NATO STANDARD

AArtyP-01

NATO JOINT FIRE SUPPORT (JFS) PROCEDURES FOR LAND OPERATIONS

Edition D, Version 1

APRIL 2021

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED ARTILLERY PUBLICATION

Published by the
NATO STANDARDIZATION OFFICE (NSO)

INTENTIONALLY BLANK

NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

8 April 2021

1. The enclosed Allied Artillery Publication AArtyP-01, Edition D, Version 1, NATO JOINT FIRE SUPPORT (JFS) PROCEDURES FOR LAND OPERATIONS, which has been approved by the nations in the Military Committee Land Standardization Board (MCLSB), is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 2934.

2. AArtyP-01, Edition D, Version 1, is effective upon receipt and supersedes AArtyP-01, Edition C, Version 1, which shall be destroyed in accordance with the local procedure for the destruction of documents.

3. This NATO standardization document is issued by NATO. In case of reproduction, NATO is to be acknowledged. NATO does not charge any fee for its standardization documents at any stage, which are not intended to be sold. They can be retrieved from the NATO Standardization Document Database ((https://nso.nato.int/nso/) or through your national standardization authorities.

4. This publication shall be handled in accordance with C-M(2002)60.

FOR
DEPUTY DIRECTOR Zoltán GULYÁS
Brigadier General, HUNAF
Director, NATO Standardization Office

INTENTIONALLY BLANK

RESERVED FOR NATIONAL LETTER OF PROMULGATION

INTENTIONALLY BLANK

RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

INTENTIONALLY BLANK

RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
CAN	(1) Page 2-2. 2.1.4, para (1) sub-para (a). The definition of JTAC differs from the Canadian definition. The Canadian definition from Canadian Army Order 24-05 is “a certified/qualified service member who, from a forward position, directs the action of combat aircraft engaged in close air support and other offensive air operations.” Canada does not use the term JTAC(A). (2) Page 3-4. 3.3.2. para 2a(9). This sub-para states “Providing centralized command and control for the full complement of indirect fires, joint Fires, and multinational fires provided in support of the Command. […] Centralized mission command of supporting fires is useful also when unconventional forces are operating either independently or as the only force integrated within indigenous forces and require dedicated all- weather fires and fire support coordination.” Canadian Artillery doctrine is based on a centralized command and decentralized control. This sub-para is not supported. (3) Page 3-7. 3.3.3. para (7), sub-para (b) the statement "due to the JTACs relative disregard for the airspace..." is neither supported nor accurate. JTACs are concerned with airspace above and below the CL and are trained to manage them together and integrate air and surface fires through them. This statement should be removed and is not supported.
ESP	- The Spanish Armed Forces uses the term «indirect fire» to refer to the land-base fire support. - In the Spanish Army Joint Terminal Attack Controller (JTAC) teams are deployed at corps, division, brigade and battalion level, but not at Coy level. The Coy Joint Fire Support Element (JFSE) has a surface-to-surface team composed of a forward observer (FO) and an air-to-surface Joint Fires Observer (JFO) or National Fires Observer (NFO), depending on availability. NFO teams are qualified and certificated to support JTAC, providing target information for Close Air Support (CAS) Type 2 and Type 3 where JTAC cannot see the target. - Spanish Navy does not consider JFSE at Coy level. Coy Commander are the fires Support Officer (FSO), reinforced by one Fire Support Acquisition and control Team (FSACT)
EST	Para 6.1 Field Artillery Delivered Scatterable Mines. As a signatory State to the Ottawa Convention on the Prohibition of the use of Anti-Personnel Mines, Republic of Estonia will not use this type of field artillery delivered scatterable mines.

FRA	As a signatory to the Ottawa Convention, France will not use anti-personnel mines delivered by artillery. In addition, France will not use white phosphorus rounds. Furthermore, an artillery observer must be able to contribute to the targeting process as part of the strike detection, conduct and assessment, but he/she will not have a thorough knowledge of the process, as described in Annex B.3, task 1.4.
HRV	Chapter 6.1. – Field Artillery Delivered, Scatterable Mines Croatian Armed Forces will not use this type of field delivered scatterable mines due to Republic of Croatia signatory to the Ottawa Convention
ITA	All: - In Accordance to national law, Italy will not use any device which may be classified as antipersonnel mine according to the following definition ”An antipersonnel mine is defined as a device which may be placed above, under, inside or next to any surface and adjusted or adapted with specific measures in order to explode, cause an explosion or release incapacitating substances as the result of the presence, the proximity or contact by a person”. Moreover, considering military activities in a multinational scenario, cooperation of the Italian Armed Forces also with no signatory Nations of the Ottawa Convention is permitted, with the proviso that the activities by Italian servicemen be compatible to the Ottawa regulations. - Regarding AAartyP-01 Ed. D Ver.1 chapter 2 section I, the Italian NAVY, in the Amphibious Operations context, will no apply the structure of Joint Fire Supp01t Element (JFSE), but will be implemented the Command and Control Structures and the Fire Agencies as for ATP8 Ed. D. - Italy will use the message form "Emergency Call For Fires- Fire Mission" included into ATP-97 EDB VI, march 2020" LUVM – NATO Land Urgent Voice Messages - Pocket Book", instead of message form Annex C Emergency Call For Fire included into STANAG 2934 (Ratification Draft I) -NATO Land-Based Fire Support Procedures- AArty P-1, Edition D, Version 1.

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

INTENTIONALLY BLANK

INTENTIONALLY BLANK

TABLE OF CONTENTS

INTENTIONALLY BLANK

CHAPTER 1 INTRODUCTION

1 **GENERAL**. This publication should be read in conjunction with AArtyP-5 (NATO Fire Support Doctrine).

2 **Aim of AArtyP-01(D).** The aim of this publication is to detail the procedures agreed upon by NATO forces for the employement of land-based fire support units in the framework of Joint Fire Support in order to produce timely and effective artillery support to manoeuvre units. Especially for chapter 2 and 3 the procedures as described are to be used when Automated Data Processing (ADP) systems are not used. When using ADP systems between nations the templates depicted in AArtyP-3 are to be used. In time it is foreseen that the procedures as described in AArtyP-01(D) and AArtyP-3, when both documents evolve, will come closer to each other.

3 **Scope of AArtyP-01(D).** This publication is concerned with fundamentals and those procedures likely to be used in multi-national operations. It does not, for the present, cover the complete range of technical artillery procedures.

4 **Terms and Definitions.** Artillery terms and definitions of general military significance are contained in the NATO Glossary of Terms and Definitions and/or NTDB (NATO Terminology Database).

5 **Bearings and Coordinates.** All references to mils are to the NATO mil (6400 mils in a circle; 0000/6400 is North). All coordinates will be given in the order of Eastings then Northings. If necessary the Grid zone designators and the 100,000-meter square Identifier can be added to the coordinates.

6 **Associated Publications.** Related Allied Publications (AP) and Standardization Agreements (STANAGs) are contained in Annex A, it should be noted that:

a. NATO nations have concluded a wide range of agreements on various matters, and more are under negotiation. AAP-4 contains a full list of Aps and STANAGS.

b. Most STANAGs are not circulated directly to units. Their contents are included in national and command instructions (e.g., training pamphlets, standing operating procedures and field manuals).

c. AP are STANAGS that have been converted to a document that can be used by units. This simplifies distribution and makes implementation much quicker. The related AP and STANAGs can be found in Annex A.

INTENTIONALLY BLANK

CHAPTER 2 TARGET PLANNING

2.1. JOINT FIRE SUPPORT ELEMENTS

2.1.1. General

1. The Joint Fire Support Element (JFSE) is the element responsible at all levels (company, battalion, brigade, division, corps) for the overall planning, coordinating and employment of all allocated JFS assets. It coordinates national and multinational reconnaissance assets, ground-based fire support systems, army aviation, air forces and naval forces/ naval air forces contributing to JFS. The required JFS capabilities are integrated at the respective levels in the coordination elements/ fire support elements. Major tasks of all JFSE are JFS planning, coordination and implementation as well as provision of advice to the commanders and headquarters. It is the single point of contact for JFS coordination at all levels. This element should always be tailored to the mission and to the level of force and be reinforced by all necessary liaison cells as required.

2. In this document the main focus will be on the Joint Fire Support Elements at the company level.

3. Within most NATO countries the JFSE at the company level consist of a Fire Support Officer (FSO) augmented with various sub elements as a Forward Observer, a Joint Terminal Attack Controller (JTAC) and/or a Naval Fire Support Spotter.

4. The AArtyP-01(D) briefly describes the tasks of the sub elements and refers to the specific STANAG/AP concerning the appropriate procedures.

2.1.2. The Fire Support Officer (FSO)

1. The Fire Support Officer is the commander of the JFSE. At company level the primary responsibility of the FSO is to ensure the integration of the joint fire support plan with the scheme of manoeuvre, both during planning and execution. Integrating joint fire support must achieve synergy between the different assets and effects. Secondarily the FSO commands and directs his terminal control elements (Forward Observer (FO), Joint Terminal Attack Controller (JTAC) and Spotter, (if allocated) during planning and execution. The FSO is also the link to the higher echelons JFSE for the planning and coordination of external fire support. The FSO is the company commanders advisor for all joint fire support related matters.

2. The company FSO advises the commander on the capabilities, possibilities, limitations, and employment of all fire support assets available to support his operation. The company FSO bases his actions on the needs of the supported force as directed by the manoeuvre commander's guidance.

2.1.3. The Forward Observer

1. The FO acts as the eyes of the ground based fire support. The primary duty of the FO is to locate targets and call for and adjust indirect ground based fire support.

The FO is a NATO qualified individual able to execute safe and effective land based fire support. The qualification is described in annex B.

2. In some countries the FO is also trained to provide a Joint Terminal Attack Controller with target information for Close Air Support (CAS) Type 2 and Type 3 controls where the JTAC cannot see the target. The concept of operation is that these additional trained FOs will observe a large battle area and liaise with one JTAC, multiplying the effective area of operations for that JTAC.

3. When calling for land-based Fire Support, the procedure in AArtyP-01(D) must be used.

2.1.4. Joint Terminal Attack Controller

1. CAS is an air action against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with fire and movement of those forces for fratricide avoidance and targeting guidance performed by a certified and qualified Joint Terminal Attack Controller (JTAC)/Forward Air Controller (Airborne) [FAC(A)]

a. Joint Terminal Attack Controller (JTAC)/JTAC Airborne (JTAC (A)) – a qualified individual who, from a forward position on the ground or in the air, directs the action of combat aircraft engaged in close air support of land forces (AAP-6).

b. JTAC/JTAC (A) missions provide terminal attack control for CAS aircraft operating in close proximity to friendly ground forces. Because of the risk of fratricide, JTAC/JTAC(A)s are specially trained aircrew qualified to provide delivery clearance to CAS aircraft. The JTAC/JTAC (A) is the only person cleared to perform such control from the air, and can be especially useful in controlling CAS against targets that are beyond the visual range of friendly ground forces.

2. When calling for Close Air Support, the procedure in ATP-3.3.2.1 must be used.

2.1.5. Spotter

1. The Naval fire support (NFS) observer for ground troops is called the Spotter. The JFSE on company level has the additional responsibility of observing and controlling NFS in support of the land component. The NFS procedures and amphibious Tactics, Techniques & Procedures (TTP) are described in detail respectively in ATP-04 and ATP-08. A maritime fire support group consists of naval combatants assigned to support Land Forces operations ashore by NFS.

2. When calling for NFS, the procedure in ATP-4 should be used.

2.1.6. All Arms Observer

1. A Service member trained to request ground based fire support (Call for Fire). The All Arms Observer is not fully qualified as a FO. The All Arms Observer can provide the necessary target information to the forward observer in order to engage a target with ground based fire support and, if necessary, conduct adjustments. The concept of

operation is that multiple all arms observers will observe a large battle area and liaise with one FO, multiplying the effective area of operations for that FO.

2. When using all observers for multiplying the effective area of operations it is highly recommendable to provide these service members with fire support training in the utilization, possible effects and procedures of fire support to avoid fratricide and collateral damage.

3. When calling for a standard call for fire the procedure in AArtyP-01(D) should be used. The unit SOP should define whether this CFF should be sent to the FDC directly or through the JFSE.

2.1.7. Untrained Observer

1. An untrained observer is anyone not military occupational specialty qualified in requesting and adjusting indirect fire. Occasionally the FA battalion may need to process fire missions from untrained observers. Often these are critical requests where the requestor is under fire.

2. Calls for fire from untrained personnel acting as ground observers require close attention and initiative from every member of the FDC. The FDC personnel must be prepared to assist the untrained observer in his call for fire and adjustment of artillery. The format and the related procedures for the CFF from an untrained observer is called Emergency Call For Fire. The format is described in Annex C.

2.2. TARGET NUMBERING SYSTEM

2.2.1. General

1. This section describes the basic system of target numbering agreed by NATO forces for use in fire support operations.

2. The objective of the target numbering system is to identify, with alphanumeric characters, points or areas that are to be fired upon or referenced. Such a system must uniquely identify each point or area and must be compatible with automatic data processing equipment.

3. The way in which target letters and numbers is allocated within armies to formations, units and detachments is a matter of national policy AND is not covered by this agreement. In operations where a formation of one Nation using one system is subordinate to a formation from another Nation using a different system, it will be normal for the allotment system laid down in the Standard Operating Procedures of the senior headquarters to be adopted by the junior formation.

2.2.2. Target numbering system

1. The target number is comprised of six characters, comprising TWO letters followed by FOUR number positions. (e.g. KT 1764).

2. The two-letter group may be used to indicate the originator of the target number and/or the level holding the target data.

3. Other than the letter Z, there are no permanently assigned first letters for any Nation or organization. The senior land forces artillery headquarters for an operation will establish and publish, in orders, the assigned first letter for junior Nations and organizations. The senior land forces artillery headquarters is not refrained from using any of the letters (less Z) nor are they limited to a sequential use of letters. Coordination should be conducted between major geographic commands to ensure that identical letters are not used in areas close to adjacent boundaries. Nations may use any letter during national training. Standing multinational organizations are recommended to establish a target numbering system within their Standard Operating Procedure (SOP).

4. The following is an example of the assignment of first letters for targeting in an operation:

United States	A	Germany	G
United Kingdom	B	MNC NE Corps	M
EUROCORPS	E	NRDC – Italy	N
France	F		

5. The Target Number prefix “Z” is reserved for the technical use by Automatic Data Processing Systems in nations. These target numbers are made available for nations’ sole use as required. As an example, the block of 10000 target numbers could be used to automatically generate a target number where there is a mandatory requirement within an interface for a target number in order to ‘track’ a fire mission and to ensure that the appropriate responses are sent to the originator of the fire mission. In order to avoid the simultaneous use of identical target numbers by two or more nations, ‘second letters’ are reserved for individual nations and are listed at Annex D. Annex D will be amended as an “editorial change” when necessary.

2.3. THE FIRE PLAN

2.3.1. General

A fire plan is a tactical plan for using the weapons of a unit or formation so that their fire will be coordinated.

The fire plan is prepared by the appropriate JFSE and sent to all participating units. It may consist of any or all of the following items (Examples are provided in Annex E – These are examples only. National formats or procedures may differ from the examples provided). The general elements of the fire plan can also be found in the Fire Support Annex of the operation order (ATP 3.2.2 annex G Appendix 6).

a. A target list:

A tabulation of confirmed or suspected targets maintained by any echelon for information and fire support planning purposes. Also called “list of targets”.

b. A target overlay:

A transparent sheet which, when superimposed on a particular chart, map, drawing, tracing or other representation, depicts target locations and designations. The target overlay may also show boundaries between manoeuvre elements, objectives and friendly forward dispositions.

c. One or more fire plan schedules:

A presentation of planned targets providing data for engagement. Scheduled targets are fired in a definite time sequence. The starting time may be on call, at a prearranged time or at the occurrence of a specific event.

A fire plan schedule, together with warning orders, operational fragmentary orders and standing operating procedures provides the necessary information to deliver fire support.

2.3.2. Targets

1. A target is an area, structure, object, person and group of people against which lethal or non-lethal capability can be employed to create specific psychological or physical effects.

2. Targets include a wide array of mobile and stationary forces, equipment, and other military resources that an adversary commander can use to conduct operations at any level - strategic, operational, or tactical. From a commander’s planning and execution perspective, targets fall into two general categories: planned target and target of opportunity.

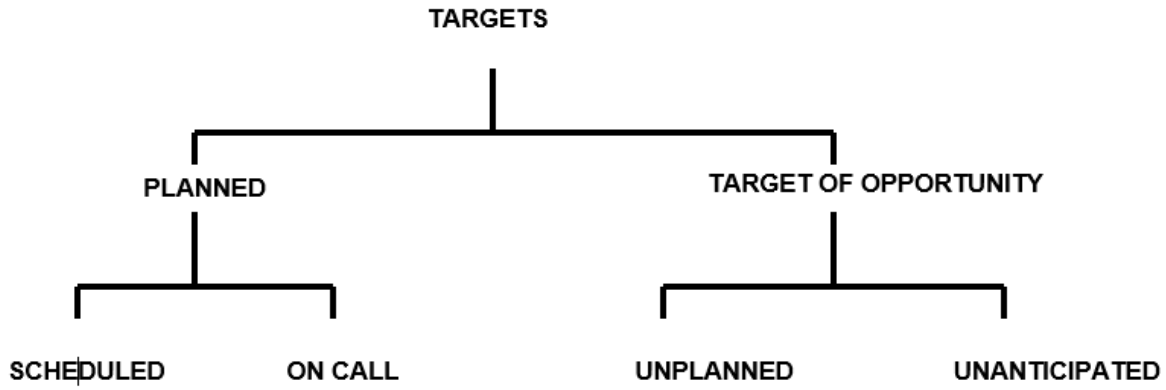
3. Planned targets are those known to exist in an operational area with actions scheduled against them to generate the effects desired to achieve the manoeuvre commander’s objectives. Examples range from targets on joint target lists in the applicable campaign plan, to targets detected in sufficient time to list in fire support plans. Planned targets have two subcategories: scheduled or on-call. Both of them are included in a fire plan.

4. Scheduled targets are planned targets upon which fires are to be delivered at a specific time. On-call targets are those that do not have fires scheduled to be delivered at a specific time, are known to exist in an operational area, and are located in sufficient time for deliberate planning to meet emerging situations specific to campaign objectives.

5. Targets of opportunity are those targets which appear during combat situation and which fire has not been planned. Nevertheless, these targets are in range of available weapon systems and, when detected or located by a sensor or an observer, they should be attacked if this would support the scheme of manoeuvre.

6. Unplanned targets of opportunity are those that are known to exist in an operational area but are not detected, located, or selected for action in sufficient time to be included in the normal targeting process. Unanticipated targets of opportunity are those that are unknown or unexpected to exist in an operational area but, when detected or located, meet criteria specific to campaign objectives.

7. Priority targets are those for which the delivery of fire has precedence over all other fire for the designated firing unit or element. The firing unit/element prepares to the greatest extent possible for the engagement of such targets. A Final Protective Fire (FPF) - an immediately available prearranged barrier of fire designed to impede enemy movement across defensive lines or areas - is an example of a priority target with the highest priority. A firing unit/element may be assigned only one priority target or Final Protective Fire at a time.

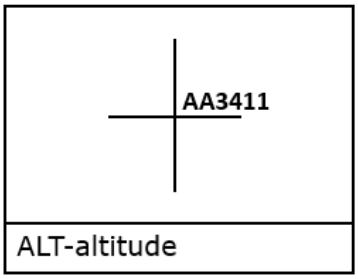


2.3.3. Size and shape of targets

Fire support personnel use standard terms and symbols to prepare maps, charts, and overlays to identify targets by shape (point, linear, rectangular circular, or target reference point) and size. The sizes specified in the following paragraph are indicative and may be changed according to the situation.

1. Point target

A point target is a target that is about 50 meters in radius. Minimum accuracy of the target location on the target list is an eight digit grid.

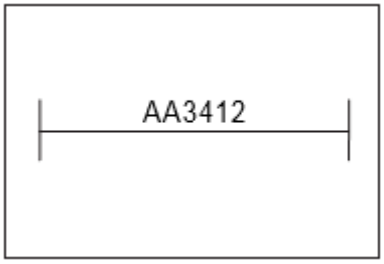


2. Circular target

A circular target is a target that is in a circular pattern or is vague as to exact composition and has a radius equal or greater than 100 meters. It is designated by a centre grid and radius equal or greater than 100 meters.

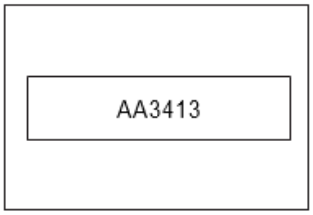
3. Linear target

A linear target is a target that is equal or greater than 200 meters in length and less than or equal to 100 meters in width. A linear target is designated by two grids or by a centre grid, a length, and an attitude. An attitude is the azimuth in mils or degrees, determined to the nearest 100 mils and always less than 3200 mils, measured from grid north to a line passing through the long axis of a linear or rectangular target.



4. Rectangular target

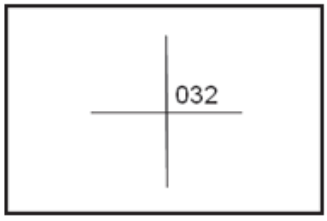
A rectangular target is a target that is equal or greater than 200 meters in length and greater than 100 meters in width described by four grids or by a centre grid, a length, width, and an attitude.



5. Target reference point

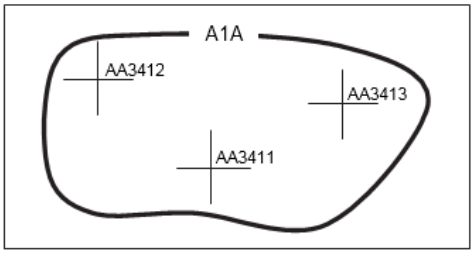
A target reference point is an easily recognizable point on the ground (either natural or man-made) used to initiate, distribute, and control fires. A target reference point can also designate the centre of an area where the commander plans to rapidly distribute or converge fires. A manoeuvre commander designates target reference points for the

subordinate elements as necessary to control direct and indirect fires. The echelon's fire support officer can also recommend target reference points become a target by using the standard target symbol and target numbering identification. The target reference point is designated by using a numeric only marking if, and only if, there is no intent to engage with indirect fire. A target reference point may also be identified as a point target.



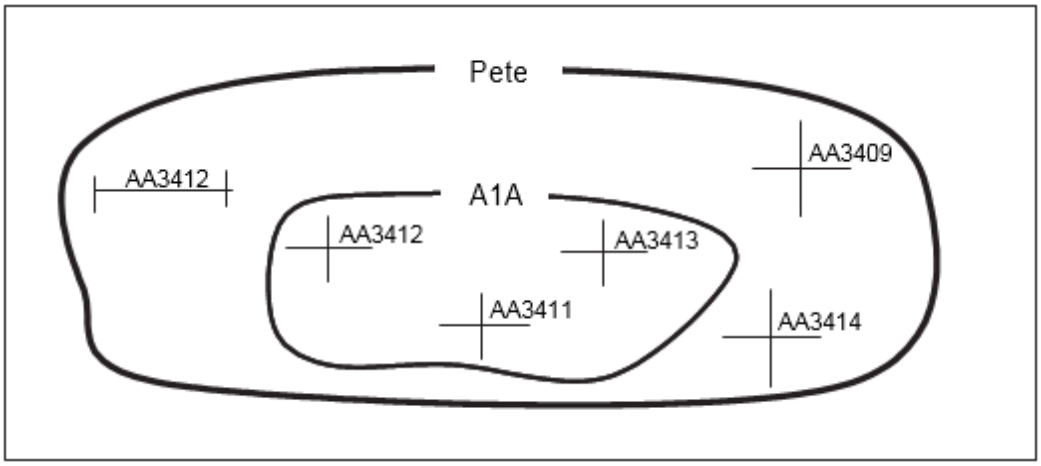
6. Group of targets

A group of targets consists of two or more targets on which fire desired simultaneously. A group of targets is designed by a letter and number combination or a nickname. Graphically portray a group of targets by circling the targets and identifying them with a group designator. Consider the number of field artillery firing batteries and battalions available when planning groups of targets. Individual targets in a group may be attacked individually.



7. Series of targets

A series of targets is a number of targets or group(s) of targets planned to be fired in a predetermined sequence to support a manoeuvre operation. A series may be fired on-call, at a specified time, or when a certain event occurs. The manoeuvre commander determines the need for a series on the advice of his FSO. The series is indicated by a series name. Individual targets or a group of targets in a series may be attacked individually.



2.3.4. Fire Planning

1. Fire planning is the continuous process of analysing, allocating and scheduling of fire. The basis for fire planning is the commander's guidance and intent. Deliberate fire planning is conducted through a formal top-down process, with bottom-up refinement. At all echelons, deliberate fire planning begins immediately on receipt of the mission. Company and battalion JFSE should not wait for a target list from higher echelons before beginning their own fire planning. For the manoeuvre brigade, the process begins with the receipt of targeting information from the division. All HPTs of one level higher will be transmitted to a lower level. Only the HPT's which can be acquired or influenced by the brigade will be included on the brigade's HPTL. The brigade S2 and FSO must refine this division guidance for the brigade area and concept of operation. (The Target List flow diagram is at Annex F.)

2. The brigade or higher level JFSE receives targets that are in its zone and in its area of influence from the higher level. The brigade FSO works with the S2, S3, and ALO to plan targets in support of the operation. The brigade FSO adds higher and own level targets to its target list work sheet, posts the targets on his overlay, and passes those targets to subordinate units and if appropriate to a DS artillery battalion. Only the HPT's which can be acquired or influenced by the brigade FSO's own unit will be included on the units HPTL.

3. The battalion FSO, in conjunction with the commander, operations officer, and primary and special staffs, is responsible for identifying his fire support requirements. He receives targets from his higher level FSO, modifies them as necessary, and adds targets of concern to his unit commander. Using the target list work sheet and overlay as tools, he forwards his list of targets to subordinate FSOs.

4. The company FSO and manoeuvre commander plan targets to support their scheme of manoeuvre. The company FSO receives targets from the higher level that are within his area of influence. He modifies them as necessary and adds any other targets according to the manoeuvre commander's priorities. Modifications and additions are submitted to the higher FSO. The company FSO nominates targets in his sector, records this target information on the target list worksheet, and forwards it to the battalion FSO.

5. The battalion FSO considers the target information he receives from each sub units FSOs, consolidates it (by eliminating duplications), adds targets needed by his level, and forwards a copy of the work sheet to the brigade FSO.

6. The brigade FSO receives target list modifications from his subunits FSOs. Using the target list work sheet and overlay, he resolves duplications, adds targets developed by his level TA assets, prioritizes the list, and sends it to the DS battalion and appropriate agencies providing support to the manoeuvre commander. He informs the battalion FSOs of any subsequent changes to their plans. It is important that the FSO allow enough planning time for subordinate headquarters and that he establishes a cut-off time for their submission of modifications so that the plan can be disseminated with adequate time for execution. The FSO records targets on a Target List (Annex E).

7. In fire planning, the priority of fires is the organization and employment of fire support means according to the importance of the supported unit's missions.

8. Superimposed is a term used in fire planning to indicate that an artillery unit is augmenting fire on a target and its fire may be lifted from that target by the authority implicit in its fire support role.

2.3.5. Target List

1. An example of a target list is at Annex E. An explanation of each heading in the target list is:

a. Line Number — A convenient reference.

b. Target Number — See paragraph 2.2.

c. Target location — See paragraph 4.2.3. 4.a.(1)

d. Altitude — See paragraph 4.2.3. 4.a.(2)

e. Target description — See paragraph 4.2.3. 6.a. and 6.b.

f. Size/Radius (optional) — See paragraph 4.2.3. 6.a.(3)

g. Attitude (optional) — See paragraph 4.2.3. 6.a.(3)

h. Remarks (optional). Special considerations for attack of the target and a more detailed description of the target.

2.3.6. Fire Plan Schedule

1. An example of a completed schedule is at Annex E. The fire plan schedule allocates targets to fire units. It specifies:

a. Timings for the engagement of scheduled targets.

b. Method of engagement expressed as one of the following:

(1) Total expenditure of ammunition by each fire unit on each target or by;

(2) Rates in rounds per gun per minute or;

(3) Method of fire for effect (e.g. 10 rounds fire for effect) or;

(4) Effect required: example include neutralize, destroy, suppress.

c. The type of ammunition to be fired for each target.

d. On call targets.

e. Any special instructions.

2. For each phase of an operation, the following may be prepared:

a. A fire plan schedule.

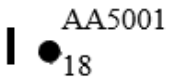
b. Instructions for other types of fire support.

3. To prepare a fire plan schedule:

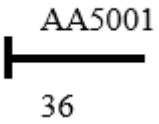
a. For each target to be fired on:

(1) Indicate the timing either by:

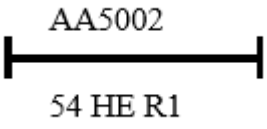
(a) a vertical line indicating a TOT.



(b) a point or vertical line followed by a horizontal line indicating the time the first rounds are to impact and the following rounds as soon as possible following standard procedures.



(c) a horizontal line with vertical line ends or points indicating the initial and terminating times. Rounds must be evenly distributed with rounds landing at the start time and the final rounds landing at the end time.



(2) Indicate the target number above this line/point.

(3) Show the amount of ammunition or the rate to be fired by the unit below this line/point.

b. Notes:

The ammunition type to be fired on each target must be clearly stated on the fire plan schedule. If no indication is given, targets must be engaged with HE/PD

(1) All initial timings refer to time first rounds arrive on the target. No rounds must arrive on the target after a specified terminating time.

(2) Targets may be engaged, singly, as a group of targets, or a series of targets.

(3) An example of a blank fire plan pro forma showing both the Target List and Schedule is at Annex E.

2.3.7. Fire Plan

The target list, combined with the fire plan schedule provides the fire plan. The fire plan is given a name with one to six alphanumeric characters.

2.4. CLEARANCE OF FIRES

Clearance of fires is the process by which the supported commander ensures that fires or their effects will have no unintended consequences on friendly units or the scheme of manoeuvre.

The supported ground commander is responsible for the clearance of fires in his area of operations, including the integration of fires with other airspace users. The commander establishes, or requests higher headquarters establishment of control measures (such as graphic control measures, direct fire control measures, airspace coordinating measures, and fire support coordination measures) that serve as a means of separating units, synchronizing fires and manoeuvre, facilitating clearance of fires, and preventing fratricide. The commander may not employ indirect fires across boundaries without receiving clearance from the unit into whose area of operations the fires will impact. He may employ direct fires across boundaries without clearance at specific point targets that are clearly and positively identified as enemy. Commanders may consider early coordination to also grant clearance for indirect fires against targets that are clearly and positively identified as enemy.

The centre of this process is in the Tactical Operation Centre (TOC). Airspace coordination, which should always be a part of the clearance of fires, is assisted through the staff process. The JFSE planners ensure that fire support will not jeopardize troop safety, will interface with other fire support means, will ensure the most responsive fires possible, and will not disrupt adjacent unit operations.

2.4.1. Airspace considerations for Land-based Fire Support Operations

Air and Land integration addresses potential conflict(s) between friendly entities that operate within air and land domain during operations. Airspace integration should complement the Fire Support actions by positive and procedural Airspace Control

Means (ACM) using time, lateral, and/or altitude integration methods. When integrating fires with air, both trajectory and maximum altitude of the munition must be considered. An appropriate ACM and/or FSCM should be established to create a permissive surface to surface environment, minimizing coordination requirements and allowing for coordination at the lowest echelon. This facilitates air and aviation while engaging targets with Land-based FS.

2.4.2. Airspace clearance of fire

The airspace clearance of fire can be defined as the authorization granted by the agency responsible to control the airspace (ACA or Sub-ACA) to an artillery unit to use, with fire, a specific volume of the airspace for a specific time window, guaranteeing the safety of the other airspace users. This authorization has the aim to manage the airspace in order to prevent/avoid any friction between airspace users. The Airspace Clearance is an integral part of the FS planning and execution because units have to submit ACM requests (ACMREQs) in order to be authorized to use the airspace. The way to submit these requests may vary whether the need arise during the planning or the execution phase.

2.4.3. Procedures for Airspace coordination during the planning phase.

1. During the planning phase, the unit should develop an airspace plan based on the COA selected by the supported unit. The aim of the unit's airspace plan is to request airspace reservation to higher headquarters in order to be finally authorized by the Airspace Control Authority (ACA or Sub-ACA) to conduct airspace activities (i.e. artillery fire, Unmanned Aircraft and helicopters flights, etc.). This is done by submitting ACMREQs which should be included in the Airspace Control Order (ACO).

2. A detailed COA analysis is necessary to identify potential airspace conflicts between all airspace users (i.e. Army aviation, organic Unmanned Aircraft (UA), joint air assets, and artillery). A detailed COA analysis also allows the development of a collaborative unit airspace plan that resolves the conflicts in accordance with the commander's airspace priorities and risk guidance. The refinement of the airspace plan needs to account for adversary locations and friendly indirect firing platform. Additionally, the unit airspace plan must be rehearsed to validate integration of airspace users and support of the commander's intent. Further information related to the Airspace Control may be found in AJP-3.3.5.

3. Deliberate planning for ACMs from outputs of FS planning will expedite surface to surface fire during the execution. Constant communications between airspace management/control cell and the JFSE is critical for reducing delay in mission processing.

4. All ACMREQs developed during the planning will be submitted to the ASM (Airspace Manager/Management Cell) for inclusion in the unit airspace plan. In this context, according to the target predicted locations and the locations of those friendly firing units expected to fire on, the staff will develop and recommend ACMREQ to link these locations, which should be validated during the rehearsal. To develop such ACMREQs the following steps may be followed:

– predict adversary fire support capabilities location in space and time;

- identify AMA/ARA from where friendly firing units are able to range those target areas;
- calculate trajectory of the rounds (maximum altitude) and GTL;
- in conjunction with the FSO, refine the choice of AMA/ARA considering the maximum altitude of the trajectories and the GTL with respect to active ACMs and/or other airspace user's operational requirements (e.g. CL/CA, planned Slow Aviation Flight Routes (SAAFR), presence of FARP, etc.);
- develop ACMREQs according to the ROZ(s) requirements (wall, goalpost, etc.);
- submit ACMREQs to the ASM for inclusion in the unit airspace plan;
- verify the inclusion of the requested ACMs in the Airspace Control Order (ACO) issued by ACC.

2.4.4. Procedures for Airspace coordination during the execution phase

1. The responsiveness of the FS is directly related to the settings arranged during the planning process, described in the previous paragraph. Consequently, in the case of the target is acquired, the friendly firing unit would be able to react promptly from the planned AMA/ARA and the firing mission would be processed immediately or within the target decay time.

2. In this case, to obtain the airspace clearance the JFSE must transmit to the ASM (via Chat, e-mail, voice, ACMREQ, or other means available) the following data (at minimum):

- Target Location;
- Firing unit location (friendly);
- Max Ord (feet msl);
- GTL (in mils or degrees);
- Duration of the mission (Time of Flight or Time of Mission).

3. According to these data, the ASM will identify and resolve potential airspace conflicts or forward the request to the higher headquarters in order to obtain the airspace clearance. It should be noted that this process will take some time with the risk of not being able to meet the target decay time. For this reason, the more is accurately predicted, planned and arranged during the planning process, the more responsive will be the fire mission.

2.4.5. Considerations for Restricted Operations Zone (ROZ)

1. The most usual method of ensuring deconfliction between artillery weapon systems and air platforms is to establish ROZ around the launch locations and target areas. The size of the ROZ is based on the distance taken by the munitions to either climb or descend through those altitudes at which the majority of airspace users are operating. If pre- determined firing positions and/or likely target areas are identified, these locations can be used to pre-plan ROZ requirements. This can reduce response time for FS units employing 'shoot and scoot' tactics. As artillery rounds/rockets time of flight is typically of the order of 1 to 3 minutes, it may also be possible to use time deconfliction should spatial deconfliction pose problems. ROZ for all pre-planned artillery fire should be published in the ACO. However, unplanned ROZ may be required to support the timely flow of the battle. Procedures for the immediate

implementation of dynamic ROZ on an as-needed basis must be established. An example of the ROZ required for airspace deconfliction is shown in the diagram below.

2. When requesting a ROZ the following aspects should be taken in consideration:

a. vertical dimension: from ground to the vertex of the trajectories plus a buffer to guarantee a vertical separation from other airspace users (this buffer, generally 1.000 ft, is defined in the Airspace Control Plan);

b. horizontal dimension:

(1) width: all the trajectories, from the shooters to the targets, must be included in the ROZ, considering the area occupied by all firing platforms and the defection of their trajectories. A buffer to guarantee a lateral separation from other airspace users may be specified in the ACP;

(2) length: the length should include the distance from the firing platforms and the targets and the range probable error over the targets;

c. times of activation: the ACMREQ must specify the effective period (from/to) the ROZ will be active. It should be considered the duration of the entire fire mission (including adjusting fire, time of flight, number of volley, etc.).

INTENTIONALLY BLANK

CHAPTER 3 DEPLOYMENT PLANNING

3.1. GENERAL

1. The aim of this chapter is to outline fire support deployment. This process is an integral part of fire support planning. The term “real estate” refers to deployment areas or positions.

2. The deployment plan is an important outcome from fire support planning. It takes the fire support plan, the fire plan and survivability requirements and produces a plan for the movement of the field artillery units. It involves both locations to move to and timings for movement. Several factors influence the deployment plan. These include:

a. The tactical situation especially:

(1) fire planning – the target areas; weights of fire required, duration of fire and timings.

(2) survivability issues based on the enemy threat.

b. Available real estate; taking into account topography, routes, weather, airspace control measures and other units.

c. The characteristics (e.g. firing range and mobility) of the field artillery system(s) in use.

d. Combat Service Support.

3.2. ARTILLERY DEPLOYMENT

1 Artillery Manoeuvre Area (AMA)

AMA is an area within which artillery is authorized to deploy but which is not reserved for its exclusive use (AAP-6).

Inside the AMA the artillery units can manoeuvre to increase their survivability. AMA vary in size depending on the ground, phase of battle, or the number of elements deploying into the area. AMA are not reserved for the artillery, rather, they are areas in which the artillery has priority for deployment. AMA assists the deployment of artillery by establishing a basis for resolving terrain conflicts at the lowest levels.

An AMA can be large enough for only a battery or it can be big enough to accommodate a Regiment/Battalion while leaving place for alternate positions within the AMA.

The manoeuvre commander assigns AMA as a terrain management technique. Considering that an AMA potentially attracts enemy counterfire, other units should stay away from that area to avoid enemy artillery attacks. The exact size of a position area

for artillery depends on the mission variables of Mission, Enemy, Terrain and weather, Troops and support available, Time available, Civil considerations (METT-TC)

During the planning process the staff defines AMA or ARA for each artillery unit (included radar and TA assets) within the Area of Operation of the supported unit in conjunction with the manoeuvre G3/S3 staff. The AMA/ARA list is then issued to all formations/units in the operation order. The artillery unit occupies but does not control the AMA and has neither the authority nor responsibilities that are associated with a unit assigned an Area Of Operations. For example, other units can move through a AMA without clearing that movement with the occupying artillery unit.

The decision to establish an AMA affects airspace control and coordination for aircraft integration. An AMA is a base upon which to establish future Gun-Target Lines (GTL) for lateral deconfliction and areas for rotary-, fixed-wing, and tilt rotor aircraft to avoid depending on high- or low-angle artillery fires.

2 Artillery Reserved Area (ARA)

ARA is an area reserved exclusively for the positioning of artillery assets (AAP-6).– ARA are areas reserved for the exclusive use of artillery. Batteries Units using static deployment methods may be allocated an ARA (eg. Ammunition Control Point – ACP, counterfire radar, etc.). In this case, the artillery unit occupies and control the ARA. Consequently, other units cannot move through an ARA without clearing that movement with the occupying artillery unit. An ARA can be part of an AMA.

Regarding the airspace control, planners can refer to the same considerations as for the AMA.

3.3. CONSIDERATIONS FOR LARGE SCALE COMBAT OPERATIONS

3.3.1. General

1. The aim of this paragraph is to provide Allied leadership with tactics, techniques, and procedures for the employment of land based fire support during Large Scale Combat Operations (LSCO). For the purposes of this doctrine, Large Scale Combat Operations will be defined as those operations requiring the employment of multiple Allied divisions in action simultaneously against a peer, or near-peer adversary, in an environment characterized by high operational tempo and lethality. These operations necessitate the coordination of multiple Fires units at echelons above brigade (EAB) to enable the freedom of manoeuvre of the Land Component Commander and his assigned forces.

2. LSCO do not change the fundamental nature of warfare and the tenets of Joint Fire Support for Land Based Operations outlined in AArtyP-5 are still relevant. The scale and lethality of LSCO however, requires that Allied fires leaders consider how best to employ the Fires assets at their disposal in order to; optimize command and control (C2); assist in organizing the battle space; achieve efficiencies to minimize logistical burden; and protect the force.

3.3.2. C2 considerations

1. During LSCO, Commanders may seek to optimize command and control over fires assets by organizing artillery for combat along functional lines in order to achieve the military principles of unity of command and economy of force. As a result, LSCO is often characterized by larger Artillery formations and organizations which are not typically employed during small-scale expeditionary missions. Historically, this has taken the form of Divisional Artilleries (DIVARTYs) or Corps Artilleries (CARTYs). These formations are distinct from Regimental Artillery (RAGs) in that they retain significant long range fires capability for the purposes of providing General Support (GS) and General Support Reinforcing (GSR) fires across the breadth and depth of the Division or Corps Area of Responsibility (AOR).

2. DIVARTYs and CARTYs performed the general role of *Force Fires HQ* (Force FS HQs) and were responsible for coordinating and executing deep shaping fires for the echelon to which they were assigned. As a concept, Force FS HQs provide the Manoeuvre Commander with additional fires related capacity and capability, allowing him to delegate fire support coordination activities, detailed planning requirements and sustainment functions for Field Artillery forces to a dedicated headquarters with a large staff knowledgeable in Field Artillery requirements. By definition the Force FS HQ is the Senior Field Artillery HQ within the organization designating it for that purpose. During LSCO, Force FS HQ may be found in either national formations or in a multinational formation as designated by Commanders at EAB. The supported Commander, in electing to designate a Force FS HQ, specifies the responsibilities that organization will assume, and if necessary, the duration of those responsibilities. These responsibilities are based largely on mission variables and may range from simple mentoring and technical oversight to full OPCON of all Field Artillery units organic, assigned, attached, or placed under that Command.

a. When Field Artillery Brigades or other organizations act as a Force FS HQ, the responsibilities they may be assigned include some or all the following:

   (1) Providing Senior Leader subject matter expertise to the supported command in the Fires arena; in some instances this involves the unit Commander assuming the responsibility known as the Fire Support Coordinator (FSCOORD) identifying that individual as the Fires advisor to the Manoeuvre Commander.

   (2) Recommending Field Artillery organization for combat to the Commander.

   (3) Providing command and control for Field Artillery units organic, assigned, attached, or placed under the OPCON of TACON of the Command (thus providing unity of Field Artillery Command)

   (4) Assisting the Fires Cell in producing the Fires Annex for the Operations Order.

   (5) Training of the Field Artillery Units that are assigned, attached, or placed under the OPCON of the Command and Mentoring the Commanders and leaders of these Field Artillery units. This includes Field Artillery technical

oversight of the training and assessment of the Fires Battalions and other Field Artillery units organic to BDEs.

(6) Advising the supported commander of Field Artillery related to new equipment fieldings and software updates within Field Artillery units.

(7) Establishing common survey, metrological and potentially radar target acquisition (TA) plans for the Command.

(8) Planning, preparing, and executing fires for close support of engaged forces, and in support of strike, counterfire (as required), and decisive and shaping operations.

(9) Providing centralized command and control for the full complement of indirect fires, joint Fires, and multinational fires provided in support of the Command. This is especially useful to the commander in circumstances where major combat operations are likely and when deconfliction of fires across multiple contiguous AOs is required. Centralized mission command of supporting fires is useful also when unconventional forces are operating either independently or as the only force integrated within indigenous forces and require dedicated all-weather fires and fire support coordination.

(10) Participating in the commander's tactical targeting process.

b. Designating a Force Fires HQ for a command improves centralized control of field artillery in the force by enhancing:

(1) Participating in the commander's tactical targeting process.

(2) The massing of Field Artillery Fires where needed

(3) Coverage of the force AO by Field Artillery fires and Radars (if also Counter Battery HQ)

(4) Rapid shifting of Field Artillery Fires as needed to support the decisive part of the operation.

(5) Effective planning for Field Artillery Fires in support of rapid manoeuvre.

(6) If so directed by the supported Commander, standardization of field artillery training, readiness, and maintenance throughout the force.

(7) Planning the fires and positions of all Field Artillery units assigned to the Fire Support HQ with a GS or GSR support relationship to the force.

(8) Coordinating the counter battery battle for the supported Commander (if also Counter Battery HQ).

(9) Accepting or passing control of fires during passage of lines operations.

(10) Authorizing changes to approved or doctrinal communications net structures for nets it controls.

(11) Coordinating the sustainment of subordinate Field Artillery Assets.

3. Another related functional role which may be employed during LSCO, is the designation of a Counter Battery HQ. A Field Artillery HQ performing this function is dedicated to the coordination and execution of radar management and counter battery fires. Depending on the scale of the counter battery fight, and the span of control, the Force FS HQ may assume the Counter Battery HQ role as an additional duty, or delegate it to a capable subordinate FA Headquarters. A more in-depth description of the roles and responsibilities of a Counter Battery HQ can be found in AArtyP-2.

4. Force FS Headquarters and Counter Battery HQs employment is desirable during CO in large part due to the complexity of employing numerous battalions and in close coordination with manoeuvre forces. The Force FS HQ and Counter Battery HQ allow the Commander to delineate responsibilities along functional lines.

3.3.3. LSCO battlespace design

1. Organization of the battlespace to facilitate fires in Large Scale Combat Operations is critically important to the effectiveness of the overall force. The implementation and employment of permissive and restrictive coordination measures discussed in Chapter 5, Section VII of AArtyP-5 must be conducted in a deliberate manner, based on mission variables, accounting for the threat and predicated on risk.

2. The organization of the battlespace within the context of AArtyP-5 Joint Fire Support Doctrine for Land Operations, suggests that the Battlespace be defined across all three dimensions and considerate of time and tempo as a “fourth” dimension. In Large Scale Combat Operations, the requirement to effectively control the battlespace is exponentially magnified by the sheer number of battlespace users. Furthermore, the existential risk created by a highly lethal adversary implies the need to be able to mass effects without massing assets and exposing the friendly force to a highly developed enemy fires capability.

3. In the horizontal dimensions, common considerations for LSCO involve unit positioning constraints, employment of FSCMs to enable deep-shaping, and means to protect and safeguard friendly assets.

4. In LSCO, the congestion of potential Artillery Manoeuvre Areas creates the need to deconflict position areas for GS and GSR assets with other friendly forces. GS and GSR assets create a large counter battery signature and expose adjacent units to risk. Battlespace designers must balance the need for security and support for these high value assets with the need to enable their employment.

5. To facilitate the execution of fires in support of shaping operations during LSCO, the establishment of permissive measures should be maximized to enable the responsiveness and, by extension, the lethality of Fires. The triggers for establishment, activation and movement of FSCMs (like the FSCL, CFL and Free-Fire Areas) should

be carefully articulated and communicated to all stake-holders using products found in the Fires Annex.

a. Best practices to effectively manage and recommend changes to these FSCMs at EAB include the application of comprehensive decision support tools which apply both quantifiable and qualitative metrics as a conditions checks for modifications to the Battlespace Plan.

b. Decision Support Tools can and should be developed in accordance with unit SOPs, but should reflect decision criteria that are arrived at comprehensively across all warfighting functions.

c. Examples of criteria in support of a decision support tools for a FSCL shift could include items like the following:

(1) Did the DIV/Corps successfully attrite the enemy unit critical capabilities short of the FSCL to an acceptable level agreed upon by the Commander? (Quantifiable)

(2) Are Artillery Assets in position to support the FSCL Shift and do they possess the munitions to cover the area short of the FSCL Shift? (Qualitative and Quantifiable)

(3) Do EAB assets have the ability to shift their ISR assets to support the increased area short of the FSCL Shift? (Qualitative)

(4) Has the Artillery Radar Common Sensor Boundary been adjusted to ensure that acquisitions long and short of the new FSCL are routed to the proper Counter Battery HQ? (Qualitative)

6. As in Counter-insurgency and small scale combat operations, within LSCO effects delivered inadvertently on friendly assets or protected objects could have negative strategic implications beyond their immediate tactical necessity. The need therefore, to employ restrictive measures commensurate with the level of risk assumed by the Commander remains prudent in both planning and execution. All efforts should be made to establish, maintain, and update restrictive measures which facilitate coordination, protect assets, and prevent unnecessary loss of life. Restrictive measures should be considered along the continuum of risk-to-force and risk-to-mission within the context of both current and future mission requirements. This is especially challenging when considering the inherent political dimensions of LSCO with a multinational force. While many of the restrictive measures outlined in AArtyP-5, are manifested in the horizontal dimension (i.e. terrestrial based) many extend into the vertical dimension, most notably Air Coordination Areas which take on added importance in LSCO.

7. In the vertical dimension, LSCO places increased stress on the Air Coordination Authority (ACA) to manage that portion of the battlespace on behalf of the Joint Force Commander. As in the horizontal domain, increased number of airspace users (both in the form of munitions and aircraft) create increased need for deconfliction, synchronization, and integration. This increase creates a capacity dilemma for the

ACA's principal means of positive command and control, the Air Operations Center (AOC), aided by the Control and Reporting Centers (CRCs) and Airborne early Warning and Control Systems (AWACs).

a. Given this consideration, Allied Fire Supporters in Large Scale Combat Operations should advocate for a battlespace framework that relies more heavily on procedural control and encourages the ACA to delegate Airspace Control Authority down to the highest tactical, lowest practical level.

b. The ability for the ACA to confidently delegate airspace control is contingent on elements of the Allied Theatre Air Ground System/ Army Air Ground System (TAGS/AAGs) being manned, trained, and equipped to execute the responsibility for delegated airspace. Currently, this delegation below the Coordinating Level (CL), is common during all combat operations due the JTACs relative disregard for the airspace below that relatively low level. However during LSCO, the area above the CL would be utilized much more heavily by the Land Component and would necessitate the employment of a HIDACZ or similar ACM, which would need to be, at a minimum, procedurally controlled by an ACA approved entity.

c. Additionally, In large scale combat operations, JFSEs at all levels become stakeholders in the development of the Airspace framework, and must ensure that the airborne assets they rely on, as critical to both target acquisition and to the delivery of fires according to their fire planning are accounted for in the overall unit airspace plan (UAP) forwarded to the ACA.

3.3.4. Logistical considerations

1. The expenditure rates of supplies, especially ammunition, during Large Scale Combat Operations create stress on the sustainment and logistics functions in support of Field Artillery forces. Alongside an increase in fuel consumption, medical requirements, and equipment replacement, the most pressing challenge for logistics is Ammunition. Historically high rates of fires in LSCO, coupled with the weight and bulk of Artillery ammunition, necessitate careful application of the guidelines governing CSS laid out in AArtyP-5.

2. Artillery planners during LSCO should expect to be challenged by the need to establish and maintain adequate stockpiles of ammunition in operational proximity to users while not simultaneously creating a high value target for the enemy. Strict adherence to Target Selection Standards and Attack Guidance (preferably relying on automated decision support tools) will limit inefficient and unnecessary expenditures, while reducing the signature of the force vulnerable to counterfires. Planners will need to consider task organizing GS and GSR Field Artillery units to ensure that they have the ability to draw from area support activities. They will further need to consider deliberate sustainment planning in support of major firing events (for example, preparatory fires or counter preparatory/counter Battery fires).

3. For low-density high-value ammunition, Artillery planners will need to understand and account for transportation requirements and throughput from the national point of origin to the point of use. In some cases, this may involve multi-modal

movements as well as tactical and strategic air lift. Effort should be taken to maintain asset visibility on Allied interchangeable ammunition and to organize for combat in such a manner as to facilitate ‘in extremis’ ammunition transportation, handling, and cross-leveling as required.

4. Best practices include the application of combat configured loads, and expeditionary support packages which are comprised of ammunition loads comprising complete rounds, to minimize the time spent on reorganization of large shipments of ammunition at the firing unit location.

3.3.5. Force protection in LSCO

Large Scale Combat Operations are characterized by a highly lethal operating environment within which peer or near-peer adversary actors pose significant risks to the force. In terms of air threats, the ability of Allied Air Power to establish and maintain constant air superiority cannot be assured. Therefore it is prudent to consider, the task organization of ground based air defense (GBAD) to protect high-value artillery assets. In addition to mobility, dispersion, camouflage and maintaining the minimum ELINT signature necessary to accomplish the mission will be critical to survivability of Artillery assets during LSCO. Additionally, Large Scale Combat Operations and the rapid movement of counterattacking forces create the possibility for significant by-passed enemy units to continue to pose a threat in rear areas. Planners should consider the task-organization of manoeuvre forces to provide ground combat force protection to High-Value fires assets such as Long-Range Artillery and Radar/Sensors

CHAPTER 4 FIRE MISSION

4.1. GENERAL

1. The aim of this chapter is to describe the calls, terms, procedures and commands that have been agreed by NATO forces when performing fire support in a multi-national framework. This chapter deals with non- ADP systems (i.e. countries may have ADP systems but the use of them is not opportune for reasons of for example communications restraints, Rules of Engagement (RoE) or others). The interoperability between ADP using countries and between ADP and non-ADP systems is covered in the AArtyP-3. All multi-national Fire Mission (if not being able to use the possibilities of AArtyP-3) are to use the procedures laid down in this chapter.

2. The differences in national procedures, language, capabilities and the limited scope of this agreement make the presence of Fire Support Liaison Officers essential (see AArtyP-5).

3. Throughout this chapter the word “gun” is used in its generic sense to include all indirect fire systems and the word “observer” is used to indicate the originator of a call for fire.

4. Calls for fire (CFF) are regarded as requests, unless prior authority has been granted to order fire:

a. Requests for Fire: The Fire Direction Center/Command Post (FDC/CP) will determine the units to fire, the type and quantity of ammunition (except if specified in the CFF due to RoE, for example) to be expended, and any other appropriate data and report this information to the observer.

b. Orders for Fire: The observer may order fire from the fire unit(s) he has been authorized to control, in this case the observer will determine the type and quantity of ammunition.

5. A general overview of the Fire Mission procedure is described in Annex G.

4.2. CALL FOR FIRE PROCEDURES

4.2.1. CFF Routing Protocol

1. Message routing protocol determines routing of a request for fire. Specifically, routing determines whether the mission is transmitted to the JFSE or the FDC first. The decision is based on net structure, type of transmission (digital or voice), expected volume of traffic, training level of the JFSE and FO, tactical situation. Routing for requests can be centralized or decentralized.

2. Centralized Mode

a. All requests for fire are sent to the JFSE for approval and then relayed to the appropriate FDC. This allows the JFSE to modify, coordinate, and clear every

mission. The primary disadvantage is the delay caused by mission coordination and de-confliction occurring before the FDC receives the mission information.

b. The use of centralized tactical fire control should be used when there are few firing units, when ammunition is low, during critical operations where the commander needs to exercise control, or when restrictive ROE are in place.

3. Decentralized Mode

a. Requests for fire are sent directly to the firing agency. The JFSE monitors the request and conducts coordination while the supporting arm processes the mission. The advantage to this is the speed with which a mission can be fired when the tasks occur concurrently and the ability of the observer to communicate directly with the firing unit is increased. The disadvantages are possibilities of firing an uncoordinated mission and the requirement for the observer to maintain communications with the firing unit.

b. Decentralized tactical fire control is used when maximum responsiveness and speed of execution is necessary. In these situation airspace is likely to have been pre-cleared, or procedural controls established to provide priority airspace to fires assets, with the commander desiring a more permissive environment and accepting a somewhat higher risk to airspace conflicts.

c. With decentralized control, FA battalion commanders, S3, and FDOs must closely monitor ammunition expenditures and the number of rounds fired from current positions. The potential for ammunition shortages and forced survivability moves may increase under decentralized control

4.2.2. Sensor-to-shooter options

1. It is important to shorten the targeting cycle as much as possible in order to guarantee a timely and effective fire support. Different options are possible, based on:

a. The tactical situation, because none of the standard FS relationships accurately convey the manoeuvre commander’s guidance for fires or cover all the contingencies identified (see AArtyP-5),

b. The need to control fires (FSCM, shortage of platforms or ammunition),

c. The need to guarantee the required safety to friendly units and civilians,

2. Some possible options are described in Annex H. These options are non-exhaustive.

4.2.3. Elements of a Call For Fire

1. The call for fire is divided in THREE PARTS:

a. Warning Order

b. Location of target (including direction when necessary);

c. Target description, method of engagement, fire and control

3. The sequence of the elements of a call for fire is mandatory. It is not necessary to await completion of all the elements before beginning the transmission of a call for fire. The THREE parts are sent separately and subsequently to avoid any confusion and to stress the importance of each part.

4. Part ONE – Warning Order

The warning order consists of:

a. Observer Identification (mandatory): This is the establishment of communication between the observer and the FDC/CP.

b. Mission type (mandatory):

During the transmission the term “Fire Mission” or “Fire Mission Polar” (Ref Par 4C) must be followed by the mission type, which are:

(1) Adjust Fire

(2) Fire for Effect

(3) Immediate suppression

(4) Immediate smoke

c. Target number (mandatory): TWO letters followed by FOUR digits.

d. Number of gun (conditional): amount of guns or size of fire units that will fire in the fire for effect.

It is not mentioned if an effect will be asked for later on in the call for fire (normal way). It will be specified for missions as mark or mark illuminating where one gun is firing to indicate a target for example and for missions where less than one battery is to fire such as illuminating missions.

Example: “S9C27 this is S9C37 Fire Mission, Fire for Effect on KT2564 over”

5. Part TWO – Location of Target

The location of the target may be given, in order of priority in one of the following ways:

a. By Grid Coordinates:

The observer sends the most accurate target location possible. The minimum acceptable standard is a six digit grid when calling for fire on a map spotted target location. Send a minimum eight or ten digit grid location for registration points or other points for which greater accuracy is required. Altitude is included immediately after the grid. The observer-target direction is normally sent after

the entire initial call for fire, since the FDC does not need the direction to locate the target.

Grid is the standard method of target location and when used is not announced in the warning order. It is the normal method of circulation by national FDC/CP to other nations and the only option if working with both ADP and non ADP artillery units, as described in the AArtyP-3.

(1) The grid will be given in MGRS, preceded by the word “Grid”, to the degree of accuracy required by the type of engagement. Easting = THREE to FIVE digits , Northing = THREE to FIVE digits

(2) Altitude (in meters) is normally given by the observer. If it is not given, it is determined in the FDC/CP. Altitude (eventually preceded by MINUS if below mean sea level) and introduced by the word “Altitude”.

(3) The grid can be given in UTM (optional)

(4) Examples

“GRID 32U MG 14910 52360 Altitude 256 over”

b. Reference Shift/From a Target Number

(1) The designation and location of the target/Target Number, must be known to both the observer and the FDC/CP. The reference/shift from the known point will include the direction, horizontal correction (shift) and the vertical correction (shift), if any, to the target. All corrections are expressed in meters except if specified otherwise.

(2) Examples:

“From KT 1764, Direction 1200, Right 400, Drop 200, Up 50 over”.

or

“Shift KT 1764, Direction 0400, Right 400, Drop 200, Up 50 over”.

c. By Polar Coordinates/Polar Plot:

(1) To be used only when the position of the observer is known by the FDC/CP.

(2) Polar coordinates consist of the direction, distance and vertical correction/shift, if any, from the observer’s position to the target. A vertical correction/shift is accepted as being defined in meters unless specified otherwise. When using Polar coordinates the phrase “Fire Mission Polar” should be used during the warning order.

(3) Examples

"Direction 1240, Distance 2000, Up 50". "Direction 1242, Distance 1795, Up 23 mils".

d. By Target Number:

The recorded target[1] and associated location must be known to both the observer and the FDC/CP.

Example: "S9C27 this is S9C37 Fire Mission, Fire for Effect on KT2564 over"

e. Report value accuracy (optional):

Accuracy of target location is referenced by TLE category (chapter 5).

If nothing is stated, it is assessed that the conditions at FO are fulfilled to fire for effect from the first round.

The observer must specify when requesting/ordering Precision Guided Ammunition (PGM) (see chapter 6).

f. Direction

When the observer anticipates that he will be required to adjust or correct the fire, he will send a direction.

The direction is normally expressed in mils using grid north from the observer to the target. If the direction is given in degrees, the word "degrees" must be stated. If the observer wishes to use the gun-target line (GT line) he will order "Direction GT line". If a direction is not ordered by an air-observer, the GT line is used. If the observer wishes to use an arbitrary reference line other than the line observer-target or gun-target, he will order it in the normal way, e.g. "Direction 1440".

6. Part THREE – Target description, method of engagement, fire and control

a. Target description:

The observer must describe the target in enough detail that the FDC can determine the amount and type of ammunition to use. The FDC selects different ammunition for different types of targets. The observer should be brief but accurate. The description should contain the following. The observer includes any or all of the following target features using the standard terminology as given in Annex I to present chapter and also gives the target size:

[1] A recorded target is a target that is saved for future use or reference.

(1) **Target Type** (mandatory): Provides information over the type and subtype of the target (see Annex I)

Example: “Heavy Mortar”.

(2) **Degree of Protection** (conditional): Provides information relative to the target protection. The degree of protection is only mentioned for target type “Personnel” (see Annex J).

Example: “Prone”.

(3) **Target size and shape** (mandatory): Defines the size of the target. The target can be either **circular**, in this case the observer specifies radius in meter, or **rectangular**, in this case the observer transmits a Length, a Width (both in meter) and an attitude (azimuth of the longest axis), or **linear**, the observer specifies the length and altitude of the line, or **converge**, all guns firing in effect will use one single impact point.

Example: “Radius 150” or “300 by 150 Attitude 1585” or “length 150 Attitude 1585”

(4) **Target activity**: Provides information relative to the activity of the target, e.g. “Preparing to move”, “dug-in”.

(5) **Target strength** (mandatory): Provide information relative to the number of elements in the target area (personnel, guns,…) to be fired on or within the defined target area. Expressed in ONE to FOUR digits. Number of elements in the targets: provide information of the strengths of the target (example: “platoon, 3 tanks”)

(6) **Example of target description** with all mandatory subparts:

”3 Heavy Mortar, Radius 150 over” or

“Platoon Heavy mortar, 300 by 150, Attitude 1585 over”

b. Method of engagement

(1) Type of adjustment (optional):

(a) Area fire

Use area fire to attack an area target. Since many area targets are mobile, the adjustment should be as quick as possible, consistent with accuracy, to keep the target from escaping. A well-defined point at or near the center of the area to be attacked should be selected and used as an aiming point. This point is called the adjusting point during adjust fire missions. To achieve surprise, adjust fire on an auxiliary adjusting point, and after adjustment is completed, shift the fire for effect to the target. Normally, observers conduct adjustment on an area target with one adjusting weapon.

(b) Precision fire

Conduct precision fire with one weapon on a point target to obtain registration corrections or to destroy the target. When the mission is a registration, the FDC initiates it with a message to observer.

(2) Trajectory type (optional):

This is the order to define the trajectory. The orders that can be sent are “High angle or Low angle” fire. Comment: If no order is given the convention is to fire at low angle for tube artillery and high angle for mortar units.

(3) Ammunition (optional):

This element indicates the volume and eventually the type of ammunition. The FO will specify the ammunition if he wants to have a special effect (illumination, smoke HE, WP). If nothing is specified, it will be determined by the FDC/CP:

(a) Type:

The observer could specify the “type of ammunition” required in effect. This ensures that the response is in accordance with the observers call for fire, which may differ from national default options. The ammunition consists of a shell and a fuze function eg. Point detonation, delay or proximity. Ammunition is determined in accordance with the degree of protection of the target (Annex J).

(b) Number of Rounds:

Used to specify the numbers of rounds (rockets) to be fired in effect for each effector.

(4) Distribution (optional):

(a) Converged sheaf

A converged sheaf is a special sheaf in which each piece fires a unique time, deflection, and quadrant elevation to cause the rounds to impact at the same point on the ground. A converged sheaf is typically used for small, hard targets.

(b) Open sheaf

An open sheaf is a special sheaf in which each piece fires a unique time, deflection, and quadrant elevation to cause the rounds to impact in a straight line, perpendicular to the gun-target line and centred on the target, with bursts spaced one effective burst width apart.

For MLRS employment, the open sheaf is used to increase the effectiveness against personnel targets and is appropriate when TLE

precludes using a closed sheaf and when the collateral damage estimate allows the larger sheaf. The aim point for every single rocket is displaced from the target centre at a defined distance.

(c) Close sheaf

The close sheaf is generally referred only to the MLRS. It is effective against light material and personnel targets and is used when collateral damage precludes an open sheaf. In this case the aim point for every single rocket is displaced from the target centre at a defined distance, reduce compared to the open sheaf.

(d) Special sheaf (linear, rectangular, circular, or irregular)

Special sheaf (linear, rectangular, circular, or irregular) of any length and width may be requested. If target length, or length and width are given, the observer must also give attitude.

(5) Remarks – danger close (optional):

(a) Definition danger close

Danger close in close air support, artillery, mortar, and naval gunfire support fires, is the term included in the method of engagement segment of a call for fire which indicates that friendly forces are within close proximity of the target. The close proximity distance is determined by the weapon and munition fired. Danger close does not restrict ground force manoeuvre or fires employment. It is simply a warning to both the manoeuvre commander and fire support personnel to take proper precautions because of the proximity of friendly forces (and possibility of increased risk).

The FO specifies danger close when the target is (or rounds will impact) within 600 meters of any friendly troops for mortars and artillery, 750 meters for 5 inch naval guns and tomahawk land attack missile (also TLAM).

If the adjustment of fires brings impacting rounds within danger close distance during the conduct of the mission, the observer must announce DANGER CLOSE to the FDC. The observer makes corrections from the round impacting closest to friendly troops using the creeping fire technique. If the adjustment of fires moves the round outside the danger close distance, the observer transmits CANCEL DANGER CLOSE.

Danger close method of engagement should not be confused with risk estimate distances (RED). Risk-estimate distances allow the commander to estimate the risk in terms of the percent of friendly casualties that may result from a strike against an enemy in close proximity to friendly elements. Risk estimate distances are the distance, in meters from the intended point of impact at which a specific degree

of vulnerability will not be exceeded. Risk-estimate distances are for combat use only. They are not the minimum safe distances for peacetime training use.

(b) The FO adds “danger close” as part of the method of engagement.

(c) The grid reference ordered will be the location of the target. Prior to adjustment the observer may order a correction to ensure that the first rounds do not endanger friendly forces. The size of this correction may be varied to take account of calibre, ammunition, range from the guns to the target, probable errors, Rules of Engagement and possible variations in muzzle velocities.

(d) Creeping Fire

Deliberate corrections towards the target are used and fire is brought to a distance from friendly forces where the risk is acceptable to the manoeuvre unit commander.

The creeping fire technique is an adjustment for which the observer uses corrections of 100 meters to creep the rounds to the target.

The observer may also use creeping fire in special situations where the potential for collateral damage requires exceptional care to limit unwanted damage to structures or vehicles close to the target.

(6) Remarks – mark

Mark is included in the method of engagement to indicate that the observer is going to call for rounds for either of the following reasons:

(a) To orient self in the zone of observation.

(b) To indicate targets to ground troops, aircraft, or other observers.

(7) Effect required (conditional):

(a) The default effect is neutralization.

(b) If the observer didn’t specify the number of rounds, he can specify a defined effect or a percentage.

c. Method of fire and method of Control (mandatory):

(3) Method of fire:

In area fire, the observer normally conducts adjustment with one howitzer or with the center gun of a mortar platoon or section. If the observer determines that more than one gun is necessary for adjustment, the observer can request 2 GUNS IN ADJUST or PLATOON, BATTERY RIGHT (LEFT). (Adjusting at extreme distances may be easier with two guns firing.)

The normal interval fired by a platoon or battery right (left) is 5 seconds. If the observer wants some other interval, it must be specified.

(4) Methods of control

Method of control indicates the way the delivery of fire should be controlled. Methods of control can be combined in order to achieve the desired effect and timing of the observer.

i. “At my command”: (followed by) “Fire” is used when the observer wishes to control the moment of firing for any reason. The order “Fire” is given after the fire unit has reported “Ready” and when the observer wishes to fire.

ii. “Restricted when ready”: a method of control given by the observer to fire from a specific time and for a time window specified by an amount of minutes. The earliest time firing can start is expressed in FOUR digits, while the length is expressed in THREE digits. It allows the FDC/CP to command the fire in order to have a volley deliver at the considered level (section, platoon, battery or higher) Example: “Restricted when ready, from 2359, for 65 minutes”.

iii. “Time On Target” (TOT): a method of control stating the exact time the observer can expect rounds to hit the target. It is expressed in four digit (ex. 1525). TOT is usually used for preparatory fire. The observer must ensure that both the FDC and their time are synchronized prior to the mission. Example “TOT 1525”

iv. “Time To Fire” (TTF): a method of control defining the time (expressed in FOUR digits) when the first volley has to be fired.

v. “Time To Target” (TTT): a method of control stating the amount of time, expressed in how many minutes and seconds, the observer can expect rounds to hit the target. The countdown starts after delivery of the "hack" statement. TTT is usually used for moving targets. Example: “TTT 5 minutes”.

vi. “When ready”: is the clearance to fire given by the observer at effectors level that allow the effectors to deliver the volleys when they are ready without waiting the firing readiness of the section, platoon, battery. It’s the chosen method if the urgency of fire is paramount or when any method of control is omitted. By convention, “when ready” is the method of control.

vii. “Continuous Illumination”: Rounds are fired at such an interval as to maintain uninterrupted illumination of the target area, e.g. “Continuous Illumination”.

viii. "Co-ordinated Illumination": Illumination rounds are fired, using an interval, so that the target area is illuminated at the time of impact of other projectiles. It may be controlled by either the FO or the FDC/CP.

ix. "Continuous Fire": In field artillery and Naval Fire Support, loading and firing at a specified rate or as rapidly as possible consistent with accuracy within the prescribed rate of fire for the equipment. Fire will be continue until terminated by the command 'End of Mission" or temporarily suspended by the command "Cease Loading" or "Check Fire".

x. Firing interval (conditional): It allows the observer to define the time interval between the volleys to be fired. It is expressed in seconds with a maximum of THREE digits. Example: "Interval 20 secs"

xi. Duration of fire (optional): This is a term used to specify the duration for the delivery of the required effect. It is expressed in minutes with a maximum of THREE digits. It will be mainly used for smoke, illuminating and suppression missions. It is normally defined as a period of time but can be defined as a start and an end time.

4.2.4. Message to observer

When the observer's call for fire is received, the FDC/CP to which it has been directed will determine if and how to attack the target. This analysis is transmitted in a message to observer as soon as possible. The message to observer may include the elements shown in the table below. When any element has been specified by the observer in his call for fire, it may be omitted from the message to observer, if the FDC/CP can meet the observer's requirements, otherwise it must be included. If the request for fire cannot be met the FDC/CP will report "Cannot comply" plus the reason (see section below).

Serial	Element	Remarks
(a)	(b)	I
1	Call sign originator (M)	
2	Target number (M)	As given by the FO in its call for fire or provided by the FDC/JFSE
3	Firing unit (O)	
4	Amount of guns (M)	Maximum TWO digits to define the amount of guns firing in effect

5	Number of rounds from each gun for fire for effect (M)	The amount of ammunition is specified if different of these requested by the FO in its call for fire or if it was not specified in the call for fire.
6	Projectile and/or Fuze Function (O)	If a type of ammunition is not specified in the call for fire, the best possible projectile and fuze function combination taking into account the target description and size will be fired, it will be sent to the FO (M).A report must also be made if the FDC/CP changes the type of ammunition requested by the FO or cannot comply with the order (M).
7	Method of engagement (M)	The FDC/CP only reads back the remaining method commanded by the FO or modify it if not applicable.
8	Method of fire (M)	The FDC/CP only reads back the method commanded by the FO or modify it if not applicable. ONLY in voice procedure.
9	Method of control (M)	The FDC/CP only reads back the method commanded by the FO or modify it if not applicable.
10	Observer data (O) – (Shortest)Time of Flight (seconds) – Ordinate Altitude (meters above mean sea level) – Error probable in range (meters) – Angle T[2]	"Time of flight" is always sent for High angle mission, for an air observer, a mix of different projectiles (e.g. illuminating with HE shells). It can be repeated if there is major change after the command "Shot". Error probable in range, Gun-Target Line and Angle T are mandatory if the CFF is "Danger Close" Angle T is mandatory in case the angle is > 500mils

[2] Angle between gun-target line and observer-target line

	– Gun-Target line (MILS) – Other information	

Note: M = mandatory – O = Optional

4.2.5. Fire Mission commands

Fire mission commands allow the FO conducting fire to initiate or interrupt the fire and the FDC/CP to warn the FO of the completion of fire.

1. Format:

   a. Originators Identification (mandatory):

      This is the establishment of communication between the observer and the FDC/CP.

   b. Mission type (mandatory):

      “Fire Mission Command” as stated in paragraph 4.2.5.2 and 4.2.5.3.

   c. Target number (mandatory):

      To identify the target to which the message is related.

2. Messages from FO to FDC:

   a. “Do not load”

      The command used when a section is allowed to prepare ammunition and lay on the target without loading a projectile.

   b. “Request splash”

      The command used to request a warning 5 seconds prior to round impact.

   c. “Fire”:

      A command used to order the delivery of a fire for which the method of control is “At my command”, to resume firing after an interruption or to command a target belonging to a fire plan.

   d. “Check Firing”:

      A command to cause a temporary halt in firing while all other drills, including loading, continue.

e. “Cease Loading”:

The command used during firing two or more rounds to mean that the guns are not to be reloaded. Fire shall be brought to an end with bores (barrels) clear.

f. “Repeat”:

During the adjustment, it is given to ask for another round(s) at the last data, preceded by any change in number of guns and/or ammunition and/or interval, if necessary.

During Fire for Effect, it is given to ask for the same number of rounds using the same method of fire for effect as last ordered.

g. “Cancel”:

(1) The series “do not load”, “cease loading” and “check firing” are annulated by sending “cancel do not load”, “cancel cease loading” or “cancel check firing”.

(2) Can also be used to cancel other orders. (Not with target grids)

h. “Stop”:

This order caused the halt of ALL activities, including firing and loading, in case of safety incidents and is lifted by “Cancel stop”. It is always sent on voice net and transmitted at all levels.

Comment: BEL, DNK, HUN and POL use this term.

i. “End of mission”:

The observer sends “End of mission” to specify the mission will be considered as ended after completion of the fire. With the “”End of Mission” command a Battle Damage Assessment can be transmitted. The BDA can be transmitted in plain text or in code, see Annex E for possible options. The number of casualties or destroyed vehicles may be added using a maximum of FOUR digits.

3. Messages from FDC to FO:

a. “Can not comply”:

The FDC/CP warns the FO when it is not able to deliver the requested fire or effect; it also tells the reason.

b. “Laid”:

The term to indicate that the guns have been laid on the firing data but the round has not been fired. The FO will receive this command after sending a CFF as “do not load” or after establishing a priority target.

c. “Ready to fire”:

The term to indicate that a weapon or weapons are aimed, loaded and prepared to fire.

d. “Shot”:

It is reported for the first round of adjustment or the first fire for effect volley.

e. “Splash”:

“splash” is reported by convention, five seconds prior to predicted time of impact when: firing high angle, an air observer is controlling the mission or requested by a ground observer.

Notes

(1) If an observer requires an alteration to the interval of five seconds, he couples the alteration with “Report Splash”, e.g., “Report Splash 10”.

(2) USA and ESP always report “Splash”.

f. “Neglect”

It is reported when for any reason a shell is fired at incorrect data or with incorrect ammunition. Another shell or shells is fired at the correct data without any order from the observer. Unless “At My Command” is in force, or during a “danger close” mission.

g. “Rounds complete”:

“Rounds Complete” is always reported when fire for effect is completed.

h. “Target recorded”:

This may be reported by the FDC/CP when it has recorded the data of the fire mission.

4.2.6. General procedures for adjustment of artillery fire.

1. This section describes the agreed procedure when dealing with non-ADP artillery units and the agreed simplified procedures to be used for the adjustment of ground force artillery fire by ground or air observer. Grid is the only option for adjusting or shifting fire if working with both ADP and non ADP artillery units, as described in the AArtyP-3.

2. Observer. The observer observes and corrects fire relative to a spotting line (called the Direction), which may be:

a. When the observer anticipates that he will be required to adjust or correct the fire, he will send a direction. The direction is normally the grid bearing (measured

in mils) from the observer to the target and is sent in FOUR digits. If the direction is given in degrees, the word “degrees” must be stated.

b. If the ground observer wishes to use the gun-target line (GT line) he will order ”Direction GT line“. If a direction is not ordered by an air observer, the GT line is used. If the observer wishes to use an arbitrary reference line other than the line observer-target or gun-target, he will order it in the normal way, example: “Direction 1440”.

c. The FO will send the direction just prior the first correction.

3. TARGET GRID PROCEDURE

a. Corrections

The following corrections are used in relation to the target and the direction/spotting line:

POSITION OF ROUND	CORRECTIONS	UNIT
Right of line	Left	Meter
Left of line	Right	Meter
Beyond target (over)	Drop	Meter
Short of target (short)	Add	Meter
Below desired height of burst	Up	Meter
Above desired height of burst	Down	Meter

Note: The up/down corrections apply to either time air burst or to a change in target altitude.

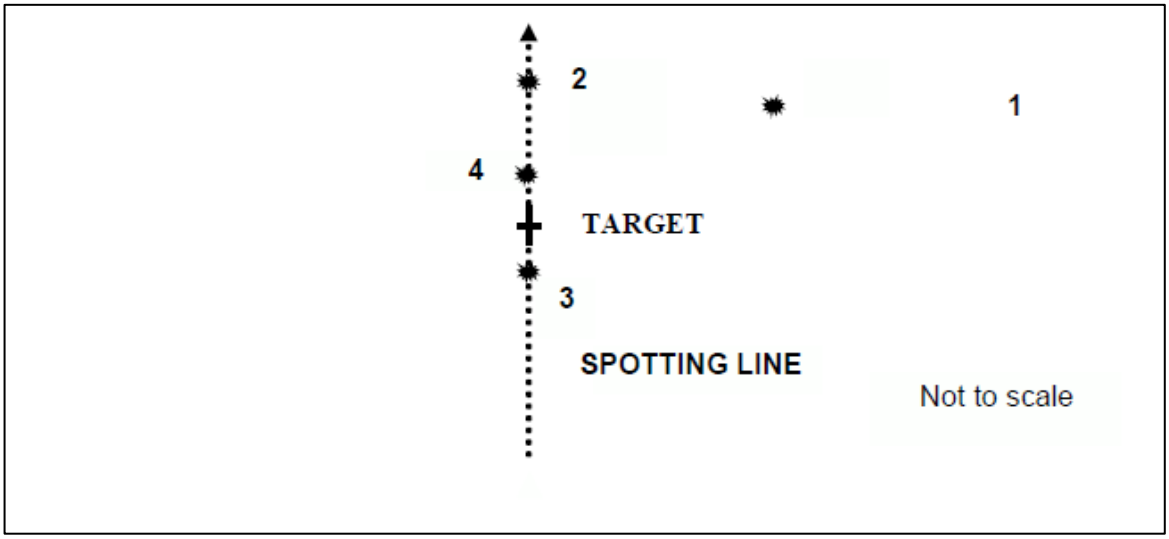
b. Adjustment

The adjustment procedure consists of two stages:

(1) Stage I – Correcting fire on to the spotting line.

(2) Stage II – Bracketing along the spotting line until a suitable adjustment is obtained, after which fire for effect is initiated.

c. An example of adjustment is as follows:



POSITION OF ROUND	CORRECTIONS
1. Round one or first series of rounds fell to the right	Left 200 over
2. Round two or second series of rounds fell on the line and over	Drop 200 over
3. Round three or third series of rounds fell short	Add 100 over
4. Round four or fourth series of round fell and over Drop 50, 5 Rounds, Fire	Drop 50, 5 Rounds, Fire for effect over

Note:

1. The third and fourth round or series of rounds constitute the 100 meter bracket on the spotting line.

2. When the observer is experienced he will combine the actions of serials 1 and 2 above.

4. LASER RANGE FINDER (LRF) PROCEDURE

Corrections: If the observer indicates a target using polar coordinates, fire can be adjusted by one of the following procedures.

a. Target Grid Adjustment

The FO gives one unique correction consisting of one correction in direction (left or right) and one correction in distance (add and drop). Both parts are not

mandatory (depending on the observation) but both are expressed with a precision of one meter.

b. Laser Range Finder (LRF) Adjustment. LRF adjustment may be conducted in the following ways:

(1) Using single round the observer lazes the point of burst/impact of the round and then sends the Direction, Distance and Vertical Angle to the FDC/CP.

(2) Using multiple rounds the observer lazes the point of burst/impact of each round and sends the mean Direction, Distance and Vertical Angle to the FDC/CP.

(3) Using multiple rounds the observer lazes the mean point of impact and sends the Direction, Distance and Vertical Angle to the FDC/CP.

c. This correction is usually accompanied by an order for FFE.

4.2.7. Special procedures

1. Call for fire – Fire Plan target

The procedure is as follows

a. Originator Identification (mandatory):This is the establishment of communication between the observer and the FDC/CP.

b. Mission type (mandatory): “Fire Mission Fire for effect/Adjust Fire on”

c. Fire plan name (mandatory) : one to six alphanumeric characters

d. Target number (mandatory): TWO letters followed by FOUR digits.

e. The FO will send the direction to warn the FDC/CP that he is ready to observe or cannot observe in case of a problem.

f. Example

“SC27 this is SC37 Fire Mission Fire for effect from target list TL2568 on target number KT1589 over”

2. Call for fire – Registration Fire (not in AArtyP-3)

Ordered whenever survey, ballistic and/or meteorological data are not available, when data is suspect or known to be inaccurate. Normally the FDC/CP directs the observer to conduct a registration mission on a designated point. However, the observer may be directed to select the registration point. The procedure sounds as follows

a. Originator Identification (mandatory):This is the establishment of communication between the observer and the FDC/CP.

b. Mission type (mandatory): “Fire Mission Registration on”

c. Reference point (mandatory): TWO letters followed by FOUR digits.

d. Example

“SC27 this is SC37 Registration Fire from target list TL2568 on KT1589 over”

4.2.8. Special situation

1. Round lost

a. A spotting of “LOST” occur when the observer is unable to locate the round (either visually or by sound). A round may be lost for various reasons:

a. it may be a dud (non-functioning fuze), resulting in no visual or audible identification;

b. the terrain or weather may prevent the observer from spotting the round or its smoke;

c. adversary fire may prevent the observer from hearing or seeing the round;

d. the forward observer simply may have failed to spot the round;

e. errors by the fire direction center (FDC) or the firing piece may cause the round to be lost;

f. GPS malfunction or fin or canard deployment malfunction for a precision-guided munition.

b. When dealing with a lost round, the observer must consider own experience, the level of FDC and or gun section training, and the location of friendly elements with respect to the target. The observer should take corrective action based on the confidence in the target location, the accuracy of fire on previous missions; whether the lost round is an initial round or a subsequent round, and the urgency of the mission.

c. The observer must take one or more of the following corrective procedures when a round is lost:

a. begin a data check throughout the system, starting with the target location data and the call for fire;

b. request a white phosphorous (WP) round, a smoke round, or a 200 meter airburst with high explosive (HE) on the next round;

c. repeat;

d. end the mission and start a new mission;

e. make a bold shift. The observer should be very careful in making bold range or deviation corrections when the target plots near friendly troops.

2. Round doubtful

A spotting of “DOUBTFUL” is a round that can be observed but cannot be spotted as “OVER, SHORT, TARGET, or RANGE CORRECT.

3. Round unobserved

A spotting of “UNOBSERVED” is a round not observed but known to have impacted (usually heard).
A spotting of “UNOBSERVED OVER” or “UNOBSERVED SHORT” is a round not observed but known to have impacted over or short.

4.3. VOICE PROCEDURES FOR THE CONDUCT OF LAND-BASED FIRE SUPPORT

4.3.1. General

1. The passing of calls for fire by radiotelephone demands absolute accuracy and speed. Standardized voice procedures, correctly applied, increase communications security, decrease the possibility of errors and shorten the response time of artillery support.

2. The aim of this section is to describe the standardized voice procedures to be used between forward observers and fire direction centers/command posts when calling for fire.

3. NATO forces will follow the principles described in this chapter when one nation calls for fire from another nation using standard calls, terms, procedures and commands.

4.3.2. General procedures

1. **Language.** For multi-national operations the working language is normally English. Whenever the national language of the observer is different from that used in the Fire Direction Centre (FDC) or Command Post (CP), it is advised that a fire support liaison officer is attached to the FDC/CP to assist in interpretation.

2. **Phonetic Alphabet.** When necessary to help identify any letter of the alphabet, the standard phonetic alphabet is used (See ACP 125).

3. **Pronunciation of Numerals.** The rules for pronunciation of numerals in ACP-125 will be observed, including the rule for the conduct of artillery fire, where the pronunciation of whole hundreds is to be “hundred” instead of “one zero zero”.

For example:

Numeral	Spoken as
100	ONE - HUNDRED
500	FIVE - HUNDRED

4. **Use of default Values.** In calls for fire between observers and FDC/CPs of different nations, knowledge of national defaults is not to be assumed. This means for fire missions at battalion level and above, that the observer will always describe the target and the FDC/CP will, if possible, report the projectile and fuze function, which will be used at the FFE.

5. **Deviations from ACP-122 and -125.** The voice procedure used for the adjustment of land-based fire support systems deviates somewhat from communication procedures published in ACP 122 and 125 in that abbreviated procedure is used in those instances where no confusion will exist. The deviations normally consist of one or more of the following:

a. After the identification phase (included in the warning order of the call for fire), the call signs is NOT repeated anymore. Under certain circumstances, when identification is required, transmissions are identified by the use of call sign suffix words, letters or numbers only. (FRA identifies all transmissions by the use of call sign and number).

b. A short phrase read-back method of transmission is automatically accomplished without the special operating instruction **"**READ BACK".

c. Divergence from the normal or abbreviated normal message format. Examples of radiotelephone procedures used for the adjustment of field artillery are given in section V.

6. **Short Phrase Read Back Procedures**:

a. To facilitate the transmission of firing data and to standardize requests for repetition which otherwise might be necessary, the call for fire, message to observer, subsequent corrections and fire commands will, where applicable, be transmitted in short phrases consisting of one or more elements of firing data.

b. Each phrase is read back by the receiving operator, without operating instructions to do so, exactly as it was received.

c. The length of each phrase, or the number of elements of firing data included in each transmission should be commensurate with the state of training and experience of the individuals concerned and established procedure.

7. **Examples.** Examples of general procedures are given at in examples 1-6 of the section V below*.*

4.3.3. Special applications

1. **General.**

There are four instances of special application of the use of voice procedures in the adjusting of land-based fire support systems of sufficient note to warrant illustrating their use. These are:

a. The use of a relay station between the FO and FDC/CP.

b. The use of “SPLASH”.

c. Voice procedures used in conducting simultaneous missions.

d. The transmission of fire commands between the FDC/CP and the firing battery(s).

2. **Relay Procedures**. In circumstances where direct radio contact between the FO and FDC cannot be established because of distance, terrain etc., the relay procedure ,as given in example 7-9 of the section V, is to be used.

3. **Splash.** In circumstances where the warning “SPLASH” must be transmitted to the FO, the voice procedure described in the example 10 of section V will apply.

4. **Simultaneous Missions.** On radio channels where different languages are being used, every effort should be made to avoid using simultaneous procedures (e.g., use of alternative channel), however, there are times when it becomes necessary to fire two or more missions simultaneously on the same fire direction channel. When this situation arises, it is necessary that stations identify their transmissions in order to avoid confusion. All stations, when sending or transmitting, use their one suffix number. In this situation the procedure as shown in example 11 of the section V will apply.

5. **Fire Commands.** National procedures will be used for fire commands between the FDC/CP and the firing units (this assumes that liaison is established at FDC/CP level).

4.3.4. Challenge and authentication

1. Challenge and authentication should be considered a normal element of initial requests for fire. The FDC inserts the challenge in the last repeat sequence of the fire request transmission. The observer transmits the correct authentication reply to the FDC/CP immediately following the challenge

2. Subsequent adjustment(s) of fire will be challenged by the fire direction officer or equivalent when in his judgment such a challenge is appropriate and feasible. He must consider security, friendly troop safety, communications, deception and fire support responsiveness to the manoeuvre force.

3. Under no circumstances should challenge and authentication reduce fire support responsiveness. When an artillery battery is in a unique high response posture, challenge and authentication may be deferred beyond execution of the initial fire request, but should be accomplished as soon as operationally feasible.

4.3.5. Examples - procedures

The Forward observer (FO) could make a preliminary call to the Fire Direction Centre/Command Post (FDC/CP) in order to establish communications and to warn of an imminent call for fire.

1. EXAMPLE 1: WARNING ORDER

Forward Observer (C/S S9C37)	FDC/CP (C/S S8C27)	Remarks
"S8C27, This is S9C37 Fire Mission on target number KT2015 Over"		Note: During mortar procedures an alternate frequency may be assigned to link the observer with the fire unit.
	" S9C37, This is S8C27 Fire Mission on target number KT 2015 Out	

Notes:

1. USA call signs and USA artillery battalion organizations are used throughout these examples. Each nation will use its own call signs and organization.

2. Other elements may be included with the warning order according to Annex G.

2. EXAMPLE 2: COMMUNICATIONS NOW ESTABLISHED, THE FO CONTINUES WITH THE CALL FOR FIRE

Forward observer (C/S S9C37)	**FDC/CP (C/S S8C27)**	**Remarks**
"From KU1234, Direction 5690, Right 600, Add 800, Up 20, Over"		**Not in ADP process**
	"From KU1234, Direction 5690, Right 600, Add 800, Up 20, Out"	
"Heavy Armor, radius 80, strength 5, Adjust Fire, At my command, Over"		
	"Heavy Armor, radius 80, strength 5 , Adjust Fire, At my command, Out"	
	"Authenticate 44 Over"	
"I authenticate 76 Over"		
	"Correct/wrong Out"	Note: Authentication needs to be regulated by written orders (fire support communications).

Note:

1. Voice call signs are omitted after communication has been established.

3. EXAMPLE 3: MESSAGE TO OBSERVER

FDC/CP (C/S S8C37)	**Forward observer** **C/S S9C27)**	**Remarks**
"This is S8C37 on KT2015, 8 guns in effect firing Two Rounds HE, At my command, time of flight 45, Over"		1. The adjusting fire unit may be indicated. 2. The ammunition type must be sent. Standard defaults for the projectile type is not advisable.
	"This is S8C27 on KT2015, 8 guns in effect firing Two Rounds HE, At my command, time of flight 45, Out"	

4.

5. EXAMPLE 4: SUBSEQUENT CORRECTIONS

FDC/CP (C/S S8C27)	Forward observer (C/S S9C37)	Remarks
	"Direction 2565 over"	
"Direction 2565 Out" "Shot , Over"		
	"Shot , Out" "Left 100, Drop 400, Over"	
"Left 100, Drop 400, Out" "Shot, Over"		
	"Shot, Out" "Add 200, Over"	
"Say Again, Over"		
	"I say again, Add 200, Over"	
"Add 200, Out" "Shot, Over"		
	"Shot, Out" "Add 100, Over"	
"Add 100, Out" "Shot, Over"		
	"Shot, Out" "Drop 50, Fire for Effect, Over"	
"Drop 50, Fire for Effect, Out"		

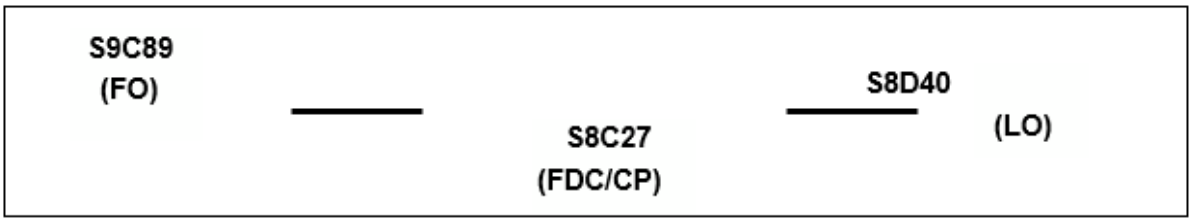
6. EXAMPLE 5: REPORT TO OBSERVER AFTER FIRE FOR EFFECT

FDC/CP IC/S S8C27)	Forward Observer (C/S S9C37)	Remarks
"Shot, Over"		The FDC/CP informs the FP when the guns start the method of FFE.
	"Shot, Out"	
"Rounds Complete, Over"		FDC/CP informs the FO when the guns finish the method of FFE.
	"Rounds Complete, Out".	

7. EXAMPLE 6: END OF MISSION AND BATTLE DAMAGE ASSESSMENT

FDC/CP IC/S S8C27)	Forward Observer (C/S S9C37)	Remarks
	"End of Mission, 2 tanks destroyed, 1 tank burning, , Over"	The terms used in the BDA are summed up in annex K
End of Mission, moderate damage to tank formation, Out"		

8. EXAMPLE 7: RELAY PROCEDURES



Participants:

1. In cases where the FO and FDC/CP are not in direct radio contact a third station that can communicate with both may relay the call for fire. In this example the Fire Support Officer (FSO) with a manoeuvre battalion is able to contact both the FO and the FDC/CP.

2. When the FSO hears the FO transmit a preliminary call for fire but does not hear the FDC/CP respond, he automatically transmits the following:

Liaison Officer **(C/S S8D40)**	**FDC/CP (C/S S8C27)**	**Remarks**
"S8C27, This is S8D40, From S9C89, fire mission on KV2412, Over"		
	"S8C27, fire mission on KV 2412, Out"	

Note: With communications established, the FO continues his Call for Fire. To permit the originator to correct any mistakes done by the relay station (FSO in this example), a pause of five seconds is made between the relay station transmission and the read back. The example below applies when not using ADP systems.

Fire Support Officer **(C/S S8D40)**	**FDC/CP (C/S S8C27)**	**FO** **(C/S S9C89)**
		"From Registration point one, Direction 1940, Right
"S8D40, From Registration point one, Direction 1940, Right 600, Over"		
	(Five second pause) "S8C27, From Registration point one, Direction 1940, Right 600, Over".	
"S8D40, Out"		
		"Infantry prone, 300 by 150, attitude 1456, strength 50, neutralize, adjust fire, when ready,

"S8D40, Infantry prone, 300 by 150, attitude 1456, strength 50, neutralize, adjust fire, when ready, Over"		
	(Five second pause) "S8C27, Infantry prone, 300 by 150, attitude 1456, strength 50, neutralize, adjust fire, when ready, Over"	
"S8D40, Out"		

The mission will continue to be sent in this manner until all elements of the call for fire have been received and read back by the FDC/CP. The relay station reads back that portion of the call for fire request transmitted by the FO and transmits the information to the FDC/CP. The call signs suffix number of the originating and receiving stations are not confused.

Fire Support Officer **(C/S S8D40)**	**FDC/CP (C/S S8C27)**	**FO** **(C/5 S9C89)**
	"This is S8C27 on KV 2412, 16 guns in effect firing Two Rounds HE, time, Adjust Fire, When ready, time of flight 35, Over"	
"This is S8D40 on KV 2412, 16 guns in effect firing Two Rounds HE, time, Adjust Fire, When ready, time of flight 35, Over"		(five second pause) "This is S8C27 on KV 2412, 16 guns in effect firing Two Rounds HE, time, Adjust Fire, When ready, time of flight 35, Over"
"S8D40, Out""		

The mission will continue to be sent, relayed and acknowledged in this manner until it is complete.

Notes:
1. The relay example above was accomplished without the aid of operating instructions, e.g. unit address designations. If necessary, the originating station will use whatever transmission instructions as required to accomplish the mission.
2. The ammunition type must be specified. Default options are not to be used in international procedures.

9. EXAMPLE 8: CORRECTING A MISTAKE DURING THE RELAY PROCEDURE

Fire Support Officer (C/S S8D40)	**FDC/CP (C/S S8C27)**	**FO (C/S S9C89)**
	"This is S8C27 on KV 2412, 16 guns in effect firing Two Rounds HE, time, Adjust Fire, When ready, time of flight 35,	
This is S8C40 on KV 2412, 16 guns in effect firing One Round, HE, time, Adjust Fire, When		
	"S8C27, Wrong Over"	
"S8D40, wrong Over"		
	"This is S8C27 Wrong, on KV2412, 16 guns in effect firing Two Rounds HE time, Adjust Fire, When	
"This is S8C40 Wrong, on KV2412, 16 guns in effect firing Two Rounds HE time, Adjust Fire, When		
		(Five second pause) "This is S9C89, Wrong, on KV 2412,16 guns in effect firing Two Rounds HE, time, Adjust Fire, When ready, time of flight 35, Over"
"S8D40, Out"		

10. EXAMPLE 9: CORRECTING A MISTAKE BY THE TRANSMITTING OPERATOR

Fire Support Officer **(C/S S8D40)**	**FDC/CP (C/S S8C27)**	**FO** **(C/5 S9C89)**
		"Right 100, Add 200, **Correction,** Right 100, Drop (Note: "Correction" should not be repeated.)
"S8D40, Right 100, Drop 200, Over"		
	Five second pause) "S8C27,Right 100, Drop 200, Over"	
"S8D40, Out"		

Note: If a transmitting operator makes an error, he transmits the pro-word 'Correction" followed by the last word group or phrase that was incorrectly transmitted. The transmission then continues.

11. EXAMPLE 10: SPLASH PROCEDURE

The following procedure is used when the FO has requested "Splash" or when it is reported by convention (see Chapter 2). After the guns have fired the following transmission is made. It can only be applied in voice procedure.

FDC/CP (C/S S8C27)	**FO** **(C/S S9C89)**	**Remarks**
	"Direction 5569, Over"	Note. "Splash" is transmitted no later than five seconds before time of impact. Due to short delay before impact, "Splash" is not read back.
"Direction 5569, Out" **"Shot Over"**		
	"Shot, Out"	
"Splash"		
	"Left 100, Drop 400, over"	
"Left 100, Drop 400, Out"		
	"Shot, out"	
"Splash"		

12. EXAMPLE 11: THE SIMULTANEOUS MISSION

S8C99 (FO 1)	S9B13 (Bn FDC/CP	S9D78 (FO 2)

In the following example of a simultaneous mission, the Battalion FDC/CP (B13) receives a Call for Fire while already busy with another one. This procedure of the first Call for Fire should only be interrupted during a natural pause. Examples of natural pauses are:

1. After the initial call for fire and before the first round is fired.

2. After a report of “Shot” and during the time of flight.

F01 (C/S S8C99)	Bn FDC/CP (C/S S9BI3)	F02 (C/S S9D78)
“S9BI3 This is S8C99, Fire mission on BE2589, Over”		
	“S8C99 This is S9BI3, Fire mission On BE2589, Out”	
“Grid 432 182, Altitude 125, zone 32, Over”		
	“Grid 432 182, Altitude 125, zone 32,Out”	
“Light Machine Gun, radius 25, strength ONE, HE in effect, adjust fire, Over”		
	“Light Machine Gun, radius 25, strength ONE, HE in effect, adjust fire, Out” “This is S9B13 on BE2589, 8 guns, 1 round, HE time in effect, Adjust fire, time of flight 30, Over”	

"This is S8C99 on BE2589, 8 guns, 1 round, HE time in effect, Adjust fire, time of flight 30, Over"		
"Direction 4589 over"		
	"Direction 4589 Out" "Shot 5, Over"	
"Shot 5, Out"		
		"S9BI3, This is S9D78, Fire mission on BE8756 Over"
	"This is S9BI3A, Fire mission on BE8756, Out"	

		"S9D78, Grid 422 189, altitude 165, Zone 32, Over"
	"S9BI3A, Grid 422 189, altitude 165, Zone 32, Out".	
"S8C99 Right 100, Drop 200, Over"		
	"S9BI3 Right 100, Drop 200, Out"	
		"S9D78 Personnel standing, radius 100, strength 10, adjust fire, at my command, Over"
	"S9B13A, Personnel standing, radius 100, strength 10, adjust fire, At my command, Out"	
	"S9D78, This is S9BI3A on BE8756, 4 guns, TWO rounds in effect firing HE Quick, Adjust fire, at my command, Over"	

		"This is S9B78 on BE8756, 4 guns, TWO rounds in effect firing HE Quick, Adjust fire, at my command, Out"
	"S9B13 Shot, Over"	
"S8C99 Shot, Out"		
		"S8D78, Direction 2589 over"
	"S9B13A, direction 2589, Out" "S9BI3A, Shot 4, Over"	
		"S9D78, Shot 4, Out

"S8C99 Add 100, Over"		
	"S9BI3 Add 100, Out"	
		"S9D78 Left 50, Add 100, Over"
	"S9BI3A, Left 50, Add 100, Out" "S9BI3 Shot, Over"	
"S8C99 Shot, Out"		
	"S9BI3A Shot, Over"	
		"S9D78 Shot, Out"

Both missions continue in this manner until one FO gives "End of Mission". Thereafter, call signs are omitted.

Notes:

Call signs may be replaced by target numbers.

Ammunition defaults are not to be used in international procedures.

4.3.6. Emergency CFF

E-CFF is Call for Fire generated by an untrained observer. This situation may occur when a ground unit is not supported by a qualified Forward Observer but requires artillery fire support (for example when in self-defence or Troop in Contact situation).

When an E-CFF is requested, the designated FDC should be able to handle it considering that untrained observer:

- may be unaware about proper procedures in calling for fire;
- may be unaware about munition effects when impacting;
- may be affected by a large Target Location Error (for example because not properly equipped with target acquisition tools).

When requested to process an E-CFF, the supporting FDC should consider the following:

- provide proper guidance to the observer in order to reduce the risk of fratricide and collateral damages (for example asking to describe the surrounding area, about 1.000 m around the target);
- avoid any possible confusion between target location and observer location;
- use the E-CFF template specified in the ATP-97 NATO Land Urgent Voice Messages (LUVM);
- valuate the effect required by the observer and consider the possibility/opportunity to perform instead an adjust fire or immediate suppression/smoke;
- explain the observer how to observe the fire and adjust it;
- ask the observer how the target was located (example using compass and binocular, map, laser range finder, etc.);
- adopt proper precautions in case of Danger Close situation.

INTENTIONALLY BLANK

CHAPTER 5 DELIVERING EFFECTS

5.1. ACCURACY AND PRECISION

5.1.1. General

There are five requirements for achieving accurate and precise first-round fire for effect. These requirements are accurate target location and size, firing unit location, weapon and ammunition information, meteorological information, and computational procedures.

5.1.2. Accuracy

The delivery accuracy of artillery is a function of the magnitude of the distance between the point of aim and the MPI and the distance between the points of impact and the MPI. This accuracy has a statistical nature which is expressed in CEP (Circular Error Probable).

The delivery accuracy is important because it has a decisive influence on the casualties or damage in the target area and the amount of ammunition - unguided as well as course corrected - needed to achieve a required casualty or damage level.

The magnitude of the delivery accuracy is a function of weapon system (gun, projectile and charge), firing techniques, firing ranges and associated error sources. The magnitude of error grows with extended ranges.

The MPI error is the distance from the mean point of impact (MPI) of a series of shells from the point of aim. Any target location error (TLE) can be added to the MPI error to produce the total Delivery Accuracy (DA).

The main factors influencing the MPI error are:

a. Meteorology: 67%;
b. Projectile aerodynamics (external ballistic variability); 22%;
c. Muzzle Velocity - 10%;
d. Other effects: 1%.

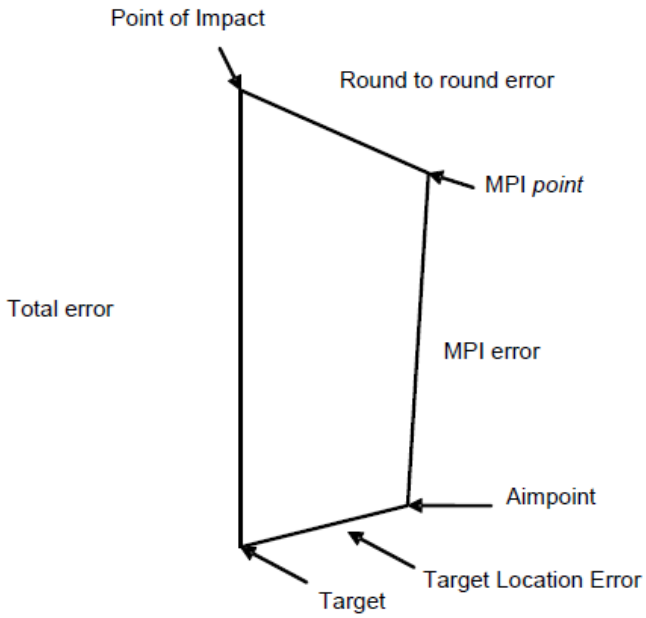
Precision and accuracy are the two main components of the artillery error budget.

Accuracy is defined as:

a. the precision of fire expressed by the closeness of a grouping of shots at and around the centre of the target (NATO Term Database);
b. the mean-point of impact (MPI) error in relation to the aimpoint (STANAG 4635 – NATO Armament Error Budget).

5.1.3. Precision

Precision is defined as “the round-to-round (RR) error around the MPI” (STANAG 4635). The RR error is the statistical distribution of a series of rounds, fired about the MPI from a single weapon. RR errors are random errors. These errors vary with each round fired within a mission. It is influenced by intrinsic characteristics of the weapon systems and the munitions.



5.2. ARTILLERY SURVEY

5.2.1. General

1. Many Nations now use Inertial Navigation Systems (INS) and/or Global Positioning System (GPS) to produce both fixation and orientation while retaining the capability to use traditional survey techniques. The purpose of this Chapter is to:

   a. Standardize the method of expressing artillery survey accuracy criteria for weapon platforms, target acquisition, surveillance and meteorological systems.

   b. Standardize which data is to be recorded for artillery survey control points and fixation points and the pro forma to be used by NATO forces.

2. An artillery survey control point is defined for use in this Chapter as a point at which the coordinates and the altitude are known and from which the bearings/azimuths to a number of reference points are also known.

3. A fixation point differs from a survey control point in that the fixation point carries no data for orientation. The prime function of a fixation point is to allow INS systems to be updated for fixation.

5.2.2. Survey accuracy requirements

1. Survey accuracy requirements are expressed in terms of probable error (PE), Circular Error Probable (CEP) and Standard Deviation (SD or SIGMA).

2. PE and CEP are derived from the positive standard deviation of the measurement (sigma - σ) as follows:

   a. σ = Positive standard deviation of the measurement (sigma).

b. PE = 0.6745 σ.

c. CEP = 1.1774 σ.

d. CEP = 1.7456 PE.

Notes:

-PE is a value which, is exceeded as often as it is not i.e. it has a 50% probability of occurrence.

-CEP is the radius of the circle centred about the true position, such that any measured or calculated position has a 50% probability of lying within that circle.

3. The NATO Standards for orientation and fixation are:

System	Orientation **(PE) (Mils)**	**Fixation (CEP) (M)**	Altitude **(PE) (M)**	Remarks
Guns and rockets (except MLRS)	1.0	20	10	If this standard is not achieved, the fact must be reported
MLRS	Only fix required. MLRS has	35	10	
Meteorological Tracking Equipment	5.0	50	10	

5.2.3. Fixation Points and Artillery Survey Control Points

1. A survey control point enables users to fix and orient their equipment on the grid system applicable to the area while a fixation point provides only fixation. Fixation point data may be published on a map or annotated air or satellite photograph and must contain the same data as is used on the survey control point pro forma except for the details at sub-paragraphs 2 f, i and j.

2. The artillery survey control point pro forma (Annex L) allows the survey control point to be identified and provides the necessary data. The following data is required:

a. A control point number and possibly a name of the locality.

b. A map series and sheet number.

c. The GRID coordinates and altitude (above mean sea level) of the control point.

d. The type of grid system used. The standard is WGS 84.

e. The accuracy of the data.

f. The survey methods used.

g. A diagram showing the location of the point. This is given to enable the point to be found.

h. The description of the point i.e. how it is marked on the ground.

i. The grid bearings/azimuths in mils to at least four reference objects. Two of these reference objects must be between 100 and 500 meters of the control point.

j. A description and sketch showing the exact point of lay and the approximate distance of each object from the control point.

k. An information block containing:

(1) The unit producing the data.

(2) By whom prepared.

(3) By whom checked.

(4) The date.

Notes:

1. When an artillery survey control point is near a UTM zone border and two sets of data are available, a separate pro forma must be prepared for each UTM zone.

2 The Artillery Survey Control Point pro forma may be printed in national languages but the format must not be altered.

5.3. TARGET LOCATION ERROR

5.3.1. General

1. Target location error (distance between the actual target position and the coordinates provided) is the single largest factor in determining miss distance. The JFSE must verify the accuracy of the coordinates provided to the weapon and ensure the JFC's RoE support the use of INS/GPS-aided munitions. An accurate target location and use of PGM will reduce risk of unwanted effects of Collateral Damage and Fratricide.

2. The effectiveness of (INS/GPS-aided) munitions depends upon the tactical situation (type of target, desired weapons effects, target movement, etc.) and the accuracy, or Target Location Error (TLE), of the target coordinates.

3. In order to deploy INS/GPS-aided munitions, eg Excalibur, Vulcano, some countries demand a specific accuracy of the target location.

4. The level of precision and accuracy required for the target coordinate and target location error will be tactical situation dependent. Where there is not a risk of fratricide or collateral damage, time to engage should not be sacrificed if the current coordinates, target location error, weapon systems and munitions will create the desired effects on target. Global positioning system-aided munitions (such as guided MLRS) can be delivered at night or through weather on a set of coordinates but their effectiveness depends on a small target location error. Urban operations usually also require a very accurate target location with low target location error.

5. The observer must locate targets using the most accurate means available. Precision munitions offer both an increased probability of achieving first-round effects on a target and increase the probability that collateral damage can be minimized. Because precision munitions are inherently more accurate, target location error must be minimized to create the desired effects on the target

6. In order to facilitate the communication of targeting accuracy, TLE is characterized in six categories.

5.3.2. Target Location Error categories

1. TLE is defined as the difference between a set of target coordinates generated and the actual location of the target. TLE is divided into six categories. The first row presents the categories of TLE which range from best (CAT 1) to worst (CAT 6) and are used to classify the coordinate accuracy of any coordinate generating system. TLE is expressed primarily in terms of circular and vertical errors, or infrequently, as spherical error.

a. Circular Error (CE) is the error of the coordinates in the horizontal ground plane (i.e. circular).

b. Vertical Error (VE) is the error of the coordinates in the vertical plane (i.e. elevation).

c. Spherical Error (SE) is the error of the coordinates in 3D spherical space (i.e. the combined error of CE & VE).

2. These errors are expressed as CE90, VE90, and SE90 distances, which means that there is a 90 percent chance that the actual target will be within these circular and vertical distances. For example, a CE 90 of 6 meters means that there is a 90 percent chance that the horizontal coordinates are within 6 meters of the actual target. This is a very small potential target location error.

5.3.3. Target Location Error categories table

TARGET LOCATION ERROR CATEGORIES					
CAT 1 0-20 feet 0-6 m	**CAT 2** 21-50 feet 7–15 m	**CAT 3** 51-100 feet 16-30 m	**CAT 4** 101-300 feet 31-91 m	**CAT 5** 301-1000 feet 92-305 m	**CAT 6** >1001 feet >305m

5.3.4. SECTION 4 - TARGET COORDINATE MENSURATION

Target coordinate mensuration is a process for measurement of a feature or location on the ground to determine accurate coordinates and height. It is used to refer to the exact location of the target. To produce CAT 1 or CAT 2 coordinates the outcome of forward observer instruments and/or GPS assisted instruments have to be confirmed and if needed/ adjusted with mensuration software.

5.4. METEOROLOGICAL DATA

5.4.1. General

1. Aim. The aim of this chapter is to determine procedures for the exchange of met data in order to achieve valid and timely MET data in formatted messages.

2. Combat experience has proven the importance of providing accurate and timely meteorological data to both artillery and other units. Meteorological data is used to enhance first round accuracy, effective downwind predictions, intelligence preparation of the battlefield, etc. The commander and staff must include meteorology in the planning process. The planning process focuses on what data is needed, who needs it, and how they will get it. Artillery meteorology, as one of the requirements for accurate predicted fires, plays an increasingly vital role in today's changing operational environment. Accuracy of indirect fires increases the lethality and thus directly relates to other issues of strategic importance such as collateral damage.

3. The ballistic calculators and firing tables used to determine firing data for artillery weapons are based on an arbitrary set of standard conditions of weather, position, and material. The standards for weather are established by the ICAO (International Civil Aviation organization).

4. The atmosphere (weather conditions) through which the projectile passes is amongst the nonstandard conditions that affect the projectile after it leaves the gun barrel. The four properties of the atmosphere that the artillery considers in its gunnery computations are wind (both direction and speed), air temperature, air density, and air humidity.

a. Wind. The effects of wind on a projectile are easy to understand. A tail wind causes an increase in range and a head wind causes a decrease in range. A crosswind blows the projectile to the right or left, which causes a deflection error. The FDC/CP converts ballistic wind measurements into range and deflection components and applies corrections to the deflection and elevation of the howitzer.

b. Temperature. Variations in air temperature cause two separate effects on a projectile. One effect is caused by the inverse relationship between density and temperature. This effect is compensated for when density effects are considered. The second effect is regarded as the true temperature. It is the result of the relationship between the speed of the projectile and the speed of the air compression waves that form in front of or behind the projectile. These air compression waves move with the speed of sound, which is directly proportional to the air temperature. The relationship between the variation in air temperature and the drag on the projectile is difficult to determine. This is particularly true for supersonic projectiles, since they break through the air compression waves after they are formed. As firing tables indicate, an increase in air temperature may increase, decrease, or have no effect on achieved range, depending on the initial elevation and muzzle velocity of the weapon.

c. Air density. Density of the air through which a projectile passes creates friction, which affects the forward movement of the projectile. This affects the distance a projectile travels. The density effect is inversely proportional to the projectile ranges; that is, an increase in density causes a decrease in range.

d. Air humidity. Humidity of the air through which a projectile passes creates friction which affects the forward movement of the projectile. This affects the distance a projectile travels. The air humidity inversely affects the range; an increase in humidity decreases range. For practical purposes in artillery meteorology, air humidity is not provided as a separate table of information, but it is being incorporated in the range effects of air temperature and air density.

5. Data determined by these samples are converted, manually or by computer, to specific Meteorological Messages, that provide weather information at specific altitudes. The Meteorological Messages are used as fixed formats for the transmission of the weather data. The field artillery uses different types of met messages. Only the Target Acquisition Meteorological Message (METTA), METB (Ballistic Meteorological Message), Computer Meteorological Message (METCM) and the Gridded Data Meteorological Message (METGM) will be described in the following paragraphs.

6. METTA. Target Acquisition Meteorological Message is a NATO Standardization Agreement to provide meteorological information such as temperature, pressure and cloud cover for remotely piloted vehicles, drones, weapon locating radars and sound ranging systems.

The METTA is fully described in STANAG 4140.

7. METB. Ballistic Meteorological Message is a NATO Standardization Agreement to provide ballistic meteorological information. The METB2 is used for surface-to-air trajectories and the METB3 is used for surface-to-surface trajectories.

The METB is fully described in STANAG 4061.

8. METCM. The computer met message is a formatted message that reports the atmospheric conditions in selected layers starting at the surface and extending to an altitude that will normally include the maximum ordinate of field artillery weapons that use these data. The METCM will usually be based on atmospheric conditions determined by measurement from a single meteorological balloon ascent, and presents (corrected) measured values from a moment in the (near) past. New developments in meteorology give the opportunity to base METCM on predicted models as well. For details see the description on the establishment of METGM, below.

9. The computer met message reports, the actual average wind direction, wind speed, air temperature, and pressure in layers present at the time of generation. The computer met message is recorded on METCM form and is divided into two parts; a header and a body. A METCM can be used directly in the ADP systems (Fire Control computer) most countries use.

The METCM is fully described in STANAG 4082.

10. METGM. METGM provides for gridded meteorological data. This means that instead of using a single meteorological balloon ascent capturing local data over a short period of time, and circulating that information using older formats, such as the Standard Computer Meteorological message (METCM), it provides a grid of data in four dimensions; vertical, two horizontal and time. The METGM is compiled from many data sources in Weather Analysis Centres (WACs). The data is no longer directly human readable in ASCII text, like METCM was, and thus it can-not be distributed by voice. Data communications are used to transfer the METGM to a fire control computer. With the NATO software NCOMET a METGM can be used to create a METCM, for a specific time, location and duration.

A METGM approach can thus reduce or remove the need for local data acquisition for some communities.

11. The format allows meteorological data to be published for a grid of any defined size/resolution containing only those parameters specifically requested by users. Thus, it can be used to pass data sets varying from coarse resolution, single-parameter data through to very high resolution, multi-parameter data depending upon specific data requirements and communications capabilities.

12. The area of coverage for Artillery usage can be scaled based on the mobility of the underlying forces and the range of the howitzers. A particular benefit of this approach is that it provides data that is more representative of the wider meteorological conditions and appropriate data will be used along the trajectory as range is increasing in modern artillery weapon platforms.

The METGM is fully described in STANAG 6022.

5.5. DEGRADED OPERATIONS

5.5.1. General

1. The aim of this chapter is to provide Allied Artillery leaders with Tactics, Techniques and Procedures for addressing the challenges of conducting degraded operations in a degraded operational environment.

2. Alliance Artillery forces prioritize precision, accuracy and responsiveness in its operations, both as a means of delivering effects, but also as a means to mitigate risk to both friendly forces and the civil populace. Within this context, to be “fully operational”, implies that Allied Artillery Forces strive to utilize digital technology as a means to reduce errors, increase speed and achieve the five requirements of accurate fire through the use of precision equipment and assured communications. At present, that measure is achievable through the following tools within each component of the Fire Support triad:

a. GPS and INU enabled firing platforms with operational digital fire control systems.

b. Forward observers with digital communications and precision observation equipment enabled

c. Fire Direction Centers able to digitally calculate accurate firing data, connected to the network.

Failure to achieve that objective end state implies a level of degradation which adversely effects the ability of the force to achieve the 5 requirements of accurate fire. This can occur for a variety of reasons; to include a contributing nation’s level of modernization. For this reason, Artillery planners must make the following assumptions when preparing for an operation and be ready to mitigate shortfalls in training, equipment, or enemy activities:

a. The Field Artillery MUST be able to continue to deliver the most accurate fires regardless of the operating conditions.

b. Equipment will periodically not operate to its fullest capabilities either due to routine maintenance, damage, simple wear, or unforeseen environmental circumstances unrelated to enemy activities.

c. Adversaries can disrupt satellite based navigation systems.

d. Adversaries can disrupt LOS and BLOS communications systems.

e. Future adversaries will possess significant and capable EW and Cyber warfare capabilities.

5.5.2. Adversary considerations

1. Regarding enemy based assumptions addressed above; adversaries have studied the manner in which the Alliance coordinates technical reconnaissance, satellite-based communications, and air and maritime power to enable ground freedom of manoeuvre and overmatch. Highly advanced potential adversaries are developing methods to counter Allied strengths in the air and maritime domains, and degrading key capabilities by disrupting access to land, space, cyberspace, and the EMS.

2. An effective Allied information network enables rapid sharing of information and understanding and effective integration of joint and combined arms capabilities. Coupled with network-assured Position, Navigation and Timing (PNT) and the availability of precision munitions, these capabilities are the trademark of how the Alliance would prefer to fight. However, as dependence on digital and electromagnetic systems grow, Land formations become more vulnerable to enemy attack in cyberspace and EW, thus threatening PNT and the Allied information network.

3. Adversaries possess the capability to degrade situational awareness, shared understanding, and common operating pictures, while threatening Allied use of precision munitions. Vital space-based capabilities can be attacked from cyberspace, or destroyed physically by ground- or air- launched anti-satellite weapons. Absent accurate PNT data and satellite communications, manned and unmanned air- and ground- platforms integration will lose the ability to impact the land, air, and maritime domains. Ultimately, Allied forces should expect periods of degradation in current and future operating environments.

4. Cyberspace and the EMS will grow increasingly congested, contested, and critical to successful operations. Land-based forces must be able to effectively operate in cyberspace and the EMS, while controlling the ability of others to operate there. Rapid developments in cyberspace and the EMS present continuous challenges. While Allied forces cannot defend against every kind of intrusion, commanders and staffs must take steps to identify, prioritize, and defend their most important networks and data. They must also adapt quickly and effectively to enemy and adversary presence inside cyberspace systems.

5.5.3. Common degraded conditions

1. Systems down due to maintenance or system fault:

a. One possible reason for degraded operations is because a piece of the automated fire control system temporarily goes down for a maintenance related issue. Unit level TTP, Battle drills, and SOPs can allow the units to reciprocally lay a howitzer, hand the howitzer or launchers to another FDC, or switch to a backup piece of fire control equipment all in order to maintain firing and targeting capability.

b. Unit TTPs and SOPs for maintenance related work-arounds vary by the type of equipment and the nature of the fault. Self-locating howitzers for instance, maybe

able to reciprocally lay with another howitzer in order to maintain firing capability, while a radar system may have to rely on another system to fill its mission while it works off the fault.

2. **Loss of PNT**: (i.e. GPS denied operations)

   a. One of the greatest threats being faced in a near-peer conflict is a persistent disruption of the GPS constellation affecting navigation and timing in operations.

   b. Field Artillery systems, in general, are capable of operating for limited durations in a GPS denied environment due to their built-in INUs. Survey TTPs can further mitigate the disruption of the GPS constellation by providing fixation points for calibrating INU.

   c. Timing, especially for secure communications, can be controlled by the net control station and pushed to subordinate radios.

   d. Also critically important is to ensure that crypto is loaded into GPS systems to prevent their exploitation by the enemy (e.g. spoofing).

3. Loss of network connectivity.

   a. Enemy cyber and jamming capabilities can disrupt the network, affecting key means of communications. Units need to ensure they have adequate Primary, Alternate, Contingency, and Emergency (PACE) means of communication and that they are known and rehearsed to lowest levels across the system of systems in order to maintain communications and firing capability as long as possible.

   b. Digital communications is the primary means for transmitting fire mission and commands. If digital communication is lost or degraded, digital communications must be re-established as soon as possible. An alternative to voice communications is degraded digital communication. Degraded digital communication uses the Fire Control Systems purely as a means of ascertaining technical firing data and transmits the fire command by voice. If one howitzer in the battery or platoon loses digital communications, the FDC will issue voice commands to that howitzer or the howitzer can fire data from an adjacent section. If two or more howitzers lose digital communications, the FDC may direct all howitzers to use degraded mode. The howitzers can then take fire commands by voice only.

   c. Other means of mitigated loss of network connectivity include relocation of affected assets outside of disrupted area.

5.5.4. Mitigation methodology

1. Commanders have several means at their disposal to mitigate the effects of degradation and operating in a degraded environment, this can be encapsulated by a “Train, Plan, Prepare” approach.

2. The first, and primary means, to prepare for this eventuality is to train under degraded conditions, replicating a combat environment; exercising repetitive battle drills which require forces to change how they operate to still accomplish the mission.

3. Second, planners should anticipate the requirement to operate degraded and develop a PACE plan (Primary, Alternate, Contingency, and Emergency Plan). across the five requirements for accurate fire to prepare Soldiers and units for battlefield contingencies.

4. PACE plans establish standardized, predictable, and repeatable solutions to tactical situations in response to enemy actions and or environmental effects that negatively impact a unit's capabilities. PACE plans provide Warfighters contingency steps, processes, and techniques ensuring forces are able to continue operations as combat situations change, degrade, or become denied.

5. Planners should develop a PACE plan for each phase of an operation to ensure that the commander can maintain the mission capabilities essential to the formation. The plan must also reflect the training, equipment status, and true capabilities of the formation. If a formation does not have four viable methods, it is appropriate to issue a PACE plan that may only have two or three systems listed. PACE plans are crucial to the commander's ability to continue effective operations. . The potential solutions should be standardized, trained and rehearsed.

6. Finally, adequate preparation prior to combat is necessary to ensure that planning contingencies are supportable. This is fundamentally comprised of two components, ensuring that all authorized equipment is on-hand and ensuring that it is properly maintained (to include all relevant calibrations, bore-sighting, etc. has been conducted)

5.5.5. Degraded operations requirements

1. **Accurate target location** is critical to achieving *first round effects* on targets. Under ideal conditions the use of digital position locating systems, mensuration tools, and laser rangefinders/designators operating from known locations are key to precisely locating targets. When these capabilities are not available and the observer is operating in a degraded mode, the observer must rely on thorough terrain map study to accurately locate targets.

   a. When degraded, errors in self location, direction and range influence the TLE. Determining the size and disposition of the target on the ground is also necessary so that accurate firing data can be computed. Determining the appropriate time and type of attack requires that the target size (radius or other dimensions) and the direction and speed of movement are considered as well.

   b. Frequently in these degraded situations, the observer is unable to accurately locate targets and must correct errors in target location by adjusting fires onto a target, thereby forfeiting surprise and optimum effects on target.

2. The Field Artillery commander is responsible for **accurate firing unit location** for all indirect fire weapon systems. The components of accurate firing unit location are

position, direction, and altitude. Global positioning systems and on-board navigation systems are the primary means to achieve these levels of accuracy. The fire direction center can also determine the grid location of each piece by using the reported direction, distance, and vertical angle for each piece from the aiming circle used to lay the battery.

Accurate weapons and munitions information is developed and provided by firing units, fire direction centers, and sustainment cells. Firing tables and technical gunnery procedures allow the unit to consider specific ammunition information (weight, fuze type, muzzle velocity variations, and propellant temperature); and firing unit specifics (for example individual howitzer muzzle velocity); thus, accurate firing data are possible. The exact procedures to apply weapons information to obtain accurate technical solution can be found in the applicable technical manuals and tabular firing tables.

Not all precision munitions can be used to their full capability in a GPS denied environment. If conditions do not permit their use, alternate munitions will need to be selected.

3. **Accurate Meteorological Corrections** for Artillery Fires are crucial. Atmospheric conditions that include wind, air temperature and air density along the trajectory of a projectile or rocket directly affect its accuracy and may cause the projectile or rocket to miss the desired point of impact. METGM is available for several days. In case of missing data for un updated MEGM it is possible to accept older messages. If data communication is not possible it might be possible to launch a meteo balloon. It is also possible to send a METCM by voice.

5.5.6. Additional degraded TTP

1. Techniques for Hasty Survey Include:

   a. *GRAPHIC RESECTION***:** The graphic resection is a quick method of determining location, but requires coordinates to known aiming points (for example, water tower, church steeple, or trigonometric markers). The advantage of a graphic resection is the relative ease in determining location. The disadvantages include visibility and more than 1 known aiming point must be available.

   b. *GRAPHIC TRAVERSE***:** A graphic traverse is a means of transferring direction and location control from one point to another using angle and distance measurements. This procedure is similar to a directional traverse, with the exception of distance to each forward station is included in the measurements. The data needed to begin a graphic traverse include the coordinates to a known aiming point and the direction to an azimuth mark.

Recommended Priority for Mode for Automated Howitzers:			
Primary	**Alternate**	**Contingency**	**Emergency**
Digital automated gun laying and positioning systems	**Fall back on position improvement aiming reference points such as the collimator, aiming posts, or distant aim point.**	**mutual lay of an adjacent or collocated howitzer.**	**Orient the howitzer with an aiming circle or other hasty orienting process previously addressed.**

2. Plan PACE for Degraded Communications.

a. **Primary** = the primary and intended method of communication between parties.

Example**:** Tactical Internet

b. **Alternate** = another common method of accomplishing the task with minimal to no other impact. Often used co-currently with primary.

Example**:** Encrypted Secure Radio, frequency hop cypher text

c. **Contingency** = method will not be as fast/easy/inexpensive/convenient as the first two methods but is capable of accomplishing the task in an acceptable time frame.

Example: Encrypted, single channel/UHF/HF/VF

d. **Emergency** = method of last resort and typically has significant delays, costs, and/or impacts. Often but undesirably the receiver rarely monitors this method.

Example: Communications Wire/IRIDUM Sat Phone/Runner or Messenger/ICOM Radio

3. Considerations for Degraded SATCOM

a. Ensure the unit Communication PACE plan is current and thoroughly rehearsed

b. Use line-of-sight (LOS) communications in lieu of satellite communications (SATCOM). Be prepared to establish Retrans stations in support of distant units. Retransmission sites require additional security measures; for example, using an infantry squad for security decreases available combat power.

c. Prioritize communications traffic.

d. Transfer data/information manually or verbally.

e. Net control stations need to transmit timing at regular intervals to keep timing synchronized.

f. Practice configuring and receiving timing via non-automated methods; for example, those other than the automated “boot” file.

g. Use LOS unmanned aircraft system (UAS) data links to conduct retransmission operations, especially when fewer ISR platforms are available.

h. Deploying alternate command posts may require additional personnel and equipment.

4. GPS Degraded Techniques:

a. GPS Electro-Magnetic Interference (EMI) Mitigation Strategy – BODY MASS SHIELDING

Use the human body to block radio waves by placing your body between the offending signal transmitter (e.g. jammer) and the receiver (e.g. GPS). Effective shielding requires placing the receiver very close to body and rotate body slowly (approximately 90 degrees every two minutes) until receiver is no longer affected by the EMI. Results may be seen under two minutes. Requires sufficient time for receiver to acquire or lose signal from each position tested, approximately two minutes. Other materials suitable for shielding include metal, cement, brick, armoured vehicles, rock or soil

b. (EMI) Mitigation Strategy – TERRAIN MASKING

Use natural terrain features or create a barrier to block the offending signal. For larger GPS enabled devices, such as a vehicles, use terrain such as a hill to block the EMI signal from reaching the receivers

Device needs to be close to the terrain feature in order to be effective, as natural wave propagation will reestablish the offending signal the further away from the feature you move. Smaller devices, such as a Handheld GPS, can be placed in a hole to block electromagnetic waves – METT-C permitting

The hole masks the jamming signal on the horizontal plane allowing the GPS signal to be received from the satellites. The hole should be six inches deep allowing sufficient view to the satellites.

5. Hasty Astronomic Observation to achieve Survey Control.

This method enables surveyors and firing battery personnel to compute a grid azimuth and a check angle from observations of the sun or a selected survey star. The accuracy of the computation depends on which instrument is used to perform the observations. The procedures for hasty astronomic are listed below:

(1) • Emplace the Theodolite Survey Device over the orienting station.

(2) • Place 0000.0 mils on the horizontal scale. Lock the scale with the horizontal clamp.

(3) • Track the celestial body (with scale locked), and announce TRACKING when the instrument is oriented on the sun or selected survey star. Announce TIP when the center of the reticle is exactly aligned on the sun or star.

(4) • At the announcement of TIP record the date and time of tip.

(5) • Depress the telescope, and emplace the End Of Line (EOL).

(6) • Unlock the scales, and repeat steps 3 and 4. Record all data on separate computer to be calculated. The Handheld Terminal Unit (HTU) will display the check angle. Compare the check angle from the HTU to the check angle on the instrument. If the difference is ±2.0 mils for the aiming circle and ±0.3 mil for the theodolite, the azimuth to the EOL displayed by the HTU is good; if not, check all data and/or re-observe.

CHAPTER 6 EFFECTS - AMMUNITION

6.1. FIELD ARTILLERY DELIVERED, SCATTERABLE MINES

6.1.1. General remarks and relation to AARTY P-5

1. In certain operations it can be necessary that the field artillery of one nation is required to fire field artillery delivered scatterable mines (SCATMIN) for another nation. Standard procedures have been developed and agreed upon.

2. This chapter has to be read in conjunction with the AArtyP-5. In this chapter the definitions, employment and responsibilities are described. The contents of the AArtyP-5 therefore describes the tactical part of the use of scatterable mines, while this chapter concentrates on the more technical part of the use of scatterable mines.

6.1.2. Request procedures

1. Requests for field artillery delivered SCATMIN follow the request format outlined at Annex M. These requests are translated into fire mission orders by the delivery unit. When time is a critical factor (a target of opportunity), a request may be originated, from the manoeuvre element using field artillery communications and standard fire mission procedures. As indicated below, when the field artillery resources of another Nation are used, the necessary clearances are obtained by the originator and the request should be in fire mission format. Planned minefields are normally only used for defensive and delay operations when there are no other delivery means that suffice, and the commander is willing to employ field artillery for such activity. They are planned and delivered before battle is joined or delivered as on call targets. It would be normal to use national resources for this task, however, should it be necessary to employ the delivery system of another nation the information is to be provided in the format at Table 1 in Annex M. Also attached in a form which may be used for submission of planned minefield requests. (See Annex M).

2. Target of opportunity minefields are normally based on one aim point. These minefields are normally fuzed for short Self Destruct. Should the target be mobile, the requesting unit must give sufficient reaction time for the mission to be actioned and the mines to arm. An example of a call for fire for an adjusted mission is shown at Tables 3 in Annex M. Missions are requested using standard call for fire procedure in accordance with Chapter 4.

6.1.3. Troop safety

1. It is the responsibility of the requesting unit or formation to ensure troop safety. The delivery unit can be asked to provide the single or left and right aim point coordinates of the predicted minefield and its safety zone to permit detailed analysis by the requesting unit or formation. The delivery unit provides a SCATMINREP to the requesting unit for purposes of troop safety.

2. Prior to the emplacement of a SCATMIN minefield, a warning is to be issued by the requesting unit or formation to all units who could be endangered either in their current locations or by their future actions. This warning is to be repeated one hour before expiration of the laid life in order to reduce possible risks and to advise the units

of the cessation of the minefield's effectiveness. Minefield reports, warnings and records shall be made in the format given at Annex M. This is the responsibility of the requesting unit or formation, based upon data provided by the delivery unit.

3. It should be noted that the engineer adviser has a special responsibility for reporting minefield locations through the chain of command.

6.1.4. Minefield reporting

Minefields consisting of SCATMIN shall be reported in accordance with Annex M. In particular, the delivery unit shall report the completion of laying and effective timing to the staff of the manoeuvre commander requesting the minefield using the format at Annex M. The engineer adviser is responsible for maintaining an up to date SCATMIN record.

6.2. BATTLEFIELD ILLUMINATION

6.2.1. General

1. Aim. The aim of this chapter is to standardize, illumination procedures (Infra-red and visible light) for use by NATO forces when operating together on land.

2. NATO forces subscribe to the requirements, limitations and principles, and employ the techniques, patterns, method of requesting and adjusting illumination, and preparing the Illumination Plan as described in this chapter. It must be understood that the artillery is not responsible for the production of the Illumination Policy or Plan, albeit that artillery staffs assist in their formulation.

6.2.2. General procedures

1. Requirements. The capability to illuminate the battlefield, at an appropriate point, is essential to the full use of most target identification and engagement systems and to the development of maximum combat power. Requirements for illumination can originate at any level from an individual soldier to a formation headquarters.

2. Limitations. The use of illumination has the following inherent difficulties:

a. Illumination can compromise measures for the concealment of friendly elements in the area.

b. Inconsistent orders with regard to the use of illumination by different units/formations along a front resulting in an uneven application of illumination policies along the FEBA, which can make the locating of friendly force unit/formation boundaries relatively simple for the enemy.

c. Use of illumination by one unit can interfere with the operation of night observation equipment in use by adjacent units. Use of illumination must be prepared in case of adversary employment negating the effectiveness of own night observation equipment.

3. Principles. The following general principles govern illumination:

a. Command and Control:

(1) The use of illumination is a command responsibility.

(2) Command and control must be exercised by the manoeuvre commander in the area to be illuminated.

(3) Illumination must follow the Commanders illumination policy and be co-ordinated with adjacent units and formations to prevent disclosure of positions and operations to the enemy and to preclude the possibility of interference with friendly image intensification, and thermal imagery equipment.

(4) Coordination will normally be accomplished by the manoeuvre commander in the area to be illuminated.

b. Employment:

(5) Illumination, once provided to support troops, must be continued without interruption until it is no longer required. Illumination missions will have to be carefully controlled when committing scarce stocks of artillery and mortar illuminants and consideration should be given to other battlefield illuminants.

(6) Illumination should, whenever possible, be provided by a source not directly in contact with the adversary being engaged. A unit providing such support must be in direct communication with the commander of the unit/formation in contact.

(7) Illumination when used should be provided by two or more independent sources to ensure continued availability and reliability.

c. Illumination should be provided by the highest level practicable in order to conserve illumination resources available to subordinate echelons

6.2.3. Mission procedures

1. General. Mortar illuminant can be used in instances which arise unexpectedly and in which speed of illumination is essential.

2. Artillery and Mortar Procedures. CFF procedures are to be in accordance with Chapter 4 and Annex C.

3. Planned Illumination Tasks. CFF/fire plan table must include the following information:

a. Date illumination is required.

b. Purpose (manner in which requesting unit/formation intend to employ the illumination).

c. Time and duration of illumination requested (e.g., “3 Minutes, On Call as of 2150 Hours”.).

d. The grid reference and height of the point(s) or areas(s) to be illuminated.

e. Method of control.

4. Naval Gunfire Procedures. See ATP-4.

6.2.4. The illumination plan

1. General. The illumination plan is:

a. Prepared and co-ordinated at the appropriate level.

b. Based upon requests of supported units or as directed by higher formation headquarters.

c. Included in operational plans and orders, normally as an Annex.

d. Included in the Field Artillery Support Plan.

2. Coordination. Coordination is accomplished at all levels to ensure the integration of battlefield illumination with fire support and the coordination of the use of all means of illumination.

3. Format. The illumination plan may consist of the same elements and have the same format’ as the fire plan (Chapter 2.3) with the following changes:

a. As the expenditure of rounds largely depends upon the atmospheric conditions, the number of rounds to be expended for each mission in the table will be replaced by the duration of the mission, given in minutes, and recorded in the “Remarks” column.

b. For all missions the size of the area to be illuminated given in the target list in the column “Size” is expressed as the diameter or its rectangular dimension in meters. In the case of a mission to be fired by an artillery unit the pattern of illumination (Chapter 2.3) will also be given in the column remarks.

6.3. BATTLEFIELD SMOKE

6.3.1. General

1. Aim. The aim of this chapter is to standardize, smoke procedures for use by NATO forces when operating together on land.

2. NATO forces subscribe to the requirements, limitations and principles, and employ the techniques, patterns, method of requesting and adjusting smoke, and

preparing the Smoke Plan as described in this chapter. It must be understood that the artillery is not responsible for the production of the Smoke Policy or Plan, albeit that artillery staffs assist in their formulation.

6.3.2. General procedures

1. Requirements. The capability to use smoke (smk) can significantly reduce the enemy's effectiveness both in the daytime and at night. Combined with other fires, it gives more opportunities for manoeuvre forces to deploy and aircraft to attack frontline targets. This enhances the chances of mission accomplishment without catastrophic losses. Smoke reduces the effectiveness of laser beams and limits the use of optically-guided missiles. Smoke may be used to reduce the ability of the adversary to deliver effective fires, to hamper hostile operations, and to deny the adversary information on friendly positions and manoeuvres. The effective delivery of smoke by ground based fire support assets at the critical time and place helps the combined arms team accomplish its mission. Smoke is used for obscuration, screening, deception, and signalling.

a. Obscuring smoke - Use and effects of a smoke screen placed directly on or near the adversary with the primary purpose of suppressing observers and minimizing their vision.

b. Screening smoke - A smoke curtain used on the battlefield between adversary observation points and friendly units to mask manoeuvres.

c. Deception smoke - A smoke curtain used to deceive and confuse the adversary as to the nature of friendly operations.

d. Signalling smoke - Smoke used to establish a reference for friendly forces.

2. Limitations. The use of smoke, especially screening smoke has the following inherent difficulties:

a. For larger smokescreens or smokescreens with a long duration the number of smoke ammunition is significant. Therefore a smoke screen should be planned in advance.

b. Smoke can limit own observations and can limit operations for adjacent units and formations.

3. Principles. The following general principles govern smoke:

a. Command and Control:

(1) The use of smoke (screening smoke) is a command responsibility.

(2) Command and control must be exercised by the manoeuvre commander in the area where smoke will be applied.

(3) Smoke must follow the Commanders smoke policy and be co-ordinated with adjacent units and formations.

(4) Coordination will normally be accomplished by the manoeuvre commander in the area where smoke will be applied.

b. Employment:

(1) Smoke missions will have to be carefully controlled when committing scarce stocks of artillery and mortar smoke projectiles.

(2) Smoke should, whenever possible, be provided by a source not

(3) directly in contact with the adversary being engaged.

(4) Smoke when used should be provided by two or more

(5) independent sources to ensure continued availability and reliability.

(6) Smoke should be provided by the highest level practicable in order to conserve smoke resources available to subordinate echelons.

6.3.3. Mission procedures

1. General.

Mortar smoke (masking, signalling) is used in instances which arise unexpectedly and in which speed of obscuration is essential.

2. Artillery and Mortar Procedures.

CFF procedures are to be in accordance with Chapter 4 and Annex C.

3. Planned smoke Tasks. The CFF procedures/Artillery Fire Plan must include the following information:

a. Date or phase smoke is required.

b. Purpose (manner in which requesting unit/formation intend to employ the smoke).

c. Time and duration of smoke requested (e.g., “3 Minutes, On Call as of 2150 Hours”.).

d. The grid reference and height of the point(s) or areas(s) where smoke has to be provided.

e. For a smokescreen also the length and direction have to be specified (one grid for the middle of the smokescreen) or given by the grids of the beginning and end of the smokescreen.

f. Method of control.

6.3.4. The smoke plan

1. General.

The smoke plan is:

a. Prepared and coordinated at the appropriate level.

b. Based upon requests of supported units or as directed by higher formation headquarters.

c. Included in operational plans and orders, included in the Field Artillery Support plans and orders.

2. Coordination. Coordination is accomplished at all levels to ensure the integration of battlefield smoke with fire support and the coordination of the use of all means of smoke.

3. Format. The smoke plan may consist of the same elements and have the same format' as the fire plan (Chapter 4 and Annex C) with the following changes:

a. As the expenditure of rounds largely depends upon the atmospheric conditions, the number of rounds to be expended for each mission in the table will be replaced by the duration of the mission, given in minutes, and recorded in the "Remarks" column.

b. For all missions the size of a smoke (screen) given in the target list in the column "Size" is expressed as its length dimension in meters.

6.4. PRECISION GUIDED MUNITIONS (PGM)

6.4.1. General

1. Aim. An important trend in the development of munition is the development of Precision Guided Munitions (PGM). These PGM provide a significant increase in range and accuracy for they have the ability to seek, find and engage (land) targets with a high degree of autonomy. The tactics, techniques and procedures however, still have to be developed. The aim of this chapter is to explain what kinds of PGM are available and what their effects are.

2. Some reasons for the trend towards PGM are:

a. The increased effectiveness due to the higher probability of delivering effects compared to conventional munitions;

b. The reduction of collateral damage due to the high precision of these munitions;

c. The possibility to accomplish missions that are impossible with conventional munitions.

3. A general doctrinal basis for precision is:

   a. It shapes “the fight” through destruction of High Payoff Targets (HPT’s) and centres of gravity;

   b. It provides stand-off precision engagement to fix adversary formations and to set the conditions;

   c. It makes fire missions quicker, enabling increased operational tempo through rapid destruction of HPT’s and other targets;

   d. It gives the opportunity to expand mission set to include urban operations by minimizing collateral damage;

   e. It reduces the dependence on and frequency of ammunition resupply because of the increased efficiency and lethality;

   f. It enhances close support through reduction in danger close distances.

6.4.2. Principles

PGM are munitions for which the effect and its point of delivery, in time and space, may be controlled, either internally or externally, after departure from the launch platform. PGM are divided, by looking at the way they are launched, into:

1. Gun launched PGM;

2. Rocket launched PGM;

3. Mortar launched PGM;

4. By plane or helicopter (precision bombs, projectiles and rockets)

6.4.3. Types of Precision Guided Munitions

PGM is to be divided in the following types:

   a. Laser Guided Projectiles (LGP);

   b. Terminally Homing Projectiles (THP);

   c. Trajectory Correctable Munitions,

   d. Course Correcting Fuzes (CCF);

   e. Sensor Fuzed (Sub) Munitions (SFM);

   f. Loitering munitions (LM);

   g. Video link lock on munitions.

5. LASER GUIDED PROJECTILES. The precision of Laser Guided Projectiles is gained by illuminating (or “painting”) the target by a laser target designator, on the ground or on an aircraft. The laser target designator sends its beam in a series of encrypted pulses so that the projectile cannot be confused by other means.

6. TERMINALLY HOMING PROJECTILES. By using terminal guidance it is possible to guide the projectile actively to the target. The THP may use a seeker to lock onto the target and steers the projectile towards the target. Some THP operate in an autonomous heat seeking mode which can recognize targets and discriminate targets among decoys and burning targets/devices.

7. TRAJECTORY CORRECTABLE MUNITION (TCM), incl. COURSE CORRECTING FUZES. TCM is as a modular projectile that can incorporate different kinds of payload. The precision of these projectiles is gained by the combination of a guidance system, based on GPS, an Inertial Navigation System (INS) and the use of canards and/or thrusters to make corrections during the flight possible. The location of the target is set into the GPS. The guidance system is built into the projectile.

8. A new development is the Course Correcting Fuze. The guidance and steering mechanism is built into the fuze. By adding this kind of fuze onto a “dumb” projectile, it is possible to create a TCM.

9. SENSOR FUZED (SUB) MUNITION. SFSM provides cannon artillery with the capability to effectively deliver effects to threats ranging from light armoured targets up to main battle tanks. SFSM consists of a thin wall carrier shell (cargo shell), a base, a submunition expulsion charge and the sensor fuzed sub munitions. Precision is gained through the submunitions. The systematic search the target area and the intelligent evaluation of sensor signals, in combination with a high penetration performance of the Explosively Forged Penetrator (EFP) make it possible to detect and destroy (effect) individual (pinpoint) targets in the target area. It is important to know that in this stage the SFSM carrier shell is still a “dumb” one. For having the desired effect on the target you still have to bring the SFSM carrier shell as close and precise as possible above the target. For this reason, developments are going on to carry the submunitions into a TCM cargo shell.

10. LOITERING MUNITIONS. Munition able to remain in position over a target and to be reassigned a target in flight. During the attack phase the target can be aborted with the munition returning to the loitering mode. These munitions can be delivered by a wide range of platforms e.g. rocket launcher, plane or ship.

11. VIDEO LINK LOCK ON MUNITIONS. A glide or self-propelled non-line-of-sight precision strike munition using video for targeting, or feature/object recognition and locked on target by operator control. The operator, on receiving the video data, arms the air vehicle to engage the target, which delivers its onboard explosive payload with precision onto the target, causing minimal collateral damage. Operators can abort a mission if the situation changes after launch or safely destroy it without inflicting casualties or collateral damage to property.

6.4.4. Procedure AT My Command PGM

For some specific types of PGM data, e.g. regarding the target and trajectory, has to be transferred from a “fuze setter” to the projectile. The data send to the projectile is valid for a limited period of time. It is recommended not to load the projectile in case of a CFF AMC. The fuze should be set after the command “fire”. This will take an additional amount of time, the FDC/CP should inform the FO about this additional amount of time.

ANNEX A TABLE OF RELATED ALLIED PUBLICATIONS AND STANAGS

Ser.	Allied Publication	STANAG	Title
1.	AAP-06	3680	NATO Glossary of Terms and Definitions
2.	ACP-122		Communications Instructions Security.
3.	ACP-125		Communications Instructions Radio-Telephone Procedures.
4.	APP-06	2019	NATO Joint Military Symbology .
5.	ATP-04	1034	Allied Naval Fire Support
6.	ATP-97	2627	NATO Land Urgent Voice Messages (LUVM) Pocket Book
7.	AArtyP-05	2484	NATO Fire Support Doctrine.
8.	AArtyP-3	2432	Artillery Procedures For Automatic Data Processing (ADP) System Interoperability
9.		2245	Field Artillery And Fire Support Data Interoperability
10	APP-11	7149	NATO Message Catalogue

INTENTIONALLY BLANK

ANNEX B QUALIFICATIONS FORWARD OBSERVER

B.1. Introduction

This annex covers the requirements for the qualification of the Forward Observer. The aim is to set the minimum requirements under which forward observers obtain certification and maintain qualification in order to successfully support the ground force commanders through the application of fire support for NATO operations, using fire support assets from any alliance nation.

B.2. Agreement

The nations agree:

1. To acknowledge that a FO certified and qualified IAW the requirements defined in this Annex is authorized to perform call for fires. This qualification is valid for 18 months. After this period of qualification the FO must remain current in order to be qualified.

2. To train all FO IAW the minimum requirements for qualifications given in this annex.

3. To recognize that NATO's operational commanders may stipulate specific training requirements for qualified FO prior to deployment to their Area Of Operation (AOO).

4. To implement a national regulation which outlines policies and personnel responsibilities for certification and qualification training of FO's, FO instructors and FO evaluators.

5. The number of life fires and simulated fires for the qualification is a national responsibility.

B.3. DUTY AREA 1 - PLANNING

A: Academics (lessons/test) LFX: Life Fire Exercise SIM: Simulation FTX: Field Training Exercise

TASK	SUBTASK	DEFINITION	METHOD
1.1		**Advise ground force commander on aspects of fire support**	
	1.1.1	**Advise ground force commander on fire support capabilities/limitations/employment.** Demonstrate knowledge of the capabilities, limitations, possibilities and employment of fire support assets. The FO will be able to successfully answer questions on capabilities, limitations, possibilities and employment of fire support assets.	A/FTX
	1.1.2	**Advise ground force commander on effects of weather, terrain and threat on fire support capabilities.** Demonstrate knowledge of the capabilities, limitations, possibilties and employment of fire support assets. Clearly define the effects of weather, terrain and threat on fire support capabilities. The FO will be able to successfully answer questions on capabilities, limitations, possibilities and employment of fire support assets..	A/FTX

	1.1.3	**Advise ground force commander on Battle Damage Assessment (BDA)** Demonstrate knowledge of the information required to successfully complete a BDA, re-attack recommendation and BDA.	A/FTX
1.2		**Advise ground force commander on the impact of fire support coordination measures on mission planning** Given a tactical scenario assess the impact of FSCMs on fire support missions in support of the ground force commanders concept of operations. Address at a minimum the definition and proper employment of permissive and restrictive FSCMs to expedite the attack of targets. FO will be able to successfully answer questions on FSCMs used during fire support missions.	A/FTX
1.3		**Apply the intelligence products to fire support mission planning** Apply the intelligence products to fire support mission planning in support of the ground force commanders concept of operations.	A/FTX
1.4		**Apply the products of the targeting process to fire support mission planning.** Demonstrate knowledge of the targeting process. Address the process that supported commander selects, prioritize targets and match appropriate effects. Address the products the FO will use when planning the employment of fire support. The FO will be able to successfully answer questions on the targeting process products.	A/FTX

1.5		**Plan fire support missions with precision and non-precision weapons, in support of the ground scheme of manoeuvre**	A
	1.5.1	**Plan precision munition employment.** Demonstrate knowledge of precision munition employment. Address the capabilities, limitations, possibilities and employment of all types of precision munitions PGM. Lessons will also cover TLE.	A/SIM
	1.5.2	**Plan non-precision munition employment.** Demonstrate knowledge of non-precision ammunition employment. Address the capabilities, limitations, possibilities and employment of non-precision ammunition..	A/FTX/SIM
1.6		**Plan engagement with appropriate ammunition in order to achieve desired effects proportional response and minimize collateral damage.** Demonstrate knowledge of ammunition, capabilities and effects. Scenarios will be utilized where ammunition is appropriately matched to targets to achieve ground force commanders desired results and comply with ROEs and restrictions.	A/SIM/FTX

1.7		**Plan fire support missions in support of the ground scheme of manoeuvre.** Demonstrate knowledge of planning factors. FO will be able to successfully conduct planning the supports the ground scheme of manoeuvre.	A/FTX
1.8		**Incorporate fire support mission planning factors for operations in an urban environment**. Demonstrate knowledge of fire support mission planning factors for operations in an urban environment. Address planning factors, techniques and procedures on how to execute fire support missions in the urban environment. FO will be able to successfully conduct planning that support the ground scheme manoeuvre for urban environment.	A/SIM
1.9		**Plan target location procedures with the understanding of target location errors.** Demonstrate knowledge of target location procedures and TLE in support of fire support mission planning. Address planning factors, techniques and procedures on how to most efficiently, effectively and accurately locate targets. FO will be able to successfully conduct planning of target location and demonstrate ability to conduct target location utilizing the potential of the available equipment. answer questions on procedures and equipment used to determine target location and TLE categories.	A/FTX

1.10		**Plan the use of digital systems in support of fire support missions**. Demonstrate knowledge of digital systems to facilitate the planning and execution of fire support missions. FO will able to successfully conduct fire planning using digital system.	A/FTX/SIM

B.4. DUTY AREA 2 – FIRE MISSION PREPARATION

TASK	SUBTASK	DEFINITION	METHOD
2.1		**Operate organic FO equipment**	
	2.1.1	**Operate organic FO communication equipment** Demonstrate the ability to operate all required organic communication-equipment necessary for requesting, coordinating and controlling fire missions. FO will demonstrate proficiency in operating communication equipment.	LFX /SIM

	2.1.2	**Operate organic FO target marking equipment (if available)** Demonstrate the ability to operate target marking-equipment. FO will demonstrate the ability to operate laser target designators and other target marking equipment.	LFX /SIM
	2.1.3	**Operate organic FO target location equipment** Demonstrate the ability to operate target location equipment and knowledge of its accuracy. FO will demonstrate the ability to successfully operate laser range finder, gps systems, targeting software and other target location equipment.	LFX /SIM
	2.1.4	**Operate organic FO related digital systems** Demonstrate the ability to operate fielded digital systems in support of fire missions. FO will…..	LFX /SIM
2.2		**Apply the products of operational planning in support of fire support execution**	LFX /SIM

	2.2.1	**Apply intelligence products in support of fire support execution** Demonstrate the ability to apply intelligence products. FO will understand which products of the intelligence planning cycle are available to him in order to devise a plan to ensure fire support resources to use against appropriate targets. Based on the commanders intent.	LFX /SIM
	2.2.2	**Apply the products of the fire support plan in support of fire support execution.** Demonstrate the ability to apply the products of the fire support plan. FO will understand what role fire support plan plays in exection of fire support.	LFX /SIM

B.5. DUTY AREA 3 – FIRE MISSION EXECUTION

TASK	SUBTASK	DEFINITION	METHOD
3.1		**Targeting**	
	3.1.1	**Target acquisition** Demonstrate the ability to visually acquire targets based on combat identification and ground force commanders fire support target nominations during daytime, night time and low visibility conditions, and through All Arms Observers. FO will demonstrate the ability to work successfully by his/her own or through an All Arms Observer to acquire target information and other critical information..	LFX /SIM
	3.1.2	**Target location** Demonstrate the ability to determine target location via map plot, gps, lrf or digital targeting system. FO will ……	LFX /SIM

3.2		**Match Target Location accuracy to desired firing methods** Demonstrate the ability to match accuracy of target location with proper fire support system and ammunition, and proper coordinate format to desired firing methods. FO will….	LFX /SIM
3.3		**Coordinate fire support missions**	LFX /SIM
	3.3.1	**Integrate fire support missions with ground scheme of manoeuvre** Demonstrate the ability to integrate fire support missions with ground scheme of manoeuvre. FO will demonstrate the ability to effectively integrate fire support missions into the ground scheme of manoeuvre by meeting the commanders intent for fire support.	LFX /SIM
	3.3.2	**Integrate fire support missions with FSCM.** Demonstrate the ability to integrate fire support missions with FSCM. FO will demonstrate the ability to effectively integrate the use of FSCM to deconflict with fire support and aviation assets to meet the commanders intent for manoeuvre and fire support	LFX /SIM

3.4		**Execute all Call For Fire procedures** Demonstrate the ability to execute all call for fire procedures named in the AArtyP-01. FO will….	LFX /SIM
3.5		**Conduct Battle Damage Assessment** Demonstrate the ability to provide accurate BDA, re-attack recommendation. FO will….	LFX/SIM

INTENTIONALLY BLANK

ANNEX C EMERGENCY CALL FOR FIRE

PREFIX	DESCRIPTION / NOTES	MESSAGE CONTENT
	Call Sign To / From	_____This is_____
	Warning Order	EMERGENCY FIRE MISSION or FIRES ADJUST
A	**Target Location**	
	Target grid or description and whether DANGER CLOSE	(DANGER CLOSE)
B	**Target Direction**	
	From observers to target. State whether the bearing is in Mils or Degrees	Target Direction ..... Mils/Degrees
C	**Target Description**	Target is ...
	Brief Description of target, type, size, activity and degree of protection to enable the fire direction centre to determine the amount and type of ammunition to be used	
D	**Effect Required**	
	Smoke, Illumination, , Neutralise, Destroy, Adjust	
E	**For How Long?**	
	Duration effect required	
F	**When?**	

INTENTIONALLY BLANK

ANNEX D TARGET NUMBERING SYSTEM – "Z" PREFIX

The Target Number prefix "Z" is reserved for the technical use by Automatic Data Processing Systems in nations. The following second letters are allocated to nations as specified and are reserved for the sole use of the listed nation.

ZA:	France (FRA)	allocated 14 Nov 05
ZB:	Germany (DEU)	allocated 14 Nov 05
ZC:	Italy (ITA)	allocated 14 Nov 05
ZD:	United Kingdom (GBR)	allocated 14 Nov 05
ZE:	United States (USA)	allocated 14 Nov 05
ZF:	Turkey (TUR)	allocated 14 Nov 05
ZG:	Netherlands (NLD)	allocated 14 Nov 05
ZH:	Portugal (POR)	allocated 14 Nov 05
ZI:	Canada (CAN)	allocated 14 Nov 05
ZJ:	Norway (NOR)	allocated 14 Nov 05
ZK:	Spain (ESP)	allocated 14 Nov 05
ZL;	Poland (POL)	allocated 14 Nov 05
ZM:	Romania (ROU)	allocated June 07
ZN:	Czech Republic (CZE)	allocated June 07
ZO:	Belgium (BEL)	allocated March 2015
ZP:	Denmark (DNK)	allocated March 2015
ZQ:	Not yet allocated	
ZR:	Not yet allocated	
ZS:	Not yet allocated	
ZT:	Not yet allocated	
ZU:	Not yet allocated	

ZV: Not yet allocated

ZW: Not yet allocated

ZX: Not yet allocated

ZY: Not yet allocated

ZZ: Not yet allocated

NOTE: Amendments and updates to this Annex will be made from time to time under the auspices of the ICG IF. These will be submitted to AArtyP-01 as “Changes” to a given “Edition”. This method is being employed in order to shorten the response time and not require the full “Ratification Process” as it is accepted as only being an **editorial** amendment.

ANNEX E EXAMPLES TARGET PLANNING

E.1. EXAMPLE 1: TARGET LIST

SECURITY CLASSIFICATION:

References: (See STANAG 2014)
(1) Maps, Charts and relevant documents
(2) Coordinate location system used
(specify the types of reference system used, eg. UTM Grid, Military Grid, etc).

Copy to.....
Issuing Headquarters.....
Modifications By : .....
Place of Issue (May be coded).....
Date/Time Group of Signature :.....
Message Reference No.:.....

Target List Number | DTG:

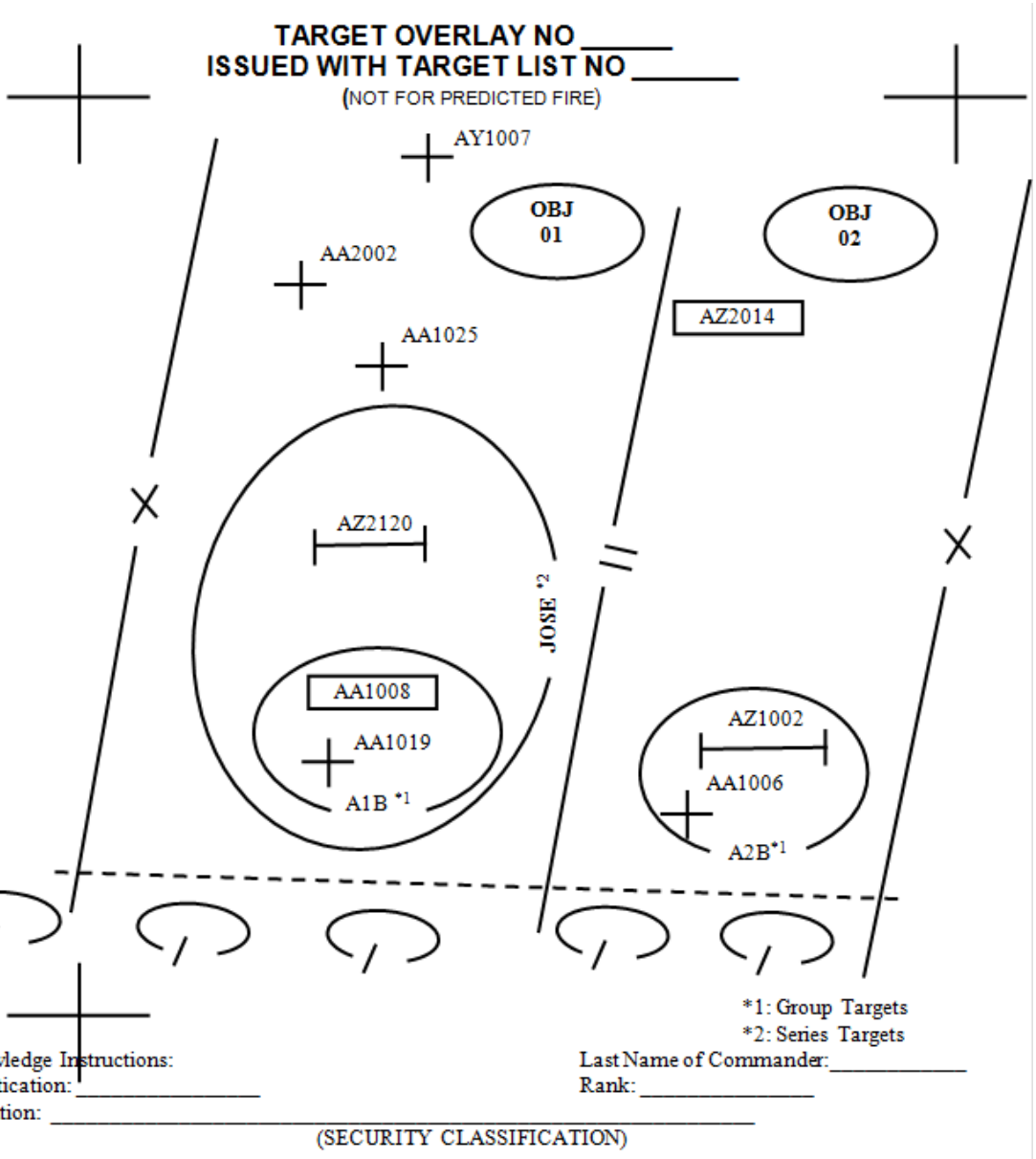
Line Number	Target Number	Target Grid Reference	Target Altitude	Target Description	Target Size/Radius	Target Attitude	Remarks
	(a)	(b)	I	(d)	(e)	(f)	(g)
01	AY1007	109 679	170	Ammo Dump	400 x 800	1600	50% VT
02	AA1006	108 724	190	OP	20		50% Delay, Group A2B
03	AA1025	110 698	150	Assembly Area	1000	750	
04	AZ1002	992 711	200	Infantry Coy	150		50% Delay, Group A2B
05	AA2002	985 683	160	Plt fighting Psn	100		Smoke
06	AA0019	972 815	180	ADA Radar	50		50% VT, Group A1B, Jose
07	AA1008	982 725	200	ADA Guns	200		On Call, FFE, Group A1B, Jose
08	AZ2120	116 582	220	BN HQ	350		Series Jose
09	AZ2014	121 475	190	POL Site	300 x 500		
10				-			

E.2. EXAMPLE 2: TARGET OVERLAY

(SECURITYCLASIFICATION)

References: (See STANAG 2014)
(1) Maps, Charts and relevant documents
(2) Coordinate location system used
(specify the types of reference system used, eg. UTM Grid, Military Grid, etc).

Copy to
Issuing Headquarters
Modifications By :
Place of Issue May be coded :
Date/Time Group of Signature :
Message Reference No.:



E.3. EXAMPLE 3: FIRE PLAN SCHEDULE

SECURITY CLASSIFICATION:

References:
•Target List No .....
•Operations Order No..... (if applicable)

Sheet ....1 .. of ...1

Copy to.....
Issuing Headquarters.....
Modifications By .....
Place of Issue (may be coded).....
Date / Time Group of Signature.....
Message Reference No.....

FIRE PLAN SCHEDULE

FIRE PLAN _____ **H HOUR** _____ (Not to be transmitted)

Line No	ORGANIZATION/FORMATION		SCHEDULED TARGETS	ON CALL TARGETS	REMARKS
	(a)	(b)	(c)	(d)	(e)
	FORMATION	FIRING UNIT	H-Hour		
1	1-2 FA (155 mm)	Btty A	AY1007 38 (a); AA1006 38 (b); AZ2014 38		(a) 50% PROXIMITY/VT (b) 50% Delay (c) 1 gun smoke (d) 18 Rounds
2	1-2FA (155 mm)	Btty B	AA1025 38; AZ1002 38 (b)		
3	1-2FA (155 mm)	Btty C&D	AA2002 R3 (c); AA0019 R3		
4	1-2 FA (155 mm)	Btty E	AA2002 R3; AA0019 R3 (a); AZ2120 36 (d)	AA 1008	

Acknowledge Instruction:
Authentication
Distribution:

Last Name of Commander:
Rank:

E.4. EXAMPLE 4: FIRE PLAN

Fire Plan		Supporting		Originator		cations by	
Superimposed		H Hour		Sheet		of	Date/Time Group

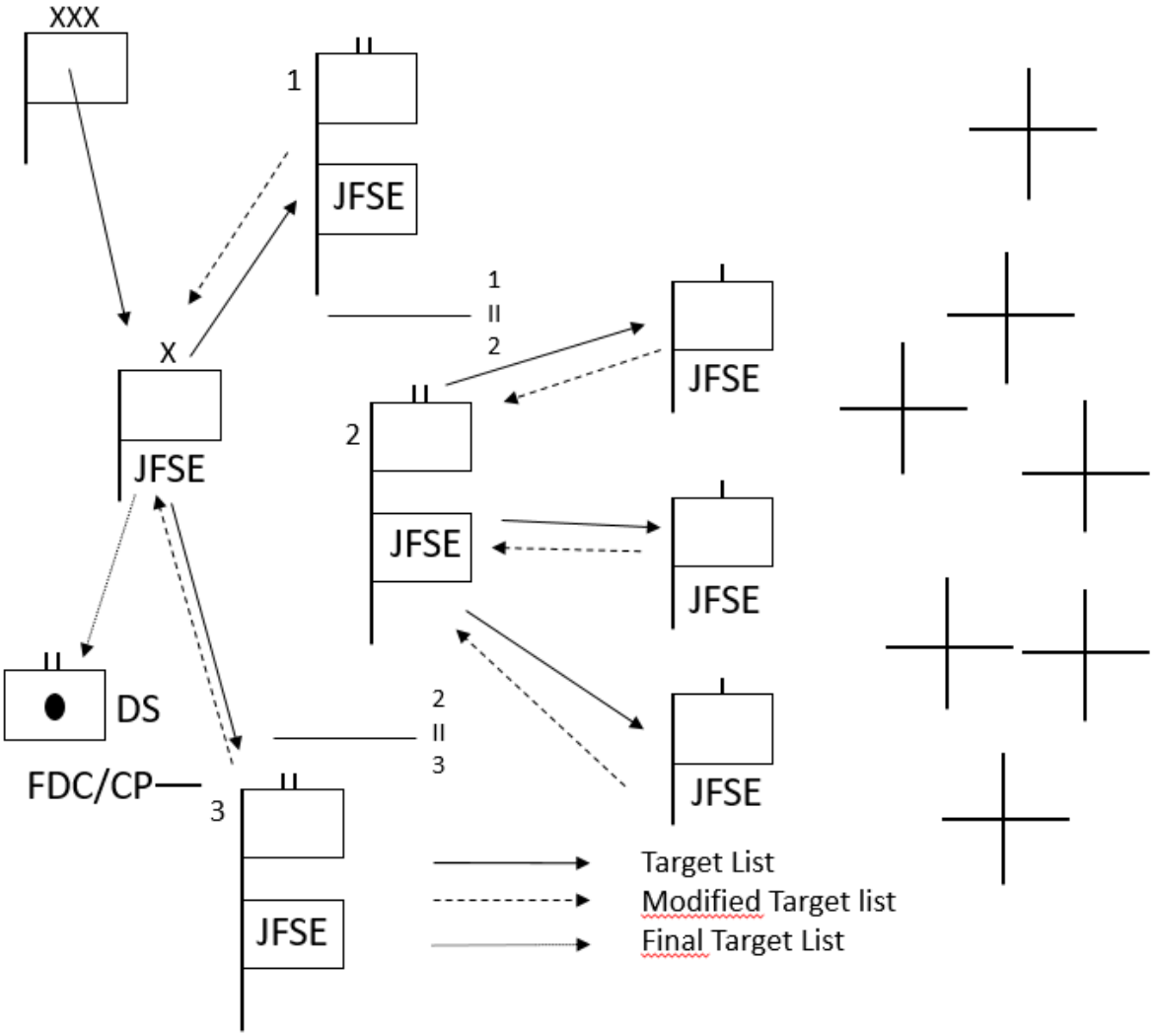
Target Information

	(a)	(b)	I	(d)	(e)
Line	Target No.	Description	Location	Alt	Remarks
1	AY1007	Ammo Dump	109679	170	50% VT
2	AA10061	OP	108724	190	50% Delay, Group A2B
3	AA1025	Assembly Area	110698	150	
4	AZ1002	Infantry Coy	992711	200	50% Delay, Group A2B
5	AA2002	Plt fighting Psn	985683	160	Smoke
6	AA0019	ADA Radar	972815	180	50% VT, Group A1B, Series Jose
7	AA1008	ADA Guns	982725	200	On Call, FFE, Group A1B, Jose
8	AZ2120	BN HQ	116582	220	Series Jose
9	AZ2014	POL Site	121475	190	
10					
11					
12					

Schedule

	(f)	(g)	(h)
Line	Regt or Fmn	Fire Units	Timings
1	1-2 FA (155 mm)	Bty A	
2	1-2 FA (155 mm)		
3	1-2 FA (155 mm)		
4	1-2 FA (155 mm)		
5	1-2 FA (155 mm)	Bty E	
6			
7			
8			
j)	Remarks		(a) 50% VT/Proximity; (b) 50% Delay; (c) 1 gun smoke; (d) 18 rounds

ANNEX F TARGET LIST FLOW DIAGRAM



INTENTIONALLY BLANK

ANNEX G FIRE MISSION PROCEDURE

CFF - 1st Transmission	Observer Identification		Forward Observer: "_____ THIS IS _____ FIRE MISSION _____ OVER."								
	A	Mission Type	1	Adjust Fire	2	Fire for Effect	3	Immediate Suppression	4	Immediate Smoke	
	B	Size of element requested to FFE	1	Number of guns _____							
			2	Size of the FA unit to FFE _____ (platoon, battery, battalion)							
CFF - 2nd Transmission	C	Target location	1	GRID	MGRS	Zone _____ Square ____ E _____ N _____ Alt _____ Direction _____					
					UTM	Zone _____ E _____ N _____ Alt _____ Direction _____					
			2	SHIFT	From _____ Direction _____ Add/Drop _____ Left/Rigth _____ Up/D. _____							
			3	POLAR	Direction _____ Distance _____ Elev. _____							
			4	T. ID.	Target Nr. _____				5	TLE _____ (Cat. I - VI)	
CFF - 3rd Transmission	D	Target description	1	Tgt Type _____ (1)			2	Tgt Subtype _____ (1)			
			3	Degree Pr. _____ (2)			4	Target strength _____			
			5	Target activity _____			6				
			7	Circular: _____ m Radius							
			8	Linear: Length _____ Attitude _____							
			9	Rectangular: Length _____ Width _____ Attitude _____							
	E	Method of engagement	Type of Adj.		1	Area fire					
					2	Precision fire					
			Trajectory / Tgt attack angle		3	Low angle					
					4	High angle					
			Ammunition		5	HE			6	Smoke HE	
					7	Illuminating			8	Smoke Phosphorus	
					9	DPICM			10	_____ (Other)	
			Fuze		11	Quick			12	Delay _____ (Normal or Deep)	
					13	Proximity _____ (High or Low)			14	Time	
					15	_____ (Other)			16	_____ (Other)	
			Volume of fire		17	Nr. of rounds per gun _____					
			Distribution		18	Converge			19	Open sheaf	
					20	Close sheaf			21	Special sheaf	
			Remarks		22	Danger Close	23	Mark	24	Cannot observe	
			Effect required		25	Neutralization			26	Destruction	
					27	Suppression			28	_____ (Other)	
	F	Method of fire	1	One gun adjust					2	Two guns adjust	
			3	Platoon ___ (left or right)					4	Battery _____ (left or right)	
	G	Method of Control	1	When Ready		2	At My Command		3	Restricted When Ready	
			4	TOT _____ Z		5	TTT _____ (min/sec)		6	TTF _____ Z	
			7	Duration of fire ____ min.		8	Firing interval ___ sec.		9	Cannot observe	
			10	Continous Illumintion		11	Coordinated Illumintion		12	Continous Fire _____ rds. per min.	

Following messages									
	H	Message to Observer	1	Call sign _____	2	Target N._____	3	Firing Unit _____	
			4	Nr. of guns _____	5	Nr. of rds. per gun _____			
			Inform FO about any of the following change to Call for Fire (see "E" part):						
			Type of adjustment		Type of trajectory		Ammunition		Fuze
			Volume of fire		Distribution		Method of fire		Method of Control
			6	TOF _____ sec	7	Max Ord _____ msl	8	PE_R _____ m	
			9	Angle T _____ °°	10	GTL _____ °°	11	_____ (Other)	
			12	Unit left	13	Unit right	14	_____ (Other)	
	J	Fire Mission Commands	From FO to FDC	1	Do Not Load	2	Request Splash		
				3	Fire	4	Check Firing		
				5	Cease Loading	6	Repeat		
				7	Cancel _____ (DNL, CF, CL)	8	Stop		
				9	End of Mission	10			
			From FDC to FO	1	Cannot comply (reason)	2	Laid		
				3	Ready to fire	4	Shot		
				5	Splash	6	Neglect		
				7	Rounds complete	8	Target recorded		
	K	Adjustment	1	Left/Rigth _____ Add/Drop _____ Up/Down _____ HOB _____					
			2	Left/Rigth _____ Add/Drop _____ Up/Down _____ HOB _____					
			3	Left/Rigth _____ Add/Drop _____ Up/Down _____ HOB _____					
			4	Left/Rigth _____ Add/Drop _____ Up/Down _____ HOB _____					
			5	Left/Rigth _____ Add/Drop _____ Up/Down _____ HOB _____					
			6	Direction _____ Distance _____ Vert. angle _____ HOB _____					
			7	Direction _____ Distance _____ Vert. angle _____ HOB _____					
			8	Direction _____ Distance _____ Vert. angle _____ HOB _____					
			9	Direction _____ Distance _____ Vert. angle _____ HOB _____					
			10	Zone _____ Square ____ E _____ N _____ Alt _____ HOB _____					
			11	Zone _____ Square ____ E _____ N _____ Alt _____ HOB _____					
			12	Zone _____ Square ____ E _____ N _____ Alt _____ HOB _____					
			13	Zone _____ Square ____ E _____ N _____ Alt _____ HOB _____					
			14	Lost	15	Doubtful	16	Unobserved	
	I	End of Mission BDA	1	Destroyed			2	Damaged _____ %	
			3	Full operational			4	Damages description _____	
			5	Effect achieved _____ (Y / N)			6	Record the target	
			7	Re-attack Reccomendation _____ (Y / N)			8	Collateral Damages _____	

Legend

Optional
Conditional
Mandatory

ANNEX H SENSOR TO SHOOTER OPTIONS

Option 1:

FO send CFF (voice or digital) to its Bn JFSE (normal reporting channel) which evaluate its capability to satisfy the request with its organic mortars or will forward it to the Bde JFSE for decision and then assignment to its organic FDC. FDC will then task the firing unit(s) which will send MTO to the FO for the execution of the fire mission.

This option is related to the most centralized routing protocol and should be used in the following situations among others:

FO has acquired unexpected targets, neither scheduled nor included in the HPTL/TSS/AGM;

- the attack requires particular coordination in terms of:
  - FSCMs and/or manoeuvre control and coordination measures check (possible risk of fratricide);
  - possible risk of collateral damages (eg. target in urban area or close to an entity included in the No Strike List or Restricted Target List);
  - airspace coordination and deconfliction;
  - cross boundary fire;
- there is a shortage of ammunition and Bde JFSE need to approve any request not considered during the planning phase;
- according to the situation Bde JFSE may need to clear every unplanned fire mission (eg. for restrictive ROE, etc.);
- there are few firing units and they were already allocated for other missions;
- the distance between the sensor and the firing unit does not allow direct or automatic relay communications.

In case of emergency situation (eg. the requesting unit is under fire) the Bde JFSE should be able to satisfy the request without any delay in order to preserve the safety of the unit.

Option 2:

FO send CFF (voice or digital) to its Bn JFSE (normal reporting channel) which will forward to the FDC directly, informing the Bde JFSE. FDC will then task the available firing unit(s) which will send MTO to the FO for the execution of the fire mission unless Bde JFSE deny the it.

This option is more decentralized than option 1. However, Bde JFSE can monitor the request and is able to check, modify or deny it before the firing unit open fire. This option should be used when the FS unit is tasked to perform direct support to the manoeuvre unit. In this case it is expected that the clearance of fire procedure was already pre-arranged or the Bde JFSE is able to complete it during the fire mission processing (before first round is shot). This

option should be used in case FO identify target included in the HPTL/TSS/AGM or relevant for the scheme of manoeuvre.

Option 3:

FO send CFF (voice or digital) to the FDC directly, informing the Bn JFSE. FDC will then task the available firing unit(s) which will send MTO to the FO for the execution of the fire mission. According to the situation, Bn JFSE may be ordered to inform Bde JFSE to let it intervene in case of need.

This option is even more decentralized than option 2. Bde JFSE is still able to monitor the request but has shorter time available to check, modify or deny it before the firing unit open fire. This option should be used in the following situations among others:

- when the FS unit is tasked to perform direct support to the manoeuvre unit;
- the target is located in a permissive FSCM (eg. beyond CFL);
- there is no risk of fratricide or collateral damages (eg. the targ is located in open terrain far from any collateral concerns);
- the airspace was already cleared before the beginning pf the operation or the fire mission would not cross the Coordination Level;
- the target is included in the fire plan (scheduled or on call target) and the fire mission was coordinated in advance (clearance of fire, etc.);
- the target has an high priority in the HPTL/TSS/AGM and is known to be critical for the Commander operation /scheme of manoeuvre. Furthermore, the total time from sensor acquisition to effects on the target is less than the estimated target dwell time;
- the distance between the sensor and the FDC allows direct or automatic relay communications;
- FO has identified a target belonging to the enemy Indirect Fire System (eg. observer, arty firing unit, etc.) and he would be able to perform a pro-active counter battery mission.

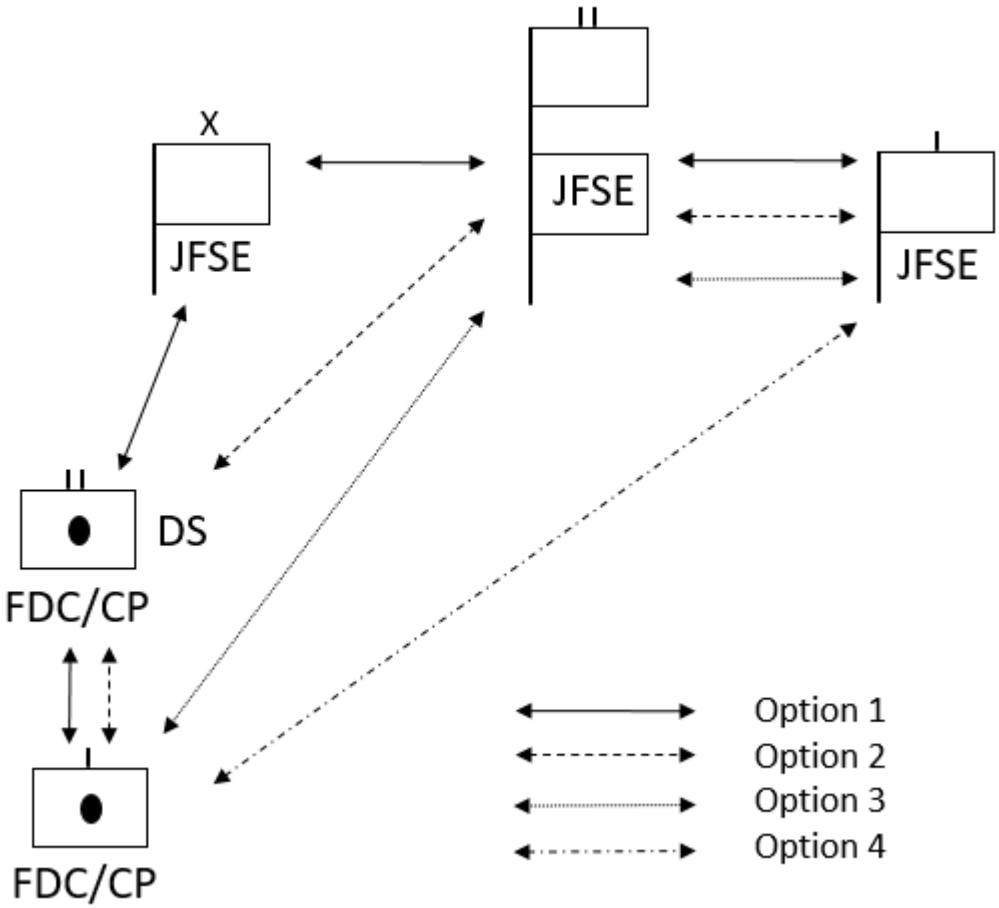
Option 4:

FO send CFF (voice or digital) to the firing unit's FDC directly, informing the Bn JFSE. The firing unit process immediately the request and then send MTO to the FO for the execution of the fire mission. According to the situation, Bn JFSE may be ordered to inform Bde JFSE to let it just monitor the execution phase.

This option is the most decentralized option and represents the most direct link sensor-shooter may existing. Bde JFSE has probably no possibility to intervene and can just follow the operation. This option should be used in the following situations among others:

- the target is included in the fire plan (scheduled or on call target) and the fire mission was coordinated in advance (clearance of fire, etc.);
- in the fire plan is specified the sensor and the firing unit for this fire mission. In this case there is no need to route the CFF through other nodes of the fire net;
- the distance between the sensor and the firing unit allows direct or automatic relay communications;

- FO is performing an operation for which the supported unit was assigned a firing unit in direct support (eg. breaching operation, river crossing operation) and the FO was authorized to call for fire the firing unit directly and the airspace was pre-cleared.



INTENTIONALLY BLANK

ANNEX I TARGET TYPE AND SUBTYPE

CODE	TYPE	SUBTYPE	CO	TYPE	SUBTYPE
01	Air Defense	Unknown	54		Very Heavy
02		Light	55		Position
03		Medium	56	Personnel	Unknown
04		Heavy	57		Infantry
05		Missile	58		Observation
06		Position	59		Patrol
07	Armour	Unknown	60		Work Party
08		Light	61		Position
09		Medium	62	Rockets/Missiles	Unknown
10		Heavy	63		Anti-personnel
11		Armoured Personnel	64		Light Missile
12		Position	65		Medium Missile
13	Artillery	Unknown	66		Heavy Missile
14		Light	67		Antitank
15		Medium	68		Position
16		Heavy	69	Supply Dump	Unknown
17		Position	70		Class 5
18	Assembly	Unknown	71		Class 3
19		Troops	72		Class 4
20		Troops and	73		Class 1
21		Mechanized	74		Class 2
22		Troops and	75	Terrain Features	Unknown
23	Building	Unknown	76		Road
24		Wood	77		Road Junction
25		Masonry	78		Hill
26		Concrete	79		Defile
27		Metal	80		Landing Strip
28		Special	81		Railroad
29	Bridge	Unknown	82	Vehicle	Unknown
30		Foot Pontoon	83		Light Wheeled
31		Vehicle	84		Heavy
32		Concrete	85		Reconnaissanc
33		Wood	86		Boats
34		Steel	87		Aircraft
35		Site	88		Helicopter
36		Raft	89	Weapons	Unknown
37		Ferry	90		Light Machine
38	Center	Unknown	91		Antitank Gun
39		Small	92		Heavy Machine
40		Battalion	93		Recoilless Rifle
41		Regiment			
42		Division			
43		Forward			
44	Equipment	Unknown			
45		Radar			
46		Electronic			
47		Search-light			
48		Guidance			
49		Loud-speaker			
50	Mortars	Unknown			
51		Light			
52		Medium			
53		Heavy			

INTENTIONALLY BLANK

ANNEX J DEGREE OF PROTECTION

CODE	FIRST VOLLEY	SUBSEQUENT VOLLEYS	VOICE EQUIVALENT
1	Half Prone, Half Standing	All Prone	**Standing**
2	Prone	Prone	**Prone**
3	Prone	Dug In	**Mix Dug in**
4	Prone	Under Overhead Cover	**Mix Overhead**
5	Dug In	Dug In	**Dug In**
6	Under Overhead Cover	Under Overhead Cover	**Overhead**

INTENTIONALLY BLANK

ANNEX K DEFINITIONS FOR BDA

CODE	DEFINITION
1	Casualties to Personnel in the Open
2	Casualties to Personnel in Tanks
3	Casualties to Personnel in APCs
4	Casualties to Personnel in Wheeled Vehicles
5	Casualties to Personnel in Earth Shelters
6	Casualties to Personnel in Foxholes
7	Moderate Damage to Exposed Wheeled Vehicles
8	Moderate Damage to Shielded Wheeled Vehicles
9	Moderate Damage to Towed Artillery
10	Moderate Damage to Tanks, APCs, and SP Artillery
11	Moderate Damage to Hard Fixed Bridges
12	Moderate Damage to Soft Fixed Bridges
13	Severe Damage to Supply Depots
14	Severe Damage to Randomly Parked Cargo/Transportation Helicopters
15	Severe Damage to Randomly Parked Light Observation Helicopters

INTENTIONALLY BLANK

ANNEX L TO
AArtyP-01

ANNEX L FORM ARTILLERY SURVEY CONTROL POINT

BEARING PICKET CARD/ARTILLERY SURVEY CONTROL POINT				
UTM Zone	UTM Square	Station Name		Accuracy
		Station Number		E + N:
		Map Series & Sheet Number		Azimuth:
				Altitude:
How Marked		E:	N:	Altitude
		Long:	Lat:	
N ↑				

Description	Sketch	Distance	Grid Bearing/Azimuth
			Mils:
			Degrees:
			Grads:
			Mils:
			Degrees:
			Grads:
			Mils:
			Degrees:
			Grads:
			Mils:
			Degrees:
			Grads:
			Mils:
			Degrees:
			Grads:

Method of Determination	Unit:
Horizontal:	Produced By:
Vertical:	Checked By:
Bearing/Azimuth	Date
Notebook Reference:	

(Reverse blank)

INTENTIONALLY BLANK

ANNEX M SCATTERABLE MINEFIELD FORMATS

M.1. EXAMPLE SCATTERABLE MINEFIELD REPORT

SUBJECT: SCATMIN REP
SCATMIN WARN
SCATMIN REC

REFERENCES.

LINE	Information/Data required
A	APPROVING AUTHORITY
B	TARGET/OBSTACLE NUMBER
C	TYPE DELIVERY SYSTEM
D	TYPES AND NUMBER OF MINES
E	SELF-DESTRUCT/SELF-STERILISE/SELF-NEUTRALISE PERIOD
F	AIM POINTS/CORNER POINTS OF MINEFIELD (STATE WHICH)
G	SIZE SAFETY ZONE FROM AIM POINTS/CORNER POINTS (STATE WHICH)
H	UNIT EMPLACING MINES/REPORT NUMBER
I	PERSON COMPLETING THE REPORT
J	DATE/TIME/GROUP OF EFFECTIVENESS
K	REMARKS

*) Check as appropriate

REMARK

For completion instructions, See next page.

ANNEX M TO
AArtyP-01

COMPLETION OF THE SCATTERABLE MINEFIELD REPORT, WARNING & RECORD

A. **Approving Authority.** Enter approving authority.

B. **Artillery Target/Engineer Obstacle Number**. If the minefield is part of barrier plan, enter the number of major unit and the obstacle number. If the minefield is not part of a barrier plan or does not have an ARTILLERY TARGET NUMBER, then leave blank or enter N/A.

C. **Type Delivery System**. Enter the type of delivery system that laid the minefield.

D. **Type And Number/Density Of Mines**. Enter as follows:
Enter AP for anti-personnel mines. Enter AT for anti-tank mines.
Enter AT/AP if both
Enter the number/density of each.

E. **Self-Destruct/Self – Sterilise/Sell – Neutralise Period**. Enter the time period in which the minefield will Self-destruct, self-sterilise, or self-neutralise.

F. **Aim Points/Corner Points Of The Minefield** (STATE WHICH). In requesting, if the system used to emplace the minefield uses a single aim point to deliver the mines, enter that aim point. If the system requires more than one aim point, enter the left and right aim points. If the system has distinct corner points enter those corner points. Based on this information, the delivery unit determines the necessary centre line and the aim points. When multiple aim points are required, that data is provided in SCATMINWARN, SCATMINREC etc and is originated by the delivery unit.

G. **Size Safety Zone From Aim Points/Corner Points** (STATE WHICH). If an aim point is given in line F, enter size safety zone from that aim point. If corner points are given in line F, enter size safety zone from these corner points.

H. **Unit Laying Mines/Report Number**. Reports should be numbered consecutively by each unit. Enter the emplacing unit and their report number.

I. **Person Completing The Report**. Rank and name of the person who completes the report.

J. **Date/Time/Group Of Effectiveness**. Enter the date/time/group (based on information provided by the delivery unit for SCATMINWARN).

K. **Remarks**. Enter any other items the reporting unit may consider important or if they are required by the Authorised Commander.

M.2. REQUEST PROCEDURES FOR SCATTERABLE MINE FIRE MISSIONS

TABLE 1 - INFORMATION REQUIRED FOR PLANNED TARGETS

(See Paragraph 6.1.2)

SERIAL	INFORMATION	EXAMPLE 1	EXAMPLE 2
1	Target Number	ZU 5730	TU 4230
2	Priority	1	2
3	Requesting Unit	HQ 4 CMBG	HQ 3 Armd Div
4	End Points/Aim Points (Notes 1, 5 and 6)	End Points NA 2150 6650 NA 2150 6690	End Points LB 3276 1887 LB 3440 1685
5	Minefield Width and	400 * 400	1500
6	Type of Mines, Density	RAAMS, HIGH ADAM, LOW	MLRS
7	Self Destruct (SD) Time	Short/Long	5
8	Scheduled or On Call	281100Z within 30 min	TOT 121530B
9	Caution NLT Emplacement	(If Required)	
10	Approval Authority	(If different from requested)	
11	Date Time Group of	280630Z	121015B

Notes:

1. Grid coordinates accurate to +/~ 10 meters.

2. Density required only for RAAMS/ADAM.

3. RAAMS/ADAM SD Times:

Short – 4 hours, Long – 48 hours.

4. Approval authority refers to Target Number and Date-Time Group of Request.

5. When end points are given it is the responsibility of the delivery unit to translate these details into aim-point coordinates

M.3. EXAMPLE ADJUSTED MISSION

(See Paragraph 6.1.2)

EXAMPLE 1	EXAMPLE 2
" (Call Sign) THIS IS (Call Sign) "	" (Call Sign) THIS IS (Call Sign) "
"FIRE MISSION BATTERY"	"ADJUST FIRE, RAAMS AND ADAM"
"GRID 572861 DIRECTION 2400"	"GRID 572861"
"COMPANY IN BMPs. RADIUS 300 STATIC" "CONVERGE"	"DISMOUNTED INFANTRY COMPANY" SUPPORTED BY 10 TANKS. 300 X 900" (Notes 1, 2 and 3)
"RAAMS AND ADAM"	
"ADJUST FIRE", (Notes 1, 2 and 3)	

Notes:

1. Adjustment is carried out with DPICM M483Al in the self-registering mode.

2. Following adjustment the observer would order FFE and would receive 24 RAAMS and 6 ADAM total. This is the standard FFE for RAAMS/ADAM target of opportunity.

3. All guns in the firing unit are to be CONVERGED onto the centre-point of the module.

M.4. MINEFIELD PLANNING SHEET

FIELD ARTILLERY DELIVERED MINEFIELD PLANNING SHEET		
SECTION A – MINEFIELD DATA		
1 TARGET NUMBER	2 PRIORITY	3 REQUESTER
4 MINEFIELD END POINTS (COORDINATES) FROM TO		
5 MINEFIELD DEPTH	6 MINEFIELD WIDTH	
7 ADAM (APERS) DENSITY	8 RAAMS (AT) DENSITY	
9 SELF DESTRUCT TIME SHORT LONG	A. SCHEDULED MINEFIELD ___HOURS___MIN.	
11 CAUTION NLT. EMPLACEMENT TIME	12 APPROVAL AUTHORITY	13 DATE TIME GROUP.
14 REMARKS		
SECTION B – G3/S3/ENG		
15 DTG. RECEIVED	16 DTG SAFETY ZONE DISSEMINATION	
17 REMARKS		
SECTION C – FSE/FSO		
18.DTG TO UNIT	19 DTG FROM UNIT	20. DTG TO G3/S3/ENG.
21 REMARKS		
SECTION D – FDC DATA		
22 TARGET NUMBER	23 FIRING UNIT	24 RANGE TO MINEFIELD CENTRE
B. TRAJECTORY ADAM LOW RAAMS LOW HIGH HIGH		26 DELIVERY TECHNIQUE MET + ΔV TRANSFER OBSERVER ADJUSTED.
27. AIM-POINT CO-ORDINATE (S) (LEFT AND RIGHT OR SINGLE)		
28 DTG MISSION COMPLETED		
29 REMARKS		

INTENTIONALLY BLANK

ANNEX N RECORD OF SPECIAL RESTRICTIONS

RECORD OF SPECIAL RESTRICTIONS

Notes

1. All Restrictions are annotated in the relevant chapter

2. Nations not ratified are at page ix.

CHAPTER	**NATION**
1	
2	
3	
4	
5	
6	
7	
8	
9	

INTENTIONALLY BLANK

ANNEX O RECORD OF SPECIAL CONSIDERATIONS

RECORD OF SPECIAL CONSIDERATIONS

Notes

1. All Restrictions are annotated in the relevant chapter

2. Nations not ratified are at page ix.

CHAPTER	**NATION**
1	
2	
3	
4	
5	
6	
7	
8	
9	

INTENTIONALLY BLANK

AArtyP-01(D)(1)