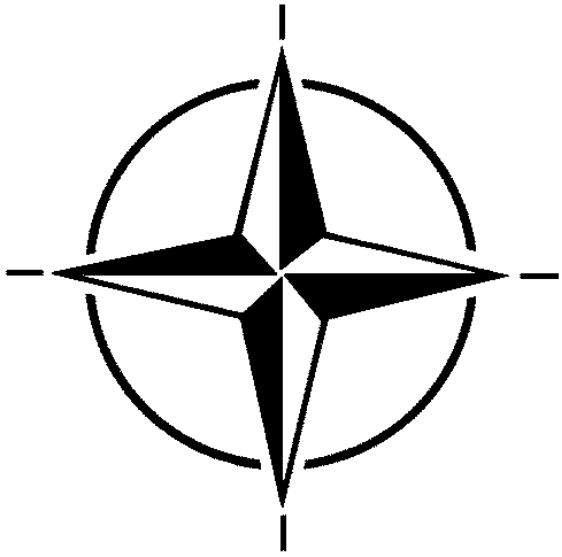


ATP-63
AJP-3.3.2.1

TACTICS, TECHNIQUES AND PROCEDURES

FOR

CLOSE AIR SUPPORT OPERATIONS

ATP-63
AJP-3.3.2.1

TACTICS, TECHNIQUES AND PROCEDURES

FOR

CLOSE AIR SUPPORT OPERATIONS

June 1999

Feedback

Any comments concerning this publication should be directed to:

NATO/ MAS
Bld Leopold III
1110 - Brussels, BE

NORTH ATLANTIC TREATY ORGANIZATION

MILITARY AGENCY FOR STANDARDIZATION (MAS)

NATO LETTER OF PROMULGATION

June 1999

1. ATP-63 - TACTICS, TECHNIQUES AND PROCEDURES FOR CLOSE AIR SUPPORT OPERATIONS is a NATO UNCLASSIFIED publication. The agreement of nations to use this publication is recorded in STANAG 7144.

2. ATP-63 is effective on a date to be promulgated by the Air Board, Military Agency for Standardization. When made effective it shall supersede the Interim Supplement to ATP-27 (B) which shall be destroyed in accordance with the local procedure for the destruction of documents.

A. GRØNHEIM
Major General, NOAF
Chairman MAS

ATP-63
AJP-3.3.2.1

TACTICS, TECHNIQUES AND PROCEDURES FOR CLOSE AIR SUPPORT OPERATIONS

Allied Tactical Publication-63 (ATP-63) Tactics, Techniques and Procedures for Close Air Support Operations, which is effective on a date to be announced by The Air Board, Military Agency for Standardisation NATO Headquarters is promulgated:

As directed
by the Chiefs of Staff

A A Milton
Major General
Director General Joint Doctrine and Concepts
Ministry of Defence

CHAPTER	RECORD OF RESERVATION BY NATIONS
1	None
2	None
3	None
4	None
5	None
6	**GR**
7	None
8	None
Annex A	None
Annex B	None
Annex C	None
Annex D	None

NATION	RESERVATIONS
GR	HAF cannot implement the Chapter 6 of ATP-63 (NIGHT OPERATIONS) due to lack of Light-Level TV (LLTV).

RECORD OF CHANGES AND AMENDMENTS

Change Number and Date	Date Entered	Effective Date	By whom Entered (Signature, Rank/ Grade)

Table of Contents

Chapter 8 - LASER OPERATIONS

Chapter 1

INTRODUCTION

101. General

1. Close Air Support (CAS) is air action against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces. This normally requires a Forward Air Controller (FAC).

2. When combat aircraft are directed by a FAC in close support of surface forces, standard procedures and high standards of training are essential for close coordination and mutual understanding between attack pilots and the FAC. To facilitate multinational and inter-command cross-operations, standard procedures are described in this document.

102. Purpose

1. The purpose of this document is to lay down the standard procedures, basic attack methods, profiles and briefing formats to be used by attack pilots and FACs. They apply to both ground and airborne FACs.

103. Scope

1. Nothing in this publication is intended in any way to restrict the development of tactics or additional procedures and techniques by national armed forces or NATO Commands. The requirement is that all air components which may be tasked to support surface forces of another nation or command, and all FACs, who may be required to direct aircraft of another nation or command, are able to do so through the application of the standard procedures outlined herein. This document should also serve as a reference for training in national armed forces.

104. Related Publications

AJP-01	Allied Joint Doctrine
ATP-33	NATO Tactical Air Doctrine *(currently under review)*
ATP-27/ AJP-3.3.2	Air Interdiction and Close Air Support
APP-7	Joint Brevity Words Publication
APP-8	Allied Tactical Air Messages (Formatted and Structured)
STANAG 2027	Marking of Military Vehicles

STANAG 2129	Identification of Land Forces on the Battlefield and in an Area of Operation
STANAG 3606	Evaluation and Control of Laser Hazards on Military Ranges
STANAG 3733	Laser Pulse Repetition Frequencies (PRF) used for Target Designation and Weapon Guidance
STANAG 3797	Minimum Qualifications for Forward Air Controllers

Chapter 2

DEFINITIONS AND TERMS

201. **Definitions**

1. The definitions listed below are those usually used in forward air controlling. Additional terms may be found in AAP-6, NATO Glossary of Terms and Definitions (English and French), and ATP-27(C), Air Interdiction and Close Air Support.

a. Close Air Support (CAS). - Air action against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces (AAP-6).

b. Contact Point (CP). - In air operations, the position at which a mission leader makes radio contact with an air control agency (AAP-6).

c. Control Point. - A position marked by aircraft, an electronic device, a conspicuous terrain feature, or other identifiable object which is given a name or number and used as an aid to navigation or control of aircraft.

d. Course. - The intended direction of movement in the horizontal plane (AAP-6). A course is expressed as a number of degrees of angle from a reference line - normally magnetic north. It does not include any calculations for wind or navigation system errors.

e. Forward Air Controller (FAC). - 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).

f. Heading. - The direction in which the longitudinal axis of an aircraft or ship is pointed, usually expressed in degrees clockwise from north (true, magnetic, compass or grid) (AAP-6).

g. Initial Point (IP). - A well-defined point, easily distinguishable visually and/or electronically, used as a starting point for the run to the target (AAP-6).

h. Minimum Attack Perimeter. - The minimum attack perimeter is the minimum distance measured back from the target along the final attack leg required for aiming and delivery of a weapon. It is dependent upon weapon characteristics, airspeed, altitude and dive angle.

i. Orbit Point. - A geographically or electronically defined location used in stationing aircraft in flight during tactical operations when a predetermined pattern is not established (AAP-6).

j. Pull-up Point. - The point at which an aircraft must start to climb from a low-level approach in order to gain sufficient height from which to execute the attack or retirement (AAP-6).

k. Reference Point. - A prominent, easily located point in the terrain (AAP-6). Used in CAS missions for making visual or weapons delivery adjustment.

l. Rendezvous Point. - A definable geographical/electronic position at which aircraft make visual/radar contact with other friendly aircraft prior to beginning an action or phase of operation, or to which to return after an operation.

m. Turn-in Point. - The point at which an aircraft starts to turn from the approach direction to the line of attack (AAP-6). For navigational planning purposes only, a theoretical turn-in point, based upon the relevant attack profile, is sometimes used to indicate the point at which the line of approach intersects the line of attack.

202. **Standard Terms and Brevity Words**

1. The following lists of standard terms (Table 2-1) and brevity words (Table 2-2) are used to minimize radio transmissions and provide common understanding while briefing, controlling and conducting CAS. A comprehensive list of Brevity Words is in APP-7 (A), Joint Publication Brevity Words.

TABLE 2-1, STANDARD TERMS

ITEM	MEANING
a. Clock Code	Used to indicate direction both in the air and on the ground. Clock references are given to the nearest hour (see Figure 2-1). – In the air, 12 o'clock is always oriented to the nose of the aircraft. – On the ground, 12 o'clock is normally oriented with the planned attack course, unless stated otherwise. The clock reference should normally be combined with a distance indication. In this case the clock code should precede the distance, e.g. "2 o'clock 1000 meters".
b. Distances	Distances should be in nautical miles for the briefing, and kilometers/meters for talk-on. Distances in meters should be estimated to the nearest 10 below 100 meters and to the nearest 100 above.
c. Pull-up	An attack manoeuvre in which the attack aircraft climbs from low level to a sufficient altitude from which to carry out the appropriate weapon delivery manoeuvre.
d. Apex	The highest altitude gained during pull-up manoeuvre.
e. Directions	The clock code, cardinal points (North, South, East, West) or left/right, short/beyond may be used to indicate directions.

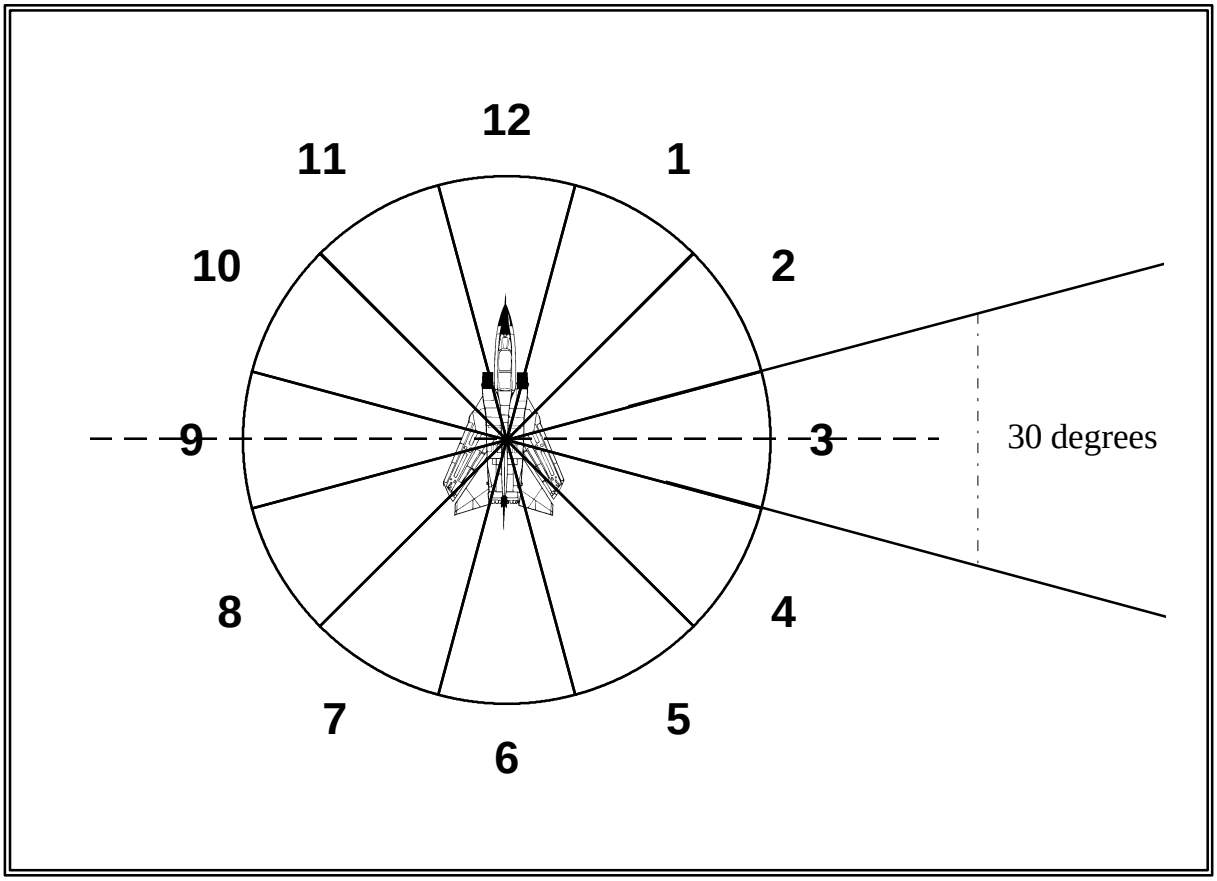
TABLE 2-2, BREVITY WORDS

CALL	MEANING
"As fragged"	Informative call indicating that the mission information is as listed in the Air Tasking Order (ATO)/Air Task Message (ATM).
"Bingo"	Informative call that aircraft has reached a fuel state where recovery is required.
"Blind"	Descriptive call indicating that an aircraft has lost "Visual" with friendly aircraft/ ground position. Opposite of "Visual".
"Break (Up/Down/Left/ Right)	Directive call to perform an immediate maximum performance turn in the indicated direction to avoid a threat.
"Check X (Left/Right)"	Directive call from FAC for aircraft to turn X number of degrees left or right and maintain new heading.
"Chattermark"	Directive call to commence briefed radio procedures to counter communications jamming.
"Cleared Hot"	Ordnance release is authorized.
"Contact"	Aircrew has a specific ground object, light, reference point, target, etc. in sight. Opposite of "Looking".
"Continue"	Continue present manoeuvre; does not imply clearance to engage or expend ordnance.
"Continue Dry"	Continue simulated attack. Release of ordnance is not authorized.
"Direct Control"	Informative call that the terminal controller is able to observe and control the attack. Aircrew must receive clearance from the terminal controller ("cleared hot") before releasing ordnance.
"Flare"	Directive call for aircrew to dispense self-protection flares to defeat an infrared (IR) threat.
"Give Attack Plan"	FAC requests attack plan of aircrew.
"Go Active"	Directive call to initiate Have Quick communications.
"Go Secure"	Activate encrypted voice communications.
"Got Briefing"	Aircrew indicates that Rear Briefing was received.
"Hold (High/Low)"	Directive call for aircrew to maintain height while awaiting further

instructions.

CALL	MEANING
"In"	Informative call indicating a turn to hot aspect relative to a threat/target.
"In Dry, (Direction)"	Aircrew has begun final attack run and intends to conduct a simulated attack in which ordnance will not be released. Direction should be used when an attack is made from medium/high altitude. It will indicate the cardinal direction (North, South, East, West) from which aircraft will attack.
"In Hot, (Direction)"	Aircrew has begun final attack run and intends to expend ordnance. Direction should be used when an attack is made from medium/high altitude. It will indicate the cardinal direction (North, South, East, West) from which aircraft will attack.
"Indirect Control"	Informative call that the terminal controller, unable to observe the attack, is able to control it with information provided by someone who can observe the attack. This form of control must be authorized by the manoeuvre force commander. Aircrews must receive clearance from the FAC ("cleared hot") before releasing ordnance.
"Jink"	Directive call to perform immediate unpredictable manoeuvres to negate a surface-to-air threat such as anti-aircraft artillery (AAA).
"Looking"	Aircrew has not seen the ground object, light, reference point, target, etc. which the FAC has pointed out. Opposite of "Contact".
"Playtime"	Informative call indicating the amount of time the aircraft can remain in minutes before terminating present activity/ return to base (RTB).
"Push (Frequency/Channel/ TAD)"	Directive call to go to designated frequency, channel or TAD. No acknowledgement required.
"Request line-up"	FAC requests information on call sign, mission number, number and type of aircraft, ordnance, playtime and abort code.
"Rope"	Illumination of an aircraft with an IR pointer.
"RTB"	Return to base.
"SAM (Direction)"	Informative call indicating visual acquisition of a SAM or SAM launch; should include position.
"Snake"	Directive call to oscillate an IR pointer about a target.

CALL	MEANING
"Sparkle"	1. Target marking by a steady IR pointer. 2. Target marking by Gunship or airborne FAC using incendiary rounds.
"Steady"	Directive call to stop oscillation of IR pointer.
"Stop, (Abort Code), Stop, (Abort Code), Stop, (Abort Code)"	FAC directs aircrew to abort the attack. It is a mandatory instruction. This call is authenticated with a predetermined ICAO character as an abort code.
"Terminate (Sparkle/Spot)	Directive call to stop either IR or Laser designation of the target as applicable.
"Triple A (Direction)"	Informative call indicating visual acquisition of AAA fire; should include position.
"Visual"	Informative call indicating sighting of a friendly aircraft/ground position. Opposite of "Blind".
"Winchester"	Informative call indicating the aircraft is out of ordnance.



Clock Code

Figure 2-1

CHAPTER 3

DUTIES AND FUNCTIONS

301. General

1. A FAC may be either an experienced operational attack pilot or another person specially trained to perform FAC duties. The intention is not to restrict the selection of individuals, but rather to ensure that any person employed as a FAC is capable of adequately and safely controlling aircraft engaged in CAS. STANAG 3797 details the minimum qualifications for FACs.

302. Additional Functions

1. A FAC may be required in certain circumstances to perform functions and duties additional to those described below. In many instances he may be the only individual capable of providing a land force formation or unit with specialist advice on air matters. Particularly if he is an Airborne FAC (ABFAC), he may also be called upon to perform such tasks as artillery fire adjustment, reconnaissance, observation duties, etc.

303. Duties of a FAC

1. The duties outlined in the following paragraphs are those directly connected with the actual control of a CAS mission. They are of a general nature only and must be adapted as necessary to suit the prevailing circumstances.

304. Target Location

1. The FAC is responsible for assisting the aircrew to locate the target. In many instances the pilot will have little or no information on the target, and may be unfamiliar with the target area. The FAC assists the aircrew to acquire the target by:

a. Providing a precise target location in the form of a map reference/common grid reference appropriate to the weapons and navigation systems of the aircraft.

b. Computing the navigational details of the attack pattern to be used.

c. Passing a detailed target description that will give the aircrew a mental picture of the target, and the immediate target area, before the attack is started.

d. Marking the target or a suitable reference point when possible by physical or electronic means.

e. Directing the aircrew onto the target and, when necessary, controlling the aircraft throughout the attack in order to position it for weapon release.

305. **Safety of Own Troops**

1. The location of friendly forces must be determined by the FAC and this information passed to the aircrew in a form that can be readily used. The position of friendly forces is to be acknowledged by the aircrew in the form of a read-back of friendly forces grid reference. Briefing the position of friendly forces and the read-back actions are mandatory actions. When planning the attack pattern to be used, the FAC should select an axis of attack which will ensure, as far as is possible, that inadvertently released weapons will not endanger friendly forces. If aircraft are observed attacking friendly forces, the FAC must order the attack to be stopped immediately.

306. **Safety of Aircraft**

1. The control of aircraft operating in the forward battle area is normally the responsibility of another agency. However, the FAC is responsible for:

a. Planning the attack to avoid ground fire as much as possible.

b. Informing the attack aircrew of any obstructions or terrain features that might constitute a hazard on the approach to or in the target area.

c. Informing the attack aircrew of known enemy air defences in the target area.

d. Informing the attack aircrew of the presence of any aircraft, particularly enemy aircraft, sighted in the target area.

e. Providing current or estimated weather in the target area, including wind direction/velocity and altimeter setting.

f. Clearing the mission for the attack and, if necessary, each aircraft on each weapon delivery pass.

g. Suggesting or if necessary, assigning the best egress route.

h. Advising on such matters as safe bailout area.

i. Providing calls to the attack aircrew for evasive manoeuvres when observing active engagements by air defences.

307. **Coordination**

1. The FAC must coordinate the air attack with the fire and movement of friendly troops. He will, if necessary, also arrange for target marking fire and suppressive fire onto enemy air defences within his area of operations.

308. **Weapons**

1. When mixed weapon loads are carried by the attacking aircraft, the final decision to use one or the other type of weapon is taken by the crew. The FAC may recommend the weapons to be used.

309. **Damage Assessment**

1. When the attack has been completed, the FAC and/or the attacking aircrew will assess target damage for completion of the In-flight Report.

CHAPTER 4

TACTICS AND ATTACK METHODS

401. General

1. There are a number of factors which aircrews and FACs should consider in determining the tactics and attack methods to be used. These include general operational situation, terrain and obstructions, weather, target defences, number of attack aircraft, their type, equipment, and ordnance, location of own troops and egress routes.

402. Responsibility

1. It is impractical to prescribe all the possible tactical variations for CAS, nor would it be desirable to do so. Decisions regarding the overall tactics of air forces in any particular operational environment must remain the responsibility of the air commander concerned. These decisions apply particularly to whether high, medium or low altitudes are to be flown, and whether single or multiple-pass attacks should be carried out. FACs must, therefore, become familiar with the concept of operations applicable to the different forces operating in their particular areas.

403. Low/Very Low Level Attacks

1. Low or very low level approaches and tactics may be used due to enemy defences, weather, or the desire to maintain surprise.

a. Advantages of low/very low level tactics include the following:

(1) Reduces enemy radar detection by using the earth's curvature for masking.

(2) Reduces chance of attack from enemy surface-to-air weapon systems by using terrain for masking.

(3) Degrades enemy Ground-Controlled Intercept (GCI) radar coverage. This denies intercept information to enemy fighters and forces enemy aircraft to rely on visual or onboard acquisition systems.

(4) Reduces enemy weapons envelope lethal zones during high speed, low altitude ingress.

(5) Improves friendly aircraft manoeuvre performance.

(6) Improves accuracy of non-precision-guided munition (non-PGM) weapons.

b. Disadvantages of low/very low level tactics include the following:

(1) Fuel consumption rates are high.

(2) Navigation is extremely demanding and requires a high level of aircrew skill. Navigation is easier for aircraft equipped with inertial navigation or Global Positioning System (GPS).

(3) Exposure to small arms, AAA systems, and IR guided weapons increases.

(4) Communication with and visual control by the FAC are difficult.

(5) Aircrews have less time to acquire and identify the target and position for successful attack.

404. **Medium/High Level Attacks**

1. A relatively high approach run to the target may be flown in a permissive air defence environment or where the attack aircraft have available adequate defence penetration suppression aids.

a. Advantages of medium/high altitude tactics include the following:

(1) Reduced fuel consumption rate.

(2) Reduced navigation difficulties.

(3) Improved formation control.

(4) Allows considerable manoeuvre airspace and allows aircrews to concentrate on mission tasks instead of terrain avoidance tasks.

(5) Allows communications, unaffected by terrain, between aircrews and control agencies.

(6) Reduces exposure to certain AAA and man-portable IR SAMs.

(7) Target acquisition and identification can be improved.

b. Disadvantages of medium/high altitude tactics include the following:

(1) Enemy acquisition radars can detect the attack force at long range. This allows the enemy to prepare its air defences.

(2) The attack force may be vulnerable to some enemy SAM systems and enemy fighter interceptors before entering the target area if local air superiority has not been achieved.

(3) Weather may prevent visual navigation and obscure the target area.

(4) Bombing accuracy may be degraded unless precision-guided munitions (PGM) are used.

(5) High altitude tactics may prevent the ground FAC from seeing the attacking aircraft.

405. **Pull-up Manoeuvre**

1. During low/very low level attacks, it may be necessary to end the approach run with a pull-up manoeuvre in order to enter the weapon delivery manoeuvre. At a predetermined point, the pull-up point, the pilot initiates a climb to an apex point from which he manoeuvres to establish a diving attack line with the target. The apex must be at a sufficient distance from and altitude above the target that the necessary delivery dive angle and other release conditions can be met.

406. **Single Attacks**

1. In hostile air defence environments it may not be feasible, for survival reasons, for aircraft to make more than one pass at a target. The FAC's attack plan and mission control must enable aircrews to destroy a target on the first attack run. Target acquisition by aircrews in sufficient time to allow for weapons release is the major problem. Should the initial attack be unsuccessful for any reason, it is usually better, if time and other circumstances permit, for the attack aircraft to return to the IP. In this case the FAC will consider a different run-in to the target, altering the attack tactic.

407. **Multiple Attacks**

1. Some situations may require multiple attacks by aircraft to achieve the necessary target destruction or neutralisation. Circumstances will dictate whether the FAC will control each successive attack, or allow the mission leader to control the subsequent attacks. In the latter case, the FAC will continue to monitor each aircraft's attack for safety reasons, and will always be prepared to assist the mission at any stage in the attacks. Multiple attacks should only be accomplished in a favourable air situation.

408. **Restricted Direction of Attack**

1. It may be necessary for the FAC to restrict weapon deliveries to a particular direction or cone of directions. This can be due to hazards such as terrain, but normally is due to tactical limitations such as location of own troops and the effects and patterns of various weapons, e.g. laser target marking/designation requires attacks within a particular cone.

409. **Attack Profiles**

1. If possible, details of attack profiles for particular aircraft should be obtained by the FAC prior to commencing operations in any particular area.

CHAPTER 5

TARGET IDENTIFICATION

501. General

1. Attack aircrews must locate and identify targets quickly and accurately. This process will be complicated by target camouflage, a crowded, active battle area, the distraction of enemy fire and difficult flight manoeuvres. The FAC is the key to accurate target identification and should apply all of his skill and available resources towards assisting attack aircrews with this task. There are several ways in which this can be accomplished. Innovative tactics and techniques can be used to improve the effectiveness of methods used for target identification and indicating positions of own troops. Developments in target marking, such as laser, should greatly assist FACs and aircrews in this procedure (see Chapter 8). However, there will undoubtedly be circumstances when the basic methods outlined in this chapter will still be applicable.

502. Marking Own Positions

1. It is sometimes necessary to mark friendly forces' front-line positions for positive discrimination between own troops and those of the enemy by visual, mechanical or electronic means. Marking systems must always be used in a secure and verified manner to minimize the effects of enemy countermeasures.

503. Coloured Smoke

1. Where feasible, coloured smoke is an excellent means of marking. If the target is very close to friendly positions, it will be better to maintain a continuous emission of smoke during the attack. This minimizes the possibility of error during weapon deliveries. In order to prevent effective use of decoy smoke, marking smoke should be laid as late as possible, shortly before the attack aircraft enter visual range of the target. Colour and position of the smoke should then be confirmed to the FAC by the mission leader. Smoke colour should not be discussed over the radio prior to this point.

504. Red Smoke Limitations

1. Red smoke is an internationally agreed signal for distress, and also a NATO agreed signal for a "No Drop" condition or an emergency closing of a landing drop zone. Therefore red smoke should not be used to avoid confusion.

505. **Panels**

1. Fluorescent marking panels can be used to mark friendly forces. For best results they should be oriented for maximum visibility for the attack aircrews. In some circumstances it may not be practicable or possible to use this method due to topography or the likelihood of enemy air attack.

506. **Signal Mirror**

1. This device provides a highly directional system for daytime, sunlight conditions. It is very effective and has the advantage of being covert. However, attacking aircrew may mistakenly identify light flashes from a signal mirror as groundfire. FACs must use caution to ensure that no confusion exists.

507. **Beacon and Laser**

1. Attacks using beacons, airborne laser trackers or precision guided weapons (including laser guided weapons) may involve modifications to standard procedures.

2. Laser Operations are covered in Chapter 8.

508. **Other Means**

1. Signal lamps and other lighting equipment may also be employed. In all cases the aim should be to produce an effective signal that is also covert.

2. At low light levels at night, it may be possible to mark the target with an IR pointer.

3. At low light levels at night, friendly positions may be marked by a variety of IR beacons.

509. **Low/Very Low Level Target Acquisition Methods**

1. The target indication methods described below have proved suitable for assisting aircrews to locate targets. The decision as to which method should be applied by the FAC mainly depends on the aids available to him and on those carried by the attack aircraft. In general, FACs should use various methods in combination with one another. Most means of target indication can be divided into two main methods:

a. Reference-Point Method. Using this method, a FAC selects a prominent point that is unique and can easily be seen from the air. It can be a natural feature such as a river bend, wood or lake or can be artificial, for example, smoke, laser, light, ground panels, etc. When the pilot locates the reference point, the FAC uses it to give guidance in direction and distance to the target location either directly or via prominent terrain features. The reference point should normally be 1000 meters left or right and 1500 meters short/beyond the target location. The two methods of giving guidance from a reference point normally used are:

(1) A clock bearing and distance.

(2) In terms of left/right or short/beyond, plus a distance.

Directions are relative to the planned attack course of the attack aircraft.

b. Visual Talk-in Method. The reference-point methods described above, use the principle of directing the pilot's eye on to some feature or point on the ground or in the air and from there to the target. With the visual/talk-in method the FAC, using voice commands, directs the pilot throughout the attack pattern in order to position the aircraft correctly for target acquisition and weapon release. This method can also be combined with any of the reference-point methods, e.g. a FAC could give voice commands until the aircraft is correctly positioned and the pilot can see the designated reference point. A FAC could also revert to this method when the aircrew fails to see the reference point. A FAC should not plan to use the visual/talk-in method unless other means of target indication are neither available nor suitable. Once the FAC has the aircraft in sight he directs the pilot by his commands (e.g. "TURN LEFT - NOW" or "TURN RIGHT - NOW") until the aircraft is lined up on the final attack heading, and then tells the pilot to "ROLL OUT - NOW". When using this method it is generally inadvisable to tell a pilot to turn a specified number of degrees in either direction as he will have to take his eye off the target area momentarily to look at his heading indicator. It is also difficult for the FAC to judge the number of degrees accurately.

510. **Medium/High Level Target Acquisition Method**

1. The difficulty of target acquisition from medium/high altitudes forces the FAC to use a target acquisition method which starts with big features (villages, rivers), then smaller features (road crossings, woods, valleys) and finally ends with the target position.

2. To ensure the pilot and the FAC are both referencing the same cardinal direction during talk-in, the controller can point out a feature on the ground such as a section of a road or a river. The direction should be a cardinal direction to prevent confusion.

3. To help the pilot estimating distances, the FAC can point out a reference distance over the ground. The reference distance (unit) should refer to the length of available feature (not meter or yards).

CHAPTER 6 R

NIGHT OPERATIONS

601. General Considerations

1. Ground forces, both friendly and enemy, conduct operations at night as well as during daylight. The successful execution of night CAS is one of the most difficult missions on the battlefield. Successful CAS at night accentuates the requirement for detailed mission planning, clear communications and solid procedural discipline.

a. Advantages. Night CAS exhibits the following advantages:

(1) Degrades or eliminates effectiveness of enemy optically-directed AAA and optically guided SAMs. Increases target acquisition problems for infrared-guided SAMs.

(2) Degrades or eliminates enemy visual detection of attacking friendly aircraft.

(3) Enemy gun muzzle flash, tracers, and missile/rocket motors are generally easier to see and react to at night.

(4) IR friendly position markers as well as IR target pointers can expedite pinpointing friendly and enemy target locations for forces equipped with night vision devices.

b. Disadvantages. Night CAS exhibits the following disadvantages:

(1) CAS aircrew cockpit workload is significantly increased, particularly in single-seat aircraft.

(2) Both the CAS aircrew and the FAC may have greater difficulty in pinpointing both friendly force position and enemy target location.

(3) Direct control of the CAS aircraft by the FAC is sometimes not possible, since the FAC may not have the aircraft in sight.

(4) Night CAS typically requires more time for successful execution, which will increase the time-on-station requirement for each mission.

602. Employment

1. Fundamental day CAS procedures also apply during night CAS. However, night CAS demands a higher level of proficiency by both CAS aircrew and FAC, and may require modified tactics, techniques and procedures. Specific attack and delivery techniques for night CAS vary depending on the aircraft.

a. Visual Employment. Visual deliveries during night are difficult, but are still a viable option. Artificial illumination may be used to enhance target acquisition. Typical methods include use of visual light and IR parachute-retarded illumination flares, visible and IR rocket flares and target position marking flares which burn on the ground. Such flares may be delivered by artillery, mortar, or by a dedicated aircraft. Positioning of these devices must be carefully coordinated so as not to degrade friendly night vision devices. However, through careful planning and coordination, visible light flares may be placed in a position that degrades enemy night vision devices while enhancing the effectiveness of friendly night vision devices.

b. Aircraft System-Aided Employment. CAS aircrews typically rely more heavily on aircraft systems during night CAS. While the following aircraft systems can be used independently, combining the systems increases the chances of mission success. The systems include the following:

(1) IR and Electro-Optical Systems. Forward looking infrared (FLIR) systems and low light-level television (LLTV) systems may provide primary navigation, terrain avoidance, and targeting reference for night CAS. FLIR systems use the far IR wavelengths to create an image based on differences between object and background temperature. LLTV systems use light intensifiers to produce an image in the visual wavelengths in light conditions too low for normal unaided vision. Cloud cover, humidity, precipitation, thermal crossover, and battlefield conditions (smoke, dust, haze, etc.) may degrade FLIR and LLTV effectiveness.

(2) Laser. Procedures for target identification and designation by laser are the same for night CAS as those used during daytime operations (see Chapter 8).

(3) Radar. Radar deliveries can be an option for certain aircraft under certain conditions. In order to perform radar-directed bombing, the target or offset aimpoints must be radar significant.

(4) GPS. The advent of GPS use by both the CAS aircraft and the FAC can increase the accuracy of CAS deliveries both during day and night. In many aircraft, accurate GPS coordinates supplied by the FAC will allow other aircraft sensors (such as a FLIR or radar) to be slewed into the desired target area. This can facilitate rapid target acquisition and identification.

(5) Data-Link. Target positions may be transferred into the aircraft's weapons computer systems via data-link.

c. Night Vision Goggle (NVG) Employment. NVGs use the far visual (red) and near IR wavelengths to produce a visible image for aircrew and ground personnel. The quality of the image is dependent on the amount of ambient light present and the amount of light which different objects reflect. When used in CAS aircraft, they are an additional sensor that enhances night CAS employment. NVGs are best used by aircrew to complement aircraft systems during night CAS, however, under the proper weather and illumination

conditions, NVGs alone can be used to successfully identify friendly forces and attack targets at night.

(1) Advantages. NVGs exhibit the following advantages:

(a) NVGs complement aircraft systems by enhancing aircrew situation awareness.

(b) Under proper conditions, NVGs may be used as the primary source for navigation, terrain avoidance, targeting and weapons delivery.

(c) NVGs allow FACs and aircrew to see the illuminated spot from small, lightweight IR pointers. These pointers may be used to rapidly identify both friendly positions and enemy targets.

(2) Disadvantages. NVGs exhibit the following disadvantages:

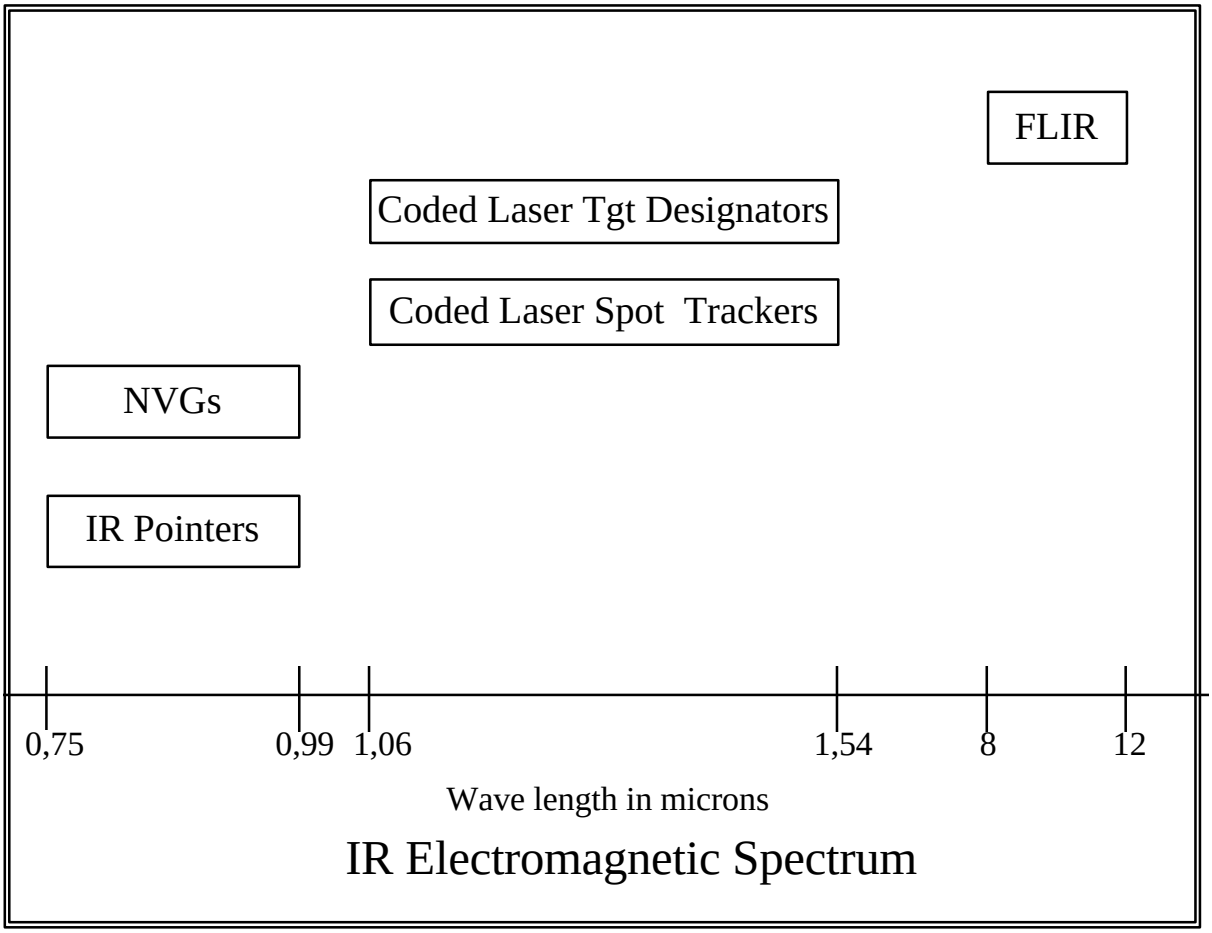
(a) Reduced illumination caused by moon phase, weather, or battlefield obscuration may degrade NVG performance.

(b) NVGs have a restricted field of view and poor depth perception which can increase aircrew workload. Extensive training by aircrew is required to ensure night CAS mission success.

(c) Enemy use of NVGs may restrict use of IR pointers.

d. IR Pointers. Small, lightweight IR pointers produce a narrow laser beam invisible to the unaided eye but which produces a bright spot which is clearly visible using NVGs. This bright spot can be moved by ground personnel to identify friendly positions and enemy targets to the NVG-equipped aircrew. Unfortunately the bright spot is dependent on the pointer power output and is degraded significantly by atmospheric particles, range and increase in beam width.

e. Equipment Compatibility. Figure 6-1 compares aircraft system compatibility with NVGs. As depicted, NVGs and IR pointers operate in the near IR spectrum and are only compatible with each other. Likewise, coded laser target designators and coded laser spot trackers operate in the mid IR spectrum and are only compatible with each other. IR pointers cannot designate for laser spot trackers, and NVGs cannot see the spot from coded laser target designators. FLIR systems operate in the far IR spectrum and cannot see either the spots from IR pointers, or from coded laser target designators. However, since these systems operate in different portions of the IR spectrum, they complement each other during night CAS employment.



Equipment Compatibility

Figure 6-1

CHAPTER 7

PHASES OF CAS OPERATIONS AND ASSOCIATED PROCEDURES

SECTION I - PHASE A 'PLANNING'

701. General

1. Planning for an air attack can be the most important function of the FAC's mission. The ability to assist pilots and ensure a successful mission requires considerable knowledge and demands from the FAC, detailed coordination, cooperation and integration of efforts.

702. Coordination

1. When the request for CAS is developed, the FAC or Tactical Air Control Party (TACP) determines and/or designates the various control points to be used. These should be clear of ground fire and are usually associated with distinct ground features. If the request is approved, the FAC must endeavour to obtain the mission data, i.e. number and type of aircraft and ordnance, their mission number, callsign and their estimated time of arrival. He then coordinates their arrival with appropriate land force elements and develops his own plan accordingly.

703. Preparation

1. As to time, the distinction between coordination and preparation is minimal, but the FAC is considered in this phase to have accumulated sufficient information to begin planning the attack. The FAC must apply his full knowledge of the enemy and friendly situation, attack aircraft capabilities and limitations, terrain, weather and safety factors in selecting the attack method and target indication method to be used. During the preparation phase he must:

a. Select the best position from which laser designation and aircraft guidance can best be achieved.

b. Warn the surface-based fire support and air defence components of the impending CAS mission. If target-marking fire, suppressive fire, or laser designation is to be provided, the support coordination should be arranged at this time.

c. Plan the attack.

d. Make final coordination with the land force commander or his designated representative just prior to the attack.

704. **Navigational Terms**

1. All directions for calculations and the briefing will be relative to magnetic north, unless true is requested by the pilot.

705. **Wind**

1. FACs, when calculating directions or flying times for attack patterns, will not include any corrections for wind. However, FACs should be prepared to give a wind velocity, if required. If a FAC considers the wind velocity such that it will substantially affect the attack pattern he should advise the aircrews accordingly.

2. Wind can greatly affect marking smokes and FACs must take this into consideration when determining where and when to place smoke.

706. **Latitude/Longitude**

1. Map references of locations are normally given in UTM grid. Some aircrews, flying aircraft with inertial navigation systems may wish locations of various points to be given in latitude and longitude. FACs should be prepared to provide this when requested.

2. FACs and aircrews should be aware of missdistances generated by the use of coordinates with different geodetic datums (e.g. European Datum 1950 [ED-50] and World Geodetic System 1984 [WGS-84]). Therefore either the same map editions should be used, or information on the respective datum has to be exchanged. The FAC should be provided with an easy calculation formula to convert positions based on different geodetic datums for the specific area of operations.

SECTION II - PHASE B 'BRIEFING'

707. General

1. In order to verify the authenticity of the agencies, an authentication procedure will be executed prior to further communication. Briefing is a very important part of the FAC's mission. A concise and accurate briefing in accordance with the Standard Briefing Format will do much to facilitate multinational operations and cross-tasking between regions. In a high threat/jamming environment, the communications must be limited to mandatory/essential information. A Standard FAC Briefing Format for CAS is at Annex B, and a Standard Briefing Format for a Rear Briefing is at Annex C.

708. Briefing Considerations

1. All CAS missions are facilitated by receiving a mission briefing from a Rear Briefing Agency (RBA), e.g. Airborne Battlefield Command and Control Centre (ABCCC), Air Support Operations Centre (ASOC) / Air Operations Coordination Centre (AOCC), TACP, ABFAC, or a designated Airborne Rear Briefer (ARB), etc. This briefing should pass as much information as possible about the CAS mission to the aircrew, which will reduce the amount of communication required by the FAC. The RBA should use the Standard FAC Briefing Format to pass mission information to the CAS aircrew. The rear briefing should be passed as early as possible, whilst the aircraft is least vulnerable to physical and electronic threat. At the end of the briefing the rear briefer should provide an identifier letter (similar to ATIS information), e.g. 'YOU HAVE INFORMATION ECHO'.

2. Radio contact with the FAC will normally be made by the mission leader prior to a CP, whenever operationally possible. He will indicate the rear briefing received with the identifier, e.g. 'GOT BRIEFING ECHO'. The FAC is to provide an updating brief as the mission runs into the attack, and a final release clearance for the attack.

709. Standard FAC Briefing Format

1. The Standard FAC Briefing Format for CAS at Annex B is used by the FAC and the attack aircrews so that the sequence of information is clear and concise. The briefing consists of a series of short statements with the mission leader required to repeat the IP, target location, mandatory attack heading and the position of friendly forces.

2. The Standard Rear Briefing at Annex C is used by RBAs and attack aircrews so that the sequence of information is clear and concise. The briefing is to be used when aircraft are diverted from CAS to Air Interdiction (AI) or are assigned AI missions short of the Fire Support Coordination Line (FSCL). The briefing should include as a minimum the target location in grid reference or latitude/longitude and a 'no friendlies within' distance. This will serve as targeting information for diverted missions or update/confirmation for those on preplanned AI sorties conducted short of the FSCL. Rear Briefs are to be positively acknowledged by the aircrew by means of a read-back of target location and 'distance of friendly forces' details.

710. **Check-in with FAC**

1. Aircraft check-in procedures are extremely important to the flow of information between airborne assets and control agencies. The CAS check-in briefing allows the FAC to better plan the use of the CAS aircraft ordnance and playtime, thereby enhancing mission effectiveness and aircraft survivability. The briefing should comprise the following items in the order as shown:

a. Aircraft Call Sign/Mission Number. Both items should be passed on initial contact. After initial contact is established, the FAC must be authenticated. After authentication, only the aircraft callsign is required for further communication. It may not be possible to pass the following briefing items to the FAC in a non-permissive environment (presence of communications jamming, poor communications due to low altitude, etc.). If in the interest of brevity or security the mission leader wishes to proceed immediately with the FAC briefing, he may end the CAS check-in briefing by using one of the following phrases:

(1) 'AS FRAGGED', which indicates to the FAC that the mission information (number and type aircraft, ordnance, playtime, etc.) is as listed in the ATO/ATM.

(2) 'WITH EXCEPTION', which indicates some item of the mission information is different than listed in the ATO/ATM. Details will be passed if requested by the FAC.

b. Number and Type of Aircraft.

c. Ordnance. This information may be passed in the form of a Standard Conventional Load (SCL) code if previously coordinated, or by specifying in detail the armament available. Numbers of ordnance should be total for the entire flight.

d. Position. Position is usually given relative to the contact point.

e. Playtime. This is the length of time in minutes that the mission is available for conduct of attacks.

f. Information Identifier. This is a letter from the NATO alphabet to identify the rear briefing to the TACP and to speed up the FAC check-in.

g. Abort Code. May be passed now or after mission leader receives the FAC briefing. May be provided by mission leader or FAC.

2. An example briefing is listed at Annex A.

711. **FAC Information**

1. The FAC acknowledges the information given by the mission leader with his callsign. He then gives the standard briefing in accordance with the format at Annex B.

a. IP. Initial Point from which the attack is to be carried out. To be read back by the pilot.

b. Bearing. Bearing to the target from the IP in degrees magnetic, or degrees true if requested.

c. Distance. Distance to the target from IP in nautical miles, to the nearest tenth.

d. Target Details (Lines D,E,F). Target UTM or LAT/LONG as required, elevation in feet AMSL and target description. The target description will constitute a brief statement of what the target is and where in relation to nearby features. The target location is to be read back.

e. Mandatory Attack Heading. Mandatory attack heading is to be briefed and read back even if the item is 'NONE'. This ensures that the attacking crew is aware of attack heading restrictions.

f. Friendly Forces. Always given; either as a precise location or none within a specified distance from the target. To be read back by the pilot.

g. Attack Clearance. Following receipt of the information contained in sub-paras a to f, the mission leader must read back the IP, target location, mandatory attack heading (even if 'NONE') and position of friendly forces (Lines A, D, G and H in the format at Annex B).

h. Target Indication. The method to be used for target indication is briefed. If a laser or beacon is being used the relevant details are passed.

i. Threats. Information on enemy air defences in the target area is given here. If there have been no reports of enemy air defences then this should be stated.

j. Weather. If weather is likely to affect the attack, weather status is passed at this stage. If cloud heights are mentioned, they are to be given in feet above ground level, and visibility is passed in meters. If the QNH is available, the standard way of passing it is in millibars, however some aircraft require it in inches. The surface wind direction can be given either in degrees or as a quadrant with the speed in knots. If there is nothing significant to report then this line of the briefing should be omitted.

k. Hazards. Information on hazards to the attacking aircraft should include natural or man made obstacles in the target area or on the approach to it. If there are no significant hazards then this line should be omitted.

l. Egress. If appropriate details of egress routing can be passed. Again if there is nothing to report, the line should be omitted.

712. **Briefing Technique**

1. To defeat the effectiveness of enemy jamming, the FAC and the mission leader must be able to exchange all the vital information in short, concise, bursts of radio transmissions. Deliberate transmission breaks must be introduced. The technique should be to transmit short groups of two or three words between each deliberate break. A crisp, concise briefing must therefore be prepared carefully in advance by the FAC. If the mission leader fails to receive any of the information in the briefing he must ask in an equally crisp fashion for it to be repeated. For example if he asked for 'LAT' and 'LONG' and received the 'Lat' clearly but not the 'Long' he should utter the single word 'LONG'. The FAC will then retransmit the crucial missing words.

2. At night, depending on the mission leader's experience, it may be necessary for the FAC to transmit only one line of the briefing at a time and wait for the pilot to read back before continuing.

3. It is fully appreciated that during initial FAC training lengthier briefing techniques may be appropriate, but the ultimate goal must always be to accomplish the briefing using transmissions of as short a length as possible.

713. **Communications Considerations**

1. The in-flight briefing should be conducted to reduce the effects of communications jamming and should take place as far behind the Forward Line of Own Troops (FLOT) as possible. This will decrease exposure of aircraft to enemy air defence threats and reduce the effects of communications jamming. Appropriate agencies should be used to relay as much information as possible prior to arrival of the flight at the CP/IP. Upon initial FAC/aircrew radio contact, the need for short, concise, transmissions is imperative. Modern, frequency agile radio equipment (e.g. Have Quick-II) will ease these problems.

SECTION III - PHASE C 'EXECUTION'

PART 1 - GENERAL CONTROL PROCEDURES

714. General

1. When the FAC clears the aircraft for the attack, the final portion of the control phase starts. This is the most demanding phase for the FAC. He must monitor every detail of the attack as it progresses, giving concise instructions at the right instant. His alertness and reaction to adverse factors can greatly affect mission results. The FAC is the intermediary between the attack aircrew and the ground unit commander being supported. He must maintain contact with the ground commander as well as with the aircrew. This ensures that the air support safely meets the specific needs of the ground forces.

715. Control Position

1. The ground FAC should select the best possible observation post consistent with the ground situation to direct a mission. This position should be such that he can see both the target and the aircraft during the attacks. Furthermore, laser and IR pointer operations dictate that a line of sight with the target is essential. This enables the FAC to monitor both the aircraft and target and direct, if necessary, the aircraft's flight path. It may often be necessary to select an alternative site and to deviate from the planned attack pattern, particularly with a moving target. When selecting his observation post, the FAC also should consider the best position for judging the attitude of the aircraft and the heading it is flying. This may be difficult under hazy weather conditions or when looking into the sun. If circumstances permit, the FAC should position himself on or close to the final attack leg so that the aircraft will pass directly over him. This gives the FAC the best opportunity of checking that the aircraft is lined up properly for the attack. The night technique involves a two man operation with the controller monitoring the progress of the incoming mission and his assistant observing the target and the friendly forces' positions. Chapter 8 details special procedures dealing with laser operations.

716. Direct Control Procedures

1. The FAC assumes initial control of the attack aircraft as soon as the mission leader establishes radio contact with him. No attack may take place unless specifically cleared by the FAC. Under certain conditions, such as when the target is very close to friendly forces, the FAC may have to clear every attack, i.e. each aircraft on each pass. The FAC must keep dry attacks (for identification of the target) to an absolute minimum. A dry attack has the obvious disadvantage of alerting the enemy, and the more time aircraft spend near the enemy, the greater the danger of being hit by enemy fire. However, in some situations, a dry attack may be necessary, permissible and possible; for instance when the target is very close to friendly positions and difficult to spot.

717. **Indirect Control Procedures**

1. The FAC assumes initial control of the attack aircraft as soon as the mission leader establishes radio contact with him; however, if due to a number of considerations, precise control during the attacking pass is not possible, the FAC will provide information covering the latest situation and gives instructions for necessary coordination with fire and for movement of friendly forces. The success of these missions requires communications, but is possible if communications are limited. Indirect control is used when the FAC cannot observe the attack, but is in contact with someone who can. The FAC issues clearance or aborts the attack based on information from the observer. This form of control must be authorized by the manoeuvre force commander.

718. **High Threat Control Procedures**

1. Although the most effective application of CAS is by direct control, enemy threat, both in air defences and communications jamming, may dictate initiation of indirect control procedures for CAS application during a conflict. To ensure attack aircraft receive the required target information and clearance to attack, a combination of airborne and ground FAC procedures can be used to perform the tasks in the postulated threat environment. An ABFAC flying to the rear area of the friendly forces and shielded from the enemy defences/comm-jamming operates as a rendezvous point and mission coordinator for attack aircraft en route to the target. The ABFAC may have been responsible for submitting the CAS request if communications were severely degraded at the requesting unit. The ABFAC has maintained contact with the ground FAC by flying a race track pattern between his removed rendezvous location and a position close enough to the ground FAC to ensure communications. When the attack aircraft arrive at the rendezvous point, the ABFAC, acting as a Forward Attack Coordinator, provides all pertinent information to include friendly positions, current situation, and final attack clearance. He has additionally coordinated the attack with the appropriate land force units to ensure safe passage and airspace deconfliction. After release by the ABFAC, attack aircraft will not have to receive additional information or final attack clearance from the ground FAC located forward, except in cases where further restrictions must be applied. The ground FAC may delegate clearance to the ABFAC.

719. **Night Control Techniques**

1. The principles for controlling by day remain valid at night provided the FAC can see the mission and has contact with the target. At all times the FAC must be aware of the location of friendly forces operating in close proximity to the target area. The target description should refer to the image seen through Image Intensifiers (II) such as NVGs and, if significant, the Thermal Image (TI).

2. At some point after leaving the IP, the pilot may wish to identify the TACP/friendly position. He calls ‘ROPE’ and, after acknowledging the call, the TACP directs the IR pointer at the aircraft and continues to illuminate until the pilot calls ‘VISUAL TACP’. At any time later in the attack run, if the pilot wishes to reconfirm the TACP position, he will call for ‘rope’ again.

3. When ready to identify the target, the pilot should request the FAC to ‘SPARKLE’. If the spot of IR light is not visible to the pilot, he should call ‘SNAKE’. The TACP will then oscillate the IR

pointer beam up to but not at the target making it easier for the pilot to see. 'Snake' is an oscillating movement short of, or a linear movement of the IR pointer's beam up towards, but short of the target. If the pilot sees the oscillating spot of IR light, he should then call 'STEADY' to request the TACP to illuminate the target with a steady fine beam. Seeing the steady spot of light, the pilot should call 'CONTACT' to let the TACP know that the target is identified. The pilot calls 'TERMINATE SPARKLE' to stop illumination of the target by the IR beam.

5. It should be noted that the incoming pilot does not see the beam emanating from the TACP, but only the small circle of IR light at the end of the beam.

6. Subsequent aircraft may require IR target designation ('sparkle'); the TACP must be ready to assist at all times.

720. **FAC Actions**

1. Once the mission leader reports 'LEAVING IP, NOW', the FAC notes the time, rechecks approach course with the mission leader, checks for any change in target position, and then begins looking for the approaching aircraft. He may have to call for fire or smoke marking rounds, and complete any final coordination with ground force units. As soon as the aircraft are sighted, the FAC calls 'VISUAL' and gives a clock reference and distance from the aircraft to the reference point or target and continues to give clock references and distances until the mission leader sees the reference point or target and calls 'CONTACT REFERENCE POINT' or 'CONTACT TARGET'.

721. **Reference-Point Method**

1. When using the reference-point method, once the mission leader has reported 'CONTACT REFERENCE POINT', the FAC then directs the mission leader to the target in stages, pausing where required to allow the mission leader to acknowledge that he sees the objects described. When he sees the target, the pilot transmits 'CONTACT TARGET'. After this, no further transmission is required from the FAC unless an aircraft is observed attacking the wrong target. If a FAC is using only the visual/talk-in method he simply monitors the aircraft throughout the attack pattern giving clock code references and distances from the aircraft to the target. If the aircraft's flight path deviates from the planned attack track, the FAC corrects it, instructing the aircrew as necessary. The FAC will continue to monitor the mission until all attacks are completed and the mission departs from his area. He must be prepared to assist the mission at any time.

722. **Directing the Aircraft**

1. If the attack goes according to plan, it will not be necessary for the FAC to direct the aircraft; he simply focuses the pilot's eyes onto the target. However, the FAC must always be prepared to direct the aircraft throughout the attack pattern. This will usually be necessary when aircraft are observed to be deviating from the planned attack profile, or the mission leader does not see the reference point or target in time to execute a first-pass attack. When this occurs, the FAC should take positive action using voice commands to direct the aircraft to a position from which the attack can be successfully completed.

Once the FAC begins directing the aircraft, he must be prepared to give the mission leader any instructions necessary for him to position correctly for the attack. If applicable, clock calls and distances should be given during the positioning, and when the pilot calls 'CONTACT REFERENCE POINT' or 'CONTACT TARGET' the FAC discontinues his directive calls.

723. **Re-Attacks**

1. Should the mission leader not see the target on the initial pass and the situation permits, the FAC can direct the mission leader to a suitable position from which to initiate a second attack.

724. **Targets of Opportunity**

1. Once a successful attack has been completed, the FAC may detect, or be given, a target of opportunity in the target area. If it is practicable to make another pass, and if there is unexpended ordnance, the mission is directed to a position where it can orbit outside the range of enemy air defence weapons while a quick briefing and target description is given. An experienced FAC may be able to talk the aircraft directly from the completion of the initial attack into an attack pattern for the opportunity target. It is generally advisable to describe the target location with relation to the first target. When the briefing is completed, the aircraft leaves under FAC direction and rejoins the desired attack pattern.

PART 2 - AIRBORNE FAC METHODS AND PROCEDURES

725. General

1. The use of an ABFAC is a proven, effective means to provide air support to surface forces. The ABFAC may be equipped with any type of aircraft. Helicopters are very useful and have the advantage of being capable of landing almost anywhere. Light observer aircraft are very effective in moderate or low threat environments. In more hostile environments, fast fighter aircraft may sometimes be used. By their nature, however, they lack the overall suitability of the other two types. The functions, however, are basically as outlined here, regardless of the type of aircraft.

726. ABFAC Tactics

1. There are advantages in placing the FAC above the battlefield. However, survivability is an important consideration in ABFAC employment. The threat can partially be reduced through tactics and by maintaining distance from enemy sources of fire. When operating in forward areas, the ABFAC must coordinate his movement with ground-based fire support activities to avoid conflictions. Accurate navigation is imperative for the ABFAC.

727. Control Positions

1. The ABFAC must coordinate his movements with the attacking aircraft. He should position himself so that he is over friendly territory and has full vision of both the target and the attack aircraft. Enemy defences may force the ABFAC to stand off at a safe distance or pass control to an available ground FAC. An ABFAC may indicate his control position to the attacking aircraft if operationally desirable. Figures 7-1 to 7-3 reflect basic ABFAC holding patterns for operating near the target, Figure 7-4 indicates suitable control areas for ABFACs operating at low level and well back (2000 meters or more) from the target.

728. Factors

1. It is essential to establish the best possible control position. Therefore, after the ABFAC has been briefed he will identify the target position on his map and then by careful study he will select what he considers to be the best control position. He then goes to this position and confirms the choice. To enable him to do this, the following factors must be considered:

a. The best attack course and associated IP.

b. The target indication methods available.

c. The tactical situation and tactical flying limitations in the forward battle area.

d. Dead ground (see paragraph 734 below).

729. **Target Indication Methods**

1. The ABFAC may use the target indication methods described in Chapter 5. In addition, ground targets may be designated by laser or other means from an aircraft. This may be achieved from the ABFAC's own aircraft or another aircraft specifically tasked for this purpose. In either case, the ABFAC may play a part in the coordination of the manoeuvres of the attack and marking aircraft. The following three paragraphs describe variations of the reference-point method suitable for use by ABFACs.

730. **Single-Smoke Method**

1. Ideally, the ABFAC should be able to mark a target. However, if this is not possible owing to limitations of enemy fire and own operating position, he might be able to mark either a good line feature or small natural reference point some distance from the target. Once the attack pilot has identified the feature, the FAC can give simple verbal directions from it to the target.

731. **Two-Smoke Method**

1. This method is applicable when operating some distance from the target, usually at low level over friendly territory. It provides distance and directional reference to the target. Two smoke-markers, which may be of different colours, are put down in a direct line with the target. The distance apart may be varied but should not be less than 180 meters. Since both markers must burn together, the maximum distance will be dictated by the burning time. During the briefing the mission leader will be told: 'Reference point will be two smoke, pointing at target. Attack along line of smoke. The length between the two smokes is one unit. From my second smoke the target is .... units away'.

2. The two-smoke method can also be used to provide a visual reference of a run-in restriction. For instance, the ABFAC could place two smokes parallel to friendly forces to depict the restriction to run-in parallel to friendly positions.

732. **ABFAC Aircraft as Reference Point**

1. The main disadvantage is that the ABFAC aircraft may be difficult to see. In conditions of poor visibility the landing light on certain types of aircraft may be used to attract the attacking pilot's eyes by pointing it directly at the attack aircraft.

733. **Tactical Flying Limitations in the Forward Battle Area**

1. The position of friendly forces has an overriding influence on the choice of an attack course and therefore the control position. The ABFAC must position himself to give the troops on the ground, the attack pilot and himself the best chance of success and survival. Close liaison with the troops being supported is essential. In addition, battlefield conditions may limit the ABFAC's freedom of reconnaissance and choice of control position.

734. **Dead Ground**

1. If the ABFAC is to operate at low level over friendly territory it is ideal to have the control position in an area of dead ground so that reconnaissance, planning and control can be done with minimum waste of time and maximum ease of movement. The position should give the clearest view of the planned attack pattern of the attack aircraft.

735. **Resolution of Factors**

1. Through map study and careful consideration of the aforementioned factors, the ABFAC determines the optimum control point. To give guidance, Figure 7-4 shows the areas around an angle-off attack pattern which are suitable for controlling and which are applicable to any size of pattern. The control position is then verified by a short airborne reconnaissance and a nearby navigation point selected so that subsequently the control position may be found quickly and easily. The orientation point can be any local feature which is easy to see.

736. **Sequence of Events**

1. The sequence of events in planning and controlling an attack controlled by an ABFAC operating at low level some distance from the target is as follows:

a. Receipt of target location and time over target.

b. From map choose likely attack pattern and control position. Go to control position.

c. If the attack course and control position are suitable, then identify target and own troops on the ground and select an orientation point.

d. If sub-para c is not suitable, choose a new control position and a new orientation point.

e. Match IP to attack course.

f. Make notes for a detailed target description.

g. Plan the attack.

h. Brief the attack pilot, clear the attack with the TACP, alert mortars or guns for smoke, and then clear the aircraft for attack.

i. If marking, do so at the required time.

j. Call for laid smoke, allowing for time of flight, burning time etc.

k. Control the attack.

l. Report results.

PART 3 - EMERGENCY PROCEDURES

737. General

1. Preparation for emergencies in combat is important for safety and for emergency recovery of aircrews. The following are basic procedures to be used in emergency situations.

738. Breaking off the Attack

1. The FAC is responsible for breaking off aircraft under his control during an attack when in his view the attack is not being properly conducted, e.g. when the aircraft is not properly aligned with the target. The attack is called off by transmitting: '(Flight Callsign), STOP, (authentication code), STOP (authentication code), STOP (authentication code)'. Compliance with this instruction is mandatory and the attacking pilot will immediately abort the attack.

739. Pre-Attack Briefing

1. The FAC should plan and prepare for certain emergencies and brief attack pilots accordingly. This should include direction and distance to the nearest safe bailout area and emergency recovery base.

740. Search and Rescue (SAR)

1. Efforts to recover downed aircrew in a combat zone can be enhanced through the efforts of the ABFAC. He can direct attack aircraft and other forms of fire support to protect the downed aircrew and recovery units. The ABFAC's control function should be extended to include control of SAR efforts until SAR control elements arrive. The ground FAC should also be familiar with SAR procedures and assist air elements as much as possible.

741. Emergency Radio Calls

1. An emergency call is given initially on the frequency in use at the time the emergency occurs, and if time permits, it is repeated on international distress frequencies (243.0 MHz, UHF, or 121.5 MHz, VHF). If a FAC receives a distress call, he must copy the message and pass it to the TACP immediately.

a. International emergency calls are listed below in descending order of priority:

(1) DISTRESS. (The aircraft is threatened by serious and/or imminent danger and is in need of immediate assistance.)
'MAYDAY, MAYDAY, MAYDAY, (aircraft callsign)'.

(2) URGENCY. (Very urgent message concerning the safety of an aircraft, other vehicles or of some person on board or within sight, not requiring immediate assistance.)
'PAN, PAN, PAN, (aircraft callsign)'.

b. The emergency message follows immediately after the emergency call and contains as much of the following information as time permits:

(1) Estimated position and time.

(2) Heading (true) and airspeed (indicated).

(3) Flight level or altitude.

(4) Type of aircraft.

(5) Nature of emergency and assistance required.

(6) Intentions.

(7) Endurance remaining.

c. The distress call should be acknowledged if possible by the FAC when he is sure that the entire message has been passed.

NOTE 1: This should be balanced with established procedures. Transmission on the above unsecured frequencies may hamper escape and evasion or rescue efforts, especially in a hostile environment.

NOTE 2: ICAO recommendations list the details of the emergency message in a different order.

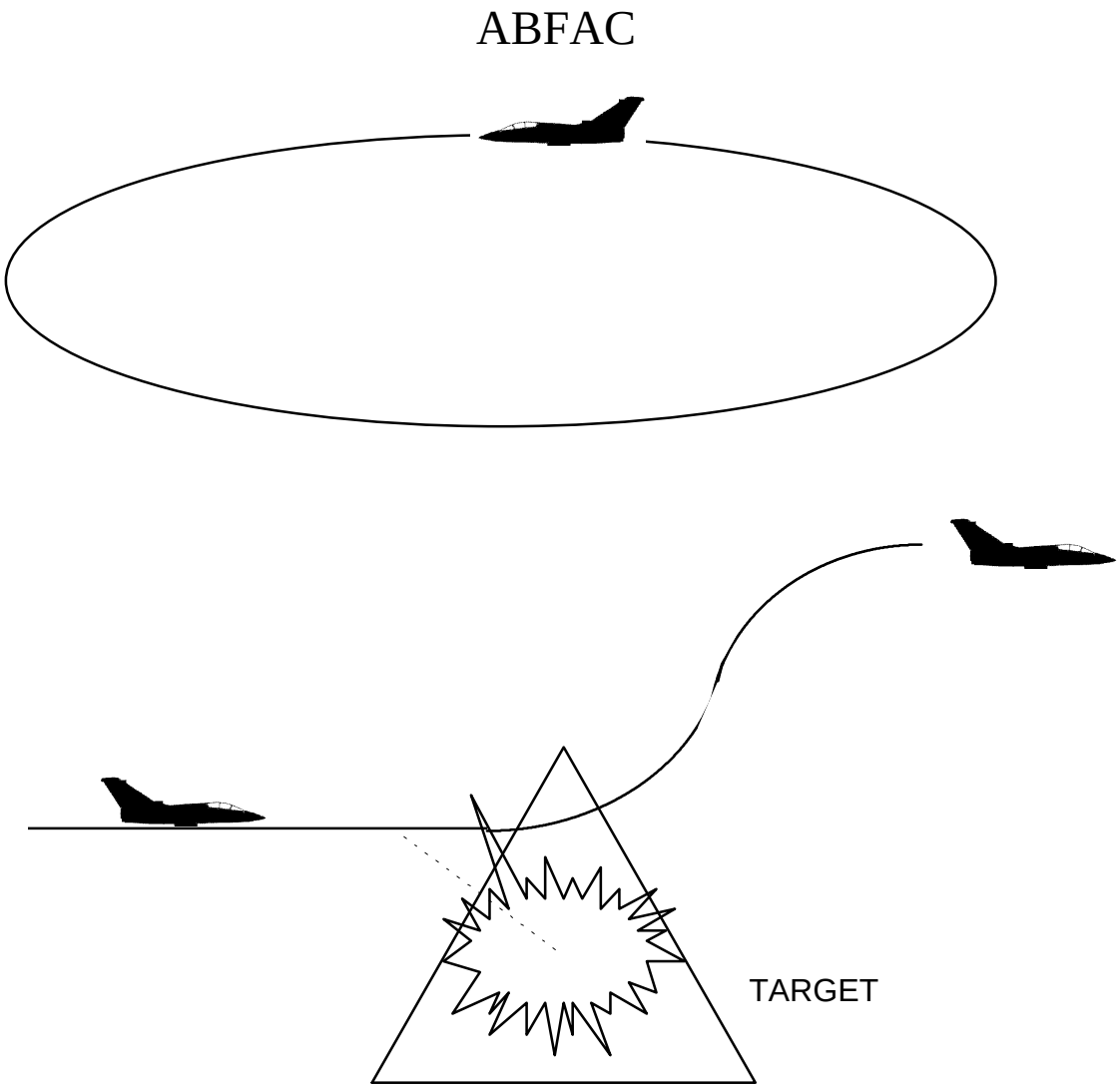
SECTION IV - PHASE D 'REPORTING'

742. **In-Flight Report**

1. After the completion of the attack, the FAC in conjunction with the attack pilots, assesses the damage to the target for the In-flight Report. Details of the In-flight Report are listed in APP-8, Allied Tactical Air Messages (Formatted and Structured).

743. **FAC Report**

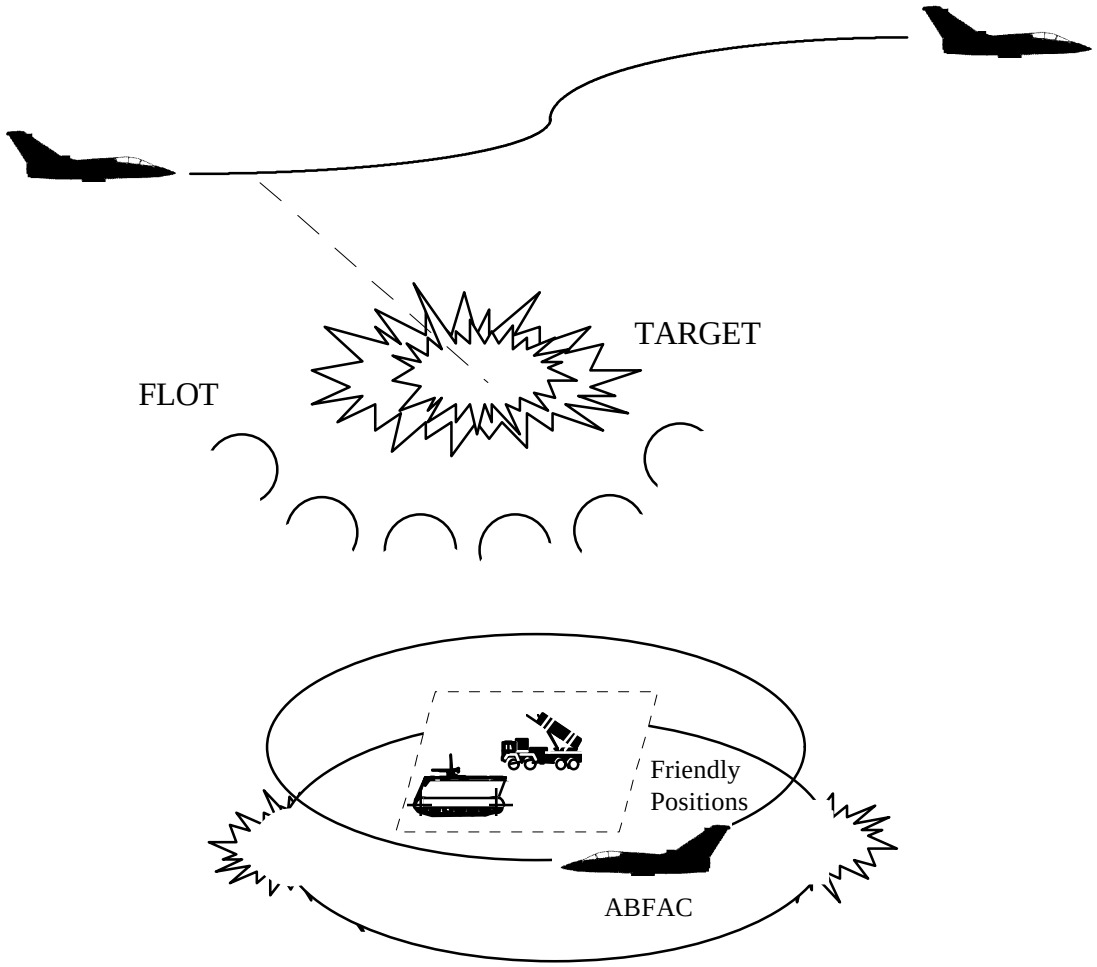
1. Immediately after the damage assessment, the FAC reports the result of the attack to the appropriate unit/formation commander.



ABFAC Overhead Holding Pattern

Used with restrictive axis or random pattern attack; always in position to see the target and attack aircraft; altitude commensurate with attack manoeuvres.

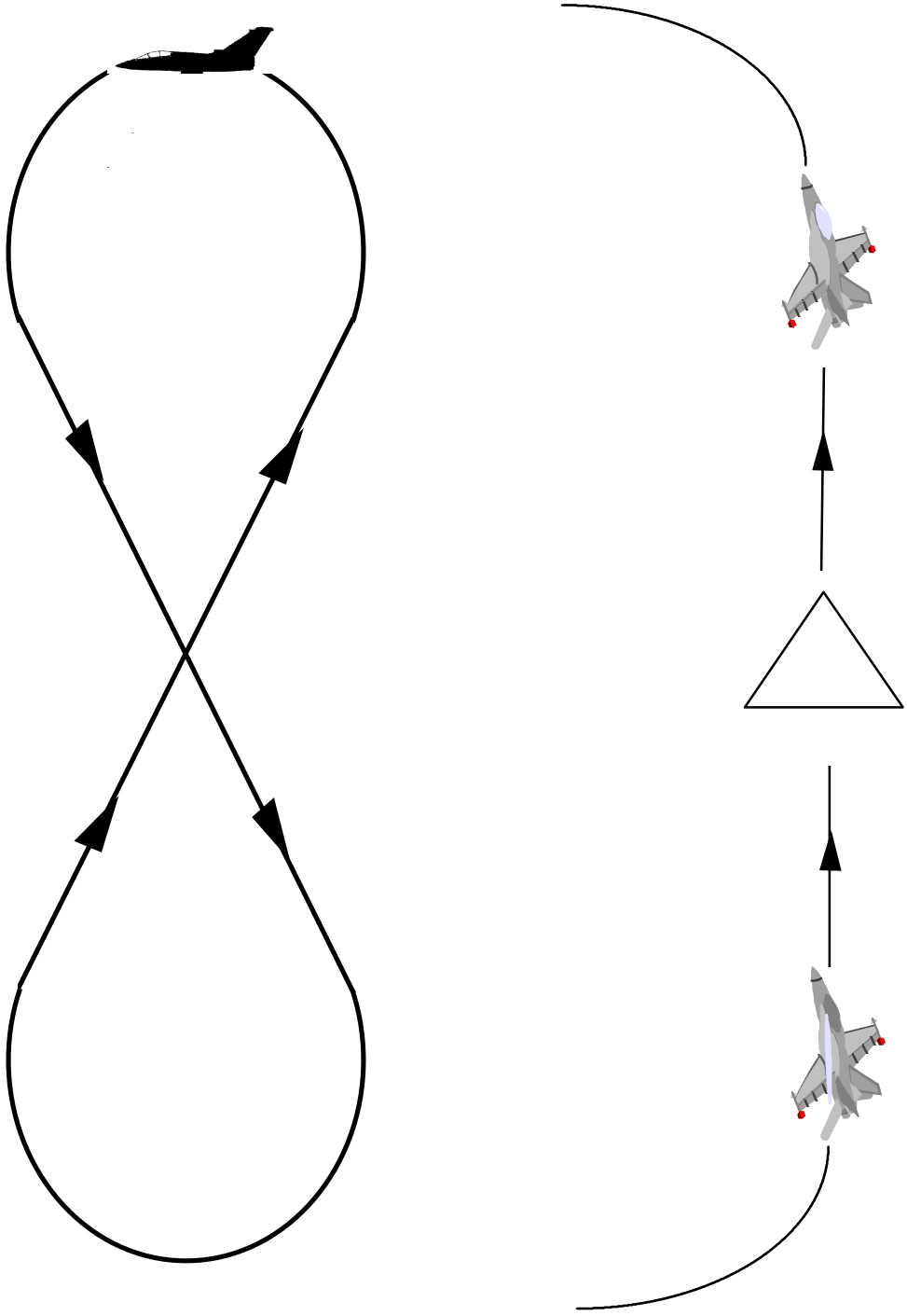
Figure 7-1



ABFAC Side Holding Pattern

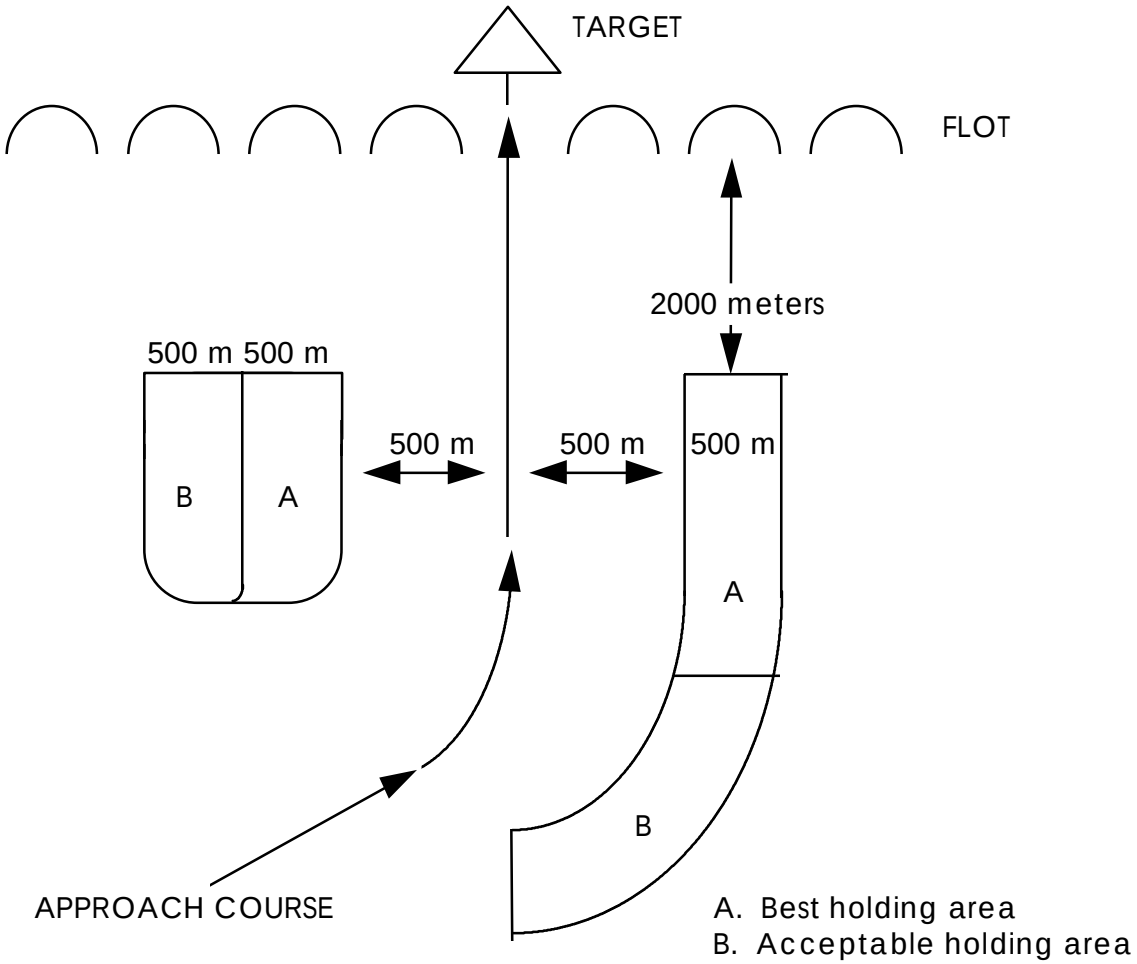
Used with restrictive axis of attack; altitude commensurate with situation.

Figure 7-2



‘Figure 8’ Pattern

Figure 7-3



Not to scale

Note: To ensure deconfliction, the ABFAC should keep 500 meters clear of the attack aircraft pattern.

ABFAC Low Level Holding Pattern

Figure 7-4

Chapter 8

LASER OPERATIONS

801. Introduction

1. Target marking by surface and airborne laser equipment enables a significant improvement to target acquisition, which leads to higher accuracy of weapons delivered by aircraft, and at the same time enhances aircraft survivability. To make the best use of laser target marking systems and to ensure interoperability with surface and air users, procedures are required to cover all aspects of Laser Target Marking and Laser Target Designation Operations.

2. This Chapter details the characteristics and use of Laser Target Designator/Marker systems in support of CAS operations; it does not address other surface uses of laser.

802. Definitions

1. Laser Target Designator/Laser Target Marker (LTD/LTM). - A system which is used to direct (aim or point) laser energy at a target. The system consists of a Laser Target Designator (LTD) or Laser Target Marker (LTM) with its display and control components necessary to acquire the target and direct the beam of laser energy thereon. By convention, the expression LTM will be used to refer to target marking to illuminate a target to an aircraft equipped with a Laser Spot Tracker, while the term LTD will be used to describe the illumination of a target for an attack by a Laser Guided Weapon (LGW).

2. Laser Spot Tracker (LST). - A device in an aircraft which receives laser energy reflected from a laser marked target or point of interest. The azimuth and elevation of the target or point of interest are then displayed on a pilot's head-up display.

3. Laser Operator (LO). - For the purpose of this document the term Laser Operator (LO) is defined as a person who operates a LTD/LTM. He may be part of a TACP, Fire Support Team (FIST), the Forward Air Marker, the FAC or a member of a Special Operations Force (SOF) unit. He may provide laser marking of a target to aid pilot target acquisition for the employment of conventional weapons against the target - LTM, or he may provide laser designation of the target for an LGW attack - LTD.

803. Laser Equipment in Use

1. Laser equipment currently in use with surface and air units ranges from hand held and vehicle mounted designators to airborne equipment in fixed wing aircraft and helicopters. This Chapter is applicable to all types of equipment.

804. **Siting and Use of LTD/LTM**

1. It is essential that a LTD/LTM is sited in such a way to give an uninterrupted line of sight between the laser emitter and the target.

805. **Critical Factors**

1. A number of factors influence the use of LTD/LTM and could affect the success of an attack mission. These include:

a. Target Aspect/ Reflectivity. When selecting an aiming point, the LO should remember that the aspect, point of laser marking, and reflectivity of the target will combine to vary the amount of laser energy reflected from the target. As a general rule, the targets should be marked on the side closest to, or facing the attacking aircraft.

b. Attack Geometry. Figure 8-1 depicts depicts restrictions to the attack geometry. As Angle α (normally less then 45°) increases, the lock-on range of the laser acquisition system decreases, and vice versa. Similarly, Angle β must be within the limits of the weapon system acquisition capability.

c. Smoke and Precipitation. Smoke, precipitation and poor visibility degrade system capability.

d. Target Range. Generally LTD/LTM will mark targets from 300 m to 10 km. (Ranges may vary substantially with individual systems).

e. Acquisition Range. Acquisition ranges may vary substantially with individual systems.

f. Safety Zone. In a sector of 10 degrees either side of the target-to-designator line there is a possibility of false a lock-on and the weapon can become a risk to the LO (see Figure 8-1). Therefore attack headings should avoid the target-to-laser designator safety zone, unless the tactical situation dictates otherwise.

806. **Laser Codes**

1. By international agreement (STANAG 3733), targets may be designated using any code from 1111 to 8788. The first digit of this code indicates the use of any specialist systems. The remaining three digits of the code correspond to the Pulse Repetition Frequency (PRF) in use. At present some laser equipped aircraft are limited in the number of codes available.

2. Laser coding ensures that the system detects only the target designated by a specific LTD and disregards differently coded emissions within its field of view. Coding also complicates the enemy's countermeasures problem.

807. **Use of LTD/LTM at Night**

1. LTD/LTM may operate at night.

808. **Use of Laser Guided Bombs (LGBs)**

1. Targets such as bridges can be designated by a LTD for LGB attacks. LGBs have a laser code built into the guidance system, which normally cannot be adjusted in flight. Consequently, it is normal for the tasking agency to specify the relevant code, which the LO and tasked air unit will use for target designation. However, if the tasked air unit is self-designating, it has the option to specify its own code.

809. **Laser Brevity Words**

1. Use of coded lasers to designate targets must be coordinated between the FAC and CAS aircrew. Table 8-1 lists brevity words which will facilitate communication during CAS laser operations.

Table 8-1, LASER BREVITY WORDS

Call	Meaning
"10 SECONDS"	Advisory call by aircrew to prepare for laser operation in 10 seconds.
"LASER ON"	Directive call by aircrew for LO to begin laser operation.
"SPOT"	Aircrew receiving laser energy. LO should continue laser operation.
"SHIFT"	Directive call for LO to illuminate a new target with laser energy.
"TERMINATE SPOT"	Directive call for LO to cease laser operation.

810. **Associated Publications**

1. The following publications give further guidance on the operation of LTD/LTM:

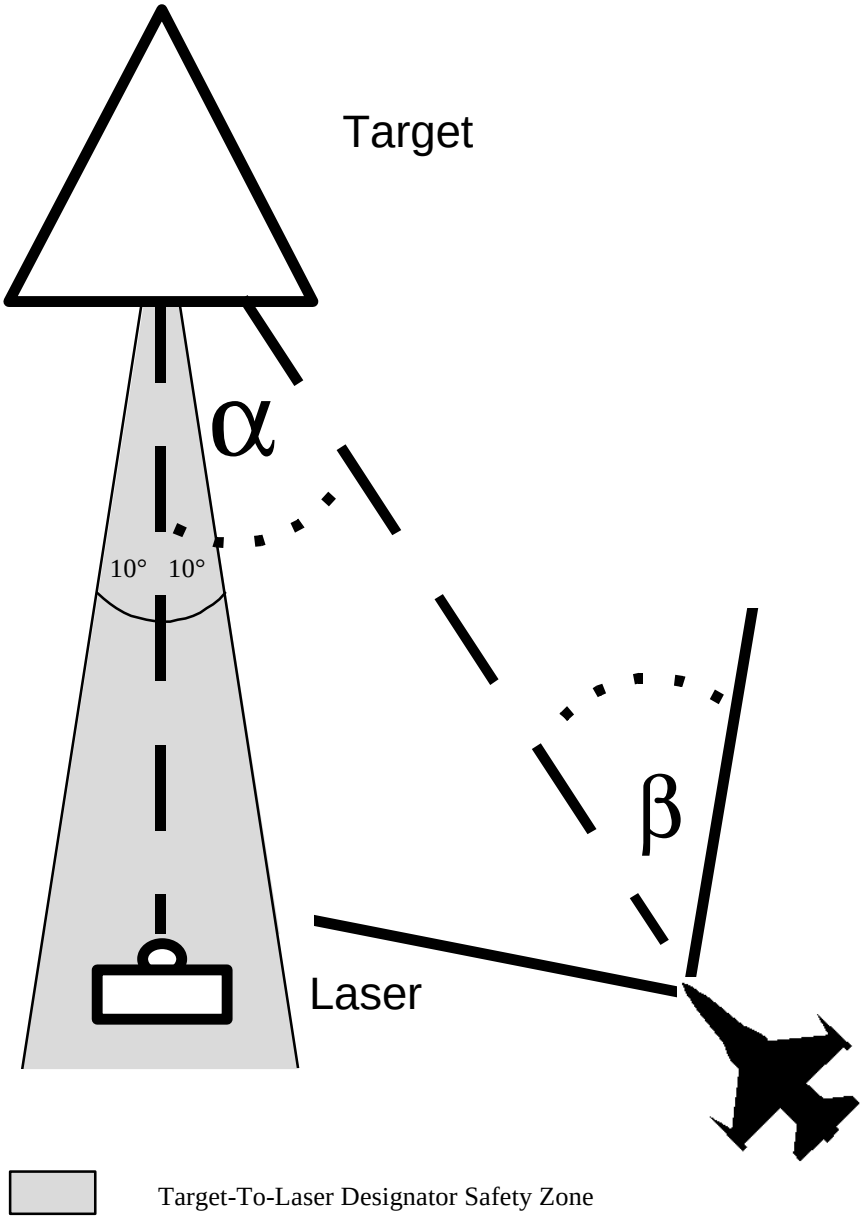
   a. STANAG 3606 - Evaluation and Control of Laser Hazards on Military Ranges.

   b. STANAG 3733 - Laser PRF used for Target Designation and Weapon Guidance.

   c. STANAG 3875 - Criteria for Categorization of Laser Designator Systems.

   d. Training Safety Regulations.

   e. User's Handbook for LTD/LTM.



Attack Geometry

Figure 8-1

EXAMPLE OF CAS CHECK-IN BRIEFING

1. Permissive Environment

Item	Transmission
Aircraft Callsign	"Hog 01"
Mission Number	"3M106"
Authentication	"Authenticate Alpha Bravo" (FAC should be authenticated before continuing with the brief)
Number and Type of Aircraft	"Two F-16"
Ordnance	"Eight Mk-82, two AGM-65"
Position	"Two minutes east of CP Romeo"
Playtime	"15 minutes"
Rear Briefing Identifier	"Got briefing Echo"
Abort Code	"Charlie Sierra"

2. Non-permissive Environment

Item	Transmission
Aircraft Callsign	"Hog 01"
Mission Number	"3M106"
Authentication	"Authenticate Alpha Bravo" (FAC should be authenticated before continuing with the brief)
Briefing Termination	"As fragged with briefing Echo"

FAC BRIEFING FORMAT

MISSION C/S _____ ABORT CODE _____

NOTE: 1. A, D, G, H IN BOLD ARE MANDATORY READ-BACK (even if "NONE")
2. Heading and bearings Mag unless True is requested

A. **IP**..... _____

B. BEARING..... _____ °

C. DISTANCE..... _____ NM

D. **TARGET LOCATION** 1. .....(UTM)_____

2. (LAT/LONG) ..... _____

E. TARGET ELEVATION ..... _____ FT

F. TARGET DESCRIPTION _____

G. **MANDATORY ATTACK HEADING**..... _____ °

H. **FRIENDLY FORCES** _____

I. ATTACK TIME TOT/TTT ..... _____

J. ATTACK CLEARANCE FAC C/S _____ TAD _____

MANDATORY READ-BACK

==========

K. TARGET INDICATION:

1. REFERENCE POINT ..... [ ]
2. SMOKE..... [ ]
3. LIGHT/ MIRROR..... [ ]
4. • LASER CODE..... _____
   • LASER TO TARGET LINE ..... _____ °
5. BEACON • FREQUENCY..... _____
   • BEARING ..... _____ °
   • DISTANCE ..... _____ meters
   • ELEVATION..... _____ FT

L. THREATS _____

M. WEATHER (IF SIGNIFICANT) _____

N. HAZARDS _____

O. EGRESS _____

ADDITIONAL

STANDARD BRIEFING FORMAT FOR REAR BRIEFING

1. **Rear Briefing**. Briefing information passed by a rear briefing agency should normally be divided into what is mandatory and what may also be required by the tactical situation. The briefing should comprise the following items in the order shown:

a. Mandatory Items:

(1) Target location in UTM/grid or LAT/LONG with target elevation in feet above mean sea level. (Mandatory read-back and recording of actions).

(2) Target description (may include advisory or mandatory attack headings).

(3) "No friendlies within" distance or nearest friendlies location. (Mandatory read-back and record action).

b. Additional Items:

(1) Target area threats.

(2) Navigation details.

(3) Hazards.

(4) Other items.

ACRONYMS

For ready reference, certain acronyms used in this publication are given below:

AAA	Anti-Aircraft Artillery
AAP	Allied Administrative Publication
ABCCC	Airborne Battlefield Command and Control Centre
ABFAC	Airborne Forward Air Controller
AI	Air Interdiction
AJP	Allied Joint Publication
ALO	Air Liaison Officer
AMSL	Above Mean Sea Level
AOCC	Air Operations Coordination Centre
APP	Allied Procedural Publication
ARB	Airborne Rear Briefer
ASOC	Air Support Operations Centre
ATIS	Automatic Terminal Information Service
ATM	Air Task Message
ATO	Air Tasking Order
ATP	Allied Tactical Publication
CAS	Close Air Support
CP	Contact Point
C/S	Call Sign
FAC	Forward Air Controller
FIST	Fire Support Team
FLIR	Forward-Looking Infra-Red (System)
FLOT	Forward Line of Own Troops
FSCL	Fire Support Coordination Line
GCI	Ground-Controlled Interception
GPS	Global Positioning System
ICAO	International Civil Aviation Organization
II	Image Intensifier
IP	Initial Point
IR	Infra-Red
LGB	Laser-Guided Bomb
LGW	Laser-Guided Weapon
LLTV	Low Light-Level Television
LO	Laser Operator
LST	Laser Spot Tracker
LTD	Laser Target Designator
LTM	Laser Target Marker

NATO	North Atlantic Treaty Organization
NVG	Night Vision Goggle
PGM	Precision-Guided Munition
PRF	Pulse Repetition Frequency
RBA	Rear Briefing Agency
RTB	Return to Base
SAM	Surface-to-Air Missile
SAR	Search and Rescue
SCL	Standard Conventional Load
SOF	Special Operations Force
STANAG	Standardization Agreement
TACP	Tactical Air Control Party
TAD	Tactical Air Direction
TI	Thermal Image
TOT	Time on Target
TTP	Tactics, Techniques and Procedures
TTT	Time to Target
UHF	Ultra High Frequency
UTM	Universal Transverse Mercator Grid
VHF	Very High Frequency
WGS	World Geodetic System

LIST OF EFFECTIVE PAGES

Effective Pages	Page numbers
Original	I, II
Original	III, IV
Original	V, VI
Original	VII (Reverse Blank)
Original	IX to XII
Original	1-1, 1-2
Original	2-1 to 2-6
Original	Figure 2-1 (Reverse Blank)
Original	3-1, 3-2
Original	3-3 (Reverse Blank)
Original	4-1, 4-2
Original	4-3 (Reverse Blank)
Original	5-1, 5-2
Original	5-3 (Reverse Blank)
Original	6-1, 6-2
Original	6-3 (Reverse Blank)
Original	Figure 6-1 (Reverse Blank)
Original	7-1 to 7-16
Original	Figure 7-1 (Reverse Blank)
Original	Figure 7-2 (Reverse Blank)
Original	Figure 7-3 (Reverse Blank)
Original	Figure 7-4 (Reverse Blank)
Original	8-1, 8-2
Original	8-3 (Reverse Blank)
Original	Figure 8-1 (Reverse Blank)
Original	A-1 (Reverse Blank)
Original	B-1 (Reverse Blank)
Original	C-1 (Reverse Blank)
Original	D-1, D-2
Original	LEP-1 (Reverse Blank)