Time period during which ship is allocated

Figure 4-5: Allotment message

UNALLOTTED SPOTTER (Call Sign GB)	**OTC (Call Sign MW)**	**NGS SHIP (Call Sign ZX)**
(a)	(b)	(c)
(1) MW. THIS IS GB. GUNFIRE REQUEST. A. TARGET NUMBER 6362. B. MACHINE GUNS 1047. C. 200900Z TO 201100Z. D. NO CHANGE. E. REQUEST LIGHT CRUISER, OVER. (See Note 1)		
	(2) GB. THIS IS MW. GUNFIRE REQUEST. A. TARGET NUMBER 6362. B. MACHINE GUNS 1047. C. 200900Z TO 201100Z. D. NO CHANGE. E. REQUEST LIGHT CRUISER. OUT.	
	(3) ZX, BG. THIS IS MW. A. TARGET NUMBER 6362. B. ZX WORK WITH GB. C. SPOTTING NET 2. D. VOICE. E. 20 ROUNDS. F. NOW UNTIL 2001100Z. OVER. (See Note 2)	

UNALLOTTED SPOTTER (Call Sign GB)	OTC (Call Sign MW)	NGS SHIP (Call Sign ZX)
(a)	(b)	(c)
		(4) MW. THIS IS ZX. A. TARGET NUMBER 6362. B. ZX WORK WITH GB. C. SPOTTING NET 2. D. VOICE. E. 20 ROUNDS. F. NOW UNTIL 201100Z. OUT
(5) MW THIS IS GB. ROGER OUT.		
NOTES: 1. Request for support. 2 Allotment message.		

Figure 4-6: Example of a request for support and an allotment message

31. Once allotted a ship, the spotter will pass the call for fire directly to it on the frequency assigned in the allotment message. When a ship has been placed in DS of a shore unit, the spotter with that unit need not formally request its fire, but may call directly on the assigned frequency. Response time will be approximately as fast as a DS artillery unit in this case.

32. Observers who are not tasked as NGS spotters are not on the naval gunfire nets, and pass their requests and calls for fire to higher headquarters on the normal artillery nets. Response time in this case would roughly equal that required for a divisional artillery target fire by an unauthorized observer.

FIRE MISSIONS

33. **Fire discipline**. Generally, the fire discipline used for gunfire support is the same as that for artillery fire, and normal orders may be sent. Specific differences are discussed below.

a. **Target number**. The spotter will always include a target number in his warning order.

b. **Location of the target**. Target location is given using grid coordinates, the spotter shall specify the unit of measurement being used (feet/yards/metres, mils/degrees, grid/magnetic). The altitude of the target must be included.

c. **Target distance**. Distances and corrections are understood to be in metres unless otherwise specified. Direction can be ordered in TRUE/mils T or MAG/mils N.

d. **Method of engagement:**

(1) **DANGER CLOSE**. If friendly forces are within 1000 metres of the target for guns 6 inches or larger, or 750 metres for guns smaller than 6 inches, the term DANGER CLOSE is used. The spotter will order a correction which will place the opening salvo no closer than 750 metres

for less than 6-inch guns or 1000 metres for 6-inch or larger guns from friendly troops; e.g., "DANGER CLOSE, SOUTHEAST 600, LEFT 600, ADD 400."

(2) **Trajectory**. Reduced charge and/or high angle are available to some guns to allow a higher trajectory, though Canadian ships do not have this capability.

e. **Method of fire and control:**

(1) **Method of fire:**

(a) **Number of guns.** The spotter specifies the number of guns to be used in adjustment and in FFE; if the number of guns for FFE is not specified, it is understood to be the same number as used in adjustment. When firing guns larger than 6-inch calibre, the spotter will normally adjust with one gun. When firing the guns of 6-inch calibre or less, the spotter will normally adjust with one gun for destruction missions and two guns for neutralization missions.

(b) **Armament.** When a multi-armament ship is providing the support, the spotter will specify the armament (main or secondary) desired for adjustment and FFE; the same armament will be used for both.

(2) **Method of control.** The spotter will order the method of control of fire. However, the firing ship may initiate direct fire, with the spotter's concurrence, by ordering "SHIP ADJUST" whenever the target indicated by the spotter is positively identified and is visible from the ship. The methods of control of fire are:

(a) **Spotter adjust.** The spotter will direct the adjustment of all rounds onto the target. This is the standard method and no command of "ADJUST FIRE" is necessary.

(b) **Ship adjust.** The spotter may order "SHIP ADJUST" if the spotter considers that the ship is in a better position to spot. The spotter designates the target in the normal manner, but the ship spots and adjusts its own fire. The spotter shall assist the ship if possible by providing line GT range spots**,** since a ship may experience difficulty adjusting for range.

(c) **Cannot observe.** The spotter transmits "CANNOT OBSERVE" to the ship when requesting fire on a target at a given location but which is not visible either to the spotter or to the ship. Only important area targets can be engaged profitably by this method of

control because critical adjustment of the fire will not be possible. The spotter must indicate in the call for fire the volume of FFE.

(d) **FFE.**

(e) **AMC**.

f. **Miscellaneous orders by the spotter**:

(1) **LOST.** While the spotter will normally order corrections for unobserved rounds, the spotter may report "LOST "to the ship. The ship will make the next salvo visible by either:

(a) applying a logical correction, or

(b) if visibility is bad, firing a multi-gun salvo or a smoke projectile.

(2) **LARGE SPREAD.** This order indicates that the spread is excessive. The spotter shall also indicate the direction and magnitude of the large spread to aid the ship in correcting its fire control problems.

(3) **TREND.** TREND is reported if salvos are observed to be creeping off or away from the target; e.g., TREND SW.

(4) **TARGET.** This may be reported when a salvo falls on the target.

(5) **STRADDLE.** This may be reported when a multi-gun salvo straddles the target. It may also be followed by a correction to place the MPI squarely n the target.

(6) **(Number) GUNS (number) SALVOS**. This order indicates the number of guns to be used for each salvo and the number of salvos required.

(7) **FRESH TARGET**. This indicates that a new target will be fired using the information gained in the adjustment of the preceding target. The spotter follows the words FRESH TARGET with an abbreviated call for fire in which the location of the new target is given as a correction from the last round fired on the old target. The spotter then transmits the new target's description followed by each remaining element in the call for fire when it differs from that contained in the original call for fire. If the bearing of the spotting line to the new target differs by more than 10 mils from the old bearing, it is transmitted to the ship, but not until after the ship has fired the initial salvo on the new target. The spotter may immediately call for FFE provided that the fresh target is no more than 1000 metres right or left of the GT line.

(8) **MIXED.** MIXED indicates that a multi-gun salvo contains both air and impact burst.

(9) **END OF MISSION**. This order may be given by either the spotter or the ship.

(10) **RECORD AS TARGET**. This order indicates that more fire on that target may be required. Unless the ship is at anchor or moving slowly, it will normally be impossible to record a target.

g. **Reports by the ship:**

(1) **GT LINE.** The GT bearing (in degrees or mils, true, magnetic or grid) is reported by the ship as soon as it is known and prior to opening fire.

(2) **DELAY** (Estimate of time in minutes). This report indicates that the ship will not be ready to fire until the given time has elapsed. If the report is made during an adjustment, it is subsequently followed by READY.

(3) **FIRST SALVO AT (Point of aim).** This report is sent when the spotter has included DANGER CLOSE in the call for fire.

(4) **SUMMIT** (Maximum Ordinate) in feet, yards or metres. This report is always given if the spotter is airborne.

(5) **WILL NOT FIRE.** This report signifies that the ship is unable to fire for safety or other reasons, e.g., when the ship is under attack.

34. **Sequence of** sending the initial call for fire. The spotter's sequence of initial orders is given in Figure 4-7.

Ser	SPOTTER'S CALLS FOR FIRE	EXAMPLE
(a)	(b)	(c)
1	Spotter identification	ZX THIS IS GB
2	Warning order and target number	FIRE MISSION, TARGET NUMBER 1048
3	Location of target	GRID 637 452, ALTITUDE 150 FEET
4	Direction	DIRECTION 1740 MILS GRID
5	Description of target	INFANTRY PLATOON DUG IN 150 x 100 METRES ATTITUDE 0850 MILS GRID
6	Type of Adjustment	DANGER CLOSE NW 700, L800
7	Trajectory	REDUCED CHARGE (NOT CANADIAN)
8	Ammunition	VT
9	Method of Fire	2 GUNS MAIN ARMAMENT
10	At My Command	AT MY COMMAND
11	Method of Control	SPOTTER ADJUST
NOTE: Obligatory orders are underlined.		

Figure 4-7: Spotter's sequence for the initial call for fire

35 **Adjustment of fire**. Normal target grid procedure is used to adjust the fire. The dispersion pattern of naval guns is large, and for area targets adjustment is normally carried out until a 200-metre bracket is established. However, the bracket established before FFE may occasionally be greater or smaller than 200 metres to suit either the target size or the ship's fire control system.

36 **FFE**. The spotter specifies the number of guns per salvo and the number of salvos; e.g., "TWO GUNS, SIX SALVOS, FIRE FOR EFFECT". The spotter must know the number of mounts on the firing ship, and the number of barrels per mount, in order to know the maximum of guns available for a salvo.

37 **Illumination**. The HOB illuminating round is approximately 500 metres, and the rate of descent is 10 metres per second. Illumination diameter is 500 metres. The spotter shall specify the line of fire so that empty carrier shells do not endanger friendly troops. Adjustment is done as for a normal artillery illumination mission.

38 **Destruction Fire**. Destruction fire will be more accurate and target destruction will be achieved more quickly if the target is visible from the firing ship and if the ship is anchored or otherwise maintaining a fixed position. Hence the SHIP ADJUST procedure will normally be used.

39 **Example**. An example of a complete fire mission is given in Figure 4-8.

SPOTTER	SHIP
(a)	(b)
(1) ZX. THIS IS GB. FIRE MISSION. TARGET NUMBER 5040. OVER.	
	(2) GB. THIS IS ZX. FIRE MISSION. TARGET NUMBER 5040. OUT. (Note 1)
(3) GRID 324 796. ALTITUDE 300 FEET. DIRECTION 2420. OVER. (Note 2)	
	(4) GRID 324 796. ALTITUDE 300 FEET. DIRECTION 2420. OUT.
(5) 10 APCs. RADIUS 100 METRES. ATTITUDE 1850 MILS GRID. DANGER CLOSE NE 800 METRES. LEFT 400, DROP 300. OVER. (Notes 3 and 4)	
(6) 10 APCs. RADIUS 100 METRES. ATTITUDE 1850 MILS GRID. DANGER CLOSE, NE 800 METRES. LEFT 400, DROP 300. OUT.	
(7) 2 GUNS. MAIN ARMAMENT. AT MY COMMAND. SPOTTER ADJUST. OVER. (See Note 5)	
	(8) 2 GUNS MAIN ARMAMENT. AT MY COMMAND SPOTTER ADJUST. OUT.

SPOTTER	SHIP
(a)	(b)
	(9) GUN-TARGET LINE 085 DEGREES MAGNETIC. FIRST SALVO AT LEFT 400. DROP 300. OVER.
(10) GUN-TARGET LINE 085 DEGREES MAGNETIC. FIRST SALVO AT LEFT 400, DROP 300. OUT.	
	(11) READY. 15. OVER.
(12) READY. 15. FIRE. OVER.	
	(13) FIRE. OUT
	(14) SHOT-SPLASH. OUT. (Note 6)
(15) RIGHT 400, ADD 400. OVER.	
	(16) RIGHT 400. ADD 400. OUT.
	(17) READY. OVER.
(18) READY. FIRE. CANCEL AT MY COMMAND. OVER.	
	(19) FIRE. CANCEL AT MY COMMAND. OUT.
	(20) SHOT-SPLASH. OUT.
(21) DROP 200. OVER.	
	(22) DROP 200. OUT.
	(23) SHOT-SPLASH. OUT.
(24) RIGHT 100. ADD 100. 4 GUNS ONE SALVO. OVER. (Notes 7 and 8)	
	(25) RIGHT 100. ADD 100. 4 GUNS ONE SALVO. OUT.
	(26) SHOT-SPLASH. OUT.
(27) RIGHT 100. 4 GUNS 4 SALVOS. FIRE FOR EFFECT. OVER.	
	(28) RIGHT 100. 4 GUNS 4 SALVOS. FIRE FOR EFFECT. OUT.
	(29) SHOT-SPLASH. OUT.
	(30) ROUNDS COMPLETE. GUN-TARGET LINE 095 DEGREES MAGNETIC. OVER.
(31) ROUNDS COMPLETE. GUN-TARGET LINE 095 DEGREES MAGNETIC. OUT.	
(32) FRESH TARGET. TARGET NUMBER 5041. LEFT 800. DROP 400. INFANTRY PLATOON. NO DANGER. 4 GUNS 2 SALVOS. FIRE FOR EFFECT. OVER.	
	(33) FRESH TARGET. TARGET NUMBER 5041. LEFT 800. DROP 400. INFANTRY PLATOON. NO DANGER. 4 GUNS 2 SALVOS. FIRE FOR EFFECT. OUT.
	(34) SHOT-SPLASH ROUNDS COMPLETE. OVER.
(35) ROUNDS COMPLETE. OUT.	

SPOTTER	SHIP
(a)	(b)
(36) APCs AND INFANTRY DISPERSING. ESTIMATE 20 CASUALTIES. END OF MISSION. OVER.	
	(37) APCs AND INFANTRY DISPERSING. ESTIMATE 20 CASUALTIES. END OF MISSION. OUT.

NOTES:
1. After the initial call for fire, call signs may be dropped.
2. Altitude sent with unit of measurement stated.
3. DANGER CLOSE indicates that our own troops are within DANGER CLOSE parameters. (See Chapter 3, Section 9). The use of metres indicates the unit of measurement for all further corrections.
4. The spotter orders a safe and visible correction which is applied before the mission is started.
5. The following orders are standard and have been omitted:
   a. HE; and
   b. Fuze Quick.
6. Spotter read-back of SHOT and SPLASH is not required.
7. Spotter has split the 200-metre short bracket required for naval guns on an area target.
8. Spotter.

Figure 4-8: Example of an NGS fire mission

SECTION 4

CLOSE AIR SUPPORT

GENERAL

40. Close air support (CAS)is controlled and directed as detailed in ATP 27(B), *Offensive Air Support Operations*, and ATP 27(B), SUPP-1, *Detailed Procedures and Techniques for Forward Air Controlling*. Observers who function as forward air controllers (FACs) must be thoroughly familiar with that reference, which contains the following subjects:

g. command, control and coordination;

h. organization for offensive air support;

i. communications;

j. procedures;

k. instructions for FACs; and

l. complete instructions for using offensive air support messages.

41. The detail contained in ATP 27 is too great to include in this manual and only sufficient information is provided here to enable the BC and FOO to fulfil advice and coordination responsibilities.

CHARACTERISTICS

42. **Advantages**. Aircraft used for CAS have the following capabilities:

a. **Mobility**. Ground attack aircraft can be deployed over ranges hundreds of kilometres in a few hours.

b. **Flexibility**. Aircraft are easily switched from one target to another.

c. **Surprise**. Surprise and shock-effect can be achieved by the timing, weight, direction and type of attack.

d. **Range**. Close support aircraft can engage any target of interest to a brigade group. They can attack targets beyond the visual range of ground observers, such as convoys, troop concentrations or gun positions.

e. **Firepower**. Aircraft can carry a wide variety of weapons of high destructive power; e.g., tactical fighter aircraft can deliver bombs, rockets, napalm, cluster bomb units (CBU), cannon and guided missiles.

43. **Disadvantages**. Ground attack aircraft have the following limitations to varying degrees, therefore, fire units superimposed on other targets may be required to augment or replace the firepower expected from the fighter ground attack (FGA).

a. **Target identification**. The fact that an aircraft attack is delivered by its pilot is both a limitation and an advantage. If an enemy's camouflage and concealment practices are good, a pilot may have a great deal of difficulty spotting his target and accurately delivering his weapons even when he is controlled by an FAC, unless the target or its immediate vicinity is marked.

b. **Time on station**. Modern jet aircraft usually cannot remain on station for long periods of time and, therefore, should rarely be kept on air alert status.

c. **Response time**. Aircraft response time can vary from a few minutes to one or two hours. This time is reduced significantly if aircraft are airborne or kept on ground alert, but then the ground commander must be aware that they may be loaded with weapons which are not ideally matched to the target. Aircraft on ground alert will normally have a general purpose load and, if it is unsuitable, a necessary weapon change will consume extra time. For targets of opportunity, it is preferable to use other fire support resources if they are capable of engaging the target satisfactorily.

d. **Communications**. Most tactical fighter aircraft currently in service use UHF radio only, and FACs must be equipped with such a set. Attack helicopters and some of the latest tactical fighters have VHF FM for communications with land elements.

e. **Weather**. Vulnerability to weather conditions is a serious limitation for all aircraft. This is especially so in the target area, where low cloud and poor visibility make location of the target difficult and limits the type and accuracy of an attack. Pre-planned air support can never be guaranteed in the manner of artillery fire support.

f. **Vulnerability.** An effective enemy air defence system could make certain types of attack impossible or prohibitively expensive in terms of aircraft and crew losses.

m. **Availability.** The relative priority of FGA operations within the theatre will govern the number of sorties available for a given operation.

TARGET AND WEAPON SELECTION

44. **Target selection**. CAS shall not be requested for a task if other support means are adequate. Targets chosen to be attacked by aircraft should be of the following types:

a. distant targets;

b. hard targets, if they cannot be effectively engaged by other means;

c. mobile targets;

d. targets not precisely located;

e. unobservable targets requiring confirmed destruction; and

f. defiladed targets.

45. Weapon selection. It is the responsibility of the Tactical Air Coordination Centre (TACC) tasking an aircraft for a sortie to decide on the weapons to be used based on recommendations made by the FSCC. Complete and accurate target descriptions facilitate this task. FOOs shall be familiar with the criteria employed so that they may give sound recommendations as fire support coordinators. Furthermore, if no air representative is present with a unit originating an immediate request for CAS, the BC or FOO shall recommend appropriate weapon selection in their request, although they must be aware that they may be overruled by the TACC. Guidelines for basic weapon selection are given in Figure 4-9.

TARGET	WEAPONS IN ORDER OF EFFECTIVENESS
(a)	(b)
Troops in the open	CBU (anti-personnel), fragmentation bombs, small general purpose (GP) bombs, gun, anti-personnel rockets
Troops dug in	GP bombs, fragmentation bombs (VT fuzed), rockets
Gun/Mortar positions	CBU (anti-material), fragmentation bombs, GP bombs, rockets
Pillboxes and bunkers	CP bombs, rockets
Soft-skinned vehicles and APCs	Bombs
Armour and APCs	CBU (anti-armour), rockets, bombs

Figure 4-9: Air weapon selection guidelines

REQUEST FOR CLOSE AIR SUPPORT

46. The allotment of aircraft to units will normally be in the form of an allocation of a specific number of sorties. Requests for support beyond this allocation can be submitted, but it must be remembered that the demand will be high for the limited number of aircraft flying hours, and it may not be possible to grant such requests. Since the number of sorties allocated must fulfil all requirements for both reconnaissance and close air support missions unless otherwise stipulated, the supported arm commander will have to decide on the type of mission to be flown by each of the limited number of sorties available — the choice in this matter will depend in part on the advice of the BC or FOO based on the other fire support agencies available. Requests for CAS will be of two types: pre-planned and immediate.

47. **Pre-Planned Missions**. These are missions for which a requirement can be foreseen, thereby permitting detailed air planning and coordination. Pre-planned requests are approved by the CO of the unit originating the request and are forwarded in the form shown in ATP 27(A) to the TACC at higher headquarters. After decision at the appropriate level, the originators of a

request will be notified through command channels whether their requests have been accepted or refused.

48. **Immediate missions:**

a. Requests for immediate CAS initiated at company level are forwarded to the battle group FSCC via the artillery or command nets. The requests are validated by the FSCC on behalf of the supported arm commander prior to being forwarded to the TACC.

b. Under no circumstances will a request be forwarded without all intervening headquarters being aware of it, since to do so might interfere with the commander's tactical plan. If no facilities exist at an FSCC at any level to monitor the air request net, then requests must be forwarded to that headquarters on the artillery or command nets for approval.

49. **Suppression of enemy air defence (SEAD)**. Enemy air defence weapons are a high priority for engagement by indirect fire prior to an actual air strike. SEAD is normally controlled at divisional level and is similar in nature to the CB fire plan. SEAD plans are coordinated and controlled from the FSCC. When employing close air support, BCs and FOOs must be aware of the following SEAD planning factors:

a. location and nature of the target;

b. aircraft type and direction of the attack;

c. location and type of enemy air defence weapons;

d. fire support and EW resources available for enemy air defence suppression; and

e. other concurrent friendly or enemy operations.

SECTION 5

FIRE SUPPORT COORDINATION

COORDINATION AT COMBAT TEAM LEVEL

50 Formal FSCCs are not established with the combat team. Coordination at this level is carried out as necessary by the FOO.

THE FSCC AT BATTLE GROUP HEADQUARTERS

51. The FSCC at this level is normally composed of:

a. the BC's party of the affiliated artillery battery;

b. he mortar platoon headquarters (if the battle group is based on an infantry battalion);

c. air defence troop commander, when allotted;

d. a Tactical Air Control Party (TACP), when allotted; and

e. a naval gunfire representative, when allotted.

52. It is usually advisable for the FSCC to be physically based on the mortar platoon commander's CP in order to allow the BC the full freedom of movement away from the battle group CP, and to cater for the possible re-allotment of artillery within the formation. The BC party can move their radios into the FSCC as required. The FSCC must be collocated with the battle group CP in order to provide the intimate degree of liaison required to efficiently fight the battle.

53. The FSCC must be organized to provide some common working space for personnel from all fire support agencies. Duty shifts shall include representatives from all elements in the FSCC, so that the required expertise is constantly available.

54. When the appropriate facilities are not available at battle group level, requests for naval and immediate CAS will be passed to the next higher headquarters as stipulated in Sections 3 and 4 of this chapter. Care must be taken to ensure that the supported arm is kept informed of the action on all air requests.

55. The following communication nets are found in a battle group FSCC:

a. battle group command net;

b. artillery regiment net;

c. artillery battery net;

d. Tactical Air Direction (TAD) net (when controlling aircraft);

e. mortar platoon net;

f. air request net (if a TACP is allotted to the battle group);

g. naval gunfire net (if allotted); and

h. air defence net, when these elements are allotted.

56. The fire support coordination functions must be carried out at all times, including when the battle group CP is moving. This requirement can normally be met by maintaining radio contact between the various elements of the FSCC.

COORDINATION MEASURES

57. **Unit Boundaries**. Fire must not be directed across boundaries without reference to the unit on the other side. Thus (in Figure 4-10), the OP at B cannot shoot at a target in area N without requesting permission through the BC from the FSCC supporting the battle group on the right. To save time at the gun position, it is normal under these circumstances for OP B to transmit the initial orders with the inclusion of AT MY COMMAND, so that computation can be carried out while permission to fire is being obtained. OP C can freely engage targets in area N since that OP will know the current deployment and plans of the supported battle group, including its patrols.

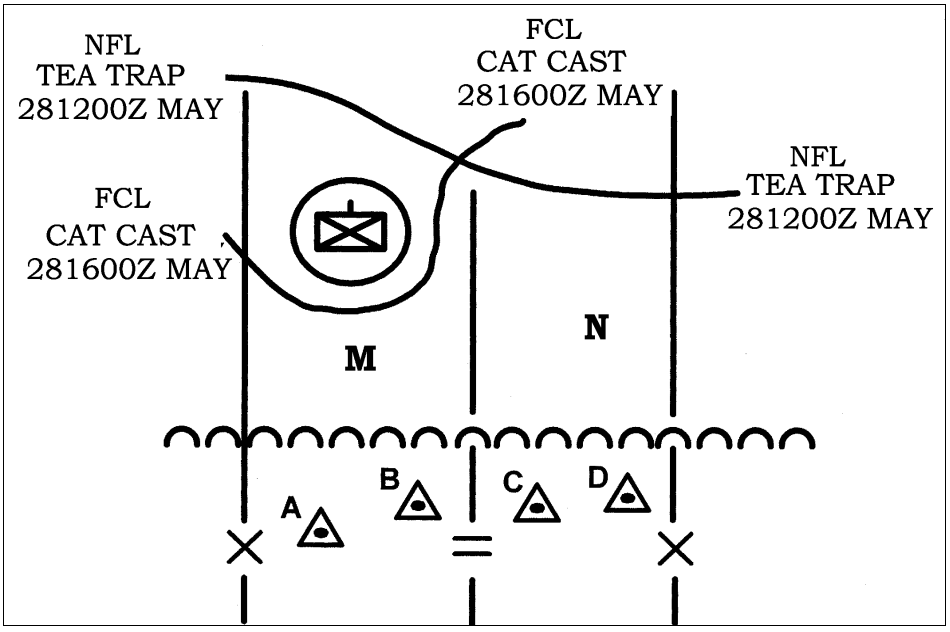


Figure 4-10: Fire coordination measures

58. **Fire Support coordination lines (FSCLs) and no-fire lines (NFLs)**. When the location of these lines is received from higher headquarters, they will be plotted on maps with a dashed black-and-yellow line showing the date and time of effectiveness and the types of line. Fire may

be directed across the boundaries beyond the NFL without references to the neighbouring unit. Supporting elements, e.g., aircraft, may attack targets forward of the FSCL without prior coordination with the ground force commander, provided the attack will not produce adverse surface effects on or to the rear of the FSCL, but will not attack within the FSCL without coordination. See definitions in Glossary.

59. **Restricted fire lines (RFLs)**. An RFL may be established at any level to coordinate fire between two converging forces. No fire may be directed across the line without reference to the unit on the other side.

60. **Specific restrictions**. Specific restrictions may be ordered as necessary for coordination or safety. The reason for their imposition should be included in the order, e.g., "AIRSTRIKE, NO FIRING SOUTH OF THE RIVER SOURIS." These restrictions should be cancelled as soon as possible.

INDIRECT FIRE/AIR COORDINATION

61. Indirect fire support will only be restricted when absolutely necessary, and only if the loss of surface-delivered fire is justified by the degree of risk to friendly aircraft. For FAC-controlled CAS missions, coordination can best be carried out by maintaining positive control over both the indirect fire units and the aircraft from the FAC's position. If the FAC is not also a FOO with communications to all agencies, some degree of collocation or liaison is necessary, with the FOO maintaining overall coordination and control. If a restriction is necessary, it is ordered after the aircraft leaves the initial point (IP) on its run to the target, and cancelled immediately after it is clear of danger. In most cases, only momentary restrictions on indirect fire need be applied; for example, a typical order might be: "NO FIRE ON TARGETS NORTH OF THE 26 NORTHINGS LINE".

62. A CAS mission will probably require the aircraft to penetrate the airspace of a neighbouring battle group — especially if the tactical situation allows multiple passes by high performance aircraft. Appropriate liaison must be carried out between the FSCCs concerned.

63. If an indirect fire target appears during a restriction, the FSCC will decide, based on the target description and the aircraft's mission, which one will be allowed to proceed. In many cases it is possible to allow both targets to be engaged, e.g., by ordering the aircraft to stay on one side of an easily recognized point or line.

64. In some circumstances it may be possible to engage a target simultaneously with artillery and ground attack aircraft. This could often be a useful flank suppression technique.

CHAPTER 5

FIRE PLANNING

SECTION 1

INTRODUCTION

GENERAL

1. For any operation, the supported arm commander is responsible for formulating the tactical plan including the fire plan, which normally includes artillery. The artillery commander is responsible for:

   a. advising the supported arm on the use of allotted artillery and other fire support resources;

   b. coordinating and issuing the fire plan; and

   c. implementing the artillery portion of the fire plan.

2. The general term “artillery commander” is used throughout this chapter to indicate either the CO, BC or FOO, depending on the level at which the tactical plan is formulated.

3. Although this chapter is primarily concerned with the procedures for implementing the artillery fire plan, the artillery commander’s other responsibilities are equally important and are discussed as necessary. To give sound advice, the artillery commander must have a thorough understanding of the tactical plan. The artillery commander must be expert in the application of fire power, understanding the employment of all supporting weapons, including artillery and mortars, anti-tank weapons, machine-guns, tanks, NGS and CAS; see Chapter 4.

4. The full integration of air support into a fire plan requires great care. When pre-planned strikes by CAS are included, consideration must be given to alternate engagement of their targets in the event that bad weather or other circumstances intervene. When both aircraft and indirect fire sources are programmed to attack the same target, such as preparation of a landing zone for a helicopter assault, care must be given to deciding the position of the aircraft in the attack sequence. For pre-planned missions, it may be advisable for the aircraft strikes to be scheduled first whenever their presence cannot be guaranteed due to uncertain weather conditions; in this case, indirect fire sources can dwell on the target if, for example, the helicopter wave is late. However, if attack helicopter or ground attack aircraft are available with sufficient time on target when an assault is launched, they can be extremely useful for neutralization.

FIRE PLANNING

5. Fire planning is the continuing process of analysing, allocating, and scheduling fire support. It determines how fire support resources will be used, what types of targets will be attacked, and with what means.

6. **Aim.** The aim of fire planning is to effectively integrate fire support into battle plans to optimize combat power. To accomplish this aim, fire support planning is concurrent with battle planning. Fire planning must be flexible to accommodate the unexpected in combat and to facilitate rapid change. Fire planning anticipates the massing of fire support assets, changes in the force mission, resupply, target acquisition and target execution.

7. Fire planning is a deliberate process starting at the highest level (usually division or brigade) working its way down to the BC and finally, the FOOs allocated to combat teams. The FOOs then begin the process of refinement back up to the originating level.

8. The advantages of this process are:

a. the concept for fire support is developed early and the artillery regiment and the manoeuvre brigade can plan for battle concurrently;

b. the fire support effort is focused exactly where the manoeuvre commander intends to fight the battle;

c. guidance to each successive level is built in along with the allocation of resources;

d. a workable plan can be developed in a relatively short period of time;

e. it permits the movement of artillery to be integrated into the movement plan of the supported manoeuvre element to ensure that the firing elements are in position to support the commander’s intent; and

f. the fire plan for each level is complete in time for the orders group for subsequent rehearsals; this helps integrate the plan with the manoeuvre force, identify problem areas and ensure that the fire plan supports the manoeuvre commander’s intent.

9. The BC will receive the regimental fire plan during or soon after the brigade orders. Targets to support the battle group commander’s plan are then added to the regimental fire plan. Once the BC has completed the fire plan, it is passed to the FOOs. They will then have an opportunity to add targets to it. They will also recommend modifications to targets in their area of influence. These refinements are then passed back up to the level that originated them.

10. It is very important that every target added to the fire plan by the BCs and FOOs be selected to support the manoeuvre commander’s intent. The BC and FOO use the following tools to assist in the preparation of the fire plan:

a. The BC is present when the different courses of action are wargamed during the operational planning process. This provides insight into the probable flow of the battle and its critical events. The knowledge gained during the wargame must be used to begin the development of the fire plan.

b. Higher level intelligence preparation of the battlefield (IPB) products can greatly assist the BC during planning. Maximum use of these tools is encouraged any time they are available.

c. The manoeuvre commander's concept of operations and intent for fire support permits the integration of the fire plan into the manoeuvre plan.

d. The higher level fire plan.

11. There are two basic types of fire plans, offensive and defensive, each of which can be made in either a quick or deliberate manner.

a. **Offensive fire plans**. These plans are designed to support offensive operations. For large, complex actions, normally at brigade group level and above, such plans involve the fire power of several units, and need to be very carefully and closely co-ordinated. The procedures involved in deliberate fire planning at this level are fully discussed in CFP 306(2) and are not considered further in this volume. Smaller and less complicated operations, on the other hand, can be supported by a quickly arranged fire plan which emphasizes speed and, therefore, verbal rather than written orders. Such quick fire plans are normally planned and co-ordinated at a lower level than deliberate ones, and involve fewer troops and guns. In very simple situations, completely verbal orders may suffice.

b. **Defensive fire plans**. These plans are used at all levels to co-ordinate indirect fire support for the protection of the supported arm in defensive situations.

PRINCIPLES

12. **General**. The following five principles apply to all levels and types of fire planning.

a. **Co-operation**. The close co-operation which is required to ensure the success of the supported arm commander's tactical plan demands effective interlocking communications, proper siting of key personnel and the timely passage of information. It also implies co-ordination between all arms.

b. **Concentration of fire**. There will frequently be more targets than fire units available to engage them. This results in a tendency to disperse the fire too thinly. Careful planning should result in concentrating the fire so that it is effective on the most important targets.

c. **Flexibility**. The fire plan must be capable of reacting to unforeseen changes in the tactical situation. This is primarily achieved through the use of superimposed

units which can be lifted off the fire plan to engage targets of opportunity without jeopardizing the success of the operation. The fire plan must be capable of rapid modification.

d. **Simplicity**. The more complex the fire plan is, the greater will be the loss in flexibility. A simple plan is quicker to arrange, easier to modify and less susceptible to error.

e. **Surprise**. The greater the surprise achieved in the fire plan, the greater the chances of effectiveness are likely to be. The preparations for the fire plan must be concealed and careful consideration given to the amount of adjustment, use of smoke testers, etc.

FACTORS

13. The main factor in artillery fire planning is the supported arm commander's requirements. The artillery commander must do everything possible to meet these demands or to provide satisfactory alternatives.

14. The factors which influence meeting the requirements of the supported arm commander are:

a. the time available to prepare the fire plan;

b. the amount and types of ammunition available;

c. the maximum rate of fire of the guns to be used; (see Figure 5-1);

EQUIPMENT	RATES OF FIRE (rpg per minute)		
	1 MINUTE	3 MINUTES	SUSTAINED FIRE
105mm LG1	12	-	8 (Note 1)
105mm C1/C3	5	4	3
155mm M109A4/A6	3	2	1
155MM M198	3	2	1 (Note 2)
155mm FH70	3	2	1
155mm AS90	6 (3 rds/15 secs)	-	2
81mm Mortar	20	15	12
4.2 inch Mortar	20	15	10
NOTES: 1. Manufacturer's quoted rate of fire. 2. Or as indicated by thermal indicator.			

Figure 5-1: Maximum rates of fire

d. the number and types of guns available;

e. the accuracy with which target locations can be determined;

f. the number of observers available to adjust;

g. the state of survey and meteorology;

h. the communications available; and

j. the degree of surprise desired.

FIRE PLAN TERMS

15. **Tactical classification of fire**:

a. **Preparatory fire**. Preparatory fire is undertaken to:

(1) weaken the enemy by inflicting casualties to personnel and damage to his equipment, destroying his defensive works and disrupting his communications, and

(2) demoralize the enemy so that he will offer little or no resistance to our operations.

b. **Covering fire**. Covering fire is delivered to neutralize the enemy's direct fire weapons which can engage our assaulting troops in an attack or counter-attack.

c. **Defensive fire (DF)**

(1) **DF**. DF is delivered to assist and protect a unit engaged in a defensive action. DF targets may be in depth with the object of disorganizing enemy preparations for attack and the movement of his reserves, or they may be close tasks designed to engage and destroy the enemy at relatively close range when the attack is launched. DF tasks must be sited to cover possible enemy approaches, fire orders must be brief, and the response rapid. Standard responses will be detailed in formation and unit Standing Operating Procedures (SOPs).

(2) **Final protective fire (FPF)**. Those close DF tasks which cover the most likely and dangerous enemy approaches are nominated as FPF. Guns will normally be laid on these tasks when not otherwise engaged.

(3) **DFs in the attack**. In the attack, the DF targets required to cover the period of reorganization on the objective must form part of the planning for the operation and will generally have to be selected from maps or air photographs, or from intelligence provided from target acquisition sources. After the objective has been captured, additional DF targets may be selected and the locations of the original ones confirmed. In the meantime, the original ones will provide a framework of pre-arranged targets which can be used to neutralize any immediate counter-attack. DF targets included in a fire plan remain effective after the fire plan has been

fired, until such time as a consolidated DF plan is issued, or the fire plan is cancelled.

d. **Counter-battery fire**. Counter-battery missions are undertaken to destroy or neutralize the enemy's indirect fire weapon systems (artillery) and are normally coordinated at Divisional Artillery Headquarters. Counter-mortar fire is undertaken to destroy or neutralize the enemy mortars. These missions are normally coordinated by the CO of the DS artillery regiment.

e. **Harassing fire**. Harassing fire is delivered to curtail the freedom of enemy movement, disturb his rest and, by threat of losses, to lower morale.

16. **Classification of targets**. A target consists of personnel, materiel, or an area that warrants engagement by fire and which may be numbered for future reference.

A. **Planned targets**. A planned target is one on which fire is pre-arranged. It includes the following:

(1) **Scheduled targets**. Target on which fire is to be delivered at a specific time.

(2) **On-call targets**. Targets other than scheduled targets on which fire is delivered on request.

b. **Targets of opportunity**. A target of opportunity is one which has not been considered, analyzed or planned.

17. **Combination of targets:**

a. **Group of targets**. A group of targets consists of two or more targets on which fire is desired simultaneously. Each target in a group will have a fire unit allotted, by the Ops O, to fire on it. A group of targets is designated by an alphanumeric combination (A8P), and it appears on a map or trace as shown in Figure 5-2. On the executive order to fire ("A8P, 3 ROUNDS FIRE FOR EFFECT"), each fire unit will engage its designated target. A group of targets could be used in the following circumstances:

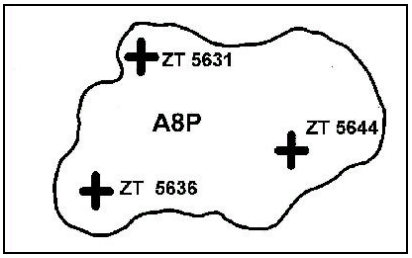


Figure 5-2: A group of targets

(1) **On continuous fire support plans (CFSPs):**

(a) Large enemy positions along the route requiring more than one battery to engage may make it impossible to adjust the target before the advance begins. If intelligence indicates that the target covers an area larger than the footprint of a multi-battery mission, then

each fire unit could be given a different target number (aim point) within the enemy position. This will ensure a good distribution of fire over the enemy position.

(b) It is unlikely that observed adjustment of the objective is possible. Using intelligence reports, the different enemy positions in the objective area could each be a target number. This permits a rapid response to calls for fire on enemy positions. This is especially useful when the time required to reach the objective is unknown.

(2) On the defence, the supported arm's killing zones (KZ) are often larger than the footprint of a multi-battery mission. If only one target is used, the effectiveness of the fire support would be significantly reduced. Using three or four targets to cover the KZ and grouping them allows a rapid response from the guns and better coverage of the KZ.

b. **Series of targets**. A series of targets is a number of targets, groups of targets, or both, that are likely to be fired in succession. A series of targets is not engaged simultaneously. When a series of targets is adopted, the CPO prepares map data for all of the targets contained in the series. A series of targets is indicated by a nickname (MAD HATTER) and is depicted in Figure 5-3. Series of targets are useful in the following situations:

(3) Identified enemy approaches shall be covered by a series of targets on each approach. Each series of targets is ordered adopted by the observer as it becomes relevant to the battle.

(4) Within a CFSP, a series can be used along each route. If the advance is long, then a number of series can be used.

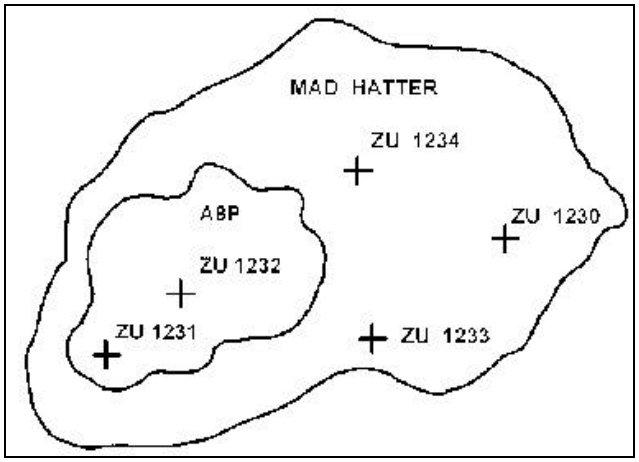


Figure 5-3: A series of targets (MAD HATTER is a series with a group, A8P, within it)

18. **Superimposed artillery**. A term used in fire planning to indicate that an artillery unit is augmenting fire of other units on a target, and that its fire may be lifted from that target and applied elsewhere by the authority implicit in its allotment.

19. **Time on target (TOT)**. A term used to indicate the method of firing on a target in which various units time their fire so that all projectiles reach the target simultaneously at the time specified. It also indicates the time at which aircraft are scheduled to attack or photograph a target. By convention, all scheduled targets on a fire plan table are TOT.

20. **Fire plan**. A fire plan is a tactical plan for using the weapons of a unit or formation so that their fire will be co-ordinated. It is the means by which the artillery commander defines all targets assigned or able to be assigned to units whose fire is placed at his or her disposal, and allocates these targets to specific units as required. Fire plans may be designed to support either offensive or defensive operations. A completed fire plan consists of some or all of the following documents.

a. **Target list:**

(1) This is a list containing the locations of targets and a brief description of each. It may also indicate, in the Remarks column, special types of engagements, ammunition to be used and target combinations such as group or series. See Figure 5-12.

(2) If all targets on the list are of one type, e.g., DF, Hostile Battery (HB), etc., the lists's title may be so annotated.

(3) Altitudes given are in metres unless otherwise specified.

(4) The target list will often be circulated in advance of other fire planning documents and in some cases, (e.g., simple low-level DF plans), constitute the only document for the fire plan.

b. **Target overlay:**

(1) A target overlay is a transparent sheet which, when superimposed on a particular chart, map, drawing, tracing or other representation, depicts target locations and designations. It thus supplements and confirms the target list. The target overlay usually shows boundaries between manoeuvre elements, objectives, friendly forward dispositions, safety lines and other graphical information. See Figure 5-3.

(2) A target overlay will only be produced if time permits.

(3) Targets are identified on the overlay by their symbol and target number. Since reproduction of the overlay may cause inaccuracies, the target locations given in the target list are authoritative and the overlay is annotated: NOT TO BE USED FOR PREDICTION.

(4) Groups and series of targets are represented by solid lines encircling the targets concerned and are indicated by their alphanumeric combination or nickname, respectively.

c. **Fire plan table.** A fire plan table is a presentation of planned targets giving data for engagement. Scheduled targets are fired in a definite time sequence. The starting time may be on call, at a pre-arranged time or at the occurrence of a specific event. Fire plan tables are dealt with in detail in Section 2 of this chapter.

d. **Written portion.** A written portion may be included if the originator so desires. Alternatively, any additional instructions may be given in an operation order or annotated on the target list, overlay or fire plan table.

COMMAND AND CONTROL TERMS

21. **Command**. Within the artillery context, a special implication of command is that the officer, in whom it is vested, has authority to move the guns and to indicate where they will be deployed. Maximum fire support can best be provided over a wide front if command is centralized at a high level. The optimum level depends on the task of the formation being supported, the artillery resources available and their capabilities, and the ability of the artillery commander to keep in touch with the tactical situation and the units he commands. Command of close support and some general support artillery is usually, therefore, centralized at division level. The appropriate formation operations staff must ensure that the required artillery deployment areas are earmarked and that subordinate units or formations reserve the necessary areas. The allocation of areas to artillery units must be done early to facilitate dumping, artillery reconnaissance and survey.

22. **Control**. Control in the artillery sense means control of fire by the issue of technical orders which can be implemented at the guns and which do not entail movement of the guns. Control is exercised by:

a. pre-planned or impromptu changing of the priority in calls for fire;

b. orders concerning the level at which fire plans are to be prepared and issued; and

c. any special authorization to order concentrations of fire.

23. **Tactical tasks**. The assigning of tactical tasks is the process of placing artillery fire power at the disposal of a unit/formation without changing the grouping for command. Artillery may be tasked as shown in the table at Figure 5-4.

24. **Affiliation**. It is generally desirable that an artillery unit be assigned as the DS artillery of a given formation or supported arm unit on as continuous basis as possible. This is advantageous, not only from the point of view of development of personal understanding and team spirit, but also because battle procedures often vary between different formations and supported units. This relationship is referred to as an affiliation, a term which in itself has no precise tactical implications.

ARTY WITH A TACTICAL MSN OF -	ANSWERS CALLS FOR FIRE IN PRI FROM -	ESTB LN WITH -	ESTB COMMS WITH -	HAS AS ITS ZONE OF FIRE -	FURNISHES FWD OBSERVERS	IS POSN BY -	HAS ITS FIRE PLANNED BY -
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
GS	1. Force Arty HQ.	No inherent reqr.	No inher-ent requi-rement	Zone of supported unit/fmn.	No inherent requirement.	Force Arty HQ.	Force Arty HQ.
GS Rein-forcing	1. Force Arty HQ. 2. Reinforced arty unit. 3. Own observers.	Reinforced arty unit.	Reinforced arty unit.	Zone of sp unit/fmn to incl zone of reinforced arty unit.	Upon req of reinforced arty unit, subj to prior approval of Force Arty HQ.	Force Arty HQ or, subj to approval, the rein-forced arty units.	Force Arty HQ.
Reinforcing	1.Reinforced arty unit. 2. Own observers. 3. Force Arty HQ.	Reinforced arty unit.	Reinforced arty unit.	Zone of fire of rein-forced arty unit.	Upon req of reinforced arty unit.	Reinforced arty unit or ordered by Force Arty HQ.	Reinforced arty unit.
DS	1. Sp unit. 2. Own observers. 3. Force Arty HQ.	Supported unit (down to bn level).	Supported unit.	Zone of supported unit.	To (each)* coy size manoeuvre elm of supported unit.	Unit comd, as deemed nec, or ordered by Force Arty HQ.	(Dev own fire plan.)
* "Each" applicable to US only. (QSTAG 217)							

Figure 5-4: Canadian field artillery tactical missions (inherent responsibilities)

25. **Priority of fire**. As seen in Figure 5-4, each tactical task has a different priority of fire associated with it. Generally, BCs and FOOs work within a regiment that is in DS to a formation (usually a brigade). The priority of fire is controlled by the Ops O who allocates the priority of fires to the BCs/FOOs for a period of time or phase of operation. For example: "11, CC1 THIS IS 95, PRIORITY OF FIRE FROM CC1 TO 11 FOR THE NEXT 60 MINUTES". The BC/FOO is considered authorized for the resources given by the Ops O. (In the previous example, 11 is an authorized observer for the next 60 minutes.)

26. **NOTE**. This priority of fire is actually being directed to the manoeuvre force, but will be coordinated by the BC/observer.

27. If the BC is allocated the priority of fires by the Ops O, any FOOs working for that BC are allocated the same priority by convention. The BC is responsible to either parcel out the priority of fire or sort out calls for fire from assigned observers.

SECTION 2

QUICK OFFENSIVE FIRE PLANNING

GENERAL

28. The quick fire plan procedure is used when the situation requires the arranging of a fire plan in a short space of time.

29. The artillery commander must know which guns and observers are available. The allocation of additional guns, ammunition and observer may be made by the next higher artillery commander based on knowledge of the tactical situation but, in some circumstances, the artillery commander may have to bid for required resources. A suggested battle procedure outline is shown at Figure 5-5.

Ser	SP ARM COMD	BC	BC TECH	ANCHOR OP	REMOTE OP
(a)	(b)	(c)	(d)	(e)	(f)
1	Details the gen outline for the op and christens the grd.	Determine res reqr (incl mors). Req add gun/ammo alloc and auth of observer(s). Wng O. Upgrade tgt records.	Prep proforma, tgt nos, etc.	Prep to asst.	
2	Tgts indicated (obj first if possible).	Reads back, asigned tgt nos, begins to formulate adjustment plan.	Copies fire plan (comm writes down tgt indication).	Tech com-mences ad-justment as ordered. FOO monitors the fire plan.	
3	Details timings, ammo, rates, pri of tgts, DFs, mors, FGA, etc.	Discusses. Formulates the adjustment plan and sends preliminary adjustment orders.	Prep tgt info block.	Copies fire plan info. FOO/Tech pass tgts to remote OP, adjust tgts.	Recv/read back tgts. Adjust tgts.
4	Cfms H-hr, time check, loc of comd, BC, FOOs, MFC.	Adjustment orders. Predicts DFs.	Verifies DFs. Sends tgt info as dir by BC.	Adjusts tgts. Assist BC with air/mors.	
5		Sends adjustment orders. Orders to depl FOOs, FCs, FAC.			
6		Complete fire plan schedule.	Verifies schedule.		

Ser	SP ARM COMD	BC	BC TECH	ANCHOR OP	REMOTE OP
(a)	(b)	(c)	(d)	(e)	(f)
7		Sends fire plan schedule (Regt Net). Monitors adjustment and mod the adjustment plan as reqr.		Copy.	Copy.
8		Briefs remote OP.		Sends dir to tgts (Regt Net).	Marries up.
9	OP commences.	Monitor fire plan.		Adjusts MPI of FFE. Engages tgts of oppor-tunity (req mod for the latter).	Adjust MPI of FFE. Engages tgts of oppor-tunity (req mod for latter sit).
10	Success!	Briefs OPs on obsn on re-org.		Moves fwd as ordered.	Cfms/adjusts DFs as ordered.
NOTE. This suggested sequence stresses concurrent activity and ensures all essential tasks are executed. It is only a guide to be adapted to prevailing conditions.					

Figure 5-5: Suggested battle procedure for a BC's fire plan

COORDINATION WITH THE SUPPORTED ARM COMMANDER

30. The artillery commander must understand completely the detailed tactical plan. This is usually accomplished by normal liaison between directly with the supported arm commander. In particular, the artillery commander must know:

a. the form of the attack including the phases;

b. the attack position, and dismount areas;

c. the objectives and targets to be engaged;

d. the H-hour (the time at which the manoeuvre elements are to cross the Line of Departure (LD)) and other important timings, particularly those affecting troop movement;

e. the rate of advance when applicable;

f. the distances at which fire must be lifted from objectives; and

g. the action taken by the supported arm upon securing the objective.

31. The artillery commander shall assist the supported arm commander in formulating the fire plan, shall ensure complete understanding of the supported arm commander's intentions or decision concerning the following points.

a. **Targets**. The identity, location, size, shape and composition of the targets must be accurately determined. As each target is indicated, the artillery commander shall assign a target number (and a nickname, if desired) to it.

b. **Degree of importance**. The degree of importance of the target to the tactical plan must be understood. If time is short, some targets may be predicted or adjusted to a lower level of accuracy. There will often be more targets than there are fire units, and the artillery commander must be able to suggest alternatives, such as engagement by other weapons.

c. **Weight of fire**. The amount of FFE will depend upon the degree of neutralization the supported arm commander desires. The artillery commander must be prepared to recommend the type of ammunition, the intensity and duration of the fire.

d. **Timings**. The timings of fire can usually be established from the movement intended within the tactical plan. In any event, it is essential to know the time at which fire is to begin and terminate for each target.

e. **he positioning of observers**. FOOs are allocated to manoeuvre elements and the establishing of stationary ground observers (anchor OPs) or air observers to observe the fire plan. Whenever possible, the artillery commander shall have all available FOOs, MFCs and FACs present initially to facilitate the fire plan briefing.

f. **The authority to modify the fire Plan**. This is normally retained by the supported arm commander who was responsible for the formulation of the tactical plan. This authority may be assigned to the artillery commander.

g. **Adjustment policy**. The importance of surprise, including any restrictions on adjusting for future engagement. This must be determined early to ensure concurrent activity.

h. **Other resources**. The control and allocation of infantry mortars and other weapons supporting the operation.

j. **Deployment of fire units**. Any requirements for fire units to be redeployed must be passed to the Ops O.

k. **DF**. The plan for DFs on reaching the objective.

m. **Time synchronization**. The artillery adviser must ensure that all elements involved in the operation are on a common time.

32. Immediately after the supported arm commander’s briefing, the artillery commander shall prepare and send the orders for the fire plan. The artillery commander must know how to contact the supported arm commander at all times.

INITIAL ACTION BY THE ARTILLERY COMMANDER

33. **Request resources**. The BC has to request priority of fires of the batteries/unit he requires. For example: "95 THIS IS 19. MY INDIA CALL SIGNS ARE ATTACKING AN ENEMY COMPANY POSITION. REQUEST PRIORITY OF FIRE FROM CC1 FOR NEXT 90 MINUTES."

34. **Warning order**. At the first opportunity, the artillery commander must send a warning order to the guns, including as many of the following items as are available:

a. the nickname of the fire plan;

b. the quantities and types of ammunition to be prepared, for example: 25 ROUNDS HE (by convention the quantity is understood to be per gun);

c. the time of H-hour or an approximation of it — this may be sent in one of the following forms:

(1) H-HOUR 1400 — this will be sent if H-hour is within one hour,

(2) H-HOUR (ENCODED) — this will be sent if H-hour is not within one hour,

(3) H-HOUR NOT BEFORE 1330, or

(4) H-HOUR LATER — this will be sent when the supported arm commander has not yet stated the H-hour; and

d. the time scale, in relation to H-hour, to be used in preparing an artillery fire plan table.

35. An example of a complete warning order: "WARNING ORDER. FIRE PLAN BIG APPLE. PREPARE 25 ROUNDS HE. CALL SIGN 2, PREPARE 10 SMOKE. H-HOUR NOT BEFORE 0800. TIME SCALE MINUS 10."

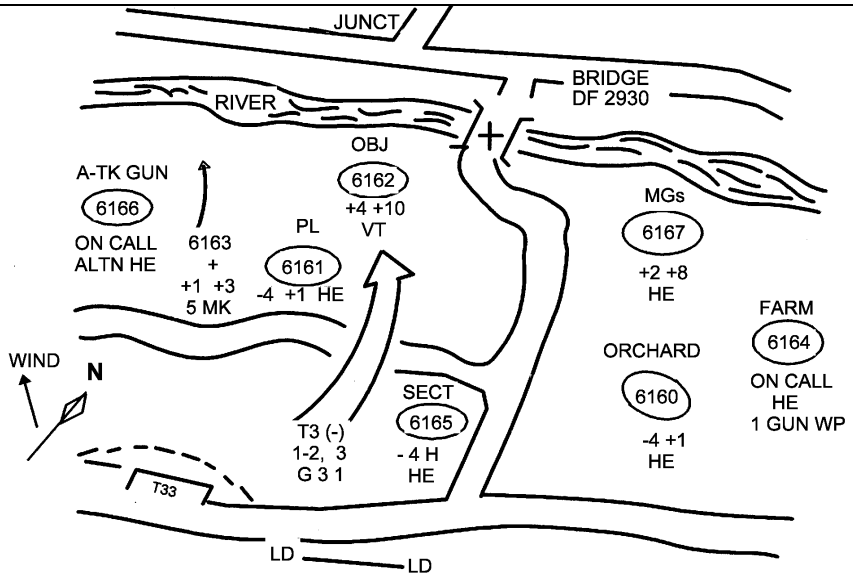
36. **Fire plan sketch**. As the supported arm commander gives his order concerning the fire plan, the artillery commander shall record the decisions on a sketch (Figure 5-6) including:

a. the relative location of each target, including DF targets and targets which are on call;

b. target numbers (and nicknames, if applicable);

c. target description; and

d. timings, types of guns, and the quantities and types of ammunition.



RESOURCES					
EQPT	NUMBER	SURVEY	AMMO HE	OTHER	OBSERVERS
FD			U	50 BE	
MED	**3**	**REGT**	**150** ;	**50 WP**	**2**
MOR	**1 x PL**		I	**150 VT**	**1 x FC**
OTHER					

WARNING ORDER			
FIRE PLAN	**LOST CAST**		
PREPARE	**50**	RDS HE	**PER BTY**
PREPARE	**15**	RDS SMK	**AND WP PER BTY**
PREPARE	**50**	RDS	**VT PER BTY**
H-HOUR	**NOT BEFORE 0930**		
TIME SCALE	**-5**		

ADJUSTMENT PLAN							AMMO
TARGET NO	OBSERVER	GUNS	NET	GUN DATA COORDS	BRACKET	PRIORITY	IN FFE
ZT 6160	**31**	**3**	**3**	**GUN DATA**	**100**	**3**	**HE**
ZT 6161	**31**	**2**	**2**	**GUN DATA**	**100**	**2**	**HE**
ZT 6162	**32**	**2, 3**	**REGT**	**GUN DATA**	**100**	**1**	**VT**
ZT 6163	**32**	**1**	**1**	**COORDS**	**---**	**2**	**SMK**
ZT 6164	**32**	**3**	**3**	**COORDS**	**---**	**3**	**HE 1 GUN WP**
ZT 6165	**31**	**1**	**1**	**GUN DATA**	**50**	**1**	**HE**
ZT 6167	**172**		**MOR**	**GUN DATA**	**50**	**1**	**HE**

AIDE-MÉMOIRE

FROM SUPPORTED ARM	SUBSEQUENT PLANNING
COMD 1 FORM OF ATK PHS g 2 FUP LD g 3 OBJS g 4 H-HR g 5 RATE OF ADV g 6 TGTS g 7 DEGREE OF IMPORTANCE g 8 FFE g 9 TIMINGS g 10 MODS g 11 RESTRICTIONS ON ADJUSTMENT **NIL** 12 INF MORS g 13 DF TASKS g 14 TIME CHECK g	1 ON-CALL TGTS g 2 SCHEDULED TGTS g DURATION ____ TOT ____ 3 DF PLAN g 4 SMK SCREEN ALTN g 5 TIMINGS g
MISCELLANEOUS	
1 MOV OF GUNS **NO** 2 LOCS OF OBSERVERS g 3 FIRE PLAN TO SP ARMS ELMS _____	

Figure 5-6: Example of a completed fire planning guide (NOTE: All or any part of this guide may be used at the BC/observer's discretion. Guide to be locally reproduced.)

37. **Observer to begin adjustment**. The artillery commander shall have the observer commence adjustment as soon as possible.

38. **Use of mortars**. If mortars are to be used in the fire plan, it is desirable to have the MFC or an observer adjust those targets as early as possible, bearing in mind that the mortars must be bedded in before they will shoot consistently.

ADJUSTMENT PLAN

39. With the supported arm commander's concurrence, the artillery commander must decide which targets are to be engaged without adjustment. Of those to be adjusted, it must be decided which are to be adjusted to produce gun data and which are to be adjusted to produce co-ordinates. Important factors in this respect are:

a. the time available;

b. the accuracy with which targets are located;

c. their relative tactical importance;

d. the state of survey and met;

e. the number of guns available; and

f. ammunition restrictions.

40. Full use shall be made of any applicable target which has been recorded. These targets may require upgrading.

41. **Factors**. Once it has been decided which targets are to be adjusted, the artillery commander will make an adjustment plan based on a consideration of the following factors:

a. **Observation:**

(1) The observer with the best visual command of the target shall be chosen to adjust it.

(2) Targets that are close together shall be adjusted by the same observer.

(3) Any regrouping necessary before the attack commences since one observer may have to move to join a different combat team on the attack.

b. **Communications**. The artillery commander is responsible for allotting the available radio nets so there is no conflict between adjustment and early passage of fire plan orders to the guns. In most cases, the observers will be ordered to join the net(s) of the fire unit(s) they are required to adjust in order to reserve the regimental net for artillery commander's own use.

c. **Guns**. The artillery commander will allot the guns available for adjustment, bearing the following points in mind:

(1) if possible, the guns which are to engage the target shall be used for adjustment,

(2) the maximum number of guns shall be used in adjustment when the aim is to determine gun data rather than co-ordinates,

(3) if co-ordinates are to be circulated, such targets must be adjusted early,

(4) the most important targets must be adjusted early,

(5) adjusted, thus leaving the guns laid for the first serials, provided that the circulation of co-ordinates is not required, and

(6) there may be a need for the simultaneous adjustment of two targets on the same net.

42. **Adjustment Plan**. (Figure 5-6) Frequently the most influential factor governing the formulation of the artillery commander's plan will be the time available for the conduct of adjustment. The adjustment plan need not be committed to paper, but decisions concerning each target must be made on:

a. the target number;

b. the observer to adjust;

c. the type and degree of adjustment, i.e., for co-ordinates or for gun data;

d. the fire units to be used in adjustment, and if the adjustment is for gun data, the number of guns to use;

e. the radio net to be used;

f. the priority of adjustment; and

g. the type of ammunition to be used at FFE.

BRIEFING THE OBSERVERS

43. The artillery commander shall direct the observers to adjust the targets for future engagement by specifying the following: (Figure 5-7)

a. the observer to adjust;

b. the target number and nickname;

c. the location and extent of the target;

d. the type and degree of adjustment and the fire unit to be used;

e. the number of guns to be used if adjustment is to determine gun data;

f. the net to use;

g. the priority of adjustment, i.e., PRIORITY 1. ZT 1764;

h. any other information that is required by the observer, e.g.:

(1) the number of fire units to engage, e.g., C/S 2 AND 3, REGIMENT,

(2) the ammunition to be used at FFE and whether smoke testers will be allowed, if applicable, and

(3) any special procedures for engagement, e.g., LINEAR, DELIBERATE SMOKE, DANGER CLOSE;

j. the time by which adjustment must be completed; and

k. further action by the observer on completion of adjustment.

44. The indication of the target shall be carried out in the normal manner with the observer using the terms SEEN or NOT SEEN as applicable. When indicating targets to an air observer the use of cardinal point indications from a known or prominent object may be of assistance, e.g., "REFERENCE BOULDER HILL. NORTH-EAST 400". Cardinal point corrections must not be sent to the guns.

45. Observers shall record all briefing orders, whether they are addressed to them for action or not.

BC'S ORDERS TO OBSERVERS (C/S 19)	**OBSERVERS' RESPONSES**	
	(C/S 11)	(C/S 12)
(a)	(b)	(c)
(1) ADJUSTMENT ORDERS FETCH OFFICER		
	(2) OFFR SPEAKING.	
		(3) OFFR SPEAKING.
(4) FIRE PLAN BARBER POLE. 11. ADJUST TGTS ZT 1283 AND ZT 1287. (See Note 1) 12. ADJUST TGTS ZT 1284 AND ZT 1285. (See Note 1) 11. ZT 1283. REF BONER FARM. SOUTHEAST 400. SMALL COPSE.		
	(5) SEEN. (See Note 2)	
(6) PL AREA IN COPSE. RADIUS 100. ADJUST FOR GUN DATA, 100 M BRACKET. REGT 2 AND 3 THREE GUNS. (See Note 3) USE REGT NET.		
	(7) ROGER.	
(8) 11. ZT 1287. REF SPLIT TREE. NORTH 300. TK.		
	(9) SEEN.	

BC'S ORDERS TO OBSERVERS (C/S 19)	OBSERVERS' RESPONSES (C/S 11)	OBSERVERS' RESPONSES (C/S 12)
(10) REF TK. WEST 200. MG IN BUNKER.		
	(11) SEEN.	
(12) ADJUST FOR COORD WITH 2 ON 2'S NET. FINISH ADJUSTMENT BY 1500 HRS AND FLICK TO HIGHER NET. REMAIN WITH INDIA 3.		
	(13) ROGER.	
(14) 12. ZT 1284. REF LARGE BARN. AREA TO BE BLINDED. ALL FARM BLDGS IN THAT AREA.		
		(15) SEEN.
(16) REF BARN. SOUTH 600. RIDGE RUNNING NORTHWEST FOR 800 M.		
		(17) SEEN.
(18) SCREEN THIS RIDGE WITH DELIBERATE SMK. ADJUST WITH 3 ON 3'S NET. SEE SMK ON UPWIND PT. (See Notes 4 and 5)		
		(19) ROGER.
(20) 12. ZT. 1285. REF LARGE BARN. TRACK RUNNING THROUGH FARM BUILDINGS.		
		(21) SEEN.
(22) LINEAR. CEN PT BLUE SHED. ALTN TO ZT 1284. ADJUST FOR COORD WITH 3 ON 3'S NET. FINISH ADJUSTMENT AND FLICK TO HIGHER NET BY 1515 HRS. (Note 5)		
		(23) ROGER.
(24) 12. REPORT TO INDIA 1 AT GR 365478 BY 1530 HRS. (See Notes 5 and 6)		
		(24) ROGER.
(26) 11 AND 12. H-HR 1600. ANY QUESTIONS? (Note 7)		
	(27) NO QUESTIONS.	(28) NO QUESTIONS.

NOTES:
1. It is desirable to tell observers at the start of the briefing which tgts each observer will be reqr to adjust.
2. ACK is not reqr from the second observer.
3. The tgt will be adjusted using all of C/S 1 and 3 guns from C/S 2 and 3.
4. Length, no of pts and att of screen will be determined by the observer.
5. Unless essential to the plan, msns of this complexity are not normally incl.
6. Grid shall be encoded.
7. H-Hr shall be encoded.

Figure 5-7: Example of a BC briefing two observers by radio for the adjustment of a quick fire plan

46. The artillery commander shall indicate to the observers a time by which adjustment must be completed, thus ensuring that sufficient time is left for the work at the guns to be completed prior to the actual fire plan. As a guide, adjustment shall end no less than 10 minutes before the guns are required to start firing. Observers must keep the artillery commander advised of any delays in their adjustment.

47. The observer must be told what to do during the fire plan, e.g., go forward with the supported arm or remain stationary and observe the fire on certain targets. When the observer is expected to engage opportunity or on call targets, the observer must be told which batteries to use and under what circumstances.

48. It is the artillery commander's responsibility to ensure that the fire plan starts on time. To this end, it is essential that the artillery commander maintain close watch over the progress of the adjustment and be prepared to order alterations during the adjustment phase. The observers shall keep the artillery commander informed of delays, or modifications required to the adjustment plan. For example, circumstances might require the artillery commander to:

a. change the priority of targets;

b. change instructions regarding the number of guns to be used in adjustment or the size of the bracket to be seen;

c. forego adjustment on certain lower priority targets, particularly those on call;

d. change the allocation of radio nets; or

e. adjust a target directly.

ARTILLERY COMMANDER'S SUBSEQUENT PLANNING

49. **Engagement of planned targets**. The best and most economical way of engaging the targets must be chosen. This decision is based on a normal target appreciation and influenced by such factors as the importance of the target, and the availability of guns and ammunition. Some considerations in this respect are as follows:

a. **On-call targets**. In most quick fire plans, a higher degree of flexibility can be maintained by placing the majority of the targets on call, particularly when the speed of the assaulting troops cannot be accurately estimated and when intelligence of enemy locations is poor. The time during which a target is on call may be specified, e.g., "ON CALL AFTER H +10"; "ON CALL DURING PHASE 2 ONLY".

b. **Scheduled targets**. Scheduling of a target ensures that the fire will come down on time regardless of any unforeseen circumstances, such as a break in communications. It also allows for a more careful allocation of guns and ammunition. When the speed of movement can be estimated and enemy positions are accurately known, the more important targets shall be scheduled rather than placed on call. The duration of fire is indicated by specifying the time at which the first rounds must arrive on the target; no rounds must fall on the target after the second time specified, e.g., +7 to +12. The number of rounds ordered shall be fired over the period of time specified. Time shall be allowed between successive targets engaged by the same unit, so that the guns will have sufficient time to lay on the next target. Such a time interval shall not be less than one minute.

c. **DF**. DF tasks form part of the supported arm commander's plan for reorganization on the objective. Prior to the start of an attack, the artillery commander must determine their locations from the supported arm commander and include them on the fire plan as on call targets. They are subject to confirmation and addition when the objective has been gained.

d. **Alternative to smoke screens**. Because of the possibility that a smoke screen may be ineffective, an alternative HE target shall normally be planned. This alternative shall be adjusted in advance, unless prediction is acceptable.

50. **Superimposed fire units**. Some guns shall always be available to engage targets of opportunity, or to increase the fire on planned targets if necessary. This will be achieved by superimposing the fire on planned targets. General support reinforcing (GSR) units shall always be superimposed since their availability is not guaranteed.

51. **Timings**. In most quick fire plans, it will usually be possible to select an H-hour which will allow all arms to be ready. It will often be necessary to begin a fire plan before H-hour. When arranging timings with the supported arm commander, the artillery commander shall not irrevocably engage all resources until all guns are in action or enough of them are in action to ensure that the absence of the remainder will not jeopardize the operation. Time must also be allowed for:

a. adjustment or obtaining the locations of targets;

b. passage of fire plan orders, if necessary, the passage of target records between CPs; and

c. technical work and preparations at the guns. In a quick fire plan at the regimental level, at least 10 minutes shall be left for this purpose.

52. **Modifications to the fire plan**. In most fire plans, the supported arm commander will retain the authority to modify. Circumstances might make it desirable for the supported arm commander to delegate all or some measure of this authority to the artillery commander. In any event, the artillery commander shall be responsible for the passage of any orders required to effect any necessary modifications.

53. **Note**. Adjustment of the MPI during FFE is not a modification to the fire plan. If an observer notices that fire on a target is not effective, it is that observer's responsibility to adjust it as appropriate, providing there is sufficient time remaining on the serial for the gun position to effect the change.

54. **Ammunition reserve**. When allotted a specific amount of ammunition for a fire plan, the artillery commander must ensure that a percentage of it is retained for on-call targets and targets of opportunity.

ORDERS FOR THE QUICK ARTILLERY FIRE PLAN

55. In addition to the adjustment and deployment orders already given to the observers, the artillery commander shall send orders to the artillery CPs and to the observers in which some or all of the following will be included:

a. Orders for the fire plan itself, normally read from the artillery commander's copy of the quick artillery fire plan table.

b. Instructions on:

(1) observation and liaison,

(2) any special signals required to indicate the end of the timed program or of any phase of the tactical plan, and

(3) modifications.

THE QUICK ARTILLERY FIRE PLAN TABLE

56. The artillery commander will normally circulate the orders for a quick artillery fire plan by use of the table shown in Figure 5-8. The table is designed to allow for the transmission of data by radio. Written copies are also prepared and handed to:

a. the supported arm commander (number of copies to be in accordance with SOPs);

b. the observers; and

c. when appropriate, other supporting elements engaged in the operation, e.g., mortars and tanks.

57. **Heading**. The heading includes the following:

a. **Fire plan**. The nickname of the fire plan as assigned by the artillery commander.

b. **Supporting**. The address group of the formation or unit supported by the fire plan. This is not transmitted unless absolutely necessary.

c. **Originator**. The originator of the artillery fire plan. It is not required if the originator is the sending station.

d. **Modification by**. The call sign of the artillery officer authorized to implement modifications to the fire plan.

e. **Superimposed**. If a fire unit is superimposed throughout or from a specific time period, its call sign is entered followed by the word THROUGHOUT or the time period.

f. **H-Hour**. This will be shown as in paragraph 7c of this section.

g. **Sheet of sheets**. This is self-explanatory and is not transmitted.

h. **Date/time group**. The date and time of the transmission (not sent).

58. **Target Information**. The target information portion is a form of target list and includes the following information on every target in the fire plan (keyed to the column letters of Figure 5-8):

a. **Line number**. The line numbers on the left edge of the table are for each of reference to the target information. One line number shall be used for each target.

b. **Target number - column (A)**. The target number of each target in the fire plan shall be entered preferably in the following sequence:

(1) scheduled targets,

(2) on-call targets, and

(3) DF targets.

c. **Description - column (B)**. A brief target description will be entered in this column, e.g., "MACHINE GUN, A/TK GUN, OBJECTIVE".

d. **Location — column (C)**. An eight-figure grid reference shall be included in this column only when the target is an unrecorded target on which no adjustment will be carried out.

e. **Altitude — column (D)**. When a location has been included, the altitude will be given in metres (unless otherwise stated).

f. **Remarks — column (E)**. Special instructions for the adjustment or engagement of the target shall be entered in column (E), e.g., "ON CALL; LINEAR, 300, ALTITUDE 1200; REGISTRATION POINT 1, ALTERNATIVE TO ZT 1283; 22 WITH 3" (adjustment instructions which are important to the RCPO or GPO); etc. If a target is not to be adjusted, PREDICT shall be entered in this column.

59. **Schedule**. The schedule block is used to allocate targets to firing units and specify timings, and types and amounts of ammunition. This information is entered in the various columns by firings units as follows:

a. **Line number.** The line numbers on the left edge of the table are for ease of reference to the information contained in the schedule. One line number is used for each firing unit.

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QUICK ARTILLERY FIRE PLAN TABLE
TABLEAU DE PLAN DE TIR D'ARTILLERIE RAPIDE

SHEET / FEUILLE 1 OF / DE 1

FIRE PLAN – PLAN DE TIR	SUPPORTING – TIR D'APPUI	ORIGINATOR – AUTEUR	MODIFICATION BY – MODIFICATIONS PAR
HOT SEAT	BTZ	29	29
SUPERIMPOSED – SUPERPOSE	**H HOUR – HEURE H**	**DATE/TIME GROUP – GROUPE DATE/HEURE**	
THROUGHOUT	1530Z	211430Z	

TARGET INFORMATION – RENSEIGNEMENTS SUR LA CIBLE

LINE / LIGNE	(A) TARGET NO. – CIBLE N°	(B) DESCRIPTION	(C) LOCATION / EMPLACEMENT	(D) ALTITUDE	(E) REMARKS – REMARQUES
1	ZT5636	MACHINE GUN			RECORDED
2	ZT4010	WOOD			22 WITH FNP2
3	ZT4011	FARM			21 WITH 3
4	ZT5637	INFANTRY WITH APC			RECORDED
5	ZT4012	ANTI-TK GUN	83102640	170	PREDICT
6	ZT4013	TRACKED VEHICLE	83742745	150	ON CALL, PREDICT
7	ZT4014	RIDGE	84192760	140	ON CALL PREDICT
8	ZT4015	GULLY	84352810	130	FPF, PREDICT
9	ZT4016	BRIDGE	84712843	148	DF, PREDICT
10	ZT4017	CROSS ROADS	84912914	150	DF, PREDICT
11					
12					

SCHEDULE TIMINGS – (H) – TABLEAU FRÉQUENCE

LINE / LIGNE	(F) REGIMENT/ FORMATION / RÉGIMENT/ FORMATION	(G) FIRING UNITS / UNITÉS DE TIR	-5 H +5 +10
1	ABX	1	ZT5636 R4 · ZT5637 R2
2		2	ZT5636 R4 · ZT5637 R2
3		3	ZT4011 R3 · ZT4012 R3 (a)
4	FNP	2	ZT4010 R2 (b) · ZT5637 R1
5	ARC	MORS	ZT4011 R10
6	UWT	1	ZT4010 X (c)
7			
8			

REMARKS – REMARQUES

(a) 1 gun WP
(b) VT
(c) CAS napalm, TOT 1522Z

Figure 5-8: Example of a completed quick artillery fire plan table**Regiment/formation — column (F)**. Column (F) is used to identify the parent unit or formation to which the firing unit shown in column (G) belongs, see subparagraph c of this paragraph. This column shall be filled in and transmitted when more than one regiment is involved. Identification will be by call signs or address group.

c. **Firing units — column (G)**. In this column, the artillery commander shall designate the firing unit, e.g., 1, 4. If this is impossible, the artillery commander may merely designate the size of fire unit to be engaged, e.g., Bty, Regt. (The latter may occur when BCs/COs bid for resources in a superior commander's fire plan.)

d. **Scheduled targets — column (H)**. This column is used to specify the target number, timings, quantity of ammunition for each scheduled target and annotations.

(1) **The time scale**. This scale, covering 50 minutes, is marked every minute with a dot and every five minutes with a vertical dash. If the time program is longer than 50 minutes a second sheet is used. The top of the time scale is marked every five minutes on receipt of the warning order, e.g., "TIME SCALE MINUS 10."

(2) **Entering the target data**. The target data is marked on the schedule in column (H) as follows:

(a) Opposite the appropriate fire unit shown in column (G), each target shall be indicated by drawing a horizontal line extending from the starting time to the finishing time.

(b) The target number shall be entered above the horizontal line and the total quantity of ammunition entered below the line. If the type of ammunition is other than HE quick, or if any special instructions pertain to the target, an annotation, e.g., (a) (b), etc shall be entered below the horizontal line and reference made to it in the remarks column, e.g., (a) WP (b) 50 percent VT, etc.

(c) When FFE is to be applied at a specific time, the target number and number of rounds are displayed, but no horizontal line is shown, see (Figure 5-8, line 6, (H) H-9). The time may be specified in the remarks column by reference to a note, e.g., (a) AT H + 14, 3 Rds FFE; or (a) 5 ¸rds FFE, TOT 1230 hrs.

e. When transmitting the scheduled targets, the fire unit is specified first, followed by the timings, the target number, the number of rounds and any annotations.

60. **Order of transmission**. When transmitting a quick fire plan, the heading is sent first, followed by:

a. **Target Information**. This is transmitted by line number and by column, e.g.:

"TARGET INFORMATION. LINE 1. (ALPHA) ZT 1783. (BRAVO) MGS. (CHARLIE) GRID 61723482. (DELTA) 125. (ECHO) PREDICT. LINE 2. (ALPHA) ZT 1843, etc."

b. **Schedule**. The schedule is transmitted by line number and column. If the time scale has not been included in the warning order, it shall be sent at the beginning of the schedule, e.g.:

"SCHEDULE. TIME SCALE MINUS 15 TO PLUS 20. LINE 1. (FOXTROT) ADDRESS GROUP ACK. (GOLF) 1. (HOTEL) -10 TO -3. ZT 4526. RATE 2. NOTE (a). H TO +4. ZP 4528. RATE 1. NOTE (b). +5 TO +8. ZP 4525. RATE 3. (JULIETT) NOTE (a). SMOKE. NOTE (b). ONE GUN WP. LINE 2. (GOLF) 2. (HOTEL) etc."

61. **NOTE**. When only sub-units of one regiment are engaged in a regimental or battery fire plan, column (F) may be ignored. If column (F) is included, it will be sent only once with instructions for the first battery, providing the instructions for other batteries within the regiment follow directly one after the other.

62. **Read back**. The fire plan shall be read back by the Regimental Command Post (RCP) with the batteries acknowledging on the Regimental Ring Net. All OPs and CPs on the net shall record the fire plan orders.

SIMPLE FIRE PLAN ORDERS

63. Fire plans, which involve no more than three to six targets and only the batteries of one regiment, may be arranged simply by an officer-to-officer conversation without using the quick artillery fire plan table. Fire plans at combat team level usually take this form. When using this method, the following essential information shall be sent and acknowledged by officers:

a. target numbers and locations;

b. allotment of fire units and ammunition;

c. H-hour;

d. all timings and instructions on the firing of planned targets;

e. method of engagement and distribution of fire, if necessary; and

f. any other information essential to the guns.

64. For a simple fire plan of this kind, the orders may be given concurrently with the adjustment of the targets. A standard sequence of orders for each target is normally followed to ensure that data is not forgotten and for convenience in the command post. An example of simple fire plan orders is shown in Figure 5-9. To assist observers in recording and transmitting information, an example proforma is shown in Figure 5-10.

Ser	OBSERVER	NOTES
1	1 THIS IS 11. REQUEST PRIORITY OF FIRES FROM C/S 1 FOR NEXT 60 MINUTES. (See Note 1.) WARNING ORDER. FIRE PLAN MAPLE SYRUP. PREPARE 18 ROUNDS HE 5 VT. H-HOUR 0615 HOURS, OVER. (See Notes 2 and 3)	1. This request is subsequently passed to the Ops O for approval. The BC only has the authority to grant priority of fires if they have been given to him by the Ops O previously. 2. Warning Order sent whenever possible. 3. When the H-hour is not specified, the RCPO or CPO shall report when all fire units are ready to fire.
2	FIRE MISSION BATTERY. GRID 124 368. DIRECTION 1550. ADJUSTING ZP 2454. AT MY COMMAND ADJUST FIRE. (See Note 4) FIRE PLAN FETCH OFFICER	4. a. Initial orders for adjustment of the target which will be engaged last in the fire plan. b. GPO may report READY (with adjustment round(s)) following his read back of a serial when orders are sent in packets.
3	FIRE PLAN MAPLE SYRUP. ZP 2453 MGS. H TO +5. RATE 3. ZP 2454. PLATOON POSITION +6 TO +10. VT RATE 3. ZP 2455. GRID 1834 5624 ALTITUDE 300 FEET, DF, ON CALL FROM +11, PREDICT. 3 RDS FFE. (See Note 5)	5. The DF task could be sent later while adjustment is in progress.
4	TIME CHECK... ANY QUESTIONS? (See Note 6)	6. A time check need not be sent if a recent time signal has been received.
5	CANCEL AT MY COMMAND	
6	(Adjustment continues)	
7	RECORD AS TARGET ZP 2454. (See Note 7)	7. The observer need not wait for the report that ZP 2454 has been recorded before continuing with his orders.
8	DIRECTION 1800. L200 A800. ADJUSTING ZP 2453. ADJUST FIRE. (See Note 8)	8. In order to save time the observer has ordered a target grid correction from the last fired data.
9	(Adjustment continues)	

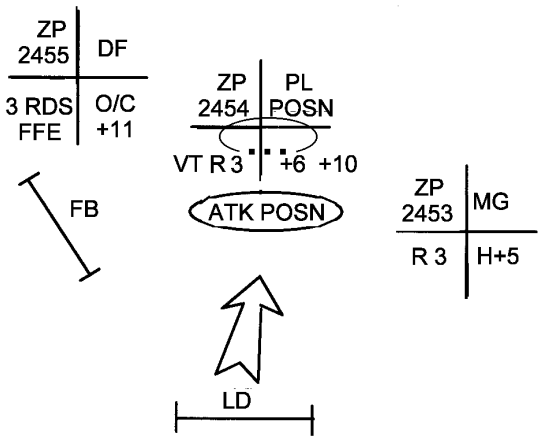
Figure 5-9: Example of simple fire plan orders

MODIFICATIONS AND CORRECTIONS TO FIRE PLANS

65. Because few operations go exactly as planned, the progress of the battle may require that modifications be made to the fire plan prior to or during its execution. These modifications may include changes in timings, tasks and ammunition.

66. Only the originator or a person authorized by the originator may order or approve modifications to the fire plan. Anyone may request a modification.

67. Before ordering a modification, the authorizing officer must ensure that there is sufficient time for it to be acted upon.

WARNING ORDER ORDRE D'AVERTISSEMENT	DIAGRAM DIAGRAMME	2. INITIAL ORDERS ORDRES INITIAUX
FIRE PLAN — PLAN DE FEUX MAPLE SUGAR		FM — MISSION DE TIR
PREPARE — PRÉPARER 18 HE 5 VT ROUNDS — COUPS		GR — COORD
H-HOUR — HEURE H 0615 HRS		DIR — DIR
		ADJ Z — RÉGL Z
		AMC — AMC
		ADJ FIRE — RÉGLEZ LE TIR
		FETCH OFFICER - ALLER QUÉRIR L'OFFICIER

3. FIRE PLAN (EXAMPLE: ZP 1234, MGs C/S 25, H HOUR +5, 40 RDS)
PLAN DE FEUX (EXEMPLE : ZP 1234, MITRAILLEUSES, I/A 25, HEURE H +5, 40 COUPS)

TARGET NO N° DE L'OBJECTIF	GR/DESC COORD/DESCR	CALL SIGN TO ENGAGE I/A DE L'UNITÉ D'ENGAGEMENT	TIMINGS MINUTAGE	AMMUNITION MUNITIONS	REMARKS REMARQUES
Z P 2453	MGS	1	H +5	RATE 3	
Z P 2454	PL POSN	1	+6 +10	VT RATE 3	
Z P 2455	GR 1834 5624 ALT 300 FT DF	1	O/C +11	PREDICT 3 DS FFE	
Z					

4. TIME CHECK — SIGNAL HORAIRE

ANY QUESTIONS

Figure 5-10: Example of a completed simple fire plan orders proforma

FIRE PLANNING WITH A LASER RANGE-FINDER

68. The use of a laser ranger finder (LRF) can simplify and accelerate the process of quick and simple fire plans. A fire plan employing an LRF is conducted in the same manner as one without. The following differences in procedures are as follows:

a. predicted targets are fixed using the polar co-ordinates procedure;

b. the laser point procedure may be used and may/shall be one of the guaranteed targets;

c. to obtain surprise, the target engaged for the laser point must be within laser point limits for all targets in the fire plan; and

d. if surprise is not important, all fire units engaged in the fire plan shall adjust the laser point.

SECTION 3

DEFENSIVE FIRE PLANNING

GENERAL

69. The aim of defensive fires (DF) is to disorganize the enemy's preparation for attack and to break up his assault when it is delivered.

70. The artillery fire plan originates at the highest levels and is passed down to the next level at orders groups or through target lists and overlays. Each level adds their targets to the fire plan and makes refinements. However, the FOO and BC will be proactive and will always submit their own fire plans in support of operations as required.

71. The BC will receive a fire plan from the Ops O outlining the targets that the division and brigade have plotted. The BC adds targets to support the battle group commander's plan. It is essential that each target have a definite reason or aim.

72. The BC passes this list on to the FOOs, who add targets to support their combat team commander's plan. The FOO can recommend refinements to the fire plan. Refinements are the changing of the location of a target. The FOO recommends a target number be deleted and a new target number, with the new location, created.

73. This section is concerned mainly with DF planning at battle group level where DF tasks must be available as soon as the supported arm has adopted a defensive posture.

RESPONSIBILITIES

74. The supported arm commander is responsible for the DF plan within area. The artillery commander will advise and will implement the DF fire plan. The factors which must be considered at all levels when producing the DF fire plan are:

a. the availability of artillery units, mortars, and NGS;

b. the allocation of targets for engagement by artillery, infantry support weapons and tanks;

c. the types of weapons, ammunition and method of engagement for each target, including restrictions to ensure the safety of our troops; and

d. whether or not adjustment will be required.

75. **FOO**. The FOO shall:

a. on receipt of the battle group DF target list from the BC:

(1) study the plan and make any recommendations for refinement to the BC,

(2) brief the supported arm commander on the DF plan, pointing out the round when possible. If time permits, the FOO shall also brief each platoon commander in a similar manner,

(3) ensure that a clear and concise drill exists with the supported arm for calls for fire on the DF targets, and carry out the BC's orders concerning adjustment of DF targets;

b. allocate a target number to each DF target selected;

c. pass the refined DF target list to the BC and the supported arm sub-unit;

d. assist the combat team commander in the initial selection of close DF targets within the combat team area of influence; and

e. call for fire on DF targets as required.

76. **BC**. The BC shall:

a. assist the supported arm commander in planning the employment of the artillery and support weapon resources;

b. assist in the co-ordination and refinement of the brigade DF fire plan;

c. assist in determining the battle group's FPF task (for mortars, and field and medium artillery);

d. allocate target numbers if necessary;

e. as required, advise on the implementation of an adjustment plan;

f. send copies of the fire plan to:

(1) the FOOs,

(2) the RCPO,

(3) the battle group commander,

(4) the battle group CP,

(5) the combat team commanders, when a FOO is not in their location, and

(6) support weapons commanders, particularly mortars and tanks;

g. disseminate instructions concerning DF targets and target list received from higher headquarters to the supported arm and FOOs; and

h. co-ordinate and control all orders concerning DF targets, and filter calls for fire as necessary.

AUTHORITY TO CALL FOR DF

77. The authority to call for DF will be notified in formation or unit SOPs, or in the DF fire plan order.

78. The authority to call for FPF is normally delegated by a battle group commander to the combat team commanders most closely affected.

DF

79. DF targets shall be chosen to support the combat team or battle group's plan. They shall be based upon likely avenues of approach of the enemy. Targets shall supplement the resources of the manoeuvre force. The ground and enemy activity shall influence the placement of DF targets, not the distance forward of the defensive area.

CLOSE DF

80. At the combat team and battle group level, the prime concern is to select DF targets that will break up an enemy attack when it is forming up or during the assault. Such tasks will usually be sited close to our own troops to cover dangerous approaches and ground that cannot be covered adequately by other weapons. Close DF tasks are chosen by the combat team or battle group commander with advice from the artillery commander.

81. When choosing close DF targets close to friendly forces, factors affecting troop safety must be considered. They are:

a. the lethal area of ammunition required to accomplish the task;

b. the degree of protection of our own troops;

c. the accuracy of target location and the size of the area to be covered;

d. the accuracy of the weapon system to be employed, including the accuracy of survey and maps, the accuracy and availability of current data required for prediction, and the accuracy of the instruments and methods used to compute the firing data; and

e. the dispersion of the weapon system to be employed.

82. Any DF target located within 600 metres of our own troops shall be assessed to determine the degree of risk to them. It will frequently be neither desirable nor feasible to adjust

close DF targets. When adjustment is carried out, the DANGER - CLOSE procedure may be required.

83. It is the responsibility of the supported arm commander to decide upon the that is acceptable under the prevailing tactical situation. The proximity to friendly troops to which fire can safely be brought to bear must be assessed by the artillery commander in the light of prevailing local circumstances as described in Chapter 3, Section 9. In most situations the distances shown in Figure 5-11 may be used as a guide. For 81mm mortar calculations see Chapter 3.

CALIBRE OF EQUIPMENT	SAFE DISTANCE IN METRES			
	PREDICTED DF TASK		ADJUSTED DF TASK	
	HE IMPACT	HE VT/ICM	HE IMPACT	HE VT/ICM
105mm	300	600	200	600
155mm	400	600	300	600

Figure 5-11: Guide to safe distances between DF targets and friendly troops

FINAL PROTECTIVE FIRE

84. The number of final protective fire (FPF) targets within a brigade depends upon the amount of fire units available. Such targets shall be placed to cover the most dangerous avenues of enemy approach into our localities, and may be changed periodically because of the change in the threat. SOPs shall include rate and volume of fire, and who has authority to call for FPF.

85. A fire unit can have only one FPF task. The minimum effective fire unit for this purpose is a field or medium battery or a mortar group.

86. When not otherwise engaged, guns allotted to an FPF task shall be laid on that target. If it is anticipated that a very quick response will be required, guns may also be ordered loaded, but this will normally be clarified by SOP.

DF IN DEPTH

87. The aim of DF sited in depth is to disorganize the enemy's preparations for attack and to strike at his reserves and headquarters once the attack is launched. They are chosen by the battle group commander advised by the BC. The brigade and division will also be selecting DFs in depth. The division deep battle is fully covered in CFP 306(2), *Artillery Staff Duties*.

TRIGGERS

88. Triggers are points on the ground that are used to assist the observer in determining when to fire on DF targets or fire missions with AMC in effect. When the target is mobile, triggers can be used to initiate a fire mission with enough lead time to ensure the fire unit is available when the target arrives in the area of impact. The other use for triggers is to tell the observer when to order FIRE so that the rounds and targets arrive at the same place at the same time.

89. Triggers are placed based on the speed of the enemy, the length of time required for the fire unit to report READY, and the time of flight. For example: the FOO has placed two triggers. As the enemy force passes the first trigger, the fire mission is initiated with AMC in effect. Since the trigger was properly chosen, the fire unit reports READY before the second trigger is reached. As the enemy passes the second trigger, the observer orders FIRE and the rounds and target arrive at the same spot simultaneously.

NUMBER OF DF TARGETS

90. There is no limit to the number of DF targets which can be arranged, but if the CPs are burdened with a large number of them, immediate response will be jeopardized. As a guide, the FOOs shall pick three to four DF targets and the BC shall add an additional six to ten DF targets.

A GROUP OF DF TARGETS

91. DF targets which are located close to one another and are tactically related may be grouped for simultaneous engagement. Each group of DF targets will be assigned an alphanumeric combination which will be indicated in the remarks column. See Figure 5-13.

92. As each task within the group will require at least one fire unit, the number of targets within each group will be limited by the number of fire units available. Unless the artillery commander otherwise orders, the RCPO will designate which batteries will engage which targets.

93. All the targets within a group can be fired by ordering the alphanumeric combination, e.g., "D9P FIVE ROUNDS, FIRE FOR EFFECT." Individual targets within the group may be engaged separately as required.

A SERIES OF DF TARGETS

94. The supported arm may occupy one of several sets of battle positions depending on the nature of the emerging enemy threat. Each set of battle positions will require a set (series) of DF targets. See also paragraph 11 of this section. Each serial will consist of individual targets or groups of DF targets, and will be identified by a nickname. The targets or groups within a series will normally be engaged individually. The following examples illustrate the orders used with a series or group:

a. ADOPT _____, e.g., "ADOPT IRON HEEL". On receipt of this order, the CPs involved shall prepare map data for all targets within the series designated.

b. CANCEL ADOPT ON _____, e.g., "CANCEL ADOPT ON IRON HEEL." This order will frequently be coupled with an order to adopt another series, e.g., "CANCEL ADOPT ON IRON HEEL. ADOPT MEAT BALL." On this order, the CP need no longer be prepared for immediate response to tasks in the IRON HEEL series but will prepare map data for all targets in the MEAT BALL series.

c. CANCEL _____, e.g., "CANCEL IRON HEEL." On this order, all targets in IRON HEEL lapse and the appropriate target records are struck out.

(SECURITY CLASSIFICATION)

TARGET LIST NO 7

References: a. (etc.) Maps, charts
b. (etc.) Relevant documents, e.g., Arty OpO No 4, etc.
c. (etc.) Coordinate location system used. (Specify type of reference system, e.g., Military Grid, National Grid, etc.).

Copy No 12 of 36
3 CDN Div Arty HQ
(issuing HQ)
BIRDWHISTLE UX176498
(place of issue: may be encoded)
061730S Nov 74
(date-time group of signature)
ARTY OPS 66
(message ref no)
Sheet 1 of 2

LINE NO	TGT NO	DESCRIPTION	LOCATION	ALTITUDE	SIZE		ATTITUDE	SOURCE AND/OR ACCURACY	REMARKS	
					LENGTH	WIDTH				
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	
1	ZU 0010	Defensive position	1100 5280	45	300	100	4500			
2	ZU 0120	Platoon position	1130 4210	62	Radius 100				A8P (G) 6 Med Regt	κ A * S
3	ZU 0121	Section with hy a/tk gun	109 4222	63	Radius 50				A8P (G) 4 RCHA	* H X
4	ZU 0125	Crossroads	1130 4720	48					Fd only	* C * A μ N (S)
5	ZU 1001	Assembly area	1280 4990	55	Radius 200					
6	ZU 1002	Infantry in trenches	1440 4250	51	200		1800		ANGRY DOG (S)	
7	ZU 1005	Observation post	1350 4310	74					ANGRY DOG (S)	
8	ZU 1006	Wood	1540 4820	45	300	200	0400			
9	ZU 1007	Entrenchment line	1420 4510	60	300		1600			
10	ZU 2002	Observation post sheltered	1310 4650	80						
17	ZU 3614	Bridge	1381 5311	46						
18	ZU 3617	Cutting	1477 5120	57						

Acknowledgement Instructions:
Authentication: (If not signed by comd or senior staff officer)
Distribution:

Last name of comd
Rank
(if authenticated)

(SECURITY CLASSIFICATION)

NOTES
1. STANAG 2031.
2. For brevity, some targets omitted.
3. Series ASH CAN includes two targets in group LONG DAY. The (S) indicates series and the (G) indicates a group.
4. Column (d): eight-figure grid reference.
5. Column (e): metres unless otherwise stated.
6. In heading, items in ( ) are for clarity and will not be included in target lists.

Figure 5-12: Example of a target list

METHOD OF ENGAGEMENT

95. The method of engagement for DF may be indicated at the time the fire is ordered, detailed in the DF target list, or detailed in regimental or formation SOPs.

96. LINEAR shall not be ordered in conjunction with a DF target unless absolutely necessary, because it defeats the purpose of DF targets (quick response in the defence of a position).

FORM OF DF PLAN — BATTLE GROUP LEVEL

97. **DF target list**. At battle group level, it is possible to produce only a DF target list, with any appropriate instructions concerning the DF plan being noted in the remarks column. See Figure 5-3-2. It may, at times, be found more convenient, both at battle group level and below, to use the target information portion of the quick artillery fire plan table.

98. **Other documents**. Target overlays (Figure 5-13) may be produced if time is available. Their completion is self-explanatory. Detailed comments on their use are given in CFP 306(2).

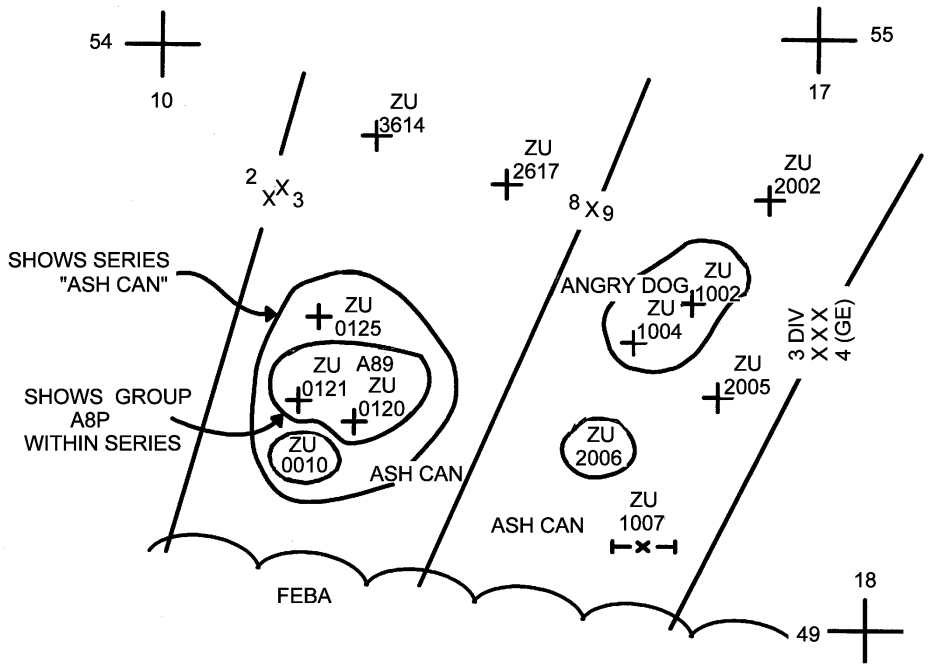
99. **Transmission of DF target lists**. Except in extreme urgency, DF target lists shall not be transmitted by radio since, if intercepted, the pattern of the defence may be compromised. If conditions dictate transmission by radio, a code must be used.

(SECURITY CLASSIFICATION)

TARGET OVERLAY NO 3
ISSUED WITH TARGET LIST NO 7
NOT TO BE USED FOR PREDICTION

References:
a. (etc.) Maps, charts
b. (etc.) Relevant documents, e.g., Arty OpO No 4 (etc.).
c. (etc.) Co-ordinate location system used. (Specify type of reference system, e.g., Military Grid, National Grid, etc.).

Copy No 5 of 36
3 CDN Div Arty HQ
(issuing HQ)
BIRDWHISTLE UX176498
(place of issue: may be encoded)
061730S Nov 79
(date-time group of signature)
ARTY OPS 67
(message ref no)



Acknowledgement Instructions:
Authentication: (If not signed by comd or his senior staff officer)
Distribution:

Last name of comd
Rank
(if authenticated)

(SECURITY CLASSIFICATION)

NOTES.
1. Example not to scale.
2. For brevity/clarity, some targets not included.
3. References not required may be omitted
4. Grid intersection points:
   a. minimum of three;
   b. grid line not repeated; and
   c. rays 1 km at map scale.
5. STANAG 2031.

Figure 5-13: Example of a target overlay

SECTION 4

CONTINUOUS FIRE SUPPORT

GENERAL

100. A manoeuvre force conducting an advance, a withdrawal, or a delay will usually be supported by a continuous fire support plan (CFSP). This fire plan consists of on-call targets on possible and known enemy positions along the route and other areas of concern to the manoeuvre commander.

101. The purpose of a CFSP is to assist the manoeuvre force's successful achievement of their objective by providing fire support. The targets in the CFSP permit the rapid response necessary to maintain the impetus of an attack or slow down an enemy pursuit force. The CFSP can also form the framework of a quick fire plan if heavy resistance is encountered. It must be remembered that the calling of fire by non-artillery units is greatly facilitated by the existence of a CFSP.

APPLICATION

102. Planning for a CFSP originates at the command level at which the advance, delay or withdrawal is being planned. Thus, for a brigade advance the CFSP would be initiated at the Regimental FSCC. They would then disseminate the information to the next level down, which would then complete its planning and disseminate it as required.

103. Some of the planning considerations include:

a. **Movement of guns**. A lengthy CFSP necessitates the movement of the guns. The movement of the guns shall be co-ordinated and ordered by the Ops O. The guns can be moved by either caterpillar, leapfrog, or both, depending on the tactical situation. A trade-off decision must be made between keeping up with the advance and weight of fire available.

b. **Reconnaissance**. A preliminary reconnaissance of likely gun areas will probably have to be made from maps and air photographs, particularly in the advance. Continuous reconnaissance of gun areas must be carried out by reconnaissance parties, moving well in advance of the guns. Furthermore, BCs and observers must report upon the suitability of possible gun areas and information on any bypassed enemy locations as they advance. This information is critical to the success of the CFSP.

c. **Targets**. Targets are selected to support the manoeuvre commander's plan. The target selection process begins with the originator of the CFSP, who selects targets to support their manoeuvre commander's plan. The CFSP is then passed to the next level down for additional targets to support the plan of that level's manoeuvre commander.

d. **Enemy positions**. Known and likely enemy positions shall be targeted. Using FLOCARK (Features, Lanes, Obstacles, CAnalizing ground, Routes, Key terrain) and knowledge of enemy doctrine and tactics, the Ops O, BC or observer predict the enemy's most likely response, counter-attacking along this route or withdrawing across this ford. Targets shall be planned to cover these eventualities. As a general rule, there shall be no more than one target for every two kilometres; obviously this depends upon the ground and the tactical situation. Wherever possible, targets are to be adjusted before engagement.

e. **Combination of targets**. The BC or observer shall use combinations of targets to assist in the responsiveness of fire. A series of targets could encompass an approach along a certain route between two phase lines with the CFSP having two or three series. Groups could be placed over large enemy positions, breaking the position into multiple targets to ensure coverage over its entirety.

f. **Observation plan**. The BC and observers must develop an observation plan for the CFSP. The BC determines the allocation of FOOs to the combat teams and advises on the allocation of MFCs. The FOO has to determine how to maintain the required level of observation as the combat team moves. The FOO shall do a detailed map reconnaissance and, if possible, an actual reconnaissance to determine points which have a good command of the ground and observation of possible and known enemy approaches and friendly movement. The FOO shall then develop a movement plan using these observation points. If an MFC or another FOO is allotted to the manoeuvre force, their movements shall be co-ordinated to ensure that observation is continuous. The movement plan will conform with that of the manoeuvre force and the manoeuvre commander shall be advised of it. If alone, the FOO will not be able to see the entire battlefield and will therefore have to rely on the manoeuvre force to provide information and initial engagement of certain areas. In this case, the FOO shall be in place to observe all known enemy positions as soon as feasible and that the manoeuvre commander advised when the FOO is in dead ground or areas of poor visibility.

104. **Rehearsals**. One of the best methods of ensuring that everyone understands a plan is to conduct a rehearsal. Therefore a rehearsal of a CFSP shall be conducted before the manoeuvre force commences the operation. The manoeuvre force should in fact conduct a rehearsal of the overall operation. The appropriate observers will attend and, at brigade level, the BCs will be there with their supported arm commanders. If the manoeuvre force does not conduct a rehearsal, then, at battle group level, the BC shall conduct one with the FOOs, MFCs and any other designated observers. The rehearsal will concentrate on manoeuvre activities, the observation plan and the plan for moving the batteries. A well conducted rehearsal will make the CFSP work more smoothly and effectively.

105. During the CFSP, it is essential that the observer have good communications with the manoeuvre commander and the guns: providing accurate and useful situation reports. Observers shall continually update their location, determining which targets can be seen and then checking the direction and distance to them. They shall be anticipating problems, especially in their

movement plan and make the appropriate decisions to correct them. Observers must always know where the manoeuvre commander is at all times.

CONDUCT OF A CFSP

106. As the advance to contact begins, the BC and observers shall follow the observation plan for their movement and observation. This ensures that the manoeuvre force continually has fire support in place to provide fire to assist them. Observers must continually update their location and pass it to the Ops O on the regimental net. It is important that targets are not used to describe locations. Instead, it is advisable that the FOO/BC use the report lines and phase lines to clarify their positions. Furthermore, observers need to be aware of any fire support coordination measures that are effective. During an advance, it is very unlikely that lead elements of different battle groups will move at the same rate; therefore, the observer has to be ready to react to enemy attacks from the flanks.

107. Observers, along with the BC, shall have guns and mortars lay on successive targets on the CFSP. As the manoeuvre elements close up and pass targets, the observer or BC shall declare the targets UNSAFE to safeguard against fratricide. Care must be taken not to declare targets UNSAFE too rapidly as some may be needed when follow-on forces attack bypassed enemy forces.

108. Observers providing fire support for missions against bypassed enemy elements must exercise due caution to ensure that the effects of friendly fire support do not adversely affect friendly rear operations.

CHAPTER 6

THE BC AND FOO IN BATTLE

SECTION 1

GENERAL

INTRODUCTION

1. The artillery is unique in that it is the principal fire support element in fire and manoeuvre. Artillery resources are often scarce; therefore, it is important to understand the manner in which they are employed to ensure their efficient use. BCs and FOOs must understand how the artillery fights and what their roles are in this fight.

2. At the divisional level, the artillery conducts mutually supporting operations simultaneously in three areas:

a. deep;

b. close; and

c. rear.

DEEP OPERATIONS

3. Deep operations are conducted by formations in the area beyond the line of sight and extend out to the limits of the area of influence. Other assets, such as AHs and air, may undertake actions out to or within the area of interest. The deep battle focuses on the disruption of enemy operations and the attrition of the enemy's forces. Artillery depth fire support tasks include:

a. CB tasks against guns, and missiles, and CM and counter-radar tasks;

b. SEAD;

c. attacks on headquarters, choke points and logistic installations;

d. attacks on reserve formations and second echelon forces;

e. laying of sensors and minefields in the enemy rear areas; and

f. harassing fire.

4. The aim of depth fire is to render ineffective the enemy's indirect fire and ground based air defence capability and reduce the strength of or delay the movement of enemy forces to a point where our forces can expect a reasonable chance of success due to favourable force ratios.

The successful conduct of deep operations requires the close co-operation of the artillery G2 and G3 staffs. The division uses air assets, aviation and conventional artillery, such as Multiple Launch Rocket System (MLRS), to fight their deep battle.

CLOSE OPERATIONS

5. Close operations comprise the majority of a formation's or unit's activities and involve the fight between the committed forces and the readily available tactical reserves of both sides. The majority of artillery assets are devoted to this task, although, at critical moments, artillery assets could be tasked to support deep operations.

6. Units tasked with the close battle generally are those in DS of divisions or brigades. It is important to understand, however, that the placing of an artillery unit in DS of a manoeuvre unit does not preclude it from periodically being used in deep or rear operations. Similarly, when not required for other operations, general support (GS) artillery may be used to supplement the fire of the DS units.

REAR OPERATIONS

7. Rear operations are those activities required to assure freedom of action in rear areas. If the commander's estimate identifies a rear area threat, then the deployment of artillery to support the rear area must be considered. The deployment of artillery in rear areas must obviously be weighed against the requirements of the close and deep battles. As a minimum, however, some artillery resources shall be capable of engaging all likely threats.

SECTION 2

PLANS

INTRODUCTION

8. The BC/FOO must have an accurate and complete understanding of the supported arm commander's tactical plan as well as the higher commander's artillery plan. The BC/FOO is responsible for ensuring that these two plans are executed in conjunction and meet the overall aim of the formation commander.

9. The BC/FOO receives direction on how the artillery will fight the battle, as directed by the CO, through the artillery Ops O or through oral orders. In either case, the orders contain important information about the artillery battle required by the BC and FOOs to complete their missions. Without it, they will fight in a vacuum.

10. In addition, the BC/FOO has to respond to the needs and aim of the supported arm commander's plan. The BC/FOO needs to have a complete understanding of the manoeuvre force's concept of operations. The BC/FOO has to brief both artillery superiors about the manoeuvre commander's plan and the manoeuvre commander about the artillery plan. Furthermore, the BC/FOO has to merge the two plans together to ensure that they meet the aim of the supported arm commander.

ARTILLERY ORDERS

11. The BC/FOO receives artillery orders in many different forms. Within the DS regiment, the BC/FOO will usually receive oral orders along with some written direction, such as, the Commander's Guidance for Fire Support. The BC/FOO must understand the artillery orders and be prepared to brief the supported arm commander about the information contained in them, emphasizing the following points:

a. the overall intent of the artillery plan;

b. the amount of indirect fire resources that the commander is likely to have available for use; including ammunition types and any restrictions on their use;

c. the availability of CAS, NGS and AH;

d. the availability of information from artillery STA equipment (radars, drones and sound ranging base);

e. any restrictions on:

(1) the adjustment of targets,

(2) the size of targets to be engaged, and

(3) the volume of fire at FFE;

f. fire support coordination measures and how they influence the use of indirect fire resources in the supported arm commander's area of responsibility;

g. the CB and CM policies;

h. likely locations of the batteries (for the BC to pass on to the BG Comd);

j. the tasks given to each of the units within divisional artillery; this information outlines the fire units from which the BC/FOO has priority of fire;

k. the Commander's Guidance for Fire Support; and

m. any other relevant information that might concern the supported arm commander's plan.

THE MANOEUVRE PLAN

12 The BC/FOO also requires the friendly forces' manoeuvre plan to be able to complete any assigned tasks. Usually, the manoeuvre commander takes the BC/FOO along to orders groups and on reconnaissance, thereby using the BC/FOO as a sounding board.

13 Throughout this time, the BC/FOO is developing an idea of the commander's concept of operations and what is required to support it. Some of the details and information that the BC/FOO needs are:

a. an understanding of how the supported arm commander intends to fight the battle and how this fits into the next higher level's intent and plan;

b. the tasks, grouping, location and planned movement of troops, providing the BC/FOO with safety information and timelines for the evolution of the plan;

c. the major concerns of the supported arm commander about the ability to accomplish the mission — thus permitting the BC/FOO to offer fire support advice and/or to identify fire support tasks and requirements;

d. the probable intentions of the enemy;

e. the location of the manoeuvre commander throughout the fight as well as the chain of command; and

f. probable subsequent tasks — information which allows the BC/FOO to anticipate the fire support requirements and to plan targets to cover this eventuality.

SECTION 3

THE BC AND FOO IN THE DEFENCE

INTRODUCTION

14. During defensive operations, the division of responsibility and the assigning of tasks to the artillery in relation to the deep, close and rear battle is fairly easily established. Bearing in mind the CB threat, a high level of centralization in artillery planning and command is possible in the defence. During the initial stages, a prime concern of the artillery commander is when to unmask the guns.

APPROACH

15. The artillery staff works closely with the supported G2 and G3 staff to coordinate the deep battle, ensuring that it supports the commander's concept of operations. Artillery and other fire support resources may become involved in the deep battle long before manoeuvre forces become decisively engaged. There may be circumstances where the artillery is deployed forward of friendly positions in order to increase its range on potential targets. The successful disruption of the enemy prior to arrival at the friendly positions in the covering force or main defensive area is a major force multiplier.

16. As the battle moves closer, the deployment of artillery must be carefully considered. The majority of artillery must be allocated to the formation/unit with the most dangerous situation or considered to be the main effort of the defence in accordance with the commander's plan. The ability of artillery to engage throughout the Main Defence Area (MDA) is very important. The rear battle can quickly become the most important one; therefore, artillery must be ready to respond.

17. Overall, defensive operations usually involve detailed planning and coordination at all levels. Defensive operations may be conducted using a mobile defence, an area defence, or a combination of both. Defensive operations will usually consist of a covering force battle, a main defensive battle, and the employment of reserves. The BC/FOO has different concerns and responsibilities in each phase.

18. The defence is characterized by a large number of supporting plans such as the anti-armour plan, the STA plan, the barrier plan and the fire plan. The objective of these plans is to ensure the complete coordination of resources, thereby maximizing the benefits of each. The BC/FOO is involved in many of these plans, not just the fire plan. Consequently, the BC/FOO will be intimately aware of the overall plan of the supported arm commander and how it ties in with higher defensive plans. The BC/FOO must understand how the artillery is going to fight and how this fight will support the commander's intent and plan.

19. Independent of the phase of the defence, the FOO shall christen the ground with the supported arm commander. This reduces the possibility of confusion during the battle. Furthermore, the FOO will make every effort to liaise with the platoon commanders and all other

elements under command in their areas of responsibility to ensure they understand how the FOO can assist them in their mission.

COVERING FORCE

20. The covering force is deployed to act as a forward security element. This provides commanders with early warning of the intentions of the enemy force and permits repositioning and preparation for the upcoming battle.

21. The covering force is a self-contained, balanced force that typically operates between a line of anticipated contact and the MDA. Its composition is dependent upon the forces available and its mission. Some of the likely tasks include:

a. deception;

b. imposing delay;

c. disorganizing the enemy;

d. inflicting casualties; and

e. gaining information.

22. A covering force is tasked with delaying the enemy advance and with defeating their leading elements. The covering force comes into contact and then attempts to maintain contact. This phase of the defence is characterized by frequent movement and sudden short engagements. The covering force attempts to provoke the enemy to deploy. Rapid, effective fire support is essential in the covering force battle.

23. At divisional level, the covering force is usually of battle group size and is supported by artillery units deployed forward of the main defensive area. Artillery deployed to support the covering force will normally be concerned with both deep and close operations. The BC needs to design the fire plan and the allocation of fire support resources accordingly. The BC and FOOs, with the covering force, will often have priority of fires from divisional artillery (including MLRS).

24. Due to the nature of the covering force battle, the fire support units will be moving frequently. This reduces their exposure to enemy CB but limits the amount of fire support they can provide. To ensure that the movement of the units does not negatively affect the fire support, it must be strictly coordinated by the BC. As the covering force battle nears the handover line, the supporting units have to move into their MDA positions. Again, this requires close coordination between the BC, the covering force and the positioning authorities in the next phase of the supporting units.

25. The fire support requirements depend on the mission that the covering force has been given; however, independent of the covering force’s mission, the BC/FOO must do the following:

a. in accordance with the supported arm commander's concept of operations, plan targets in choke points, possible assembly areas and assault positions. Targets shall be organized in series along the different avenues of approach. This assists the CPs in determining which targets to be prepared for. For large KZs use a group of targets, with each battery engaging a different target number within the KZ. This ensures complete coverage of the KZ with artillery fire. (See Chapter 5, Section 1);

b. plan targets to engage enemy forces as they enter the area of responsibility. The goal is to force the enemy to deploy, canalize or to slow down. The use of FASCAM and/or DPICM is very effective in achieving these aims. The use of FASCAM is highly dependent upon the Commander Division Engineer's (CDE=s) plan of action;

c. coordinate the coverage of obstacles with fire to fill in the gaps in the barrier plan as the friendly forces withdraw;

d. identify priority targets and determine how to acquire and engage them. Build upon the Commander's Guidance for Fire Support to fit the requirements of the supported arm commander's plan. When command and control elements and key enemy vehicles (bridgelayers, for example) are suppressed, this may lead to confusion, force deployment, the break-up of formations, the separation of tanks and infantry, and/or forcing the tanks to close down. The use of precision guided weapons is encouraged;

e. plan fires to cover the disengagement and repositioning of manoeuvre elements. This is a critical part of the covering force battle. It must be planned , practicsed during rehearsals and revised as required;

f. coordinate with the artillery in the MDA to ensure the smooth handover of responsibility and to provide continuous observation and engagement of the enemy forces. The firing of large and effective concentrations of fire will assist the covering force to break clean;

g. identify trigger points for targets and determine how observation can be achieved on these areas;

h. plan the routes to be taken throughout the battle and where observation posts can be established to support the manoeuvre commander's plan. If equipped with a GPS, the FOO shall enter both the targets and the OP locations as way points. This permits quick determination of direction and distance to the targets which saves time when the fire is needed;

j. establish what targets will be engaged by artillery, in what strength and where they will be engaged;

k. (for the BC in conjunction with the Ops O) coordinate the movement of indirect fire units to ensure that fire support is not disrupted. The subsequent tasking of the units involved must be taken into account; and

m. liaise with the supported arm and outline the fire support plan. The BC/FOO shall also identify areas where the supported arm can assist.

26. During the covering force battle, the BC/FOO must ensure that relevant information is passed to the Ops O using the quickest means possible. This information contains:

a. **enemy composition and intentions** — painting a picture of how the enemy is attacking and what can be expected once the enemy arrives at the MDA; and

b. **friendly force actions** — the covering force will not withdraw all at the same time; therefore, it is extremely important to have a clear indication of how the battle is going. Timely and complete SITREPs are required.

27. The BC/FOO must continually monitor the progress of the supported arm and of the higher battle. The BCs/FOOs of the units in the MDA shall be kept aware of when the handover of fire will take place. As the situation develops, the supported arm commander needs to be briefed on any changes to the amount of fire support available to support the covering force.

MAIN DEFENCE BATTLE

28. The main defensive battle involves the majority of the commander's forces and is used to decisively engage and defeat the enemy's main thrust. It is usually based upon an obstacle or series of obstacles.

29. The BC/FOO is involved throughout the planning of the defensive position by providing advice on the use of indirect fire support to the supported arm commander. The BC/FOO must consider the following when planning the use of fire support resources:

a. in accordance with the supported arm commander's concept of operations, DFs are used to supplement direct fire weapons, filling in the gaps in their coverage. Targets shall be organized as a series along the different avenues of approach which assists the CPs in determining which targets to be called for. For KZs, use a group of targets with each battery engaging a different target number within the KZ. This ensures complete coverage of the KZ with artillery fire. (See Chapter 5, Section 1);

b. targets shall be planned to slow and canalize the enemy to provide better targets for tanks, Tube Launched Optically Tracked Wire Commanded Anti-Armour Missile (TOW) and other anti-tank weapons. Consequently, these targets shall be decided in conjunction with the supported arm plan and after consulting the commanders of the tank and TOW units supporting the defence;

c. the use of HE and FASCAM on obstacles to reinforce or re-establish them shall be considered. This must be coordinated with the units covering the obstacle with direct fire. Remember that the use of FASCAM is controlled by division and that it takes a long time to compute in the battery CP; therefore, all FASCAM targets shall be identified early in the planning process and passed to the batteries for computation;

d. using smoke screens between enemy forward elements to isolate them from the follow-on elements and/or to break up their formations;

NOTE. Our current smoke munition does not blind infra-red systems or battlefield radars, but it can assist in creating confusion within enemy formations.

e. how, when, and where the handover of fire is to occur between the covering force and forces in the MDA and the routes that the covering force is going to use to cross through the FEBA. This is a critical point in the battle where confusion can easily occur. Close and detailed coordination is required on the part of all units involved;

f. how fire can be used to support the disengagement and repositioning of manoeuvre forces. The entire process shall be rehearsed as it is critical to the success of the defence. The rehearsal lets leaders know the amount of time required to move and the warning required by the FOO;

g. how indirect fire is going to support any counter-attacks within the BC's/FOO's area of responsibility. This includes how the BC/FOO can assist in providing observation, information on enemy positions and control of fire for the countermove force. This may require direct liaison with the BC/FOO of the countermove force;

h. identify trigger points, Named Areas of Interest (NAIs) and target areas of interest. Remember that for a trigger to work properly, the firing unit has to already be laid on the target. Usually it is better to call the trigger a little late rather than early;

j. liaise with flanking formations/units to clear fires across fire support coordination measures in advance, to outline responsibilities along the boundary in order to reduce the possibility of confusion, and to gain the outline plan of the flanking manoeuvre force; and

k. how the STA plan is laid out and how it can assist in providing early warning of targets entering NAIs and crossing trigger points, and the role of the FOO in it. It is usually better for the FOO to be superimposed on the STA plan rather than being incorporated within it. Depending upon the resources available to the supported arm, they may have substantially better TA ability than the FOO. If so, the FOO shall liaise to ensure that the supported arm has passed all important information.

30. Throughout the main defensive battle, the BC/FOO must feed the CO and Ops O constant SITREPs. As the situation becomes clearer, the BC/FOO must provide information about future activities of the supported arm. Furthermore, the BC/FOO shall keep current with the artillery situation, informing their supported arm commanders whenever the amount of indirect fire support available has changed or might change (i.e., the reinforcing regiment has now been tasked to reinforce a different regiment).

31. FOOs must continually observe their area of responsibility. They cannot be tied down by the supported arm commander. They must be free to move to positions of observation where they can observe the enemy forces. They have to be ready to make adjustments to the DF plan and must provide advice to the supported arm commander on the use of indirect fire resources. Remember, not every target shall be engaged by artillery!

THE EMPLOYMENT OF RESERVES

32. The employment of reserves may include Reinforcement, Blocking, Counter-attacks and Spoiling Attacks. These types of missions are usually given out as contingency plans to the reserve force of a formation or unit. The unit or sub-unit prepares plans for each possible option. The BC/FOO allocated to the countermoves force advises the supported arm commander throughout the planning process.

33. **Reinforcement** is conducted to assist a unit or formation in the accomplishment of their mission. The reinforcing force would probably take up a position in a fire base to provide the required support.

34. **Blocking actions** are done to stop an enemy penetration. This can be done as a prelude to a counter-attack are conducted to defeat an enemy penetration. They are usually launched against an enemy force in one of the formation/unit KZs. Unlike hasty or deliberate attacks, a combat ratio of 3:1 is not normally required. The enemy is likely to be a little disorganized and focused on their objectives, thus surprise shall be on the side of the counter-attacking force.

35. **Counter-attacks** are conducted to defeat an enemy penetration. They are usually launched against an enemy force in one of the formation/unit KZs. Unlike hasty or deliberate attacks, a combat ratio of 3:1 is not normally required. The enemy is likely to be a little disorganized and focused on their objectives, thus surprise will be on the side of the counter-attacking force.

36. **Spoiling Attacks** are normally launched against enemy forces that are forming up or assembling for an attack. They are usually conducted against opportunity targets with the objective of destroying enemy personnel and equipment, not to secure terrain.

37. The BC/FOO must do the following:

a. for each plan, the BC/FOO needs a separate fire support plan. This can be accomplished using a target list and different numbers (for example, 19 - 1 or 19 - 2) or one target list including several series of targets with each series

corresponding to a different plan. If the objective of the mission is large, then a group of targets shall be used;

b. the BC/FOO shall liaise with the other BCs/FOOs to determine how they can assist each other, including the locations of the in place BC/FOO and what they can observe, the layout of the defence in their area, and coordinating the clearance of fire. The in place BC/FOO must provide an updated situation report to the reserve BC/FOO if that contingency plan is initialized. This report contains vital information on the disposition and locations of enemy forces, friendly forces and includes target numbers that have been fired;

c. during rehearsals the BC/FOO shall study the terrain to confirm that the locations of targets are correct, to identify reference points and trigger points along the route, and to identify/confirm positions of observation. If equipped with GPS, the FOO shall enter the targets and OP locations as way points, which permits quick determination of direction and distance to the targets. This can save time when the fire is needed; and

d. plan targets beyond the objective of the mission. They can be used if the force exploits or if the manoeuvre force comes into contact with next enemy echelon.

38. The employment of reserves at the brigade and division level will probably have the priority of fire from the applicable units (regiment and division artillery respectively); however, this may not be confirmed until the last moment. The BC/FOO has to keep the fire support plan flexible and keep the supported arm commander informed of the amount of fire support available at any one time.

RESERVED DEMOLITIONS

39. **General**. The destruction of reserved demolitions is controlled at a specific level of command because it plays a vital part in the tactical or strategic plan, because of the importance of the structure itself, or because the demolition may be executed in the face of the enemy. The enemy may do his utmost to prevent the demolition from being fired or to force the premature firing of the demolition in order to hinder the withdrawal of friendly troops.

40. It is the task of the demolition guard commander to ensure that the demolition is not captured or sabotaged by the enemy before it has been successfully fired. The artillery observer, either a BC or FOO depending upon the size of the guard, is tasked with providing fire support planning and coordination to assist the demolition guard commander in completing the task.

41. **Authorized commander**. The designation of a demolition as reserved is the responsibility of the formation headquarters ordering the demolition. The authorized commander will task a unit as the demolition guard, specifying the conditions under which the demolition is to be fired and how the firing is to be ordered.

42. The artillery commander supporting the authorized commander designates the resources (FOOs and BCs, firing units and ammunition) tasked to support the demolition guard

commander. The artillery observer coordinates and plans the fire support resources to assist the guard commander.

43. **Artillery observer**. The demolition guard is usually based on a combat team, so usually the artillery observer will be a FOO. If the demolition is extremely important or covers a large area, a battle group might receive the task. In this case, a BC performs the duties of the artillery observer. Regardless of who is performing the duties of the artillery observer, the tasks are the same:

a. **Fire planning**. The artillery observer is responsible for producing and disseminating the fire plan to support the demolition guard commander's plan. The fire plan's dissemination depends upon the level of the authorized commander.

(1) If the authorized commander is the division commander, the artillery observer will be given an allocation of resources by the divisional artillery FSCC. Using these resources as planning figures, the artillery observer produces a fire plan which supports the guard commander's plan. This fire plan is passed directly to the divisional artillery FSCC where additional distribution will be completed.

(2) If the authorized commander is the brigade commander, the artillery observer will be given an allocation of resources by the regimental FSCC. Using these resources as planning figures, the artillery observer produces a fire plan which supports the manoeuvre commander's intent. This fire plan is passed directly to the brigade FSCC or the Ops for subsequent distribution.

NOTE. In either case, the fire plan shall also be disseminated to the adjacent forces' artillery observers and to any artillery advisors who are likely to have to cross the reserved demolition in contact with the enemy.

b. **Advice**. The artillery observer must continue to provide advice, planning and fire support coordination to the demolition guard commander. The artillery observer presents advice on all fire support questions and acts as a sounding board for the demolition guard commander's plan.

c. **Coordination**. The artillery observer must coordinate his/her activities with the other artillery observers in the area. This is especially important if the covering force or any friendly force is likely to cross the reserved demolition before it is fired. This coordination includes:

(1) where and when control of the battle will be handed over to the artillery observer at the reserved demolition,

(2) what forces will be crossing the river over the reserved demolition, and

(3) creation of an ON-CALL RFL, in case the reserved demolition is attacked before all forward elements have crossed the river.

d. **Delegation of Authority**. It is quite probable that a reserved demolition that was initiated by the division be delegated down to the brigade once all of the division's resources have crossed the demolition. In this case, the artillery observer's allocation of resources will probably change. The observer needs to contact the fire supporter to the new commander and coordinate activities. Most of these activities shall be done during the preparation stages of the reserved demolition.

e. **Communications**. The artillery advisor must maintain radio watch on a wide range of nets. As much as possible, these nets shall be done using land line or existing communication facilities. The artillery advisor must maintain contact with the fire units providing the allocation of resources.

SECTION 4

THE DELAY

GENERAL

44. To trade space for time while inflicting maximum damage on the enemy, fire is delivered on enemy forces at their maximum ranges and as early as possible. Artillery and CAS are very good in this role. When employed in a delaying operation, the BC/FOO shall consider the following:

a. plan targets on likely avenues of approach, obstacles and prominent terrain features (to help shift fires). If equipped with GPS, the FOO shall enter the targets and any OP locations chosen as way points, this permits quick determination of direction and distance to the targets (which can save time when the fire is needed);

b. fire smoke and DPICM at armoured command and control (C^2), and other key vehicles to delay and confuse the enemy;

c. plan targets on obstacles, barriers, gaps in friendly lines, and flanks with minefields, smoke and DPICM. FASCAM is very effective against targets when smoke has completely obscured them. Remember to use FASCAM to fill in the gaps in obstacles;

NOTE. FASCAM is controlled by division engineers and has long computation times; therefore, identify FASCAM targets early to begin the approval and computation process.

d. SEAD is very important. It permits more flexible and responsive CAS and AH support;

e. suppress enemy overwatch positions including known or suspected enemy OPs with DPICM, HE and smoke;

f. coordinate the positioning of mortars and artillery in depth, and their displacement on order by battery to ensure continuous fire support;

g. plan targets wisely. Use timelines, triggers or IPB products (if available) to ensure that the enemy and rounds meet at the same place and time. Fire support shall be flexible and responsive; and

h. plan and coordinate the rearward passage of lines with the covering force. This shall be planned for and coordinated as early as possible.

SECTION 5

TRANSITIONAL PHASES — ADVANCE TO CONTACT, MEETING ENGAGEMENT, LINK-UP, WITHDRAWAL AND RELIEF

45. Within transitional phases there are five types of operations in which the FOO/BC will be involved. This section will outline the responsibilities of the FOO/BC during these operations.

ADVANCE TO CONTACT

46. The manoeuvre force's purpose in the advance to contact is to gain or keep enough contact to determine whether a hasty or deliberate attack is to be carried out. The key to successful fire planning in the advance is flexibility coupled with rapid, accurate response. Reacting to unexpected situations on a moment's notice is often the norm. The BC/FOO must protect march columns from surprise fire, as much as possible, through the use of a well-planned and coordinated CFSP designed to inflict as much damage as possible on the enemy.

47. When the BC/FOO plans fire support for an advance to contact, the following points shall be considered:

a. (For the BC) Keep fire immediately responsive and flexible by coordinating the positioning of fire units well forward and to the flanks of manoeuvre forces, thus ensuring that the mortars and artillery can keep up.

b. Have guns and mortars lay on previously suppressed targets which have been identified.

c. Plan only essential targets. Planning too many targets may create confusion and/or delay the delivery of fire support.

d. Cancel targets that are no longer needed and update targets as the advance progresses. Plan on-call fire on any bypassed enemy elements along the route of march.

e. Plan priority of fires to support your lead elements. The BC shall consider requesting the priority of fire from regiment for those observers accompanying elements most likely to contact the enemy first. (This shall also be done by the Ops O during the planning process.) This will often be the element tasked or designated by the commander as the point of main effort.

f. Plan smoke and DPICM for suppressing known and suspected enemy positions. Use mortars for fast build-up and guns to sustain the smoke screens.

g. Use munitions that can quickly suppress the enemy (for example, DPICM and HE/VT).

h. Plan to mass fire immediately on enemy forward elements, to seize the initial advantage when the enemy is met. Ensure that you fully understand and support the commander's priorities and immediately engage those targets specified by the commander.

j. FOOs in trailing and adjacent combat teams and battle groups need to coordinate and pass information continually to their supported arm commanders, especially if smoke, illumination or FASCAM are employed or planned.

k. BCs and FOOs must pass on information about the suitability of proposed AMAs as they advance. Terrain will be at a premium and the guns will have to move frequently to keep up with the advancing formations. Any information on the locations of bypassed enemy forces, on obstacles along the routes to the AMAs and on the condition of the ground is vital. If the mine threat is high, then areas that have been cleared by engineers must be passed higher to ensure that they are used. Engineer support shall also be kept well forward to clear desired AMAs or portions thereof.

MEETING ENGAGEMENT

48. From the viewpoint of the BC/FOO, the requirements for indirect fire differ little from that of the advance to contact. These operations will often lead to hasty attacks, hasty defence, or delaying operations and are characterized by fluid movement and rapid decision-making requirements. The BC/FOO must implement fire plans that will offer the maximum in flexibility and shall always attempt to fix the enemy in order to allow manoeuvre forces freedom of movement. Speed in all cases is critical so that friendly forces retain the initiative.

LINK-UP

49. During link-up operations, the BC/FOO will be concerned with two major considerations. The first is that adequate fire support is available to dislodge and defeat enemy forces that may separate the two friendly forces that are linking up. The other is the judicious use of fire support coordination measures that will allow for the safe link-up of the friendly forces, while not inhibiting too much the use of indirect fire support during the conduct of the battle. Further, command relationships, communications requirements, and the shifting of priorities of fire will also be important planning considerations.

WITHDRAWAL

50. To disengage a force from enemy contact, the procedures for withdrawing fire support units must be clearly established and carefully performed. The fire units of the outgoing formation must stay in position until new fire units in the forward defence are in place. Concurrent planning is performed by each unit involved. The biggest problems will be with coordination and communications.

51. During the withdrawal, fire support considerations may include the following:

a. massed fire to help disengagement and discourage enemy pursuit. If necessary, request fire from adjacent units;

b. plan fire on obstacles and barriers;

NOTE. FASCAM is controlled by division engineers and has long computation times; therefore, identify FASCAM targets early to begin the approval and computation process.

c. coordinate with Ops O to permit the maximum feasible number of firing units to be left forward, with DS and reinforcing artillery being moved at the last possible moment, while ensuring that they do not get overrun; and

d. use CAS to interdict enemy reinforcement routes — this must be coordinated with SEAD.

RELIEF

52. Relief operations may include a relief in place, forward and rearward passage of lines and a retirement.

53. During relief operations, fire support considerations may include the following:

a. provision of targets, fire plans, and order-of-battle information to the force being passed through. The BC/FOO shall liaise with their counterparts to clear fires and determine handover responsibilities, placement and timings. The FOOs of one force will often be the first to see elements of the other force. Therefore, they must know the recognition signals both by day and by night;

b. coordinate with the Ops O to maintain fire support units of the outgoing unit in position until the units in the forward defence have been relieved. This permits the exchange of critical information and increases the fire support available while the force is most vulnerable;

c. plan smoke to screen movement, actual unit locations, and passage points. Remember, use mortars for fast build-up and artillery for sustainment; and

d. build or reinforce obstacles with FASCAM minefields and by cratering roads.

NOTE. FASCAM is controlled by division engineers and has long computation times; therefore, identify FASCAM targets early to begin the approval and computation process.

SECTION 6

OFFENSIVE OPERATIONS

GENERAL

54. In offensive operations, fire support is characterized by its flexibility with most of the firepower assigned to the main attack. However, the use of artillery in deep, close and rear battles must be carefully considered and a good balance struck between the often simultaneous requirements. In conjunction with the manoeuvre commander's plan, the artillery commander must consider attack of enemy assets in depth, i.e., those directly interfering with the manoeuvre force's actions.

55. Normally, one DS regiment is allocated to each forward manoeuvre brigade-size force. If the brigade is the division's main effort, the DS regiment is liable to have other Reinforcing (R) or GSR units allocated to it in these roles.

56. Offensive operations may take one of the following forms:

a. hasty attack;

b. deliberate attack;

c. counter-attacks and spoiling attacks;

d. reconnaissance in force;

e. raid; and

f. feint and demonstration.

HASTY ATTACK

57. Artillery and other fire support means in the offence assist manoeuvre forces to gain and keep momentum. One of the greatest dangers for manoeuvre forces is that they will outrun their fire support. The BC shall coordinate with the Ops O to ensure that the guns are always in range.

58. The BC/FOO shall consider the following points when supporting a hasty attack:

a. Use targets planned during the advance to contact (the CFSP) or other preceding operations. Ensure that all TA means coordinate with each other.

b. Request priority of fires to lead elements. Those elements designated as the point of main effort shall already have this done for them by the commander, but the BC and FOO need to keep this in mind. Make best use of planned targets.

c. Plan suppressive fire on known and suspected enemy direct-fire positions with HE/VT and smoke.

d. Plan priority targets throughout the depth of the sector, making active those which could have an immediate impact on the manoeuvre force and cancelling those that have been bypassed.

e. Plan fire on likely assembly areas, the objective and beyond (to exploit success). Using the commander's intent, plan targets that support the ultimate aim of the higher formation. Remember that manoeuvre forces exploit whenever given the opportunity; therefore, the plan must cover that opportunity.

f. Use smoke to obscure the line of sight of enemy observers and to screen friendly movement. Remember, smoke is a double-edged sword. It removes the enemy from our sights just as easily as it removes us from his. Furthermore, most current TA equipment is not blinded by smoke.

g. Anticipate immediate CAS needs. If necessary, divert aircraft from pre-planned missions.

h. If time permits, consider preparatory fire to fix the enemy in coordination with the assault. Use all fires available for the preparation. Make it short but intense — immediately follow with assault. Consider starting the assault under the preparation.

j. Plan massed fire from several weapon systems at the point of penetration for the final assault. More than one artillery regiment may be needed for this purpose. Consider MLRS, 203mm (8-inch), and CAS. Do not leave the mortars behind.

k. Coordinate the displacement of artillery so that artillery support to committed units is not interrupted. The manoeuvre commander must tell the BC/FOO what is wanted.

m. Plan depth fire to close off the immediate battle area to prevent enemy reinforcements and resupply. This can contribute greatly to the defeat of the enemy position.

n. (For the BC.) Plan for exploitation to occur. Have FOOs ready to regroup with any exploiting forces. Furthermore, have FOOs in position to provide support to any subsequent operations.

59. BCs/FOOs must continually update the situation. The clearance of fire must be done quickly to permit a rapid response to unforeseen circumstances. Furthermore, the BC must follow the flow of the battle on the flanks to be able to anticipate changes to the artillery allocation.

DELIBERATE ATTACK

60. There will never be too much firepower in a deliberate attack. Other helpful hints for the BC/FOO are as follows:

a. Consider the use of preparatory fire on the objective.

b. Consider attacking enemy indirect fire assets to keep them from firing on friendly forces as they advance. This is usually done at regimental and divisional level.

c. Attack targets beyond the objective to prevent enemy reinforcements and resupply, and to support the exploitation and pursuit of the enemy. Concentrate on the targeting of enemy command posts, observation posts and communication nodes. By creating confusion in enemy headquarters, the enemy can be stunned long enough for friendly forces to penetrate.

d. Plan smoke on the flanks and on crossings of exposed areas to obscure the enemy's line of sight. This must be coordinated with all units affected.

e. Plan fire on the flanks of the advance to prevent counter-attack.

f. Plan suppression and smoke missions to support breaches of known or suspected enemy obstacles thereby reducing enemy strongpoints.

g. Provide immediately responsive fire to the lead attack force. Plan the greatest volume of fires on the point of penetration or main attack. Do not forget CAS; it can help a great deal.

h. Coordinate the displacement of fire support assets to ensure continuous support.

j. Keep the fire support as flexible as possible to respond to unexpected contingencies.

COUNTER-ATTACKS AND SPOILING ATTACKS

61. During these types of operations, friendly forces will be depending upon surprise and shock action to upset the intentions of the enemy. Close coordination between moving forces and those forces already in place will be required. In the case of counter-attacks, fire plans to support these operations shall be planned well ahead of time. However, this may not always be the case and, if so, rapid decision-making and flexibility will be required on the part of the BC and FOO.

62. Spoiling attacks may also require hasty planning as friendly commanders seek to exploit temporary enemy weaknesses. In both counter-attacks and spoiling attacks, the friendly attacking forces may not have the force ratios normally associated with offensive operations. In these circumstances, indirect fire combined with surprise can achieve significant results. The

BC/FOO shall seek to maximize the amount of fire support in order to gain the benefits of the shock action provided by synchronizing manoeuvre and fire support.

RECONNAISSANCE IN FORCE

63. During the conduct of a reconnaissance in force, friendly manoeuvre forces will be seeking enemy weakness and an opportunity to exploit those weaknesses. Thus, the BC/FOO must seek to have adequate fire support resources to quickly disrupt enemy hasty positions and to support friendly manoeuvre forces that are attempting to outflank and bypass isolated enemy units. Fire units supporting this type of operation must be capable of quick forward movement in order to continue to support the manoeuvre forces.

64. Reconnaissance in force missions may also be conducted to force the enemy to react. In such circumstances, the enemy may be considerably stronger that the force conducting the reconnaissance. Thus, in these circumstances, the BC/FOO will be a critical element in providing enough fire power to assist the manoeuvre force in surviving the contact and avoiding decisive engagement.

RAID

65. Raids are conducted in order to disrupt enemy forces and may be conducted by units of any size. Because they emphasize speed, most raiding forces are relatively lightly equipped and not capable of engaging the enemy for an extended period of time. Therefore, the artillery plays a critical role in supporting the manoeuvre forces by adding a significant amount of fire power to the raiding force. In many cases, detailed fire plans can be planned ahead of time, but will, in many cases, be on call in order to maintain surprise. Fire plans that support the withdrawal of the raiding force are also critical since this is often the time when the force is at its most vulnerable. BCs and FOOs that are supporting raiding forces shall always seek priorities of fire from fire support resources for the duration of the operation due to the vulnerability of the raiding force.

FEINT AND DEMONSTRATION

66. During the conduct of a feint, the manoeuvre forces will seek to deceive the enemy by distracting him and, if necessary, engaging him in combat in order to support the development of the main effort elsewhere. The friendly forces will be of sufficient force to cause the enemy to react, but will often appear larger and more potent than they really are. In this type of operation, the artillery can play an important role. By planning and executing fire plans of a sufficient size and intensity, the BC and FOO can assist in both the support to the manoeuvre force as well as fooling the enemy as to the main intention.

67. Because the manoeuvre force will not be as strong as it appears, BCs and FOOs shall formulate fire plans that use enough resources to make up for the lack of manoeuvre force combat power. Fire plans shall be planned for both the offensive, as well as any withdrawal and delay operations that may ensue following the initial engagement.

68. During a demonstration, the role of the artillery is equally important. Because the main effort of artillery is usually focused on the manoeuvre main effort, large intense fire plans are an excellent tool for deceiving the enemy as to our main intentions. These fire plans shall be planned as though an actual attack were taking place.

SECTION 7

OFFENSIVE OPERATIONS — TACTICS

INTRODUCTION

69. The tactics used by the FOO during offensive operations will be dictated by many different factors. These include the enemy, the terrain and the composition of the supported arm. For these reasons, it is impossible to give any hard and fast rules governing the tactical conduct of the FOO in this scenario.

70. Nevertheless, there are general tactical principles that apply and that can will increase The FOOs of success. The actual requirements of the supported arms will rarely be technically difficult to achieve. The difficult aspect for the FOO is that the situation will be highly fluid, confusing, and indeed dangerous. The chances of being killed or injured while trying to fulfil the responsibilities of the FOO are fairly high in the event of a tactical error.

71. In this section, a notional layout of a combat team has been provided. In this case, the combat team consists of a half-squadron, commanded by the battle captain together with an infantry company. The infantry company commander has been designated as the combat team commander. It must be emphasized that while this layout is a fairly common grouping, the actual layout of the supported arm is variable. FOOs could find themselves working with tank squadrons, infantry companies, reconnaissance squadrons, or any combination thereof.

COMBAT TEAM OFFENSIVE OPERATIONS

72. At the beginning of the operation, the combat team commander will carry out all the necessary battle procedures; detailing the plan for the operation. In the example provided in Figure 6-1, the combat team commander has chosen the formation depicted for the advance to contact. Under normal circumstances, reconnaissance forces would ideally be out ahead of the depicted formation. For the FOO, the important tactical preparations prior to crossing the line of departure are as follows:

a. The FOO and MFC have conducted a detailed map reconnaissance and have determined an observation plan to support the advance to contact.

b. The FOO and the MFC have discussed all SOPs that they will use between themselves for the operation.

c. The FOO and MFC are in possession of all frequencies, codes, and Communications-Electronics Operating Instructions (CEOIs) for calling for indirect fire from any resource.

73. The above considerations are in addition to the normal pre-mission preparations that are discussed in this volume. With respect to SOPs, the length of time that the FOO and MFC have worked together will determine how much pre-mission liaison is required. These SOPs can only

be formulated in conjunction with the combat team commander. An example of an SOP for a combat team would be as follows:

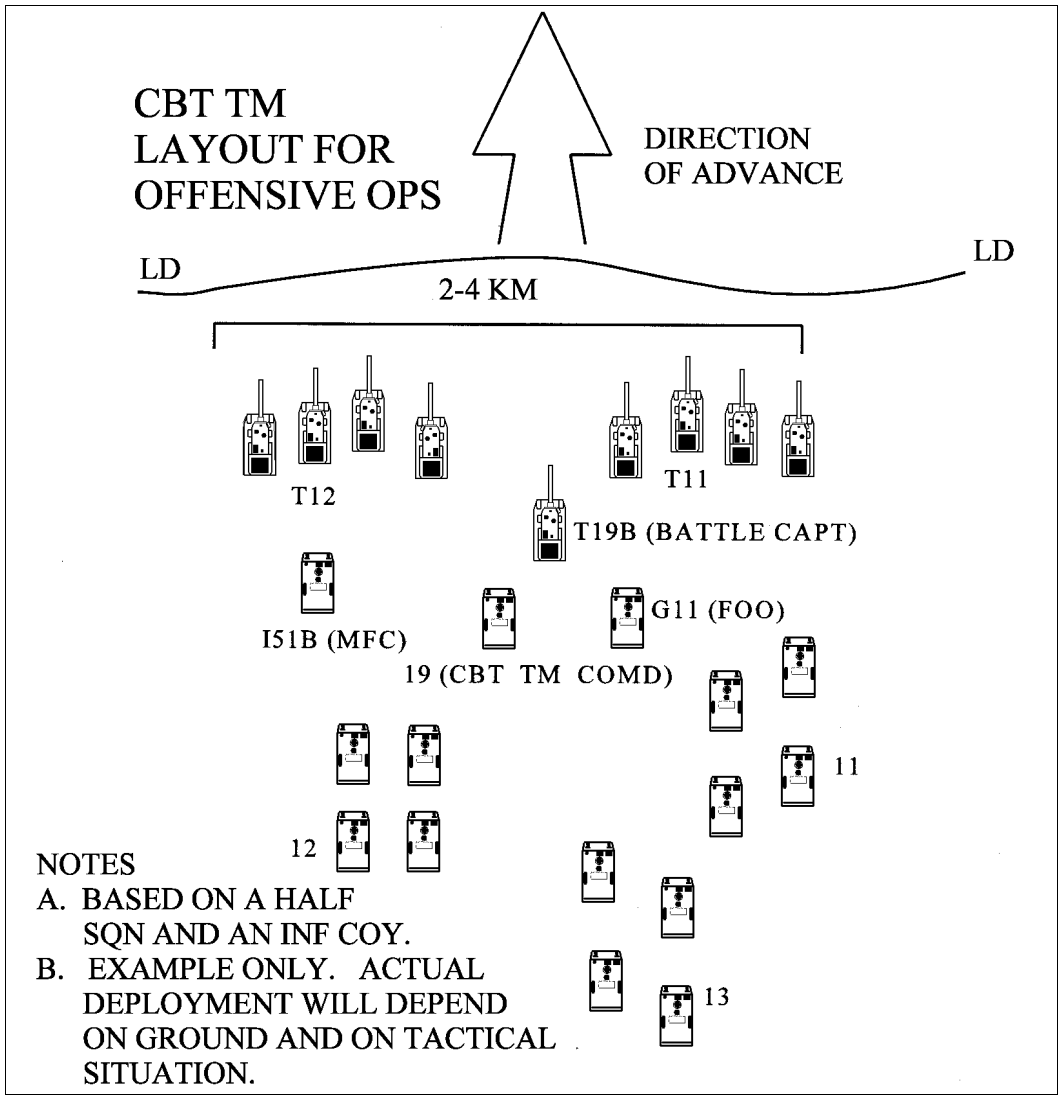


Figure 6-1: Combat team layout for offensive operations

a. Prior to contact, the FOO will remain in the vicinity of the combat team commander while moving between positions of observation. The MFC will move similarly on the opposite flank to that of the FOO.

b. upon contact, the battle captain, combat team commander and the FOO will move to the point of contact and formulate the plan. The MFC will immediately move to see the engaged enemy and commence adjustment.

c. By convention, the FOO will be in the fire base, unless otherwise ordered, and the MFC will accompany the combat team commander in on the assault. By convention, the FOO will move forward with the fire base tanks.

74. The above example is by no means the only answer for every situation. In many cases the situation will dictate that there be a change to the SOP. However, what the above example does give is guidance on how the combat team commander, FOO and MFC will work. If there are any changes, then they will come in orders.

75. Once the advance begins, the FOO and MFC shall locate themselves where they believe they can most influence the battle. Nevertheless, under most circumstances they will strive to remain one tactical bound back from the leading tanks (see Figure 6-2). This is applicable whether the tanks are using caterpillar or leapfrog methods for movement. If the combat team runs into trouble, only the tanks have the firepower and protection to find the enemy while engaged in a direct fire battle. It is important that the FOO not become a casualty in the first seconds of contact with the enemy. If the combat team is operating with both an MFC and a FOO, they shall attempt to provide as much visual coverage forward of the combat team as possible. This visibility may often be only as far forward as the lead tanks. If the FOO is working alone, then the ideal location is one close to the combat team commander, in a good position of observation, and centrally located for maximum flexibility.

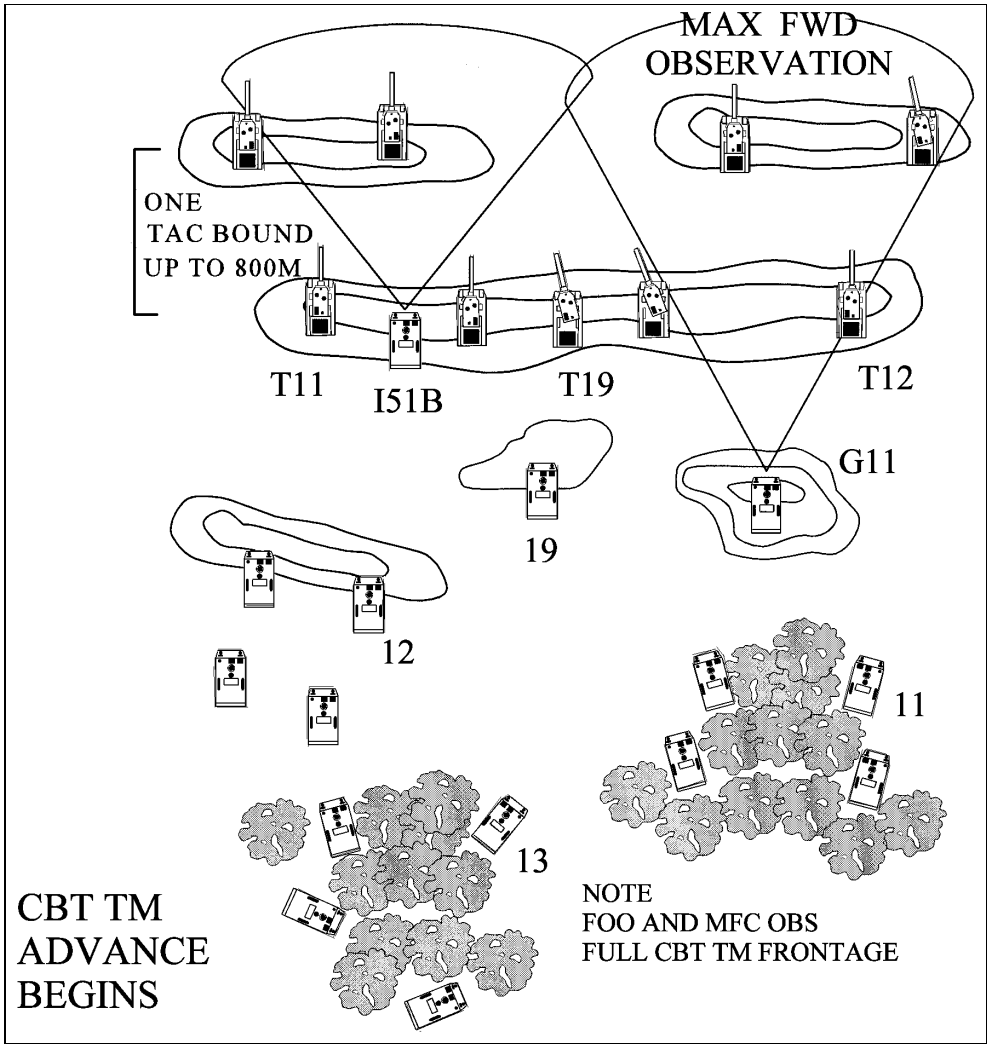


Figure 6-2: Combat team advance begins

76. The first indication that a FOO will have that the combat team has made contact is usually the firing of tank main armaments. This may be accompanied by considerable confusion. The quick reaction of the combat team at this moment is critical. The FOO and MFC must seek to place the enemy positions under fire as soon as possible for the suppression of the enemy direct fire weapons will be critical for both the immediate manoeuvring of the combat team as well as future plans.

ACTIONS ON CONTACT

77. Different combat team commanders will have different SOPs covering drills on contact with the enemy. In general terms, it will develop as follows:

a. the combat team commander will, if possible, move to a position of observation and observe enemy forces that have been identified by the lead elements;

b. the FOO will usually join the combat team commander on a quick reconnaissance;

c. at this point the combat team commander will formulate a plan with the assistance of the FOO; and

d. the combat team commander will then give orders to both the FOO and the remainder of the combat team.

78. Conversely, in exceptional situations, the above actions may take place with the combat team commander totally out of sight of the enemy positions. The combat team commander may use the contact reports and situation reports of the lead elements to formulate a plan without ever seeing the enemy position. Whatever method is used by the combat team commander, the FOO must advise on fire support for the plan and then get on with the adjustment of the enemy positions as soon as possible (assuming the combat team commander has agreed to adjustment).

79. If the FOO and combat team commander are in a position of observation, the FOO will task the FOO technician to begin the adjustment of the targets right away by giving the appropriate adjustment orders, including priorities. At the same time that the FOO and the combat team commander are doing their coordination and planning, the MFC will be moving at the best possible speed to a position of observation. Once in position, the MFC will report to the FOO that the target is under observation. Upon clearance from the combat team commander, the FOO can give the MFC adjustment orders. It is important that the MFC get started as soon as possible because, during offensive operations, the mortars may well be mobile. The same may well apply to the guns. The FOO and the MFC must ensure, during the lead-up to the actual attack, that they are ready on the fire plan, and this before the combat team is ready to attack. If the FOO and the MFC are not ready, the combat team is left waiting for the guns and mortars. As a result, the pace of operations slows down significantly thereby giving the enemy more time to react.

80. In the example provided in Figure 6-3, the combat team commander and the FOO have elected to move forward to where the lead tanks made contact. The MFC has also moved into a

position of observation. It is at this point that the FOO and the MFC are in the most danger, since by moving up to where the tanks are operating, they are in range of the enemy direct fire weapons. In the example provided, the combat team commander has elected to leave the tanks in contact as a fire base with the FOO, and do a left flanking assault taking the MFC with him. After formulating an outline plan with the FOO, the Combat Team Commander gives a warning order detailing the assembly area, line of departure, formations, etc., to enable the combat team to start moving. The FOO moves up to continue the adjustment.

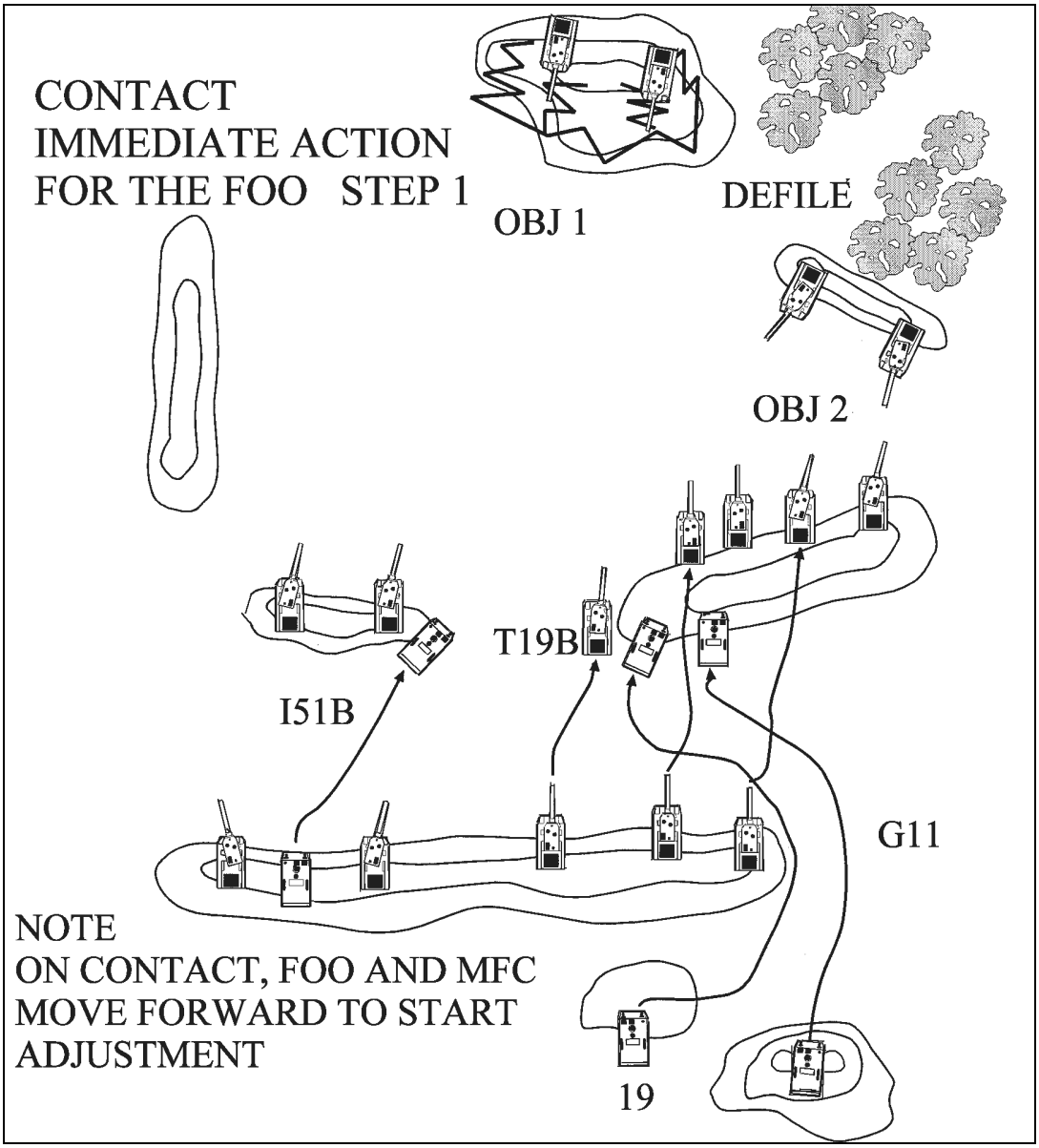


Figure 6-3: Immediate action for the FOO upon contact— Step 1

ACTIONS IN THE FIRE BASE

81. In the example provided, the FOO will observe from the fire base position. The following rules govern the conduct of the FOO in the fire base:

A. Never stop behind the tanks since this will restrict their ability to jockey. Give the tanks room to manoeuvre.

B. Stay close enough to the tanks to benefit from their protection; however, remain far enough away so that the attention of enemy direct and indirect fire is not going to endanger the FOO.

C. Always remain in defilade to the enemy, i.e., keep some physical cover between you and the enemy that is capable of absorbing the effects of his weapons. REMEMBER, THE FOO VEHICLE DOES NOT HAVE THE ARMOUR TO STAND UP TO ENEMY DIRECT FIRE WEAPONS.

82. Once in a position of observation, the FOO shall remain there throughout the adjustment to gain intelligence on the enemy positions. The exception is when the FOO is being directly targeted by the enemy using direct and indirect fire. In this case the jockey procedure shall be used. Examples of the right and wrong way to manoeuvre in the fire base are shown in Figures 6-4 and 6-5.

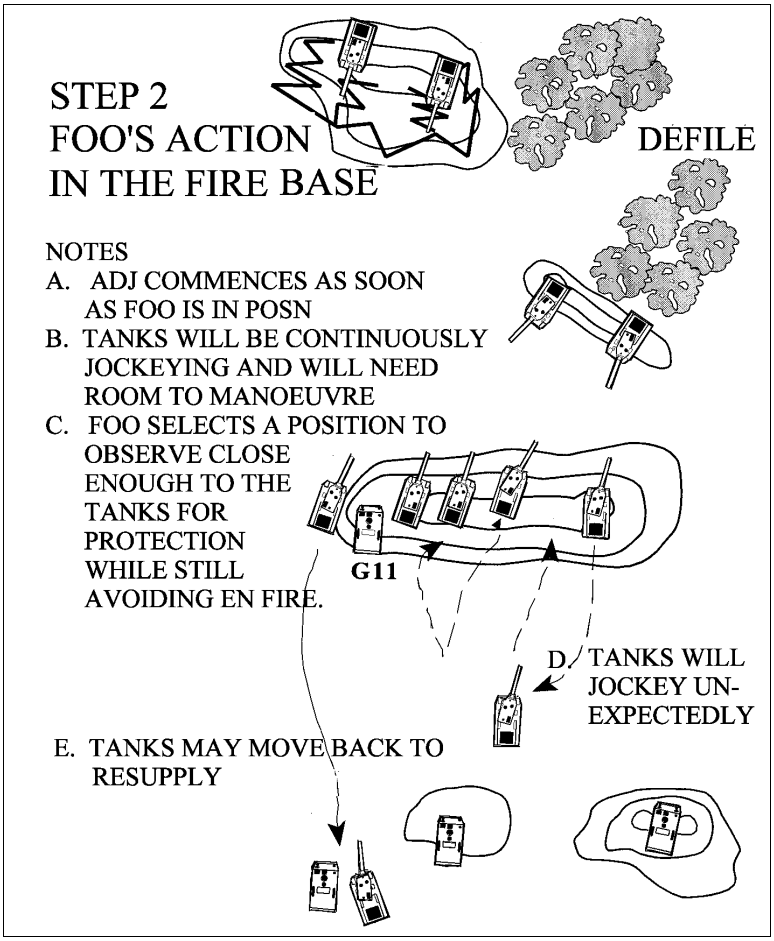


Figure 6-4: FOO's Action in Fire Base — Step 2

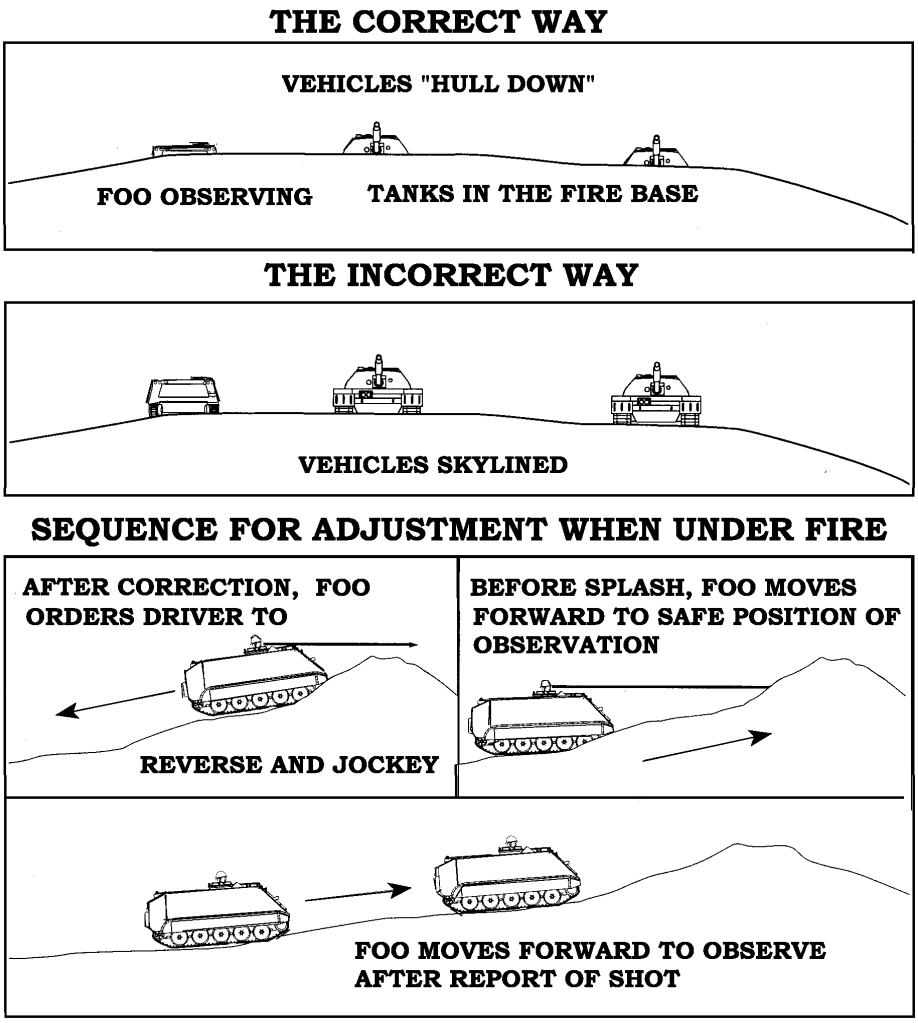


Figure 6-5: Sequence for adjustment when under fire

THE ATTACK

83. Once the attack begins, the FOO has two main responsibilities — the application of the fire plan as per the orders of the combat team commander, and the safety of the troops when and if they move onto objectives being suppressed by indirect fire. This is also an area where many combat team commanders may wish to take personal control. They may want to personally order the lifting of fire. However, in most situations the combat team commander will leave the decision of when to lift fire to the FOO. This is a very important factor in the success of the attack. Fire shall not be lifted too early, particularly during the breaching operation where the combat team will be halted in front of the enemy position. In these circumstances, the correct way to ensure that the fire is lifted at the appropriate time is for the order to be given by a call sign in the lead elements of the attack. In the example provided, the ideal person would be the MFC.

84. If there is little or no breaching to take place, and the authority has been left with the FOO, then the fire has to be maintained until the last safe moment. In the example provided, the

FOO has achieved this by selecting reference objects on the ground to assist in deciding when to lift fire as follows:

a. "OT factor" to both objectives = 2

b. Guns/ammo in use: 155mm HE

c. Line of fire of guns perpendicular to advancing troops

d. Minimum safe distance of troops under armour = 175m

e. Speed troops are moving = 300m/min

f. TOF = 30 Seconds

g. Therefore, troops will move 150m from time of the CHECK FIRING order to last round landing, thus 150m + 175m = 325m = approx 160 mils at OT factor of 2.

h. "160 mils left of objective are some trees, therefore, when the lead tanks get to those trees, 1 must check fire. As an arbitrary decision, 40 mils left of the check fire line I will use the rocks as a cease loading line. I will order the target unsafe when the troops are well up on the objective just in case there is any possibility of them getting pushed off the objective."

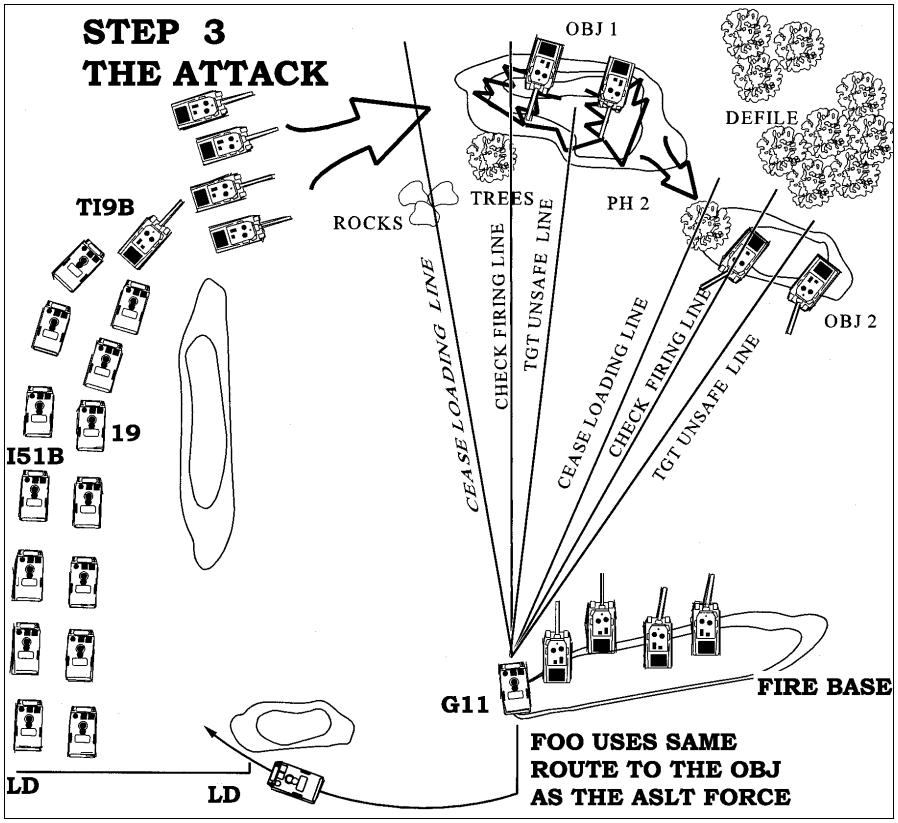


Figure 6-6: The attack — Step 3

85. The next critical decision that the FOO must make in the example given is when to move forward and how to get there safely. A frequent mistake of inexperienced FOOs is to watch the attack develop from their position and be too slow in getting onto the objective. Getting the manoeuvre forces onto the objective is only half of the task. Keeping them there is the second half. To achieve this result, the FOO must be ready to assist in defeating any potential counter-attacks. In the example provided in Figure 6-6, the FOO has taken care of this part of the plan by indicating the arc of observation for the MFC once on the objective. Nevertheless, once the MFC is deployed the FOO must get to the objective with best speed.

86. Getting to the objective represents a major risk to the FOO; however, there are ways of reducing this risk. The FOO must travel with the tanks to benefit from the protection that they provide; however, the FOO may decide to move alone onto the objective. The most prudent action is to take the proven route that the combat team took. Failure to do this may expose the FOO to danger from several different areas. The FOO may choose to take a route which is vulnerable to direct fire from weapons as yet undiscovered. The second and more likely danger is that the FOO will run into mines and anti-tank obstacles which will, at the very least, impose a delay, and at the worst, destroy the vehicle and the FOO party.

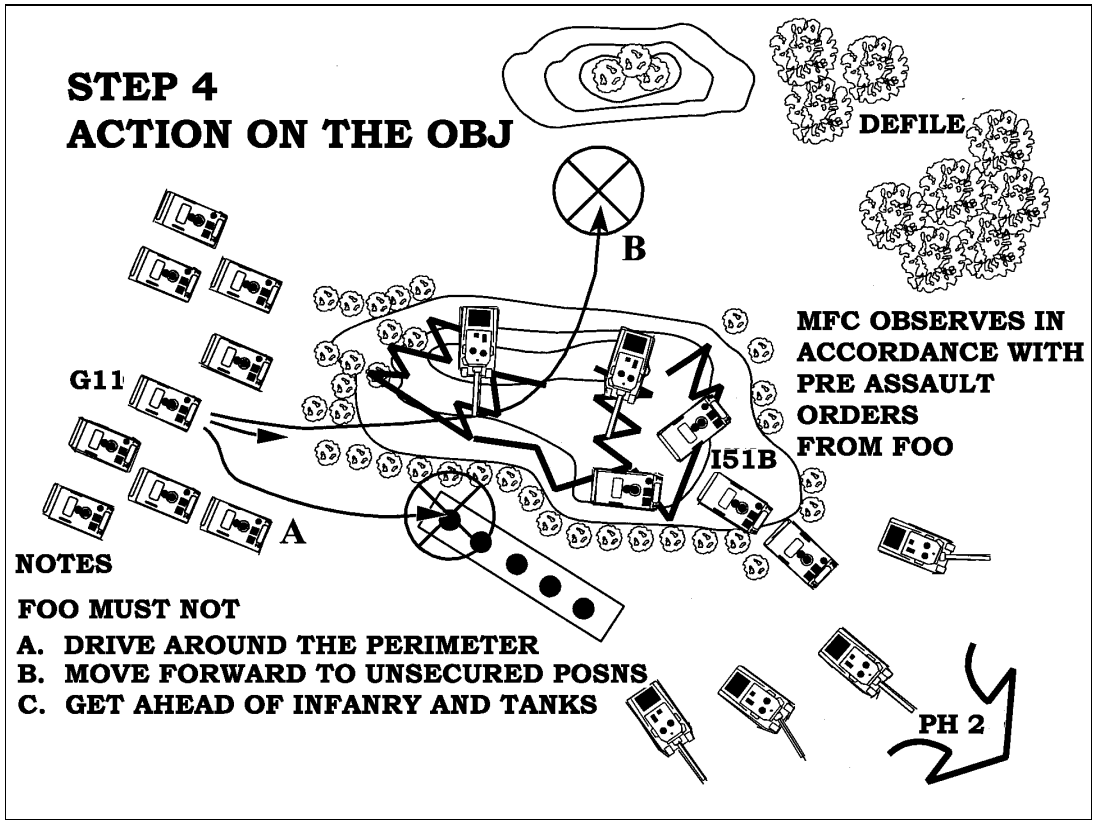


Figure 6-7: Action on the objective

87. Once on the objective, the FOO is in a highly dangerous area. There may be undiscovered pockets of enemy infantry as well as mines. In addition, the enemy position may well be known by enemy artillery, and thus the danger of artillery fire falling on the position is

quite high. On arrival at the objective, the FOO shall adhere to the following guidelines, some of which are described in Figure 6-7:

a. Use established routes through the obstacle belt, following in the tracks of preceding vehicles.

b. Stay mounted, if possible, in order to retain the protection and mobility of the APC. Many circumstances might make this impossible; however, dismounting from the vehicle brings its own problems which must be considered.

c. Never drive around the outside perimeter of the objective. It may be mined.

d. Never move up to OP positions that have not been cleared by the tanks or infantry. That inviting copse which would make the perfect OP, might just contain the enemy counter-attack force.

e. As in most situations described in this chapter, try to stay close to tanks to use their protection.

f. Always have the required equipment ready for dismount at a moment's notice — to include spare handsets, batteries, antennae, water and ammunition.

ENEMY FORCES TOO LARGE FOR A COMBAT TEAM

88. Frequently a combat team will run into enemy forces that are too large for it to handle on its own. This will normally result in a battle group or brigade level operation to overcome the enemy positions. From the perspective of the FOO and BC, the most important factor will be that the combat team in contact will often end up being the battle group fire base.

89. Shall this situation occur, the most likely result is that the FOO will end up becoming the anchor FOO for the battle group operation, and the BC will be required to formulate a fire plan. The BC may or may not have visibility on the enemy positions. In this case he will be depending upon the FOO for target information. To support the plan, the FOO must gain as much intelligence on the enemy positions and report it up to the BC. The FOOO shall also be aggressive in engaging and recording known enemy positions. This will ensure that the enemy is given little respite from the time of contact and that the fire plan will provide effective suppression of the enemy during the battle group attack.

90. In addition, battery level targets shall be upgraded to regimental or even divisional level so that the maximum number of guns can support the mission. Once the BC has formulated the plan, the anchor FOO may be required to observe check rounds from other fire units in support of the fire plan.

CONCLUSION

91. During offensive operations, the technical difficulty of achieving what the supported arm commander wants will not be beyond the capability of most FOOs. However, the conduct of the

FOO from the beginning of the operation to the consolidation will have a major influence on the success of the operation and on the FOO's chances of survival. It shall always be remembered that once contact is made, the FOO will be operating within the range envelope of lethal direct fire weapons. Thus, the difficult aspect of the FOO's job will be to survive while carrying out the wishes of the combat team commander.

SECTION 8

DEFENSIVE OPERATIONS — TACTICS

INTRODUCTION

92. From the perspective of the BC and the FOO, defensive operations will usually be conducted in a battle group context. This is dictated by Canadian doctrine of deploying defences so as to canalize enemy forces into KZs by using obstacles and fighting positions. The BG Comd will attempt to force the enemy into these KZs so as to achieve the maximum effect from limited anti-armour resources. The artillery plays an important role in assisting the battle group commander in achieving this aim and is capable of a significant contribution to the overall plan if properly coordinated. In this section, some of the tactics used by the FOO in the defence will be discussed.

WEAPON SYNERGY

93. The plan for the defence will always come from the supported arm commander. This includes tasks for the artillery. One of the most important aspects to be taken into account in the formulation of the plan is the integration of all battle group weapon systems so that they will work in concert with each other and no weapon will degrade the effectiveness of the other. This is weapon synergy and it is achieved by continuous and successive use of different weapon systems, each at their optimum range. Responsibility for weapons synergy rests with the BG Comd. Integrating the artillery in the plan is the responsibility of the BC and FOO.

94. The battle group possesses many different weapon systems, all of which will contribute to the destruction of the enemy. To address the issue of weapon synergy and how the BC and FOO fit in, an example has been provided in Figure 6-8.

95. Artillery is used at KZ 1 to cause early attrition h at long range. Direct fire weapon systems are then used at shorter ranges in KZ 2, free from obscuration caused by the artillery, to inflict maximum casualties on the enemy which has been forced to slow down and button-up. Minefields. and artillery FPFs provide closed-in protection to the combat forces.

96. In the example, only one of the infantry companies has been shown. This company has a role of back-stop to prevent the enemy from leaving KZs 2 and 3. The BG Comd has assigned TOW under armour (TUA) positions as well as tank fire positions that can fire into KZ 2. The battle group commander's plan is to fire two regiments of artillery into KZ 1 and attrit the enemy while they are moving through this area, forcing them to close down. Subsequently, they will be engaged by the TUA and tanks in KZ 2. The BG Comd will shift the fire of one of the artillery regiments to KZ 3 to deal with the enemy that reach there. The infantry company will engage the enemy on the obstacle with their anti-armour weapons and machine guns.

97. To support this plan, the BC must give detailed orders to the FOOs on how the artillery will fight the BG Comd's plan. The most important factor for the artillery support is that observation of the enemy must be continuous throughout the battle. This may not be possible for

one FOO; therefore, the BC must have a clear observation plan. The details of the battle procedure required are covered in other sections of this manual. However, from a tactical viewpoint, every observer must be clear on who is firing each target and that all coordination issues have been addressed prior to the battle starting.

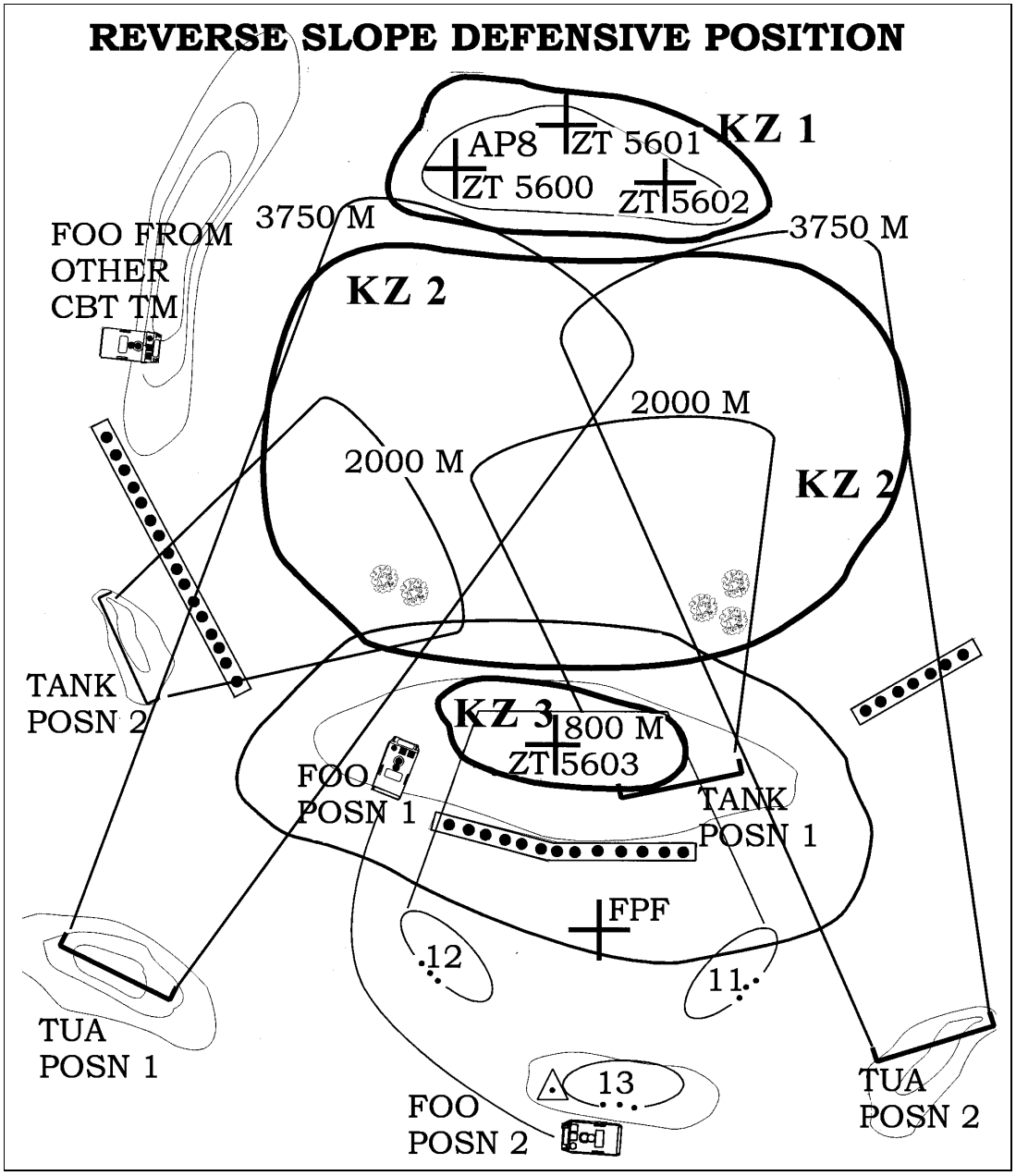


Figure 6-8: Example of artillery and supported arms weapon synergy

98. The BC has made a decision that the FOO allocated in support of the infantry company is responsible for the firing of the A8P group of targets in KZ 1. The FOO will maintain observation of this KZ for as long as possible. If required to withdraw, the FOO on the left flank from the supporting company will take over observation. If the enemy is likely to achieve KZ 3, the FOO has prepared a time and space estimate to determine when to withdraw to a position to

support the company. Thus, the FOO has two phases to support the overall plan, and will be physically located with the company during one phase only.

99. At all times, the FOO must work hard to provide the company commander with the advice required to complete the planning and coordination. The majority of this will be given prior to the plan being executed. However, once the battle begins, the FOO will have to balance the requirements of the company with additional responsibilities in support of the overall plan.

PLANNING THE ENGAGEMENT

100. Once orders have been received from the BC, the FOO must plan how to hit the enemy in the KZs. Planning and anticipation are the key requirements to achieving success in this area. In Figure 6-9, the FOO G11 has been given two tasks in support of the battle group plan. The FOO is to observe into both KZs 1 and 2. To support the plan, a group of targets has been planned in

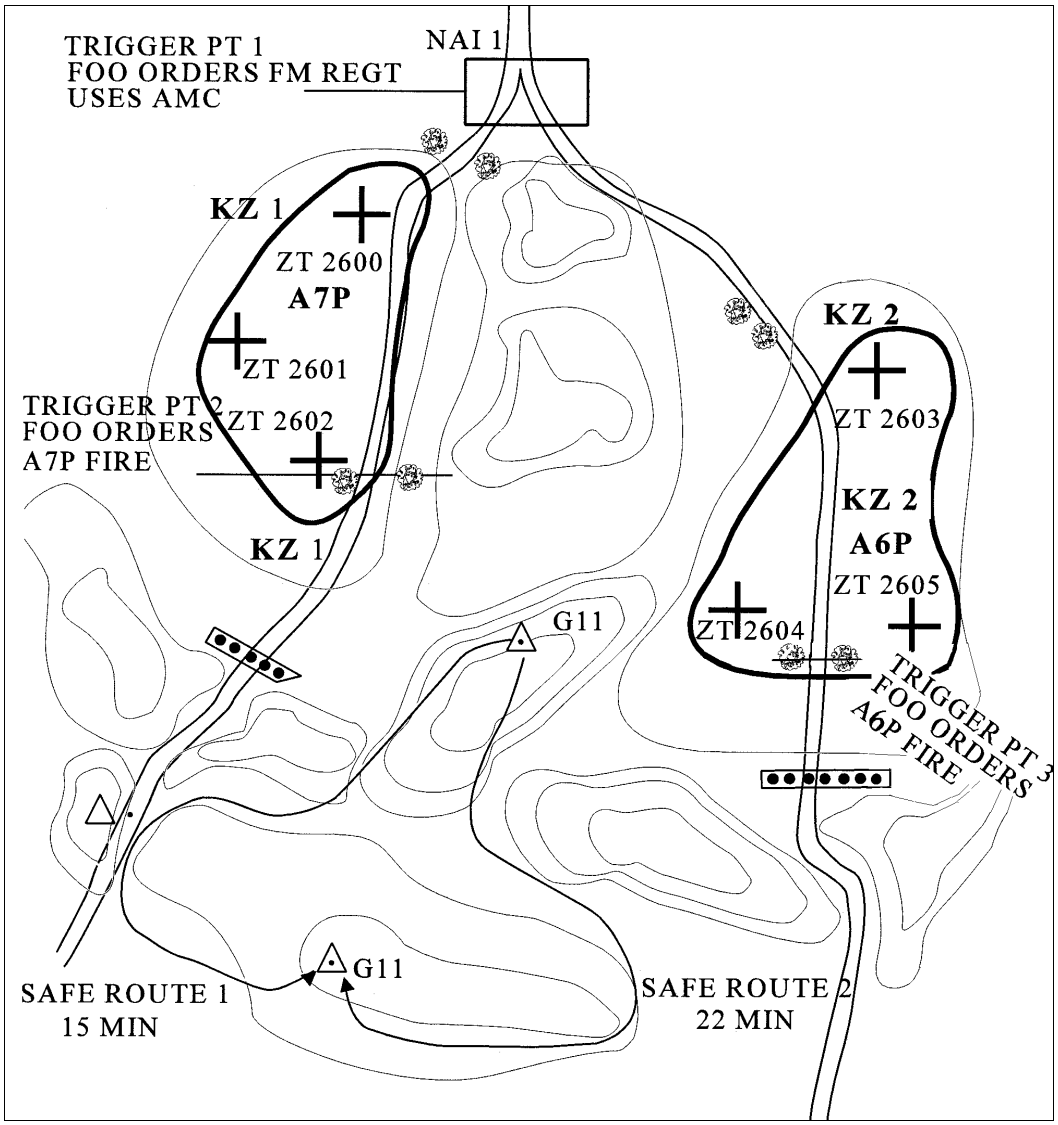


Figure 6-9: Use of triggers

each KZ. The BG Comd has designated the Y junction to the north as named area of interest (NAI) 1 and has placed an infantry reconnaissance patrol to watch this area. This patrol will report which route the enemy has chosen to continue their advance. To properly plan the fire, the FOO has determined a number of trigger points by working backwards from where the lead vehicles should be when the rounds impact. In both KZs, the FOO wants the lead vehicles to be on the southern edge of the group of targets. The following steps are taken for each group of targets:

a. TOF to targets — 45 seconds.

b. Speed of enemy vehicles — 30 km/hr = 500 m/min.

c. 45/60 = .75 of min.

d. Thus order fire .75 of 500 m = 375 m.

e. Time from FM regiment to report READY(determined from rehearsals) — 2 minutes.

f. Distance vehicles will travel in 2 minutes = 1000 metres.

g. Conclusion — "I will order FM regiment when the lead enemy vehicles are 1375 metres from the southern extreme of Group A7P and I will order fire when they are 375 metres from the same place. NAI 1 is the right distance, so when I hear the report from the reconnaissance OP, I will order the mission, and when they reach those trees I will order FIRE."

MOVEMENT DURING THE DEFENCE

101. A time and space estimate must be conducted for all situations where the FOO may be required to move during the conduct of a defence. If the FOO leaves the position too early, vital information may be lost while because of lack of observation. If the FOO leaves too late, either the new position may not be occupied in time for subsequent operations, or the FOO may not be under cover when the enemy arrives at the previous position.

MOUNTED OR DISMOUNTED

102. As in offensive operations, there are many different factors for the FOO to consider as to whether to stay mounted in the vehicle or to dismount into a trench. To summarize:

OPTION	ADVANTAGES	DISADVANTAGES
Remaining Mounted	Maintenance of high speed mobility	Greater thermal signature*
	Increased protection compared to dismounted but not dug in	Greater visual signature*
	Increased communications capability	More vulnerable to direct and indirect fire*
	Increased firepower from vehicle weapons	Isolation from supported arm commander
	Increased STA capability	Limited or no mobility in close terrain

OPTION	ADVANTAGES	DISADVANTAGES
Dismounting	Close proximity to supported arm commander	Mobility is slowed compared to mounted elements
	Increased protection from all weapons if dug in	Increased vulnerability to all weapons if exposed
	Less thermal signature	Communications may suffer
	Less visual signature	Less capacity for STA equipment
	Increased mobility in close terrain	Physically demanding due to weight of equipment required and environmental conditions
*may be reduced by proper selection of vehicle position		

Figure 6-10: Advantages/disadvantages to staying mounted in vehicle or dismounting into trench

103. The above factors may be more or less applicable to each FOO party depending upon mission, organization and equipment. For example, some FOO vehicles will offer fewer communications and STA advantages than others. In some cases, the dismounted radios will be more reliable than the vehicle systems. Nevertheless, the above table is generally applicable to current FOO vehicles, and will be even more relevant if dedicated FOO vehicles are used. Figure 6-11 shows an example of an artillery OP for a defensive position.

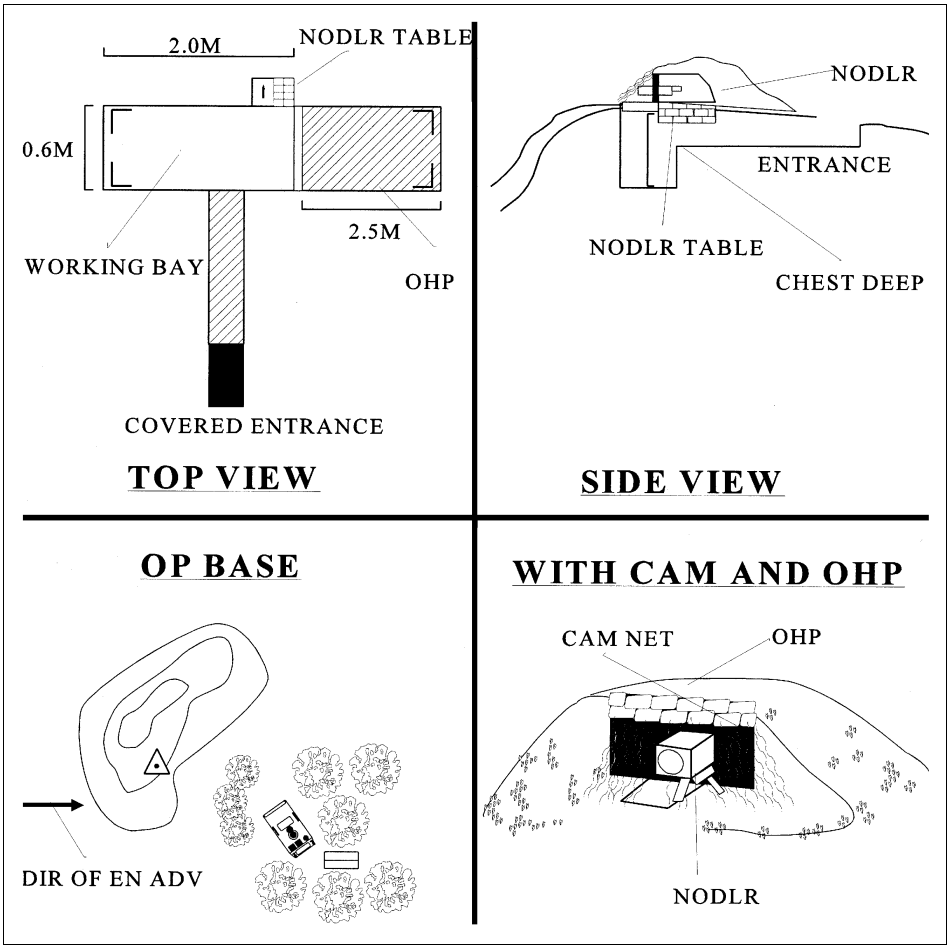


Figure 6-11: Artillery OP on a defensive position

CONCLUSION

104. The effective use of artillery in the defence is critical for the successful conduct of the battle group plan. As the artillery representatives, the BC and FOO are key to ensuring that the battle group achieves weapon synergy. The artillery must fulfil its part of the BG Comd's plan without reducing the effects of the other weapons engaged, while at the same time inflicting maximum damage upon the enemy. Complete and thorough planning must take place so that the FOO can engage the moving enemy formations while they are in the KZs. This must be done using the appropriate trigger points demonstrated in this section. Lastly, the BC must ensure that each FOO is aware of what targets, trigger points, boundaries and observation requirements they are responsible for, so as to avoid confusion once the battle begins.

ANNEX A
FIRE PLANNING AIDES-MEMOIRE

9303 2037 AD30 AY001

	(A)	(B)	(C)	(D)	(E)
LINE/ LIGNE	TARGET NO/ N° DE LA CIBLE	DESCRIPTION	LOCATION/ EMPLACEMENT	ALTITUDE	REMARKS/ REMARQUES
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

1. WARNING ORDER/ ORDRE D'AVERTISSEMENT	DIAGRAM/ DIAGRAMME
FIRE PLAN – PLAN DE TIR	
PREPARE – PRÉPARER	
ROUNDS – OBUS	
H-HOUR – HEURE H	
2. INITIAL ORDERS/ ORDRES INITIAUX	
FM – MT	
GR – COORD	
DIR	
ADJ Z – REGL Z	
AMC	
ADJ FIRE – RÉGLER LE TIR	

TARGET NO/ N° DE LA CIBLE	GR AND DESC/ COORD ET DESC	C/S TO ENGAGE/ I/A D'ENGAGEMENT	TIMINGS/ PD DE TIR	AMMUNITION/ MUNITIONS	REMARKS/ REMARQUES

Figure A-1: FOO fire planning aide-memoire

STANDARD MOVEMENT ORDER FORM

1. WARNING ORDER

a. Notice to Move From (Originator _____
b. No Move Before _____
c. New Area _____
d. Order of March _____
e. Miscellaneous _____

2. OP PARTY

a. New Location of OPs _____
b. Time of O Group _____
c. Location of O Group _____
d. Location of RV (if required) _____
e. Liaison with _____ at _____
f. Time to Move _____
g. Zones of Observations _____
h. Route_____
i. Miscellaneous _____

3 RECONNAISSANCE PARTY

a. New Area _____
b. Degree of Preparation _____
c. Centre of Arc and Arcs of Fire _____
d. LTSDT _____

4. GUN GROUP

a. New Area _____ (not nec if same as 3a)
b. Move Now/Move At _____
c. RV _____
d. Route _____ (not nec if same as 3a)
e. Order of March _____
f. TTBR _____
g. Miscellaneous _____

Figure A-2: Movement orders

RADIO ORDERS (HASTY ATTACK)

CC _____ THIS IS _____ ORDERS IN ONE MINUTE.
CC _____ THIS IS _____ ORDERS.
1. SITUATION (NO CHANGE)
2. MISSION (CONFIRMED)
3. EXECUTION
A. GENERAL OUTLINE
B. ASLT FORCE
C/S _____ FACING, ____ RIGHT, C/S _____ DEPTH
(REMAIN MOUNTED)
C/S T _____ IN INTIMATE SP
C. FIRE BASE
C/S _____ AT GR _____ (ENCODED) _____
WITH C/S _____ HRS (ENCODED) _____
D. H-HOUR _____ HRS (ENCODED) _____
E. ATK POSN _____ AND RTE _____
F. LD _____ RTE _____
G. ASLT POSN _____ ASLT LINE _____
H. CONSOLIDATION _____ OBJ
C/S ____ FACING ____, C/S _____ FACING _____
C/S ____ FACING ____, C/S _____ FACING _____
C/S ____ FACING ____, C/S _____ FACING _____
I. FIRE PLAN

UNIT	LOC	UNIT	TIMINGS	AMMO	RATE

J. ZULU HAR LOC _____ FACING _____
K. ZULU VEHS REMAIN IN INTIMATE SP (DELETE IF NEC)
L. ORDERS FROM C/S _____FOL IN ONE MIN
M. ORDERS END C/S _____ACK

Figure A-3: BC/FOO' s aide memoire for the hasty attack

LOCATIONS		
ELM	CLEAR	ENCODED
BG CP		
"A"		
"B"		
"C"		
"D"		
MORTARS		
Ø		
C/S 1		
2		
3		
4		
8		
PRA		
C/S 11		
12		
13		
AUTHORIZED OBSERVERS		
AMMO RESTR		
AMMO ALLOC		
TGT NO ALLOC		

Figure A-4: Location summary

DATE	FREQUENCIES			
ELM	MAIN	ALT	MAIN	ALT
BG CP				
"A"				
"B"				
"C"				
"D"				
MORTARS				
FAC				
Ø				
RING				
C/S 1				
2				
3				
4				
8				
PRA				
Div Arty				
ITEM		MAIN	ALT	COMPROMISE
Impose Rad Silence				
Break Rad Silence				
Lift Rad Silence				
Password				
First Light				
Last Light				
Hr Z		Local Hr (..) +/- (..) =		

Figure A-5: COEI summary

Figure A-6: FOO fire planning sequence aide memoire

OBS ID	WNG O	LOC	DIR	DESC	TYPE OF ENGAGE	TRAJ	AMMO	DISTR	AMC	METHOD	

AREA NEUT	LASER	LASER PT	DELIBERATE SMK	LINEAR
FM GR-ALT-DIR DESC IN EFF ____ RDS AF	FM 3 GUNS DIR-DIST-UP/DOWN DESC AF DIR-DIST-UP/DOWN FFE	FM 3 GUNS DIR-DIST-UP/DOWN DESC ADJ LP ZT1234 # 1 AF #2 REC AS LP ZT 1234 #3 AF, ETC. ADOPT LP ZT1234	FM GR-ALT-DIR (UP WIND PT) SMK IN EFF _____RDS LIN_____ ATT _____ AF * CANISTERS FALL SHORT – DOWN 50 * CANISTERS BOUNCE – UP 50	FM GR-ALT-DIR CENTRE OF TGT LD _____ ATT _____ LINEAR AF

ILLUM	COORD ILLUM	DANGER CLOSE	MSG TO OBS	REGISTRATION
FM _____ GUNS GR-ALT-DIR DESC ILLUM _____RDS DIAM /LAT/RGE AF	FM GR-ALT-DIR _____RDS IN FFE ILLUM AF COORDE ILLUM 30sec INTERVAL = FROM SHOT TO EFF ILLUM (-) TOF HE	FM GR-ALT-DIR A400 DESCR ____RDS AF BTY RIGHT #_____AF	GUNS/BTY TO FIRE PROJ/FUZ COMBO # OF RDS FOR FFE TGT NO REGISTRATION	FM GR (8 FIG) ALT/DIR/CONV RE3GISTRATIO0N HE (FOL BY TIME) AF
			RCPO ORDERS - OBS - TIME - LOC - METHOD - AMMO - TYPE OF GUN	
			LIMITS: 500m GUNS W/1 15 km ALT 200m 2000 +/- 2 hrs	

FIRE PLAN MODIFICATIONS

1. MODIFY _____
2. REQ MODIFY _____
3. AMEND TO READ :
   MODIFY _____ AMEND TO READ:
   H-Hr 1220
4. _____MODIFIED
5. CANCEL _____

6. DWEL AT / ON : REQR TO CONT ENGAGE FOR UNSPECIFIED LENGTH OF TIME: REF MUST BE MADE TO TGT NO OR TIME
   MODIFY _____ DWELL ON ZT1234
   MODIFY DEWLL AT AT +5, CONT FIRE, 30 SEC
7. ADD/SUB _____ MIN FROM/TO ALL TIMINGS AS FOLS: CEASE LOADING
   CHECK FIRING
   DWELL AT/ON
   MODIFY _____ ADD 4 min TO ALL TIMINGS – RESTART AT +20
   MODIFY _____RESTART AT + 8 AT 1130 hrs

Figure A-7: Types of FM aide-memoire

82% ZONE 105mm GRAPH L/A																								
PE_r	XXX	24	28	32	36	40	44	48	56	60	64	68	72	76	80	88	92	104	108	116	132	148	168	PE_r
	OT																							
1/2	1.0	6	7	8	9	10	11	12	14	15	16	17	18	19	20	22	23	26	27	29	33	37	42	
3/4	1.0	9	11	12	14	15	17	18	21	23	24	26	27	29	30	33	35	39	41	44	50	56	63	
F	1.0	12	14	16	18	20	22	24	28	30	32	34	36	38	40	44	46	52	54	58	66	74	84	
1/2	1.3	6	5	6	7	8	8	9	11	12	12	13	14	15	15	17	18	20	21	22	25	28	32	
3/4	1.3	7	8	9	10	12	13	14	16	17	18	20	21	22	23	25	27	30	31	33	38	43	48	
F	1.3	9	11	12	14	15	17	18	22	23	25	26	28	29	31	34	35	40	42	45	51	57	65	
	1.5	4	5	5	6	7	7	8	9	10	11	11	12	13	13	15	15	17	18	19	22	25	28	
	1.5	6	7	8	9	10	11	12	14	15	16	17	18	19	20	22	23	26	27	29	33	37	42	
	1.5	9	9	11	12	13	15	16	19	20	21	23	24	25	27	29	31	35	36	39	44	49	56	
	1.7	4	4	5	5	6	6	7	8	9	9	10	11	11	12	13	14	15	16	17	19	22	25	
	1.7	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23	24	26	29	33	37	
	1.7	7	8	9	11	12	13	14	16	18	19	20	21	22	24	26	27	31	32	34	39	44	49	
	2.0	3	4	4	5	5	6	6	7	8	8	9	9	10	10	11	12	13	14	15	17	19	21	
	2.0	5	5	6	7	8	8	9	11	11	12	13	14	14	15	17	17	20	20	22	25	28	32	
Z	2.0	6	7	8	9	10	11	12	14	15	16	17	18	19	20	22	23	26	27	29	33	37	42	
	2.3	3	3	3	4	4	5	5	6	7	7	7	8	8	9	10	10	11	12	13	14	16	18	
	2.3	4	5	5	6	7	7	8	9	10	10	11	12	12	13	14	15	17	16	19	22	24	27	
	2.3	5	6	7	8	9	10	10	12	13	14	15	16	17	17	19	20	23	23	25	29	32	37	
	2.5	2	3	3	4	4	4	5	6	6	6	7	7	8	8	9	9	10	11	12	13	15	17	
	2.5	4	4	5	5	6	7	7	8	9	10	10	11	11	12	13	14	16	16	17	20	22	25	
O	2.5	5	6	6	7	8	9	10	11	12	13	14	14	15	16	18	18	21	22	23	26	30	34	
	2.7	2	3	3	3	4	4	4	5	6	6	6	7	7	7	8	9	10	10	11	12	14	16	
	2.7	3	4	4	5	6	6	7	8	8	9	9	10	11	11	12	13	14	15	16	18	21	23	
	2.7	4	5	6	7	7	8	9	10	11	12	13	13	14	15	16	17	19	20	21	24	27	31	
	3.0	2	2	3	3	3	4	4	5	5	5	6	6	6	7	7	8	9	9	10	11	12	14	
N	3.0	3	4	4	5	5	6	6	7	8	8	9	9	10	10	11	12	13	14	15	17	19	21	
	3.0	4	5	5	6	7	7	8	9	10	11	11	12	13	13	15	15	17	18	19	22	25	26	
	3.3	2	2	2	3	3	3	4	4	5	5	5	5	6	6	7	7	8	8	9	10	11	13	
	3.3	3	3	4	4	5	5	5	6	7	7	8	8	9	9	10	10	12	12	13	15	17	19	
	3.3	4	4	5	5	6	7	7	8	9	10	10	11	12	12	13	14	15	16	18	20	22	25	
E	3.5	2	2	2	3	3	3	3	4	4	5	5	5	5	6	6	7	7	8	8	9	11	12	
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	3.5	3	4	5	5	6	6	7	8	9	9	10	10	11	11	13	13	15	15	17	19	21	24	
	3.7	2	2	2	2	3	3	3	4	4	4	5	5	5	5	6	6	7	7	8	9	10	11	
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	3.7	3	4	4	5	5	6	6	8	8	9	9	10	10	11	12	12	14	15	16	18	20	23	
	4.0	2	2	2	2	3	3	3	4	4	4	4	5	5	5	6	6	7	7	7	8	9	11	
	4.0	2	3	3	3	4	4	5	5	6	6	6	7	7	8	8	9	10	10	11	12	14	16	
	4.0	3	4	4	5	5	6	6	7	8	8	9	9	10	10	11	12	13	14	15	17	19	21	
	4.6	1	2	2	2	2	2	3	3	3	4	4	4	4	4	5	5	6	6	6	7	8	9	
	4.6	2	2	3	3	3	4	4	5	5	5	6	6	6	7	7	8	9	9	10	11	12	14	
	4.5	3	3	4	4	4	5	5	6	7	7	8	8	8	9	10	10	12	12	13	15	16	19	
	5.0	1	1	2	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	6	7	7	8	
	5.0	2	2	2	3	3	3	4	4	5	5	5	5	6	6	7	7	8	6	9	10	11	13	
	5.0	2	3	3	4	4	4	5	6	6	6	7	7	8	8	9	9	10	11	12	13	15	17	

LINE CORRECTION

m	1	15	20	25	30	35	40	45	50	m	55	60	65	70	75	80	85	90	95	100
OT										OT										
1.0	1	15	20	25	30	35	40	45	50	1.0	55	60	65	70	75	80	85	90	95	100
1.3	1	20	26	33`	39	46	52	59	65	1.3	72	78	85	91	98	104	111	117	124	130
1.5	1	23	30	38	45	53	60	68	75	1.5	83	90	98	105	113	120	128	135	143	150
1.7	1	26	34	43	51	60	68	77	85	1.7	94	102	111	119	128	136	145	153	162	170
2.0	2	30	40	50	60	70	80	90	100	2.0	110	120	130	140	150	160	170	180	190	200
2.3	2	35	46	58	69	81	92	104	115	2.3	127	138	150	161	173	184	196	207	219	230
2.5	2	38	50	63	75	88	100	113	125	2.5	138	150	163	175	188	200	213	225	238	250
2.7	2	41	54	68	81	95	108	122	135	2.7	149	162	176	189	203	216	230	243	257	270
3.0	3	45	60	75	90	10	120	135	150	3.0	165	180	195	210	225	240	255	270	285	300
3.3	3	50	66	83	99	11	132	149	165	3.3	182	198	215	231	248	264	281	297	314	330
3.5	3	53	70	88	105	12	140	158	175	3.5	193	210	228	245	263	280	298	315	333	350
3.7	3	56	74	93	111	13	148	167	185	3.7	204	222	241	259	278	296	315	333	352	370
4.0	4	60	80	100	120	14	160	180	200	4.0	220	240	260	280	300	320	340	360	380	400
4.3	4	65	86	108	129	15	172	194	215	4.3	237	258	280	301	323	344	366	387	409	430
4.5	4	68	90	113	135	15	180	203	225	4.5	248	270	293	315	338	360	383	405	428	450
4.7	4	71	94	118	141	16	188	212	235	4.7	259	282	306	329	353	376	400	423	447	470
5.0	5	75	100	125	150	17	200	225	250	5.0	275	300	325	350	375	400	425	450	475	500
5.5	X	83	110	138	165	19	220	248	275	5.5	303	330	358	385	413	440	468	495	523	550
6.0	6	90	120	150	180	21	240	270	300	6.0	330	360	390	420	450	480	510	540	570	600

Figure A-8: 82% zone graph (105 mm low angle)

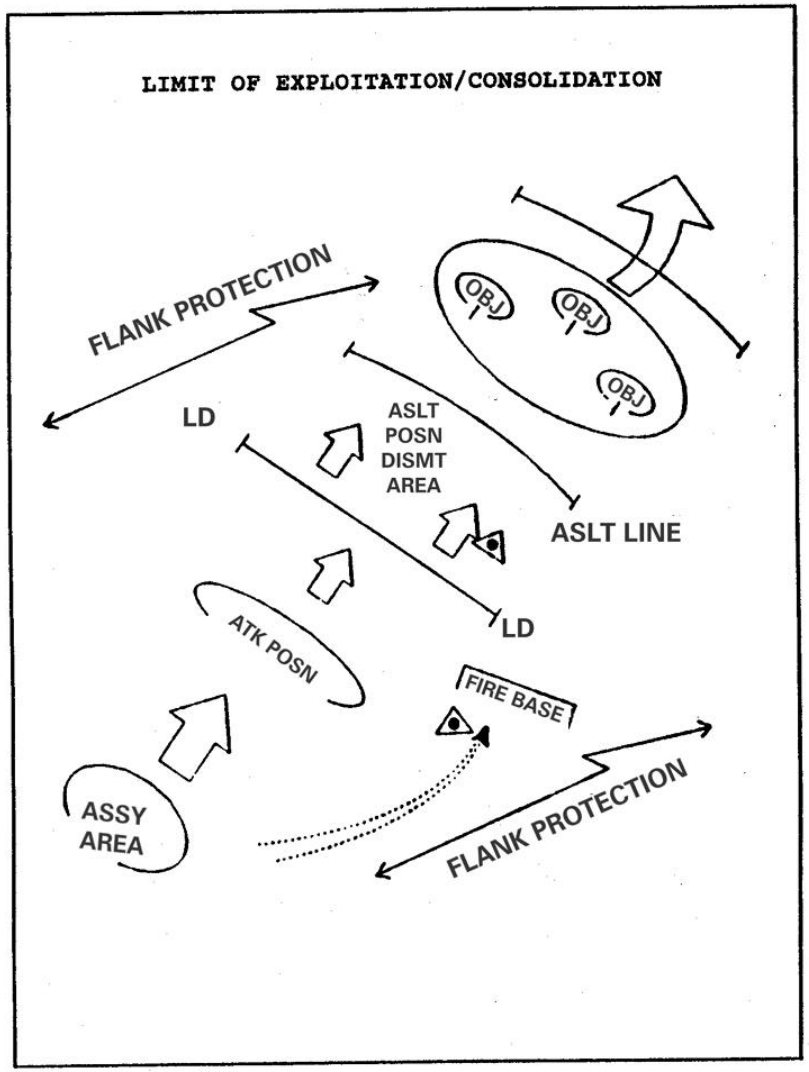

Figure A-9: Time and space considerations

MANOEUVRE SPEED							DANGER AREAS
: 100m/3 min							: 8 PER +25m
: 300m/1 min							: SPLINTER +25m
SHORT BRACKET							: DIST
BTY: 100m - A/D50 1 Rd FFE REGT: 200m - A/D100 1 Rd FFE DIV: 400m - A/D200 1 Rd FFE							OHC/ : 1/2 DIST
SPLINTER DISTANCE							
SPLINTER		81mm 250m	105mm 250m	155mm 350m	203mm 700m	MLRS 1000m	IF UNDER ARMR OR OHC ½ DIST
PREDICTED	HE ICM	600 ---	350 600	600 800	900 900	1000 1000	
ADJUSTED	HE ICM	250 ---	250 600	350 600	700 700	1000 1000	
CHARACTERISTICS							
TYPE		81mm	105mm	155mm	203mm	MLRS	
RANGE (KM)		5.4	11/17	18/24	22/30	40+	
RATE	MAX	20	---	---	---	---	
	MAX (3 MIN)	15	10	4	1.5		
	CONT	12	3	1	1	1 SALVO IN 1 MIN	
COVERAGE	BTY	100	150	200	200	1 Km²	
	REGT	---	300	300	300		
	DN	---	400	400	400		

Figure A-10: BC/FOO' s guide to speed, distance cover and the effects of splinters

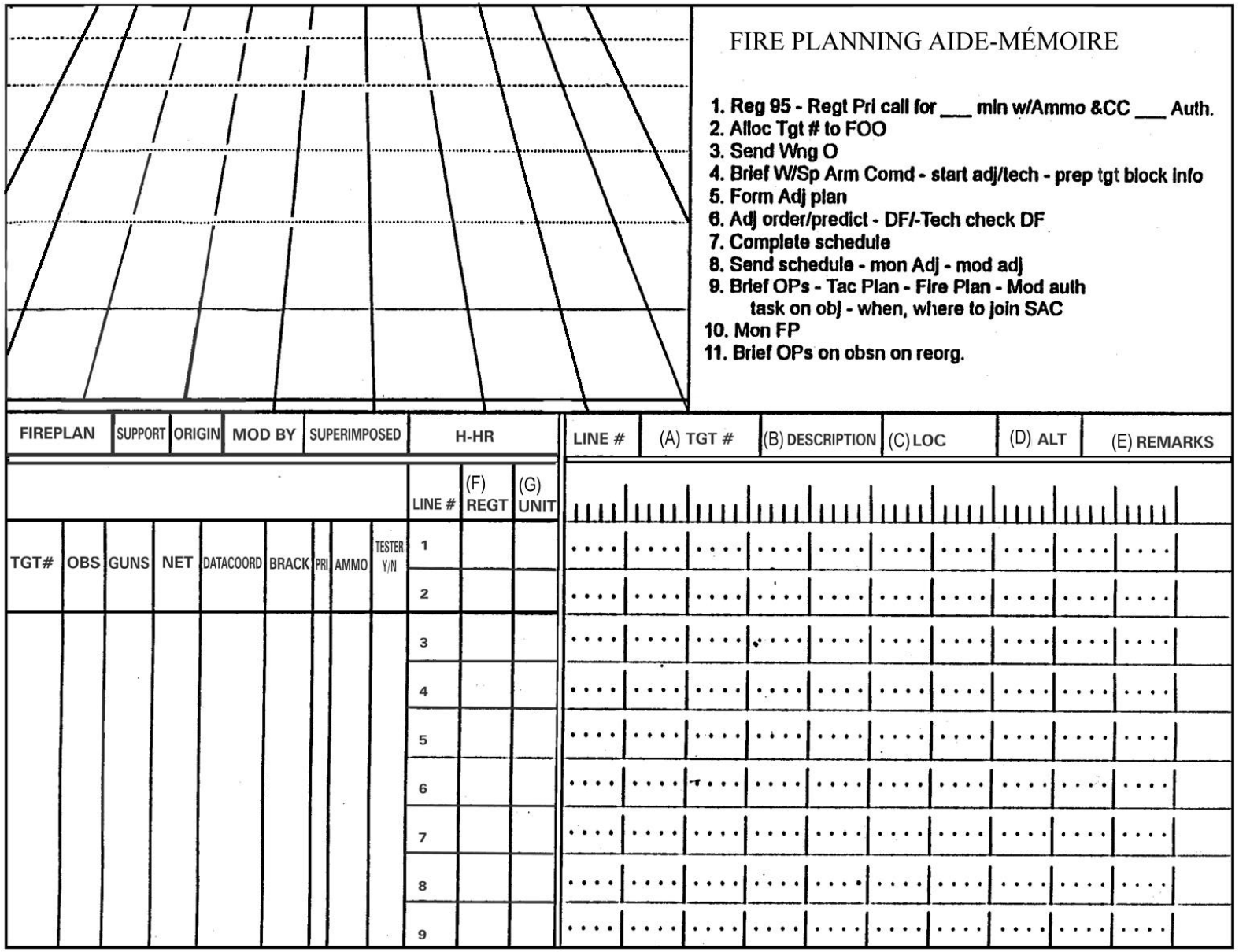

Figure A-11: Fire plan aide memoire

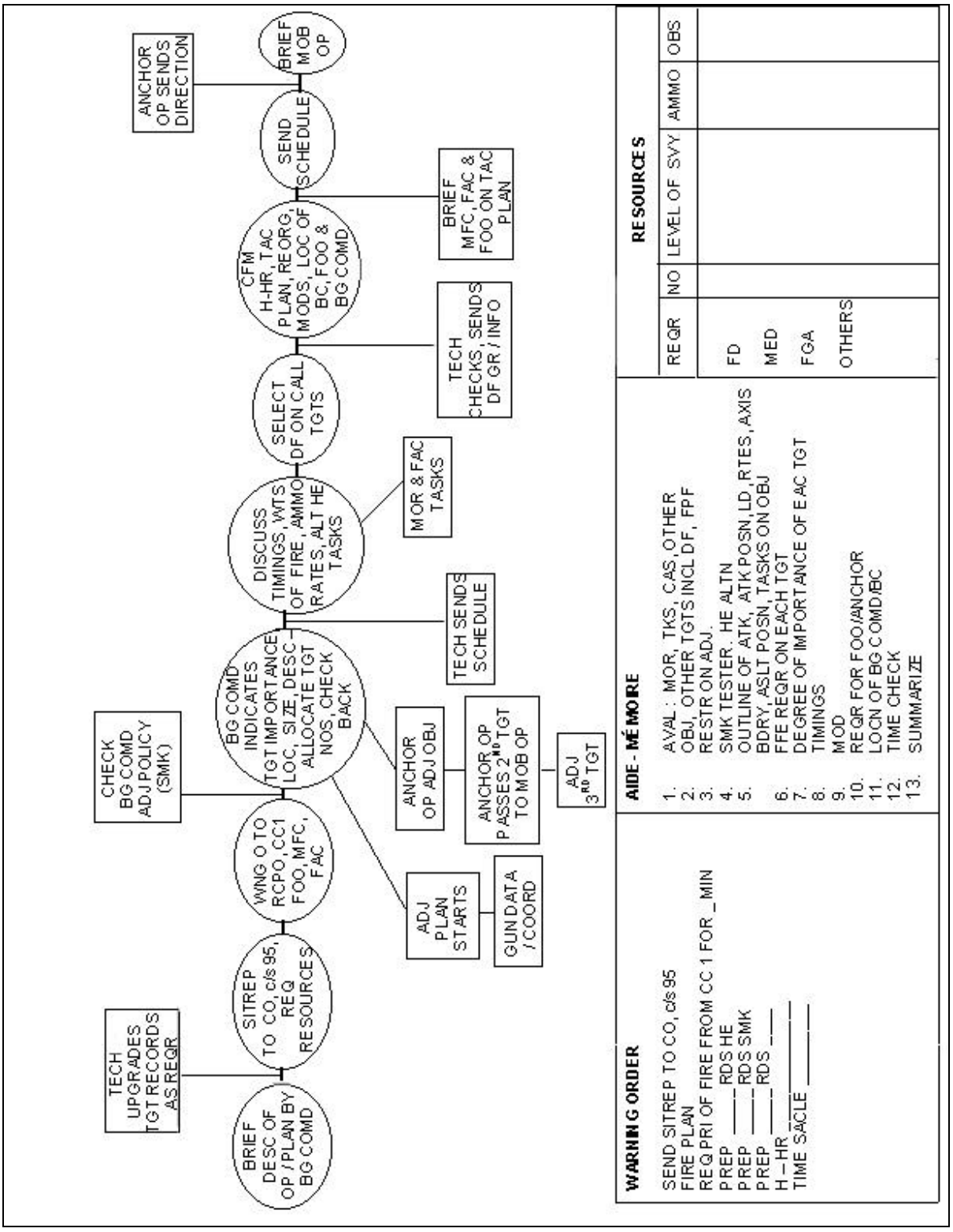

Figure A-12: Offensive fire planning sequence of events

GLOSSARY

accuracy (justesse de tir)

Accuracy is a measure of the precision with which the MPI of a group of rounds can be placed on the target. If the MPI is near the target, the accuracy is good or the error in accuracy on that occasion is small. Conversely, if the MPI is far from the target, the accuracy is poor or the error in accuracy is large on that occasion.

ADD (AUGMENTEZ)

A correction used by an observer to indicate that an increase in range along the observer-target line is desired.

ADJUST FIRE (RÉGLEZ LE TIR)

1. A command or request to initiate the process of adjustment.
2. A method of control transmitted in the call for fire by the observer to indicate that he will control the adjustment.

adjustment (réglage du tir)

Process used in artillery and naval gunfire to obtain correct bearing, range and height of burst (if time fuzes are used) in engaging a target by observed fire.

affiliation (affiliation)

The relationship established between an artillery unit or sub-unit and the formation or unit that it is assigned to in direct support on a reasonably continuous basis. This term has no precise tactical implications.

ALL AVAILABLE (TOUTES DISPONIBLES)

A command or request to obtain the fire of all artillery able to deliver effective fire on a given target.

altitude (altitude)

The vertical distance of a point measured from mean sea level.

angle T (angle d'observation(angle O))

The (interior) angle formed at the target by the intersection of the gun-target line and the observer-target line.

artillery fire plan table (tableau de plan de feux d'artillerie)

A presentation of planned targets giving data for engagement. Scheduled targets are fired in a definite time sequence. The starting time of any target may be on call, at a pre-arranged time, or at the occurrence of a specific event.

AT MY COMMAND (AMC) (À MON COMMANDEMENT (AMC))

The command used when controlling the exact time of delivery of fire is desired.

at priority call (sur demande prioritaire)

A modification to a tactical mission to assign a different priority for calls for fire. The term must always be linked with a specific authority; i.e., guns will be assigned "AT PRIORITY CALL TO _____ (e.g., a specific Artillery Intelligence Officer, air observer, or other authority)", and will immediately answer calls for fire from that authority.

attitude (orientation)

The position of a body as determined by the inclination of the axis to some frame of reference. If not otherwise specified, this frame of reference is fixed to the earth. (In the Canadian artillery context, further defined as the grid bearing of the longest axis of the target, or feature, to the nearest 50 mils.)

authorized observer (observateur autorisé)

An officer who is authorized to order fire from specific fire units in addition to his own, for the engagement of any target he feels suitable; he may issue orders directly to the units concerned without reference to higher authority.

barrage fire (tir de barrage)

Fire which is designed to fill a volume of space or an area rather than aimed specifically at a given target. (With UK/CA/AS "barrage" is normally a moving belt of fire.)

BATTERY (or section) RIGHT (or left) (BATTERIE (ou section) PAR LA DROITE (ou par la gauche))

A method of fire in which weapons are discharged from the right (or left) one after the other, at five second intervals unless otherwise specified.

battle position (position de combat)

A position from which a unit or sub-unit fights its battle.

battle procedure (procédure de combat)

The whole process by which a commander makes his reconnaissance, formulates his plan, issues his orders and causes the troops under his command to deploy for battle.

bearing (azimut)

The horizontal angle at a given point measured clockwise from a specific reference datum to a second point.

bombardment fire (tir de bombardement)

A concentration of fire onto a target.

bracket, bracketing (encadrement)

A method of adjusting fire in which a bracket is established by obtaining a round over (plus) and a round short (minus) of the target along the observer-target line (direction), and then successively halving the bracket until a target hit or the desired bracket is obtained.

call for fire (demande de tir)
A request for fire containing data necessary for obtaining the required fire on a target.

CANCEL (ANNULEZ)
Cancel, when coupled with an order other than quantity or type of ammunition, rescinds that order.

cannot observe (pas en mesure d'observer)
A type of fire control to indicate that the spotter or observer will be unable to adjust fire, but believes a target exists at the given location and is of sufficient importance to justify firing upon it without adjustment or observation.

CEASE LOADING (CESSEZ LE CHARGEMENT)
The command used during firing of two or more rounds to indicate the suspension of loading rounds into the weapon (equipment). See also CFP 406(4), Chapter 4.

charge (charge)
The propellant of a projectile, round or shell.

CHECK FIRING (HALTE AU TIR)
A command to cause a temporary halt in firing. See also CFP 306(4).

consistency (précision)
A measure of the spread of a group of rounds all fired at the same data. It is measured, not about the target, but about the MPI. Thus, if a spread of rounds about the MPI is great, the consistency is poor. Conversely, if the spread of rounds about the MPI is small, the consistency is good.

continuous fire (tir continu)
Loading and firing at a specified rate or as rapidly as possible consistent with accuracy within the prescribed rate of fire for the weapon. Firing will continue until terminated by the command END OF MISSION or temporarily suspended by the commands CEASE LOADING or CHECK FIRING. See also CFP 306(4), Chapter 4.

continuous illumination (tir éclairant continu)
A type of fire in which illuminating projectiles are fired at timed intervals which provide uninterrupted lighting of the target or specified area.

CONVERGE (CONVERGEZ)
A command used in a call for fire to indicate that the spotter or observer desires planes of fire to intersect at a point. See also CFP 306(4), Chapter 4.

coordinated illumination (éclairage coordonné)

A type of fire in which the firing of high explosive and illuminating projectiles is coordinated to provide illumination of the target and surrounding area only at the time required for spotting and adjusting the high explosive fire.

correction (correction)

1. Any change in firing data to bring the MPI or burst closer to the target.
2. A communication proword to indicate that an error in data has been announced and that corrected data will follow.

counterbattery fire (tir de contre-batterie)

Fire delivered for the purpose of destroying or neutralizing indirect fire weapons systems.

covering fire (tir de protection)

Fire used to protect troops when they are within range of enemy small arms.

crest (masque)

A terrain feature of such altitude that it restricts fire or observation in the area beyond, resulting in dead space, or limiting the minimum elevation, or both.

CRESTED (MASQUÉ)

A report which indicates that engagement of a target or observation of an area is not possible because of an obstacle or intervening crest.

DANGER (DANGER)

Information in a call for fire to indicate that friendly forces are within 600 to 1000 metres of the target. (Definition of a term peculiar to naval gunfire.)

DANGER CLOSE (DANGER — PROCHES)

Information in a call for fire to indicate that friendly forces may be endangered. This information is always given when friendly forces are within 600 metres of the target.

dead ground (angle mort)

Ground which cannot be seen from the observer’s position.

dead space (zone en angle mort)

Area within the maximum range of a weapon which cannot be covered by fire from a particular position because of:

a. intervening obstacles;
b. nature of the ground;
c. characteristics of the trajectory; or
d. the mechanical limitations of the weapon.

defensive fire (DF) (tir défensif (TD))

Fire delivered by supporting units to assist and protect a unit engaged in a defensive action.

defilade (défilement)

1. Protection which can be gained from an obstacle such as a hill, ridge, or bank against hostile ground observation and fire.
2. A vertical distance by which a position is concealed from enemy observation.
3. To shield from enemy fire or observation by using natural or artificial objects.

DELAY...(minutes) (RETARD... (minutes))

A report indicating that a ship is not ready to fire. (Definition of a term peculiar to naval gunfire.)

deliberate fire plan (plan de feux préparé)

A carefully planned, closely coordinated fire programme in support of a specific operation, normally originating at brigade or higher level and usually involving the firepower of several units.

description of target (description de l'objectif)

An element in the call for fire in which the observer describes the installation, personnel, equipment or activity to be taken under fire.

destruction fire (tir de destruction)

Fire delivered for the sole purpose of destroying material objects.

difference altitude (dénivelée)

The difference in altitude between two points usually sent during a polar mission and understood to be in mils unless metres is specified.

E.g.: Direction 3170, distance 2800, down 25.
Direction 3170, distance 3000, up 30 metres.

direct fire (tir direct)

Fire delivered on a target, using the target itself as a point of aim.

direction (direction)

Term used by an observer in a call for fire to indicate the bearing of the observer-target or other adjusting line.

dispersion (dispersion)

A scattered pattern of hits by projectiles fired by the same weapon or group of weapons with the same firing data. The term applies to both accuracy and consistency. Thus we can have dispersion of rounds about the MPI (consistency) and dispersion of rounds or MPIs about the target (accuracy).

distance observer – target (OT) (distance observateur-but (OB))

The distance along an imaginary straight line from the observer to the target.

DOWN (PLUS BAS)

1. In a call for fire, a term used to indicate that the target is lower in altitude than the point which has been used as a reference point for the target's location.
2. A correction used by an observer to indicate that a decrease in height of burst is desired.

DROP (DIMINUEZ)

A correction used by an observer to indicate that a decrease in range along the observer-target line (direction) is desired.

dud (raté)

Explosive munition which has not been armed as intended or which has failed to explode after being armed.

END OF MISSION (FIN DE MISSION)

A command given to terminate firing on a specific target.

final protective fire (FPF) (tir d'arrêt (TA))

Immediately available pre-arranged fire designed to protect friendly troops and installations by impeding enemy movement across defensive lines or areas.

fire (feu)

The command given to discharge a weapon.

fire coordination area (zone de coordination des feux)

An area with specified restraints into which fire in excess of those restraints will not be delivered without approval of the authority establishing the restraints.

fire coordination line (FCL)(ligne de coordination des feux (LCF))

A line established to coordinate fire support between airborne, helicopter-borne, or seaborne forces and link-up forces, or between any two converging friendly forces.

fire for effect (FFE) (tir d'efficacité (TE))

1. Fire which is delivered after the MPI or MPB is within the desired distance of the target or adjusting point.
2. Command to indicate that fire for effect is desired.

fire mission (FM) (mission de tir (MT))

1. Specific assignment given to a fire unit as part of a definite plan.
2. Order used to alert the weapon/battery area and indicate that the message following is a call for fire.

fire plan (plan de feux)

A tactical plan for using the weapons of a unit or formation so that they will be closely coordinated with the operations of the supported troops. See also Deliberate Fire Plan and Quick Fire Plan.

fire support coordination centre (FSCC) (centre de coordination des feux d'appui (CCFA))

A single location in which are centralized communications, facilities and personnel incident to the coordination of all forms of fire support.

fire support coordination line (LFCA) (ligne de coordination des feux d'appui(LCFA))

A line established by the appropriate ground commander to ensure coordination of fire not under his control but which may affect current tactical operations. The fire support coordination line is used to coordinate fires of air, ground or sea weapons systems using any type of ammunition against surface targets. The fire support coordination line should follow well defined terrain features. The establishment of the fire support coordination line must be coordinated with the appropriate tactical air commander and other supporting elements. Supporting elements may attack targets forward of the fire support coordination line, without prior coordination with the ground force commander, provided the attack will not produce adverse surface effects on, or to the rear of, the line. Attacks against surface targets behind this line must be coordinated with the appropriate ground force commander.

fire unit (unité de tir)

A general organizational term indicating a unit (or sub-unit) which can produce indirect fire.

first salvo at... (première salve à...)

A portion of the ship's message to the spotter to indicate that because of proximity to troops, the ship will not fire at the target but will offset the first salvo a specific distance and direction from the target. (Definition of a term peculiar to naval gunfire.)

followed by... (suivi de...)

Part of a term used to indicate a change in the rate of fire.

FRESH TARGET (NOUVEL OBJECTIF)

A command or request sent by the spotter to the firing ship to indicate the fire will be shifted from the original target to a new target by spots (corrections) applied to the computer solution being generated. (Definition of a term peculiar to naval gunfire.)

graze (impact)

Used in certain contexts to indicate detonation on impact as opposed to detonation without impact.

grid (grille)

1. (A contraction of the full term military grid.) The two sets of parallel lines intersecting at right angles and forming squares; the grid is superimposed on maps, charts and other similar representations of the earth's surface in an accurate and consistent manner to permit identification of ground locations with respect to other locations and the computation of direction and distance to other points.
2. (A contraction of the full terms grid coordinates or grid reference.) Used in giving the location of a geographic point.

grid bearing (gisement)

A horizontal angle measured clockwise from grid north.

grid north (nord de la grille)

The northerly or zero direction indicated by the grid datum of directional reference.

grouping (articulation)

The term applied to the allocation of artillery resources for command.

group of targets (groupe d'objectifs)

Two or more targets on which fire is desired simultaneously. A group of targets may be designated by a letter and number combination or a nickname.

gun data (données des pièces)

Data on the sights of a gun at the moment of firing.

gun-target line (GT line) (ligne pièce-but (ligne PB))

An imaginary straight line from gun to target.

harassing fire (HF) (feux de harcèlement (FH))

Fire delivered to disturb the rest, curtail movement and, by threat of losses, to lower morale.

height of burst (HOB) (hauteur d'explosion (HEX))

Vertical distance from the ground or target to the point of burst.

hide (cache)

An area in which a force conceals itself before operations or before moving into battle position.

high angle (tir vertical)

A command to obtain high angle fire.

high angle fire (tir vertical)

Fire delivered at elevations greater than the elevation of maximum range (usually 800*m* elevation).

hull-down (coque dissimulée)
As applied to an APC, a position in which the complete vehicle is screened, both from observation and fire, from one or more areas to the front.

illumination fire (tir éclairant)
Fire designed to illuminate an area.

indirect fire (tir indirect)
Fire delivered at a target which cannot be seen by the aimer.

indirect laying (pointage indirect)
Aiming a gun either by sighting at a fixed object, called the aiming point, instead of the target, or by using a means of aiming other than a sight, such as a gun director, when the target cannot be seen from the gun position.

infiltration (infiltration)
Clandestine movement through or into an area by small groups or individuals.

in location (en place)
A term used to denote a unit or sub-unit which, while physically situated within another unit's area of responsibility, is engaged in a task for a higher unit or formation. It is generally used in the siting of target acquisition devices.

interdiction fire (tir d'interdiction)
Fire placed at an area or point to prevent the enemy from using the area or point.

LARGE SPREAD (GRAND ÉTALEMENT)
A report by a spotter to the ship to indicate that the distances between the bursts of a salvo are excessive. (Definition of a term peculiar to naval gunfire.)

lateral spread (étalement latéral)
A technique used to distribute fire on a line perpendicular to the gun-target line.

left/right (gauche/droite)
1. A directional deviation used by an observer in adjusting ground or naval gunfire.
2. Fire correction used by an observer to indicate that a lateral shift to the MPI perpendicular to the observer-target line (direction) is desired.

line GT (ligne PB)
An imaginary straight line from gun to target.

line OT (ligne OB)
An imaginary straight line from the observer to the target.

LOST (NON OBSERVÉ)

A report used by an observer to indicate that rounds fired by a gun or mortar were not observed.

low angle fire (tir plongeant)

Fire delivered at angles of elevation at or below the elevation that corresponds to the maximum range.

map data (données cartographiques)

Map data are the bearing, range and angle of sight between the map coordinates of two points, e.g., data to which no corrections have been applied to compensate for non-standard conditions. When such data are used, they are referred to as map bearing, map range and map angle of sight.

MARK (MARQUAGE)

1. A call for fire on a specified location to orient the observer or to indicate targets.
2. A report made by the spotter in firing illumination to indicate the instant of optimum light on the target. (Definition of a term peculiar to naval gunfire.)

marking fire (tir de balisage)

Fire used for the purpose of identification.

mean point of impact / burst (MPI/MPB)
(point moyen des impacts / d'éclatement moyen (PMI/PEM))

The point whose coordinates are the arithmetic mean of the coordinates of the separate point of impact/burst of a finite number of projectiles fired or released at the same aiming point under a given set of conditions.

misfire (raté)

1. Failure to fire or explode properly.
2. Failure of a primer or of the propelling charge of a round to function, wholly or in part.

most consistent charge (charge la plus constante)

That charge, which at the selected range, produced the smallest PE_r

NEGLECT (NÉGLIGEZ)

A report to the observer to indicate that the last round(s) was fired with incorrect data and that the round(s) will be fired again using correct data. (UK/CA/AS only.)

neutralization fire (tir de neutralisation)

Fire which is delivered to hamper or interrupt movement and/or the firing of weapons.

no fire line (NFL) (ligne de sécurité (L de S)

A line short of which artillery, aircraft, or ships must not fire except on request or approval of the supported commander, but beyond which they may fire at any time without danger to friendly troops.

...(NUMBER) rounds (… (NOMBRE).coups)

A command used to indicate the number of projectiles per barrel to be fired on a specific target.

number...in (out) (nième pièce reprend le tir (incident de tir))

The term used to indicate that weapon (equipment) number... is (is not) available for firing (i.e., is not in action).

observed fire (tir observé)

Fire for which the points of impact or burst can be seen by an observer. The fire can be controlled or adjusted on the basis of observation.

observer identification (identification de l'observateur)

The first element of a call for fire to establish communication and to identify the observer.

observer-target distance (distance observateur-but)

The distance along an imaginary straight line from the observer to the target.

observer-target line (OT line) (ligne d'observation (ligne OB))

An imaginary straight line from the observer to the target.

offensive fire (tir offensif)

Fire delivered by supporting units to assist and protect a unit engaged in an offensive action.

on-call target (tir à la demande)

A planned target other than a scheduled target on which fire is delivered when requested.

open (faisceau ouvert)

A command or request used in a call for fire to indicate that the observer desires points of impact or burst to be separated by the maximum effective width of the burst of the shell fired. (Not actioned by Canadian fire units; normal deployment practices achieve this effect.)

open action (tir à vue)

The engagement of a target which is visible from the gun position but not necessarily from the individual guns.

planned target (objectif prévu)
A target on which fire is pre-arranged.

planning ranges (portées théoriques)
Because of the non-standard conditions prevailing at any given time, the guns of a unit might not be able to achieve the maximum range indicated in the firing tables. Consequently, for rough planning, i.e., in assessing the depth of coverage of the artillery in support of a formation, planning ranges are used which are 90 percent (to the nearest 500 metres) of the maximum range shown in the firing tables for the highest charge of the weapons in question.

PLATOON RIGHT (or left) (PELOTON PAR LA DROITE (ou par la gauche))
See battery right. (allied artillery term.)

polar coordinates (coordonnées polaires)
The direction, distance and vertical correction (shift) from the observer's position to the target.

polar plot (désignation en coordonnées polaires)
The method of locating a target or point on the map by means of polar coordinates.

predict (calculez)
The order to prepare predicted data.

predicted data (données calculées)
Data obtained by applying to map data the corrections required to compensate for local prevailing non-standard conditions. The process of determining and applying such corrections is called prediction.

predicted fire (tir d'efficacité d'emblée)
Fire which is brought to bear when initial adjustment to the fall of shot is either impossible or undesirable for tactical reasons.

preparatory fire (tir préparatoire)
Intense pre-arranged fire delivered in accordance with a time schedule and in support of an attack, for the purpose of disrupting the enemy's communications, disorganizing his defences and neutralizing his fire support means. Preparation fire starts prior to, at, or after H-hour and continues until lifted either on a pre-arranged time schedule or on request of the assault elements. Preparation fire may include nuclear and non-nuclear fire by air, ground, or naval means.

programme of targets (ensemble d'objectifs)
A number of targets of a similar nature, e.g., a counterbattery programme. Programme of targets may be designated using the nature of targets involved or nicknames.

quick action (mise en batterie rapide)
The procedure used when the guns are on the move, and it is necessary to get them into action quickly at an improvised gun position to respond to a call for fire.

quick fire plan (plan de feux rapide)
A quickly arranged fire programme in support of operations at brigade level or lower. The quick fire plan differs from a deliberate fire plan in that planning and coordination are effected at a lower level, fewer troops and guns are involved, speed is paramount and greater use is made of verbal orders. For simple, low-level plans, all orders are verbal and given without reference to a specific fire plan table.

range spread (étalement en portée)
The technique used to distribute fire along the gun-target line.

rate (cadence de tir)
When used in fire planning this term means number of rounds per gun per minute.

ready (prêt)
The term used to indicate that a weapon or weapons are aimed, loaded and prepared to fire.

RECORD AS TARGET (ENREGISTREZ COMME OBJECTIF)
The command used to denote that the target is to be recorded for future engagement or reference.

...RECORDED (ENREGISTRÉ)
The report used to indicate that the action taken to RECORD AS TARGET has been completed.

reference line (axe d'observation)
A convenient and readily identifiable line used by the observer as the line to which corrections will be related.

reference point (point de référence)
A prominent, easily located point in the terrain.

registration fire (tir de détermination des corrections)
Fire delivered to obtain accurate data for subsequent effective engagement of targets.

registration point (point de réglage)
Terrain feature or other designated point on which fire is adjusted for the purpose of obtaining corrections to firing data.

rendezvous (rendez-vous)
The place to which tactical groups or parties are ordered to move pending further orders. If it is necessary to occupy the rendezvous, it will normally be for a very brief period.

REPEAT (RÉPÉTEZ)
A command to fire again the same number of rounds with the same method of fire.

REST (REPOS)
A command that indicates that the unit(s) or gun(s) to which it is addressed shall not follow up fire orders during the time that the order is in force. (UK/CA/AS only.)

RETARD (RETARD)
A request from a spotter to indicate that the illuminating projectile is to burst later in relation to subsequent high explosive projectile. (Definition of a term peculiar to naval gunfire.)

ROUNDS COMPLETE (COUPS TIRÉS)
The term used to report that the number of rounds specified in fire for effect have been fired.

salvo (salve)
A method of fire in which a number of weapons are fired at the same target simultaneously. (Definition of a term peculiar to naval gunfire.)

scheduled target (tir à l'horaire)
A planned target on which fire is to be delivered at a specified time.

section right (or left) (section par la droite (ou par la gauche))
See Battery Right.

series of targets (série d'objectifs)
A number of targets and/or group(s) of targets planned to support a manoeuvre phase. It may be indicated by a nickname.

ship adjust (réglage par le navire)
A method of control in which the ship can see the target and, with concurrence of the spotter, will adjust fire. (Definition of a term peculiar to naval gunfire.)

shooting rights (autorisation de tirer)
Rights granted to an observer to engage, without reference to higher or flanking authority, any target lying within the area of influence of that formation of which the artillery unit is in direct support.

SHOT (COUP PARTI)
A report that indicates that a gun or guns have been fired.

SPLASH (SPLASH)
Word transmitted to an observer five seconds before the estimated time of the impact of a salvo or round.

spot (observer)
To observe fire, with the purpose of adjusting it. (Definition of a term peculiar to naval gunfire.)

spotter (observateur)
An observer. (Definition of a term peculiar to naval gunfire.)

spotting (observation du tir)
Adjustment. (Definition of a term peculiar to naval gunfire.)

spotting line (axe d'observation)
Either the gun-target line, observer-target line, or a reference line used by the spotter in making corrections. (Definition of a term peculiar to naval gunfire.)

spreading fire (distribution du tir)
A notification by the spotter or naval gunfire ship, depending on who is controlling fire, to indicate that fire is about to be distributed over an area. (Definition of a term peculiar to naval gunfire.)

ABBREVIATIONS

AFV; armoured fighting vehicle; **VBC;** véhicule blindé de combat

AGM; attack guidance matrix; **MDA;** matrice directrice d'attaque

AH; attack helicopter; **HA;** hélicoptère d=attaque

ALO; air liaison officer; **OLFA;** officier de liaison des forces aériennes

AMA; artillery manoeuvre area; **ZMA;** zone de manoeuvre de l=artillerie

AMC; at my command; **AMC;** à mon commandement

APC; armoured personnel carrier; **TTB;** transport de troupes blindé

BC; battery commander; **CB;** commandant de batterie

BE; base ejection; **EC;** éjection par le culot

BG Comd; battle group commander; **Cmdt GT;** commandant du groupement tactique

C of M; correction of the moment; **C du M;** correction du moment

C^2; command and control; **C^2;** commandement et contrôle

CAS; close air support; **AAR;** appui aérien rapproché

CB; counterbattery; **CB;** contre-batterie

CBU; cluster bomb units; **;** armes à dispersion

CDE; commander division engineers; **CGD;** commandant du génie divisionnaire

CEOI; communications- electronics operating instructions; **IET;** instructions d=exploitation des transmissions

CFSP; continuous fire support plan; **PFAC;** plan de feux d=appui continus

CO; commanding officer; **Cmdt;** commandant

CP; command post; **PC;** poste de commandement

CPO; command post officer; **OPC;** officier du poste de commandement

C/S; call sign; **I/A;** indicatif d’appel

CVT (fuze); controlled variable time fuze; **Fusée MVC;** fusée à minuterie variable contrôlée

DCPO; divisional command post officer; **;** officier du poste de commandement divisionnaire

DF; defensive fire; **TD;** tir défensif

Div Arty HQ; divisional artillery headquarters; **QG artil div;** quartier général de l=artillerie divisionnaire

DPICM; dual purpose improved conventional munitions; **MCADE;** munitions classiques améliorées à double effet

DS; direct support; **AD;** appui direct

EMCON; emission control; **CONEM;** contrôle d=émission

EW; electronic warfare; **GE;** guerre électronique

FAC; forward air controller; **CAA;** contrôleur aérien avancé

FASCAM; family of scatterable mines; **FMD;** famille de mines dispersables

FC; fire controller; **contr T;** contrôleur de tir

FEBA; forward edge of the battle area; **LAZB;** ligne avant de la zone de bataille

FFE; fire for effect; **TE;** tir d=efficacité

FGA; fighter ground attack; **;** chasseur d=attaque au sol

FLOCARK; features, lanes, obstacles, canalizing ground, routes, key terrain; **ACOTRoT;** accidents de terrain, couloirs, obstacles, terrain canalisant, routes, terrain clé

FM; fire mission; **MT;** mission de tir

FOO; forward observation officer; **OOA;** officier d’observation avancée

FPF; final protective fire; **TA;** tir d=arrêt

FSCC; fire support coordination centre; **CCFA;** centre de coordination des feux d=appui

FSCL; fire support coordination line; **LCFA;** ligne de coordination des feux d=appui

GPO; gun position officer; **O Tir;** officier de tir

GPS; global positioning system; **SUNOR;** système universel d'orientation

GS; general support; **AG;** appui général

GSR; general support reinforcing; **AGR;** appui général renforcement

GT; gun-target; **PB;** pièce-but

HB; hostile battery; **BH;** batterie hostile

HE; high explosive; **EB;** explosif brisant

HEPD; high explosive point detonating; **obus EB;** obus à explosif brisant équipé d=une fusée d=ogive (rapide/retard)

HF; harassing fire; **FH;** feux de harcèlement

HOB; height of burst; **HEX;** hauteur d=explosion

HPT; high payoff target; **OR;** objectif rentable

HPTL; high payoff target list; **;** liste des objectifs rentables (or)

HQ; headquarters; **PC;** poste de commandement

HQ; headquarters; **QG;** quartier général

HVT; high value target; **OGI;** objectifs de grande importance

IP; initial point; **;** point d'orientation

IPB; intelligence preparation of the battlefield; **;** évaluation du champ de bataille à partir du renseignement

IR; intelligence requirements; **;** besoins en renseignement

KZ ; killing zone; **ZA;** zone d=abattage

LAV; light armoured vehicle; **VBL;** véhicule blindé léger

LD; line of departure; **LD;** ligne de départ

LO; liaison officer; **OL;** officier de liaison

LRF; laser range-finder; **;** télémetre à laser

m; metre(s); **m;** mètre(s)

MDA; main defence area; **ZDP;** zone de défense principale

MFC; mortar fire controller; **CTM;** contrôleur de tir de mortier

MLRS; multiple launch rocket system; **LRM;** lance-roquettes multiples

MPB; mean point of burst; **PEM;** point d=éclatement moyen

MPI; mean point of impact; **PMI;** point moyen des impacts

MRR; motor rifle regiment; **RFM;** régiment de fusiliers motorisé

MSTAR; motion sensing target acquisition radar; **MSTAR;** radar portatif de surveillance et de détection

MT (fuze); mechanical time fuze; **fusée MT;** fusée mécanique à temps

NAI; named area of interest; **ZIPR;** zone d=intérêt particulier répertoriée

NCO; non-commissioned officer; **s/off;** sous-officier

NFL; no-fire line; **L de S;** ligne de sécurité

NGS; naval gunfire support; **TAN;** tir d’appui naval

NODLR; night observation device long range; **NODLR;** équipement d=observation nocturne longue porteé

OP; observation post; **PO;** poste d=observation

OP Tech; observation post technician; **tech PO;** technicien de poste d’observation

Ops O; operations officer; **O Ops;** officier des opérations
OT; observer-target; **OB;** observateur-but

OTC; officer in tactical command; **OCT;** officier responsable du commandement tactique

PD; point detonating; **;** fusée d=ogive

PE; probable error; **EP;** écart probable

PE_r; probable error in range; **EP_p;** écart probable en portée

PGM; precision guided munition; **MGP;** munitions à guidage de précision

PIR; priority intelligence requirements; **BPR;** besoins prioritaires en renseignement

QE; quadrant elevation; **AN;** angle au niveau

R; reinforcing; **;** renforcement

RAAMS; remote anti-armour mine system; **SMABPD;** système de mines antiblindés posées à distance

RCP; regimental command post; **PCR;** poste de commandement régimentaire

RCPO; regimental command post officer; **OPCR;** officier du poste de commandement régimentaire

RFL; restricted fire line; **LFR;** ligne de feux réglementée

RP; red phosphorus; **PR;** phosphore rouge

SACC; supporting arms coordination centre; **CCAA;** centre de coordination des armes d=appui

SADARM; search and destroy armour; **SADARM;** système d=arme de détection et anti-blindés

SEAD; suppression of enemy air defence; **SDAE;** suppression de la défense aérienne ennemie

SITREP; situation report; **SITREP;** compte rendu de situation

SO Arty Ops; staff officer artillery operations; **OEM Ops artil;** officier d=état-major – opérations d=artillerie

SOP; standing operating procedure; **IPO;** instructions permanentes d=opérations

SQ; super quick; **;** à fusée instantanée

SRAAW (M); short range anti-armour weapon (medium); **AABCP;** arme antiblindé courte portée (moyenne)

TA; target acquisition; **AO;** acquisition d=objectif

TACC; tactical air coordination centre; **CCAT;** centre de contrôle aérien tactique

TACP; tactical air control party; **ECAT;** élément de contrôle aérien tactique

TAD; tactical air direction (net) ; **DAT;** (réseau) de la direction tactique aérienne

TFT; tabular firing table; **;** table de tir

TGM; terminal guided munitions; **;** munitions à guidage terminal

TOF; time of flight; **DDT;** durée de trajet

TOT; time on target; **HSO;** heure sur l'objectif

TOW; Tube launched, Optically tracked, Wire commanded anti-armour missile; **TOW;** engine filoguidé à poursuite optique, lancé par tube

TUA; TOW under armour; **TUA;** TOW sous blindage

VT (fuze); variable time fuze; **fusée MV;** fusée à minuterie variable

WP; white phosphorus; **PB;** phosphore blanc