

APPENDIX A

FIRE SUPPORT ASSETS

Section I. FIELD ARTILLERY

This section Implements STANAG 2887, Edition 3, and QSTAG 217, Edition 2.

Missions

The mission of the field artillery is to destroy, neutralize, or suppress the enemy by cannon, rocket, and missile fire and to help integrate all fire support into combined arms operations. The primary characteristic of field artillery is

its massive firepower. It can deliver nuclear, chemical, and massed conventional fires rapidly within a large area and on a wide front, under all conditions of visibility, weather, and terrain. The four tactical missions and seven inherent responsibilities of the field artillery are outlined in the first table below.

SEVEN INHERENT RESPONSIBILITIES OF FIELD ARTILLERY
STANDARD TACTICAL MISSIONS

AN FA UNIT WITH A MISSION OF-	DIRECT SUPPORT	REINFORCING	GENERAL SUPPORT REINFORCING	GENERAL SUPPORT
Answers calls for fire in priority from –	1. Supported unit. 2. Own observers. ¹ 3. Force FA HQ.	1. Reinforced FA. 2. Own observers. ¹ 3. Force FA HQ.	1. Force FA HQ. 2. Reinforced unit. 3. Own observers. ¹	1. Force FA HQ. 2. Own observers. ¹
Has as its zone of fire-	Zone of action of supported unit.	Zone of fire of reinforced FA.	Zone of action of supported unit to include zone of fire of reinforced FA unit.	Zone of action of supported unit.
Furnishes FIST or FSE ² -	Provides temporary replacements for casualty losses as required.	No requirement.	No requirement.	No requirement,
Furnishes liaison officer-	No requirement.	To reinforced FA unit HQ.	To reinforced FA unit HQ.	No requirement,
Establishes communications with-	FSOs and supported maneuver unit HQ.	Reinforced FA unit HQ.	Reinforced FA unit HQ.	No requirement.
Is positioned by –	DS FA unit commander or as ordered by force FA HQ.	Reinforced FA unit or as ordered by force FA HQ,	Force FA HQ or reinforced FA unit if approved by force FA HQ.	Force FA HQ.
Has its fires planned by-	Develops own fire plans.	Reinforced FA unit HQ.	Force FA HQ.	Force FA HQ.
¹ Includes all target acquisition means not deployed with supported unit (radar, aerial observers, survey parties, and so forth.) ² An FSE for each maneuver brigade, battalion, or cavalry squadron and one FIST with each naneuver company or ground cavalry troop are trained and deployed by the FA unit authorized these assets by TOE. After deployment, FISTs and FSEs remain with the supported maneuver unit throughout the conflict.				

The second table shows the tasks and responsibilities for control of artillery in an ABCA (Australia, Britain, Canada, America) operation.

TACTICAL TASKS AND RESPONSIBILITIES FOR CONTROL OF ARTILLERY (ABCA)

ARTILLERY WITH A TACTICAL TASK OF	ANSWERS CALLS FOR FIRE IN PRIORITY FROM	ESTABLISHES LIAISON WITH	ESTABLISHES COMMUNICATION WITH	FURNISHES FORWARD OBSERVERS TO ¹	WEAPONS MOVED AND DEPLOYED BY (POSITIONED BY)	HAS AS ITS ZONE OF FIRE	HAS ITS FIRES PLANNED BY	NATIONS TO WHICH TERMINOLOGY APPLIES
Direct support	Directly supported formation or unit. Own observers. Force field artillery. ²	Directly supported maneuver formation or unit.	Directly supported formation or unit (battalion, regiment, or brigade).	Each maneuver company of the directly supported formation or unit.	Direct support artillery unit commander or as ordered by force field artillery HQ.	Zone of action of the directly supported formation or unit.	Develops own fire plans in coordination with directly supported formation or unit.	us
	Directly supported formation or unit. Any other formation or unit as authorized by the controlling HQ.	Directly supported formation or unit.	Directly supported formation or unit.	Directly supported formation or unit.	Next higher artillery HQ.	Zone of action of the directly supported formation or unit or as ordered by higher artillery HQ.	Artillery formation or unit in direct support in conjunction with directly supported formation or unit.	UK CA AS
In Support	Supported formation or unit. Any other formation or unit as authorized by the controlling HQ.	No inherent requirement.	No inherent requirement.	No inherent requirement.	Next higher artillery HQ.	Zone of action of the supported formation or unit or as ordered by higher artillery HQ.	Next higher artillery HQ.	UK CA AS
At Priority Call	Formation or unit to which placed at priority call. Any other supported formation or unit. Any other formation or unit as authorized by the controlling HQ.	No inherent requirement.	No inherent requirement.	No inherent requirement.	Next higher artillery HQ.	Zone of action of the formation or unit to which placed at priority ceil or as ordered by higher artillery HQ.	Formation or unit to which placed at priority call.	U K CA AS
General Support	Force field artillery HQ ² and target acquisition artillery. Own observers.	No inherent requirement.	No inherent requirement.	No inherent requirement.	Force field artillery HQ. ²	Zone of action of the supported formation or unit or zone prescribed.	Force field artillery HQ. ²	us
General support Reinforcing	Force field artillery HQ Reinforced artillery unit. Own observers.	Reinforced artillery unit.	Reinforced artillery unit.	Reinforced artillery unit if approved by force field artillery HQ. ^{1,2} Applies also to the provision of liaison officers.	Force field artillery HQ ² or reinforced artillery unit if approved by force field artillery HQ. ²	Zone of action of the supported formation or unit to include zone of fire of the reinforced artillery unit.	Force field artillery HQ ² or as otherwise specified.	us AS
Reinforcing	Reinforced artillery unit. Own observers. Force field artillery HQ. ²	Reinforced artillery unit.	Reinforced artillery HQ	Reinforced field artillery unit. Applies also to the provision of liaison officers.	Reinforced artillery unit or as ordered by force field artillery HQ.	Zone of fire of the reinforced artillery unit or zone prescribed.	Reinforced artillery unit.	us
¹ The US will not furnish forward observers but will furnish fire support teams (on request). ² Force artillery headquarters or higher artillery headquarters.					LEGEND: AS = Australia CA = Canada UK = United Kingdom us = United States			

Employment

An FA battalion is normally placed in direct support of a maneuver brigade. The direct support FA battalion may have one or more FA battalions reinforcing it. Generally, the brigade FSO coordinates field artillery positioning within the brigade zone; however, the battalion FSO may be required to coordinate positioning in the battalion zone with the battalion commander and/or S3. In a brigade zone, priorities for positioning are as follows:

- Direct support units.
- Reinforcing units.
- Divisional GSR, then GS units.
- Corps GSR, then GS units.

Considerations

An FSO must consider the following in planning FA support:

- Assigned tactical mission.
- Number and caliber of artillery units in support.
- Range capabilities, including special munitions and rocket-assisted projectiles (RAPs).
- Ž Effects of munitions available and quantity on hand.
- Position location to include primary, alternate, supplementary, and future positions.
- Size of the final protective fire.
- Radius of burst.
- Maximum and sustained rates of fire.

Multiple Launch Rocket System

The MLRS is a highly mobile, rapid-fire, free-flight rocket delivery means designed to complement cannon artillery in all fire support roles. The MLRS provides potential for interdiction fires against high-payoff targets 15 to 30 kilometers (km) from the front line of troops.

Organization

MLRS battalions are assigned to corps, and MLRS batteries are organic to the armored and mechanized infantry divisions. Each battalion will have three firing batteries with nine launchers in each battery. All MLRS firing batteries are organized identically and are capable of operating independently from their parent headquarters. MLRS units, like all FA units, are organized for combat by the designation of a command relationship and the assignment of a tactical mission.

Mission

Unlike most other FA units, MLRS batteries operating independently of battalions may be assigned tactical missions. The most appropriate standard tactical mission for an MLRS unit is general support. An MLRS unit can perform only nonstandard versions of general support reinforcing and reinforcing missions, because it lacks the personnel and equipment to establish liaison with the reinforced unit. An MLRS unit should not be assigned a mission of direct support. The need for moving after firing, ammunition constraints, and lack of communications prevent the MLRS unit from effectively performing a DS mission.

Munitions

The central component of the MLRS is the self-propelled launcher-loader (SPLL). The launcher can fire 12 rockets per minute. Each rocket can be loaded with dual-purpose (antipersonnel and/or antimateriel) bomblets.

The bomblets of one rocket cover an area roughly equivalent to three football fields. The launcher can be reloaded in 10 minutes.

Section II. MORTARS

Mission

Mortars are the only organic indirect fire support asset in the maneuver arms arsenal. Mortars provide responsive high-angle fires that can kill the enemy, suppress enemy fires, and conceal the movement of friendly forces. Therefore, it is extremely important to include mortar fires in the fire support plan. The FSO's doctrinal responsibility is limited to recommending the integration of mortars into the fire support plan. For considerations of mortar employment, refer to FM 7-90. Some of the areas with which the FSO must be concerned are as follows:

- Characteristics and capabilities.
- Support and command relationships.

Ž Employment.

- Displacement.

Characteristics and Capabilities

The maneuver battalion mortar platoon consists of six 107-mm (4.2-inch) mortars (three sections with two mortars each). Each mortar is track-mounted in an M106A1 (an M113 chassis), which can carry 88 rounds of ammunition. Listed below are specific characteristics that the FSO must consider when including mortars in the fire support plan.

When planning mortar fires, the FSO must consider the high rate of fire and the ammunition availability. A mortar platoon can fire over 300 rounds in less than 5 minutes. As a result, the ammunition supply may be exhausted very quickly.

SELECTED CHARACTERISTICS

RANGE (IN METERS)	HE M329A2	HE M329A1	ILLUM	WP	CHEMICAL
Minimum	770	920	400	920	1540
Maximum	6840	5650	5490	5650	5650
RATE OF FIRE					
Maximum	18 rounds per minute (rd/min) for 1 min and 9 rd/min for the next 5 minutes				
Sustained	3 rd/min				
EFFECTIVE BURSTING RADIUS	HE: 20 meters				
FINAL PROTECTIVE AREA	300 X 40 meters (six tubes)				

Support and Command Relationships

Support and command relationships are means by which the commander can designate priorities for mortar fires or establish command relationships. Previously, mortars and other battalion organic assets were given missions of direct or general support. Because mortars are organic to the battalion, the assignment of such missions is not necessary. However, the commander must clearly establish priorities of fire as required.

Priorities

The commander may specify support by assigning priority of fires and/or priority target(s) to a subordinate unit.

Command Relationships

There may be situations in which the mortar platoon cannot support all of the battalion while remaining under battalion control. This may occur when a maneuver unit is given a mission that separates it from its parent unit. In those situations, a platoon or a section may be placed under operational control of or be attached to the supported unit.

Operational Control. This gives a commander the authority to direct forces provided him to do specific missions, usually limited by function, time, or location. The commander controls the tactical employment, movement, and missions of the mortars. He is not responsible for logistical or administrative support.

Attachment. This temporary relationship gives the commander receiving the attachment the same degree of command and control (C2) as he has over units organic to his command. The commander selects the general location of the attached mortar element and controls its deployment as well as its fires. He is also responsible for logistical support and security of the mortars. Attachment is appropriate when units are assigned independent missions.

Employment

The commander has three options in considering how to employ the battalion mortar platoon. It can be employed by platoon, by section, or by squad. Each squad consists of one mortar and its crew. Squads can be grouped together into sections. Finally, the entire platoon may be employed together. Selected options are based on commander's guidance, METT-T, and priority of fires. The FSO must be prepared to advise the commander on which option to use. (See the table of tactical tasks and responsibilities for control of artillery.) When employing mortars, the FSO must consider the following:

- Mortars can provide responsive smoke and illumination fires.
- Ž Mortars are most effective against soft-skinned targets.
- Ž Their high-angle trajectories make mortars effective against targets masked or in defilade.
- High-angle fires are easily detected by enemy radars.
- High-angle fires are adversely affected by strong winds.
- Mortar positions are seldom surveyed; therefore, more adjustments are needed and surprise may be lost when targets are attacked. (Overcome this by requesting FA survey support.)
- Mortars are effective in military operations on urban terrain (MOUT).
- METT-T must be considered when mortars are employed. General positioning guidelines are as follows:
- Ž In the offense, one-half to two-thirds of the maximum range should be in front of lead elements.

- In the defense, one-third to one-half of the maximum range should be in front of the forward elements.
- Positions should be selected to minimize the number of moves required.
- The mortars must be able to displace quickly and provide continuous support.

Platoon Employment

The platoon operates from one or two firing positions and fires as one unit. The best way to position a platoon with four or more mortars is to place the platoon sections in two separate locations, at least 300 meters apart. However, this distance must be based on the terrain, the ability to cover the sector, and limits in command and control. A platoon located in a single area enhances command and control and local security but is more vulnerable to enemy counterfire. The FDCs are trained to mass fires from separate locations onto a single target.

Section Employment

This places each section as a separate firing unit. The mortar platoon is normally employed by section to cover wider frontages. Each section is positioned so it can provide fires within the zone of action of the supported maneuver element. When the platoon is employed by section, each section has an FDC or a computer. Depending on the range to target and separation of sections, more than one section may be able to mass fires on the same target.

Squad Employment

This places one or more mortar squads on the battlefield as separate firing units. This is usually done to support special requirements, such as—

- One-mortar illumination mission(s).

- Roving mortar adjustments.
- Antiarmor ambushes.
- Support of a very wide front.
- Coverage of a large front by the maneuver element.
- Support for critical installations during rear combat operations.

Displacement

It is essential that the mortars displace quickly and remain flexible to provide continuous fire support. On the basis of the scheme of maneuver, the mortar platoon leader forms a displacement plan in support of the fire plan. The displacement plan is a map overlay showing initial positions, subsequent positions, routes between the positions, and any control measures in effect.

Considerations for selecting displacement techniques are described below.

Displacement Techniques

By Platoon. Displacement by platoon may be used when contact with the enemy is unlikely. In this method of displacement—

- The need for speed outweighs the need for immediately available fires.
- Accurate and timely response to calls for fire is sacrificed; therefore, greater reliance is placed on *hip shoots*.
- Command and control problems are minimal.

By Section. Displacement by section is slower than displacement by platoon. In displacement by section—

Ž Continuous accurate fires are required.

DESIRABILITY OF OPTIONS

EMPLOYMENT OPTIONS				
TACTICAL REQUIREMENT	PLATOON (ONE LOCATION)	PLATOON (TWO LOCATIONS)	SECTION	SQUAD
Massing fires	1	2	3	4
Responsiveness	1	2	3	4
Command and control	1	2	3	4
Ease of resupply	1	2	3	4
24-hour operations	1	2	3	4
Radio traffic	1	2	3	4
Effects on target (rounds per volley)	1	2	3	4
Displacement	4	3	2	1
Survivability	4	3	2	1
Restricted by terrain	4	3	2	1
Support for wider front	4	3	2	1
Vulnerability (to counterfire)	4	3	2	1
1 = Best option 4 = Worst option				

- Speed is essential.

Ž Command and control is more difficult.

By Individual Squad. Displacement by individual squad is the slowest technique. In this method—

Ž The need for continuous fire outweighs the need for speed.

- Command and control is extremely difficult.

Movement Options

Two movement options are available—successive bounds and alternate bounds.

Generally, the alternate bounds method is used to keep up with supported elements when displacement is rapid. The successive bounds method is used when the maneuver element movements are not so rapid.

Successive Bounds. In this technique, part of the platoon is moved to the next position. After that subelement is in position and ready to fire, the rest of the platoon moves to the same position.

Alternate Bounds. In this technique, part of the platoon is moved to the next position. After that subelement is in position and ready to fire, the rest of the platoon moves to a different position. This method of movement applies to both the offense and the defense.

Section III. TACTICAL AIR SUPPORT

Missions

TACAIR supports the AirLand Battle by providing interdiction (air interdiction [AI] and battlefield air interdiction [BAI]) and close air support missions. At the brigade and battalion levels, CAS will be the primary support mission. CAS involves air actions against hostile targets that are in close proximity to friendly forces and require detailed integration of each air mission with the fire and movement of friendly forces. CAS includes the delivery of munitions by Air Force, Navy, and Marine Corps aircraft. The missions are distributed to each corps by the land component commander (cdr). The corps commander then further distributes the CAS missions down the Army chain of command. Usually, CAS missions are distributed no lower than brigade. CAS targets are either preplanned or immediate.

Preplanned Close Air Support

Preplanned CAS may be categorized as follows:

- Scheduled mission— CAS strike on a planned target at a planned time (TOT).
- Alert mission— CAS strike on a planned target or target area executed when requested by the supported unit. Usually, this mission is launched from a ground alert (scramble), but it may be flown from an airborne alert status. Alert (on-call) CAS allows the ground commander to designate a general target area within which targets may need to be attacked. The ground commander designates a conditional period within which he will later determine specific times for attacking the targets.

To plan CAS, the S3 air must work closely with the S3, FSO, and ALO.

Requirements that can be foreseen in time to be included in the tactical air control center (TACC) air tasking order (ATO) are forwarded as preplanned air requests. Ground unit planners must forward CAS requests as soon as they can be forecast. These requests for CAS normally do not include detailed timing information because of the lead time involved. Preplanned CAS requests involve any information, even general information about planned schemes of maneuver, that can be used in the apportionment, allocation, and distribution cycle. Estimates of weapons effects needed by percentage (for example, 60 percent antiarmor and 40 percent antipersonnel), sortie time flows, peak need times, and anticipated distribution patterns are vital to preplanning the air tasking order. The ALOs and S3s at all planning echelons must ensure that such information is forwarded through the battlefield control element (BCE) as soon as it is foreseen by the echelon planners. Do not wait to plan all details of individual CAS missions before forwarding preplanning data to higher echelons.

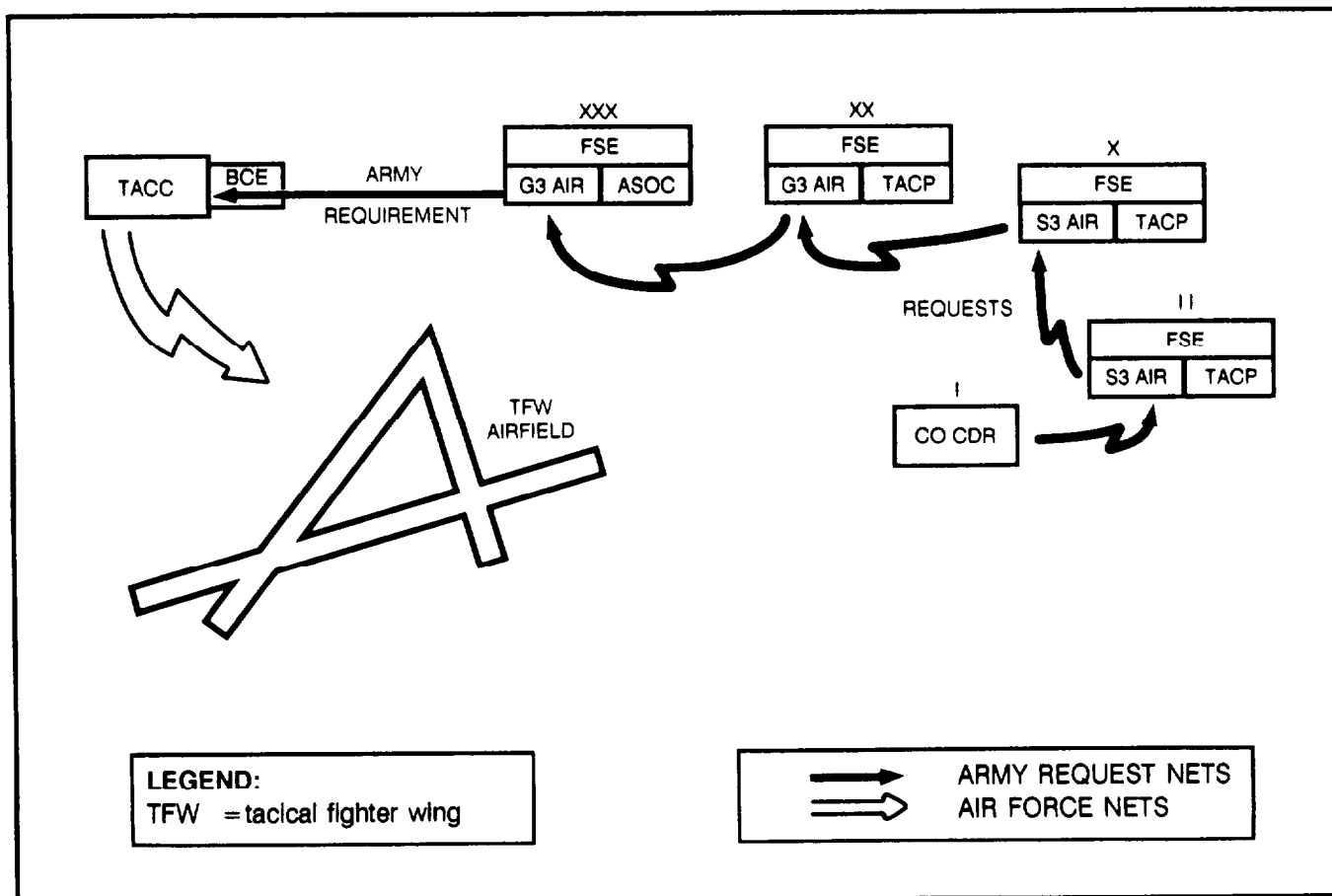
There are specific request channels for preplanned CAS. Requests for preplanned tactical air support missions are submitted to the FS cell. The commander, ALO, and S3 at each echelon evaluate the request; coordinate such requirements as airspace, fires, and intelligence; consolidate; and if approved, assign a priority or precedence to the request. The S3 air then forwards approved requests by Army communications nets to the next higher echelon. The FS cell of the corps main CP makes the final consolidation and approves preplanned requests for TACAIR support. After approval, the requests become the ground force request that is passed through the BCE to the TACC for execution. The requestor is notified of the approval. The requestor is also notified if requests are disapproved at any echelon. The TACC does the necessary planning and includes the

mission in the ATO for execution. Requests for CAS that do not reach the TACC in time to be included in the ATO are treated by the air support operations center the same as immediate requests.

The CAS aircraft assigned to attack preplanned targets may be diverted to higher priority targets; therefore, the FSO should plan for the engagement of CAS targets by alternate fire support assets. Specific planning considerations are as follows:

- Unit mission.
- Enemy air defenses. What are the enemy air defense capabilities?
- Terrain. Does the terrain restrict the use of any type of munition or aircraft?
- Weather. Does the weather favor the use of aircraft? What is the weather forecast for the immediate future?
- Time available for planning.
- Weapons effects. What types of targets are to be engaged and what are the desired weapons effects?
- Command control, and communications.
- Mission response time.
- Close air support and artillery integration.

PREPLANNED CLOSE AIR SUPPORT REQUEST CHANNELS



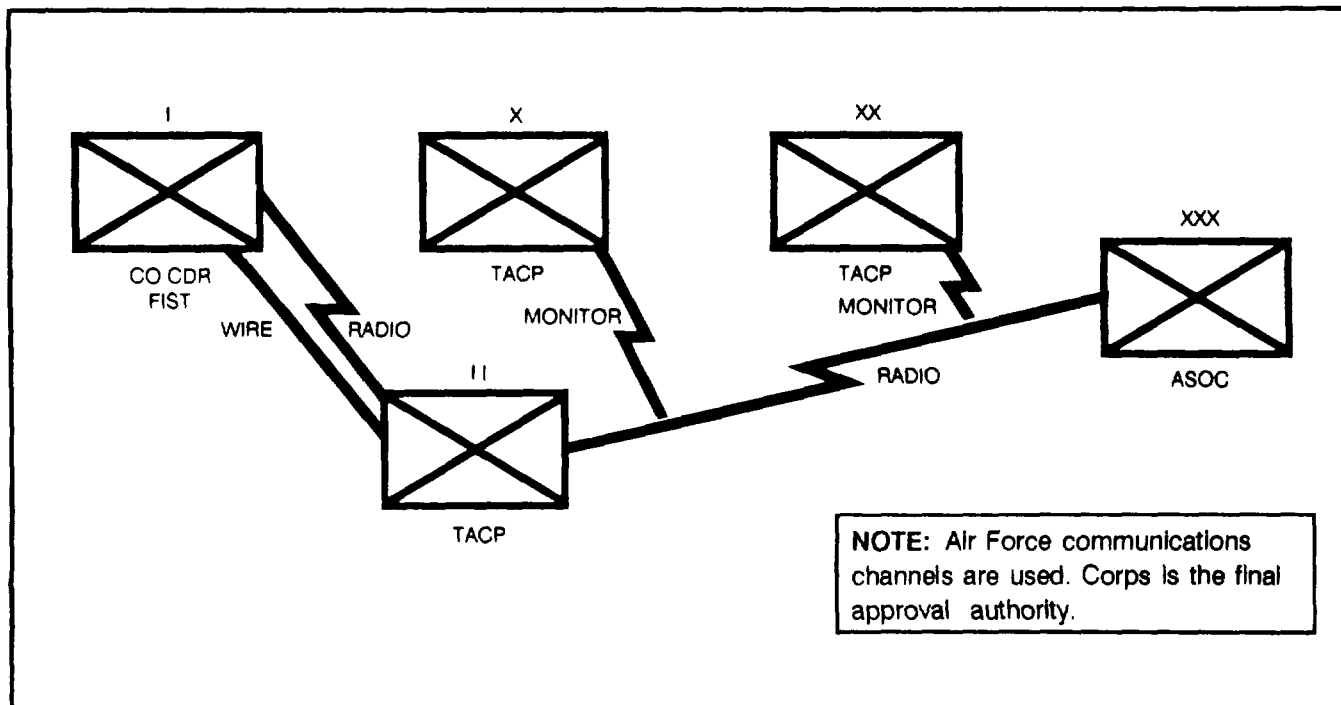
Immediate Close Air Support

Immediate requests are used for air support mission requirements that were identified too late to be included in the current air tasking order. They are sent through specific request channels.

Those requests initiated below battalion level are forwarded to the battalion command post by the most rapid means available. At battalion level, the commander, ALO, and S3 consider each request. Approved requests are transmitted by the TACP over the Air Force air request net directly to the ASOC collocated with the corps tactical operations center (CTOC) or separate division TOC. The TACP at each intermediate headquarters monitors and acknowledges receipt of the request. Silence by an intermediate TACP indicates approval by the associated headquarters unless, within a specified period, a disapproval is transmitted. The ASOC

coordinates the request with the corps G3 air for all air support requests initiated by the corps. Meanwhile, intermediate TACPs pass the request to the associated headquarters G3 or S3 for action and coordination. All echelons coordinate simultaneously. If any Army echelon above the initiating level disapproves a request or substitutes another support means (for example, Army aviation or field artillery), the TACP at that headquarters notifies the ASOC at corps and the originating TACP, which notifies the requestor. When the corps commander or his representative approves the request, the ASOC initiates the necessary action to satisfy the request. If all distributed sorties are committed, the corps commander can request additional sorties from the next higher echelon, when appropriate. If the ASOC has no CAS missions available, it can, with Army concurrence, divert sorties from lower priority targets or request support from lateral or higher commands.

IMMEDIATE CLOSE AIR SUPPORT REQUEST CHANNELS



Organization

At brigade and battalion levels, a TACP advises the maneuver commander on the capabilities and proper use of air support, requests immediate CAS through the Air Force request net, helps with planning if required, and provides final control of CAS missions. At brigade, the TACP is composed of two Air Force ALOs who are trained to control air strikes and two noncommissioned officers (NCOs) called tactical air command and control specialists (TACCSs). At battalion, the TACP is composed of one ALO and two enlisted specialists. At least one TACCS per battalion TACP is qualified as an ETAC (qualified to control CAS sorties).

The person who has final control of CAS missions, formerly referred to as the forward air controller (FAC), will vary from mission to mission according to the situation. Threat permitting, the AFAC is best able to control CAS because of his mobility, wide field of observation, and improved line-of-sight communications. If an AFAC is not available, the ALO and ETAC members of the TACP are qualified to control CAS from the ground. In this manual, the term FAC has been used to refer to the particular individual – ALO, ETAC, or AFAC – who performs the final coordination and control of CAS missions.

Attack Coordination

After submitting a CAS request, the TACP and FIST must take a number of actions before munitions can hit the target.

Communications

Radio frequencies (primary and alternate) and laser designation settings used by FISTs, TACPs, AFACs, tactical air controllers-airborne (TAC-As), and tactical fighters should be predetermined and forwarded to all parties. Not all CAS aircraft have frequency modulated (FM) radios. The

TACP may have to relay FIST FM transmissions to the fighters by ultrahigh frequency (UHF) (Have Quick) or very high frequency (VHF) if available. The Army SOP is to operate FM-secure. Most Air Force FM is not secure-capable. Even if it is secure-capable, Air Force FM is not compatible with the Army secure FM because of encoding procedures.

Authentication

Proper authentication procedures must be used during CAS missions. Because intraservice Air Force and Army authentication tables differ, each air and ground element must obtain the joint authenticator, AKAC-1553, through unit communications security (COMSEC) custodians. This joint authenticator, which has been developed for crisis or contingency and exercise use only, is called the dryad numeral authentication system. This system is used for joint interoperability worldwide and is part of the intertheater COMSEC package.

Tactical Air Control Party Functions

The battalion TACP directs contact between a FAC and a FIST on a common frequency. The FAC moves to where he can observe the target. When the FAC arrives, the FIST orients him to the target, friendly positions, and known enemy air defense artillery (ADA) positions. If no FAC is available, the TACP contacts the FIST. The FIST becomes the *eyes* for the TACP in the target area. These actions take place while higher echelons process the air request.

After approval of the air request, either the TACP or the TAC-A or both receive fighter mission data from the ASOC. Data include —

- Mission number.

Ž Fighter call sign.

Ž Number and type of aircraft.

Ž Ordnance.

- Time on target.

While the air request is being processed, the FAC, battalion ALO, or TACP determines additional mission-essential information. Such information includes, but is not limited to —

- Updated target location and identification means.
- Availability of fires for SEAD.
- Fighter communications capability.

Ž Attack restrictions.

- Friendly AD considerations.
- Time factors for the attack.

If the aircraft have airborne laser spot trackers (LSTs), the laser setting must be passed to the attack aircraft. If the aircraft have laser-guided weapons (LGWs), the laser setting to be used (Army setting for LSTs, Air Force setting for LGWs) and the laser target line must be passed to the TACP.

When the aircraft arrive in the target area, the TACP gives them current target information, navigation data, and a verbal picture of the specific target. The FAC must pass enough information to enable the pilots to positively identify the targets. If required, he calls corrections from target marks or the flight leader's bombs. He is prepared to abort the attack if the safety of friendly troops is threatened. During the entire attack, the FAC watches for enemy surface-to-air fires and warns the aircraft accordingly.

After the attack, the FAC or FIST or both send their bomb damage assessment (BDA) to the TACP. The TACP relays the BDA to the appropriate headquarters.

Airborne Forward Air Controller Functions

The airborne FAC, when available, usually operates in a fixed-wing aircraft. With his excellent mobility and improved line-of-sight communications, he is better able to observe and describe the target. His functions are—

- To coordinate with the TACP and ground commander.

Ž To relay CAS requests if required.

- To observe the target.

Ž To provide or relay the mission briefing to the flight leader.

Ž To provide final attack control when the threat permits.

Ž To mark the target with WP rockets.

- To observe (if possible) and report BDA.

Fire Support Team Functions

As new targets appear, the company FIST may be in the best observation position. The FIST can help in CAS by orienting the FAC to the target, friendly positions, and enemy ADA. The FIST should also prepare to initiate on-call SEAD and to mark the target.

If no FAC is available, the FIST becomes the eyes of the battalion TACP. Target data from the FIST are relayed to the fighters by the TACP. Should troop safety so require, the FIST calls for a mission-abort through the TACP. He also passes munitions corrections and assesses mission results. Regardless of the type of munitions used, Air Force mission results are referred to as BDA.

If no AFAC or battalion TACP is available in an emergency, the FIST will direct tactical fighters that are equipped with compatible

radios. In this case, the brigade TACP prepares the CAS mission briefing.

Laser Target Designation Procedures

The TACP coordinates with the FIST on using lasers to accurately mark targets for aircraft with airborne LSTs. A FIST can mark a target by placing a laser spot on or near the target. The LST-equipped aircraft receives the reflected laser energy, locks onto it, and displays an aiming cue in the pilot's head-up display (HUD). The pilot uses the aiming cue to locate the target and aim the aircraft weapons.

The LST on the A-7 is called a target identifier set, laser (TISL) and on the A-10 aircraft, a Pave Penny. The Air Force uses FIST laser settings with Pave Penny or TISL, while the FIST uses the Air Force laser setting for Air Force LGWs. When Air Force settings are required, the TACP passes them to the FIST. The USAF laser code is a four-digit number; the first digit is always 1. The Army laser code uses the last three digits of the USAF code. The laser code setting of three digits is passed in the CAS briefing.

Even when using laser designations, TACPs and FISTs should also consider marking with smoke. Marking smoke allows a pilot to point his LST accurately enough to acquire the laser spot. Caution should be used to avoid laser-to-target visibility problems or attenuation problems caused by the smoke. However, without marking rounds, aircraft may be pointed too far away from the target area for the LST to acquire the laser spot.

Effective employment of laser designation depends on timely and correct radio calls between the FAC or FIST and the CAS aircraft. When using a laser, the pilot will make the following radio calls:

Ž **10 SECONDS** (time until **LASER ON** call expected).

- **LASER ON.**
- **SPOT.**
- **TERMINATE.**

Saying **10 SECONDS** means the pilot wants the laser on in approximately 10 seconds. The FAC relays the call to the laser designator operator (LDO).

LASER ON directs the FAC or FIST to ensure that the LDO designates the target immediately. Maximum laser designation time is usually 20 seconds. The pilot may request a longer laser-on time by saying **LASER ON** and the time; for example, **LASER ON, 30 SECONDS**. The FAC should acknowledge this call.

The pilot calls **SPOT** when he acquires the laser spot. This confirms to the FAC and the pilot's wingman that the pilot sees the designated target.

The last call in the sequence is **TERMINATE**. The pilot makes this call to turn the laser off. Minimizing laser-on time is important in a laser countermeasures environment and when battery-operated laser designators are used. The LDO will turn the designator off—

- When the LDO hears **TERMINATE**.
- Ž When the weapon hits the target.
- After 20 seconds (or longer, if requested).

Detailed information on CAS laser procedures is in TRADOC Pamphlet 34-3.

After a request for immediate CAS is approved, the TACP and FIST perform the functions shown on the next page.

LASER TARGET DESIGNATION FUNCTIONS OF TACTICAL AIR CONTROL PARTY AND FIRE SUPPORT TEAM

WHEN FAC CAN OBSERVE TARGET	WHEN FAC CANNOT OBSERVE TARGET
<p>The FAC locates—</p> <ul style="list-style-type: none"> • The target. • Friendly forces. <p>Ž Enemy air defense.</p> <p>The FAC passes the mission briefing.</p> <p>The FAC requests, as required—</p> <p>Ž AD suppression.</p> <ul style="list-style-type: none"> • Target marking. • Abort code (from fighters). <p>The FAC —</p> <ul style="list-style-type: none"> • Considers troop safety. • Warns flight leader of enemy AD fires. <p>Ž Orients flight leader to target.</p> <ul style="list-style-type: none"> • Calls corrections. • Provides BDA. <p>The FIST helps the FCA—</p> <ul style="list-style-type: none"> • Locate the target. • Locate friendly forces. • Locate enemy air defense. <p>Ž Initiate and control on-call SEAD.</p> <ul style="list-style-type: none"> • Mark with smoke, or laser-designate the target. <p>Ž Integrate fire support with CAS.</p>	<p>The TACP passes the following target Information from the FIST to the TAC-A or flight leader</p> <p>Ž Target location.</p> <p>Ž Description.</p> <ul style="list-style-type: none"> • Location of friendly forces. • FIST frequencies and call signs. • Laser code. <p>The TACP requests, as required—</p> <p>Ž AD suppression.</p> <ul style="list-style-type: none"> • Target marking. <p>Ž Abort code (from fighters).</p> <p>The TACP is prepared to relay the following instructions to the flight leader</p> <ul style="list-style-type: none"> • Orientation to the target. • Abort calls <p>Ž AD warnings.</p> <ul style="list-style-type: none"> • Corrections. • Troop safety. <p>The TACP relays bomb assessment from the FIST.</p> <p>The FIST passes target information to the TAC-A and is prepared—</p> <ul style="list-style-type: none"> • To initiate and control on-call SEAD. • To mark with smoke or laser-designate the target. • To pick up fighters visually, if possible. <p>Ž To orient fighters to the target.</p> <ul style="list-style-type: none"> • To call corrections, if appropriate. • To call ABORT (danger to friendly ground or air forces or wrong target), if required. • To provide BDA.

Planning Considerations

CAS mission success is directly related to thorough mission planning. Planners must consider weather, target acquisition, target identification, identification of friendly forces, general ordnance characteristics, final attack heading, troop safety, SEAD, and CAS and artillery integration.

Weather

Weather is one of the most important considerations in visual employment of weapons. Poor light, limited visibility (rain, snow, fog, smoke, or night), low clouds, or attack into a low sun all hinder target identification. Gusty winds can degrade the accuracy of weapons employment.

Target Acquisition

Well-camouflaged or small stationary targets are difficult to acquire from fast-moving aircraft, as are targets masked by hills or other natural cover. On the other hand, moving vehicles may highlight themselves by their dust trails, exhaust smoke, and relative movement against their background. The use of marking rounds can key the attacking pilot's eyes to the right target area, enhance target identification and help ensure first-pass success.

Target Identification

A precise description of the target in relation to terrain features easily visible from the air, smoke or laser target marking, or other means is critical to avoid attacking friendly forces by mistake. Target identification is always difficult at the ranges at which fighter aircraft must line up on the target. This task becomes even more difficult when both sides use similar vehicles.

Radar beacons are an alternate means of target identification. USREDCOM Manual 525-5 provides a single-source document for planning and executing beacon procedures.

Identification of Friendly Forces

Pilots of fighter aircraft must know the position of friendly forces before attacking. Several safe means of friendly identification may be used. These include a mirror flash, a marker panel, and the direction and distance from prominent land features or target marks.

General Ordnance Characteristics

Tactical fighter aircraft can employ a wide variety of general- or specific-use weapons. Newer weapons are designed to produce specific effects against specific targets. Some weapons require restrictions when used with troops in contact. Modifications to existing aircraft, such as improved weapons delivery computers and sight systems, also improve their capability to use existing general-purpose (GP) weapons more effectively.

Final Attack Heading

Choice of the final attack heading depends on considerations of troop safety, aircraft survivability, and optimum weapons effects. For example, overflying a ZSU-23-4 on an otherwise perfect final attack heading would be foolish. In general, linear targets should be attacked at a small angle off the long axis to ensure target coverage and to increase the probability of multiple hits. Missiles or bombs are effective from any angle; cannons, however, are more effective against the sides and rears of armored vehicles.

Troop Safety

Troop safety is a key consideration in using CAS. The primary cause of friendly air attacks on friendly troops is misidentification of friendly forces as enemy forces.

Suppression of Enemy Air Defenses

SEAD may be required, depending on the capabilities of the tactical aircraft and the presence of enemy air defense systems in the target area.

Close Air Support-Artillery Integration

Army artillery and tactical air power are complementary. Because artillery support available to ground forces is more continuous and faster to respond than CAS, ground elements depend heavily on artillery and are reluctant to impose firing restrictions. CAS missions, therefore, must integrate with artillery so that only limited firing restrictions are required. The ACA is the fire support coordinating measure that accomplishes this integration.

Airspace Coordination Area Development. The following criteria will be considered in developing an ACA for an operation:

- Ž The ACA should be easily identifiable from the air.
- Ž It must allow the particular aircraft involved enough room for maneuver.
- Ž It must allow access to and egress from the initial point to the target area. Establish an IP that is deconflicted with the mortars, AD, and FA.
- It must consider the ordnance and capabilities of the aircraft. (Will the aircraft use the standoff technique, or must it overfly the target?)
- Ž When possible, it should include terrain that masks aircraft from hostile air defense systems.
- Ž It should separate the aircraft from friendly fires and their effects by either time or space.
- It should allow surface systems to provide SEAD and to mark targets if necessary.
- It should be simple so that dissemination to both pilots and surface systems is easy.

Separation Plans. FACs learn four standard separation plans and coordination procedures at the Air-Ground Operations School and basic FAC flight school.

Ž Lateral separation.

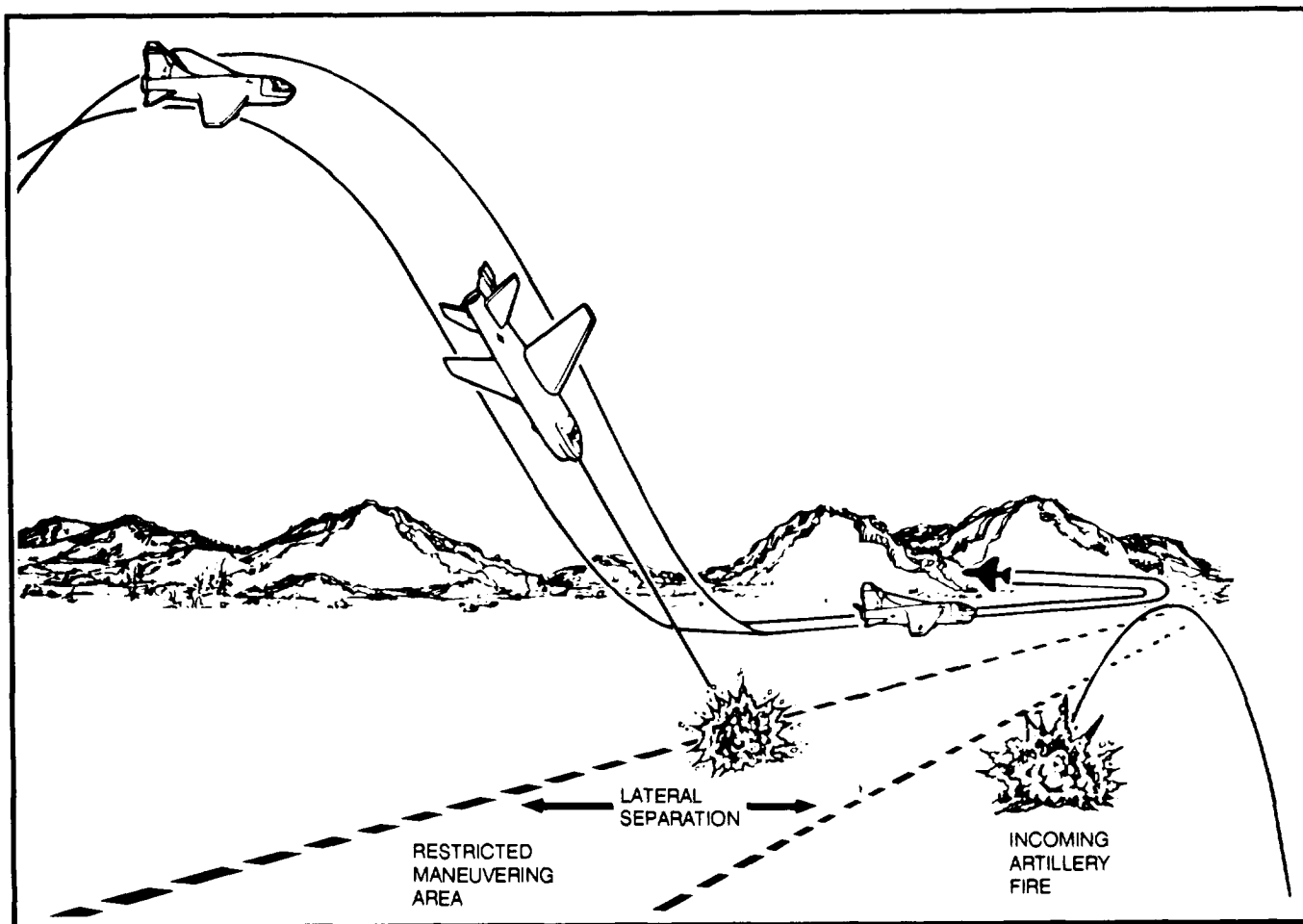
- Altitude separation.
- Time separation.
- Altitude and lateral separation.

The degree to which these plans are practiced varies greatly. It is based on the theater, the availability and restrictions of ranges, and unit safety restrictions. Air Force FACs understand

the importance of not restricting Army artillery unnecessarily during CAS.

Lateral Separation (Adjacent Targets). Lateral separation plans are for coordinating attacks against two targets that are close together. The FAC needs to know the gun-target (GT) line so he can restrict any fighter attack run from crossing this line. Establishing a temporary ACA is one way to do this. It will keep the fighters and airborne FAC away from indirect supporting fires. The ACA should be big enough that fighters can operate over the target yet small enough that supporting fires are not too restricted. The ACA can be defined by grid coordinates, geographical features, or time.

ARTILLERY-FIGHTER LATERAL SEPARATION



Altitude Separation (Same Target). Altitude separation plans apply when both CAS and artillery attack the same target and the artillery fires at a low angle. Lateral separation and recovery altitude restrictions ensure clearance from the artillery trajectory and frag pattern. Other restrictions normally include—

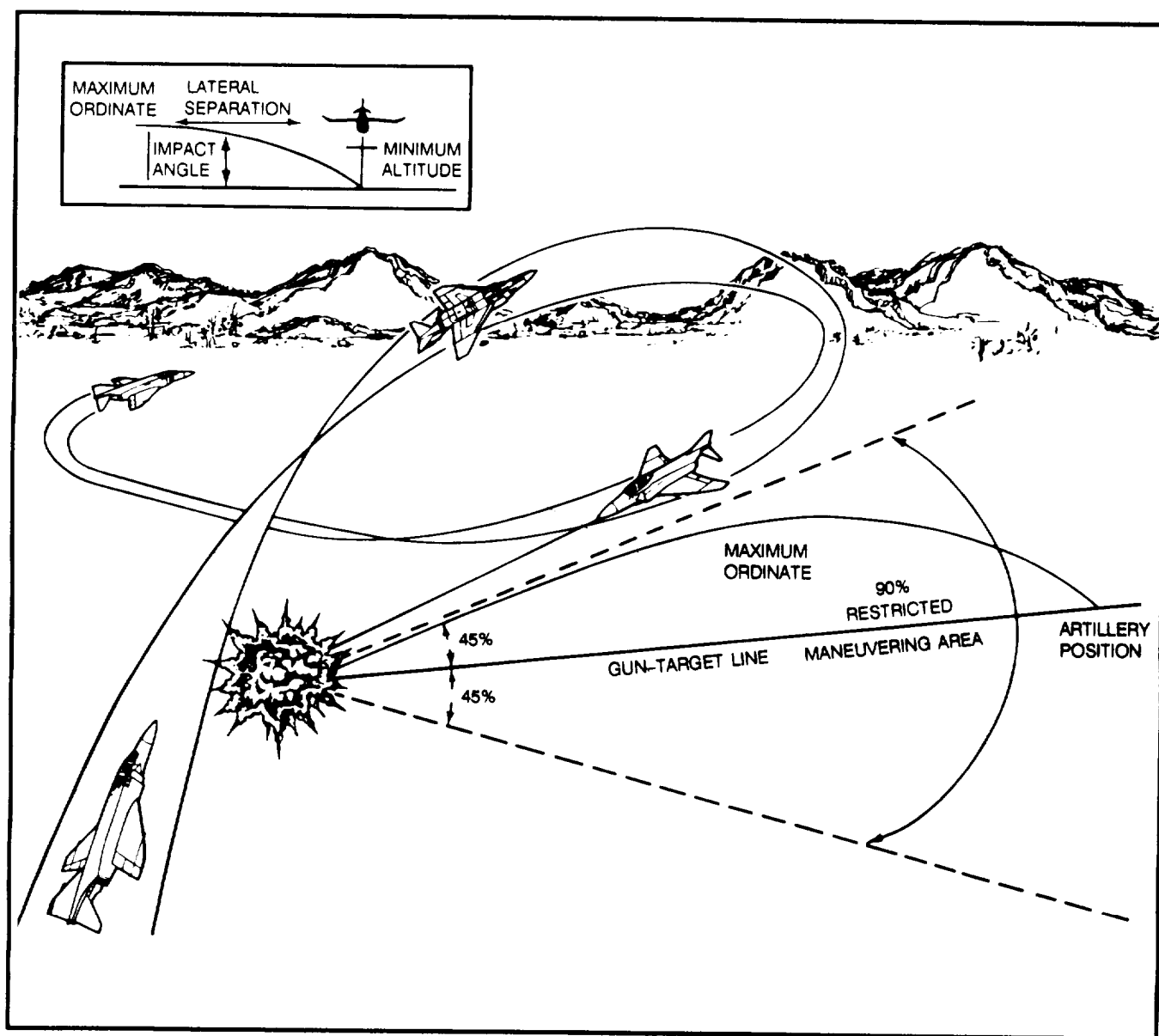
- No change in artillery trajectories.

Ž No overflight of the GT line by the fighters, except at the impact point.

Ž Restricted final attack heading.

When fighter pilots cannot adhere to these restrictions, the FAC must instruct them to recover above the maximum ordinate altitude or frag pattern, whichever is higher.

ARTILLERY-FIGHTER ALTITUDE SEPARATION



Time Separation (Same Target). Time separation plans specify the intervals during which artillery and/or mortars fire. The FAC determines these intervals in conjunction with the FSO. The artillery and/or mortar fires are controlled by the call for fire. The aircraft is controlled by appropriate instructions included in the CAS briefing, sometimes called the *nine-line brief*. These controls ensure a time separation of aircraft and artillery and/or mortar fires on the same target or target area.

EXAMPLE OF TIME SEPARATION

The FSO and ALO determine the IP to be used. The time separation agreed upon between the ALO and FSO is 30 seconds.

Call for Fire:

(BATTALION FDC) THIS IS (TF FSO) (use appropriate call signs).

TARGET AC2101, 2-MINUTE SEAD PROGRAM, FINAL VOLLEY IMPACT 6 MINUTES FROM MY MARK.¹

TARGET AC2103 MARKING ROUND 6 MINUTES FROM MY MARK, PREPARE TO MARK.²

PREPARE TO MARK, 5, 4, 3, 2, 1, MARK.
(The mark given is for both the SEAD program and the marking round.)

CAS Mission Briefing (transmitted concurrently by the ALO):

(1) X RAY.

(2) 075 OFFSET LEFT.

(3) 10.2.

(4) 1,200 FEET (mean sea level [MSL]).

(5) TANK COMPANY ATTACKING WEST.

(6) QA044092.

(7) WP.

(8) 2,000 METERS SOUTH ON HIGH GROUND.

(9) WEST TO AVOID ARTILLERY SUPPRESSION.

REMARKS: TOT 6 MINUTES FROM MY MARK. (In case rounds are not complete on SEAD program, abort instructions may be issued here.)

The FSO waits 30 seconds, taking into account transmission time, and tells the ALO to give the 6-minute mark to the aircraft. The ALO contacts the aircraft and transmits **6-MINUTE MARK, MARK.**

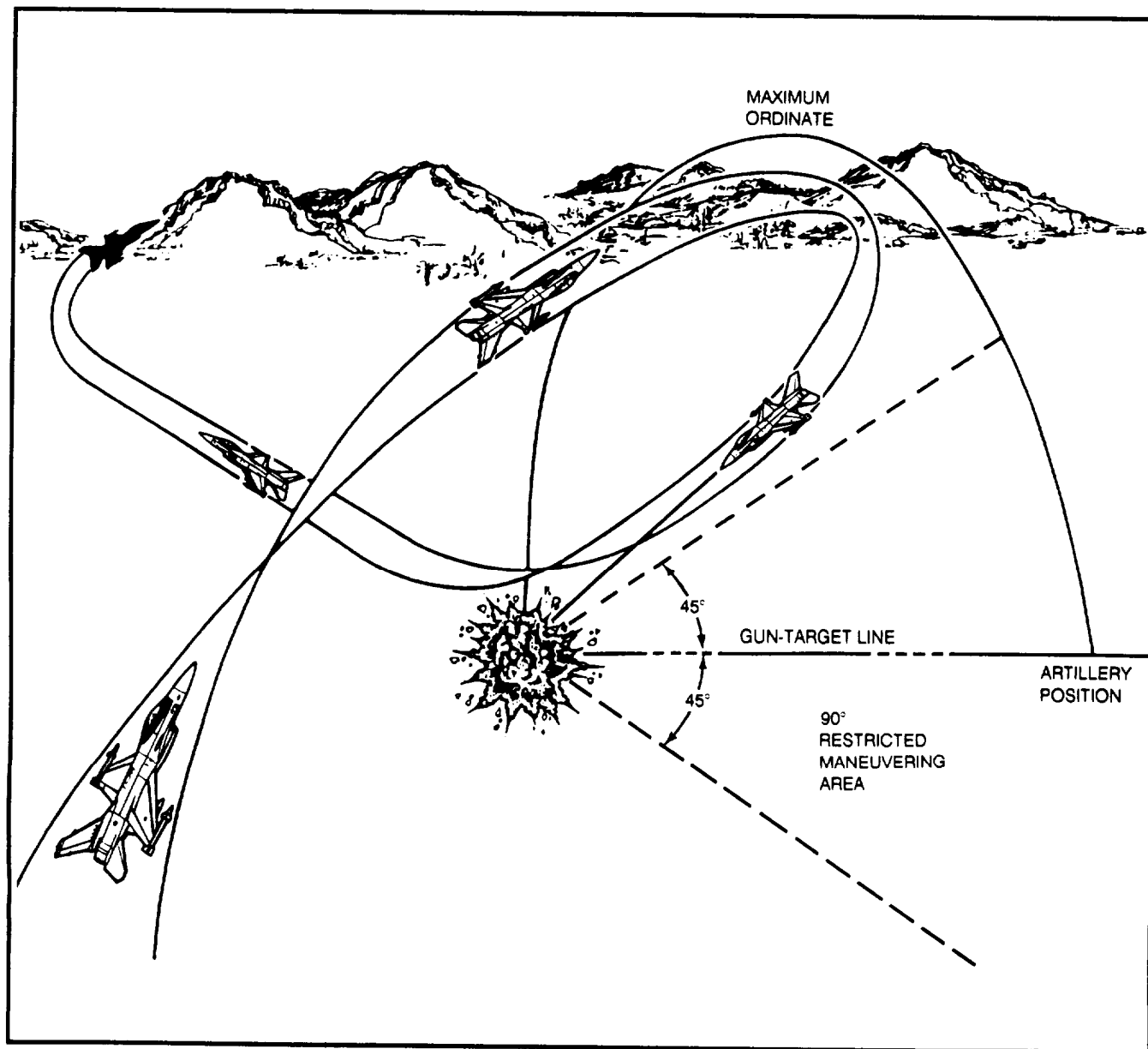
At minute 4 of the schedule, the first artillery and/or mortar rounds impact; at minute 6, the final rounds impact (both suppression and marking rounds). Aircraft will be 30 seconds behind the final volley impacting. The ALO will clear the aircraft to attack.³

¹The artillery and and/or mortars execute the mission as a schedule of fires.

²The marking round may or may not be requested.

³The artillery and/or mortars may still be firing elsewhere in the zone but only through positive clearance by the TF FSO.

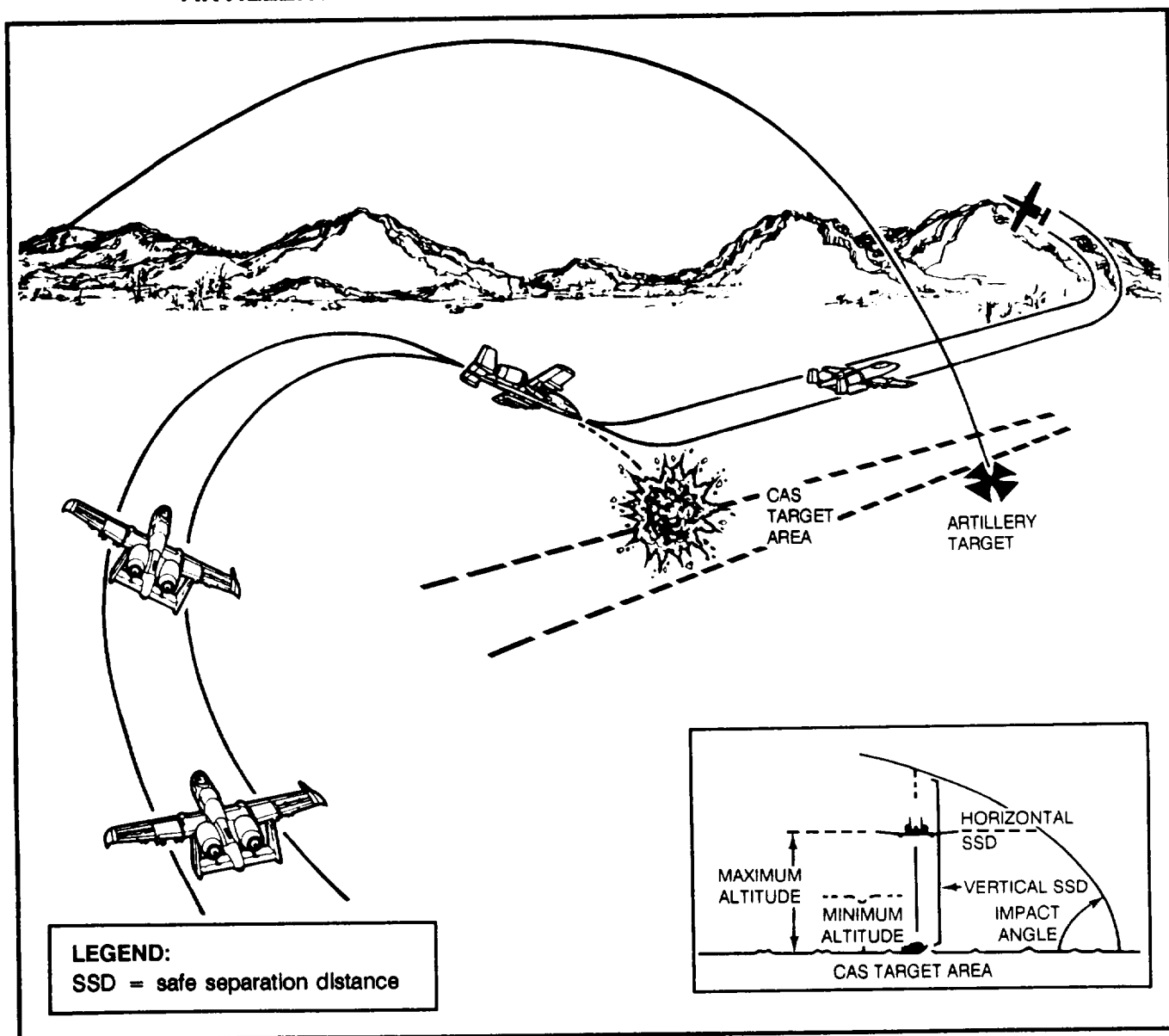
ARTILLERY-FIGHTER TIME SEPARATION



Altitude and Lateral Separation (Closely Adjacent Targets). Altitude and lateral separation plans are the most restrictive. They provide for SEAD when the CAS target is between the artillery and enemy antiaircraft positions. As shown in the graphic on the next page, the vertical restriction is a maximum altitude directly over the CAS target and under the

gun line. This restriction provides both horizontal and vertical clearance. The fighters need to know the minimum ordinate over the target. To avoid artillery, they must remain well below this altitude when near the gun-target line. Normally, the fighters will restrict their attack headings to within $\pm 45^\circ$ of a line perpendicular to the gun line.

ARTILLERY-FIGHTER LATERAL AND ALTITUDE SEPARATION



Attack Execution

Close Air Support Mission Briefing

The CAS mission briefing format varies slightly from theater to theater; however, the information is the same. Target information may be passed to a TACP, an airborne FAC, or a TAC-A. It will be properly formatted and passed to the flight leader.

The following brief would be transmitted as follows: **X RAY** (pause), **075** (pause), **10.2** (pause), **1,200** (pause), **TANK COMPANY ATTACKING WEST** (pause), **QA044092** (pause), **LASER 372** (pause), **2,000 METERS SOUTH ON HIGH GROUND** (pause), **EGRESS WEST TO AVOID ARTILLERY SUPPRESSION**.

The mission briefing format may include the following additional information:

• Hazards (weather or high terrain, for example).

- Attack restrictions (assume none unless specified).
- Attack frequency and FAC call sign.
- Fire support integration.
- Threat update.
- Detailed description of target area.

EXAMPLE CLOSE AIR SUPPORT BRIEF

CLOSE AIR SUPPORT BRIEF (GIVEN TO THE AIRCRAFT)

(AIRCRAFT CALL SIGN) THIS IS (YOUR CALL SIGN)
CAS BRIEFING FOLLOWS:

(1. INITIAL POINT (IP)) " **XRAY** "

(2. HEADING (IP TO TARGET [TGT]) " **075** "
(MAGNETIC) (OFFSET:) " L / R "

(3. DISTANCE (IP TO TGT)) " **10.2** " (NAUTICAL MILES)

(4. TARGET ELEVATION) " **1,200** " (FEET MEAN SEA LEVEL)

(5. TARGET DESCRIPTION) " **TANK COMPANY
ATTACKING WEST** "

(6. TARGET LOCATION) " **QA044092** "
(LATITUDE/LONGITUDE OR UTM OR OFFSETS OR VISUAL)

CLOSE AIR SUPPORT BRIEF (CONT'D)

(7. TYPE MARK) " **LASER** " (CODE) " **372** "
(WP, BEACON, LASER) (BEACON, LASER)

(8. LOCATION OF FRIENDLIES) " **2,000 METERS
SOUTH ON HIGH GROUND** "

(9.) "EGRESS **WEST TO AVOID ARTILLERY
SUPPRESSION**"

(REMARKS) " _____ "

(TIME ON TARGET) "TOT _____" OR
(TIME TO TARGET (TTT)) "STAND BY _____"
PLUS _____ HAZARD (MIN)
(SEC)

OMIT DATA NOT REQUIRED. LINE NUMBERS ARE NOT TRANSMITTED. UNITS OF MEASURE ARE STANDARD; SPECIFY IF OTHER UNITS OF MEASURE ARE USED.

NOTES:

1. For further information, see TC 90-7
2. The three-digit number in item 7 is the laser designator setting

- Abort code (obtained from the attack aircraft).
- Clearance (for example, **CLEARED TO DEPART, CALL DEPARTING**).

Additional data may be passed if the situation permits. The FAC will assume that a jamming environment exists and transmit the FAC-to-fighter briefing by using short, concise transmissions. When the FAC gets to the additional information step, he may try to expand on his briefing. The fighters should use this time to ask for repeats or to ask questions critical to the attack. Some information can be passed only after the fighters see the target area.

Final Attack Control

At the contact point, the TAC-A, TACP, or FAC updates the flight leader as he flies toward his initial point. When cleared to attack, the flight leader switches to the attack frequency, checks in with the FAC or FIST, and calls as his flight departs the IP. This radio call is used to coordinate SEAD and/or marking rounds. Whenever tactically possible, the FAC will try to pick up the fighters visually and give them final directions to help the pilots acquire the target.

Direction and Distance Reference

If the tactical situation permits, a direction and distance reference can be used to aid in target acquisition. The FAC should provide a common reference for orientation. For example, **THE MAIN ROAD** (or river, tree line, and so forth) **RUNS EAST-WEST**. Next, the FAC must select some discernible ground feature to establish a common distance reference. A river, road, or field can be used; and distances are given in meters. For example, **THE MAIN FIELD** (or drop zone, assault strip, and so forth) **IS 100 METERS LONG**. Use definite statements in this and all other briefing items. The fighters expect the

EXAMPLES OF DIRECTION AND DISTANCE REFERENCE

STAR 11, THIS IS ALFA 53.
THE RIVER RUNS NORTH-SOUTH.
THE FIELD IS 100 METERS LONG.
OFF YOUR RIGHT WING, NOTE SANDBAR IN RIVER.
TARGET IS 400 METERS EAST OF SANDBAR.

and

STAR 11, THIS IS ALFA 53.
THE TREE LINE RUNS EAST-WEST.
FROM X INTERSECTION TO Y INTERSECTION IS 100 METERS.
HALFWAY BETWEEN X AND Y, TARGET IS NORTH 25 METERS.

FAC to give them the best available measurements and estimates. Words like *about*, *approximately*, *let's*, and *please* waste radio transmission time. Specific and authoritative instructions are needed to accomplish a mission.

Call to Abort Attack

If the fighters are not aligned with the correct target or if it appears that friendly troops may be endangered, the attack must be aborted. The authentication abort code is obtained from the attack aircraft during the CAS briefing. To abort a CAS attack, the FAC and FIST must have the same authentication system as the aircraft.

The CAS abort procedure uses the challenge-reply response. The flight leader gives the FAC the two-letter challenge code. The reply letter is the abort-call code word. The reply letter will be given to the fighters only when an abort is desired. The letter should be transmitted after the words **ABORT, ABORT, ABORT**.

EXAMPLE ABORT CALL

STAR 11, ALFA 53.

ABORT, ABORT, ABORT.

DELTA (authentication of the abort code received from the attack aircraft).

Reattacks

The FAC or FIST coordinates reattacks with the fighters. This may require additional coordination such as SEAD, fire support coordination, and re-marking the target. In a medium- to high-threat environment, reattacks degrade aircraft survivability.

Bomb Damage Assessment

The BDA provides the same information as mortar or artillery fire mission surveillance. The TACP relays the BDA through USAF channels, while the FIST uses Army channels.

Night Close Air Support

The capability of TACAIR to attack moving targets or provide CAS at night is limited to low-threat situations. In a night high-threat scenario, current capability is very limited. To enhance execution of night CAS in the future, the Air Force is acquiring additional night-capable systems, such as the low-altitude navigation and targeting infrared for night system (LANTIRN).

Advantages. For tactical fighters engaged in CAS, the most important advantage of night is the limitation it imposes on all enemy optically-sighted antiaircraft artillery (AAA) and infrared (IR) surface-to-air missiles (SAMs). This is particularly true if operators do not have night vision devices. Also airborne and ground illumination may degrade enemy night vision capabilities.

Disadvantages. Darkness imposes limitations on the use of tactical fighters for CAS. During

night and twilight, pilots have more difficulty visually pinpointing targets and accurately locating enemy and friendly forces.

Levels of Threat Air Defense. Enemy muzzle flash, tracer, and missile burn are easier to identify at night. However, radar-guided SAMs and AAA and enemy air-to-air operations may hinder night CAS operations.

Low-Threat Close Air Support. The Air Force considers small arms, optically-sighted AAA, possible SA-7, and limited enemy counterair operations as low-threat defenses. In such an environment, expect the Air Force to fly more night CAS missions.

High-Threat Close Air Support. Radar-guided SAMs and AAA and enemy air-to-air operations pose a high threat to CAS aircraft. Such defenses may cause high losses and require limiting CAS to tactical emergencies. SEAD operations greatly increase the chances of success.

Planning. Close air support missions at night require extensive planning. The TACPs and FISTs must emphasize—

Ž Target and friendly force identification.

Ž The availability of mortars or artillery for target illumination and SEAD.

The maneuver commander, his chain of command, and the ALO must plan and coordinate as early as possible. The ALO, in turn, coordinates with the ASOC to ensure that they have addressed all the necessary planning considerations. In this regard, planning for night CAS should include all day CAS considerations, plus those discussed in this appendix.

In general, two to four aircraft will perform night CAS. They will fly at low, medium, or high altitude, depending on the threat, offensive tactics, and avionics capabilities.

Targets. The first priority for a successful night CAS mission is identifying the target. The second is accurately marking the friendly forces whose safety is important. Once supporting aircraft have identified the target and friendly positions, enemy defenses can be referenced from the target location. The ground commander should rely first on Army assets to mark and/or illuminate the target. The Air Force ground or airborne FAC may also request Air Force illumination.

Airborne and Artillery Illumination. Artillery or mortar illumination is preferable because Army units can provide continuous illumination within their resources.

Flares released from AFAC aircraft, fighters, or flare aircraft can effectively illuminate an area. The A-10, A-7, F-4, OV-10, OA-37, and AC-130 can carry target-marking flares. For effective lighting, the flares must be close enough to the target and at the proper height. Then fighters will be able to respond to a detailed target description. The Air Force fighters capable of night CAS missions under battlefield illumination are the A-10, A-7, F-16, F-4, and F-111.

Flare aircraft or AFAC aircraft can drop long-burning illumination markers (LOGs) to mark targets for use as a common reference for fighter employment. After being dropped, the LOGs burn on the ground for 30 minutes. Ground fires from any source may also serve the same purpose. Once there is a reference on the ground, fighters can use the reference mark to attack the marked position or other locations.

Enemy Ground Fire. Enemy ground fire, AAA, tracer rounds, and surface-to-air missile firings can disclose targets.

Laser Designators. Laser designators can enhance night target acquisition. CAS aircraft may be equipped with laser energy receivers

known as laser spot trackers. They can acquire targets without using conventional illumination. The LST receives laser energy and provides cockpit head-up steering to the source. When LSTs are used, coordination is paramount between the ground unit, the FAC, and the fighters.

Radar. The F-4, F-16, F-111, and A-7 can use radar-significant terrain points, radar reflectors, or portable radar beacons to provide reference information for blind or beacon bombing.

Friendly Positions. Friendly marks improve CAS safety and can provide target area references. Tracers and radar beacons can serve both purposes. Whenever possible, friendly positions should be marked if safe separation is a factor.

Flares. Fired in the air, flares such as trip flares and 40-mm illuminating grenades are effective marks. However, they are usually visible to the enemy as well.

Both wind and cloud cover are important factors in using flares successfully at night. Planners and flare aircraft should calculate the time of delivery and the wind drift to make sure that the target is illuminated during the attack. Flares used during limited visibility can create a *milk bowl* effect, making it more difficult for an aircraft to find the target. When used under a cloud deck, the flares might highlight the fighters against the clouds. Under these conditions, LOGs will be better than flares to mark the target.

Lights. Strobe lights are often excellent for night marking. They are commonly used with blue or infrared filters. They can be made directional by using any opaque tube. In overcast conditions, strobe lights can be especially useful.

Bright directional lights are useful marks, especially in overcast conditions. They are highly directional and can easily be covered with colored filters. Vehicle lights are useful

nighttime marks; but for security, it is best to cover headlights and use tail or brake lights. Any light source that can be readily covered and uncovered can be used for coded signaling.

Combinations of Marks. Combinations or arrays of two or more signaling devices improve chances of acquisition and security of the signal.

Additional Night Close Air Support Capabilities. Other CAS capabilities for night operations are discussed below.

Laser Target Designation Systems. Pave Tack is a pod-contained laser target designating, ranging, and tracking system. Pave Tack uses forward-looking infrared (FLIR). It can be installed on the RF-4C, F-111F, and certain modified F-4E aircraft. The pod provides laser tracking of ground targets for attack with conventional ordnance or laser-guided weapons.

AC-130A/H Spectre Gunships. The primary missions of the AC-130s are special operations and conventional CAS for troops in contact. They also conduct armed reconnaissance, convoy escort, and perimeter defense. AC-130s normally remain rear-area CAS assets and will not cross the FLOT unless the threat is low and friendly air superiority prevails. An AC-130 carries the following guns:

- 7.62 mm (AC-130A only) for use against personnel under light cover.

- 20 mm for use against personnel under light cover.

- 40 mm for use against trucks and personnel under medium cover.

Ž 105 mm (AC-130H only) for use against trucks, tanks, and personnel under any condition.

NOTE: Ammunition includes HE, WP smoke, and HE plastic tracers.
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Using one sensor or a combination of them, AC-130s can locate enemy and friendly positions as follows:

- The radar can locate beacons and ground reflectors.
- The television (TV) or laser platform provides low-light-level TV (LLLTV) during darkness and during day or night laser designation.
- The IR detection set provides visual presentations of the temperature differentials between objects. IR strobes, reflective panels, or reflective tape can help locate friendly positions.

Ž Xenon arc lamps and infrared lamps provide airborne illumination.

- The Black Crow direction finder searches for electromagnetic energy in subradar frequencies. Detectable signatures include those from generators, alternators, and some radios and condensers.

Section IV. **NAVAL GUNFIRE**

General Mission

The general mission of naval gunfire support is to assist the ground force by destroying, neutralizing, or suppressing targets that oppose that force.

Organization

Naval gunfire is coordinated by the brigade air and naval gunfire platoon, a part of the air and naval gunfire liaison company (ANGLICO). The ANGLICO is a Marine

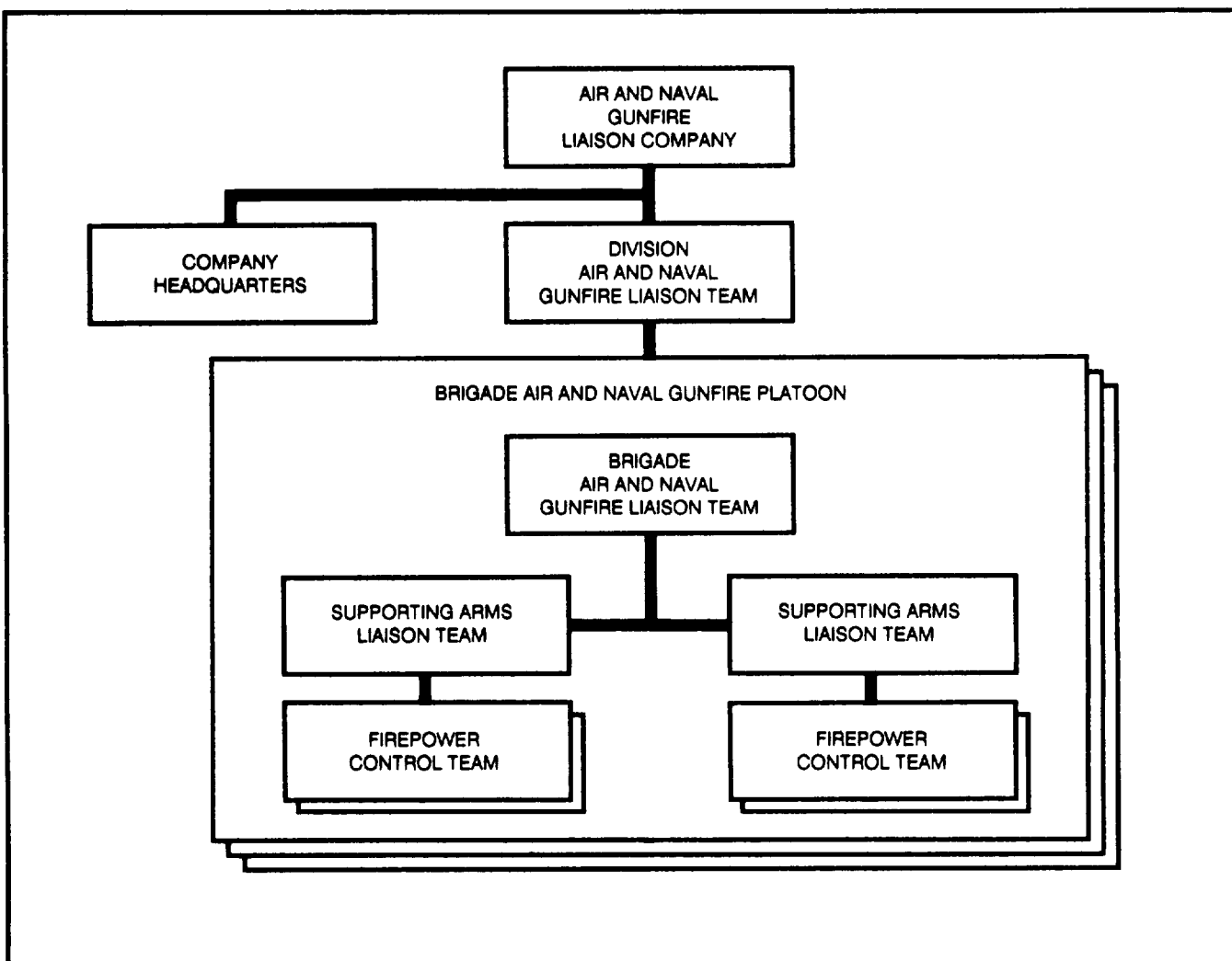
organization. The brigade air and naval gunfire platoon is organized and equipped to plan, request, coordinate, and control naval gunfire and naval air at the brigade level. Each brigade platoon is organized with a team to support the brigade and two battalion supporting arms liaison teams. Under normal conditions, each of two maneuver battalions is provided a SALT. The SALT is composed of two SALT officers and six personnel, who become part of the FS cell. Two firepower control teams are available to be sent to the maneuver companies to request, observe, and adjust navel fire support. The SALT officers

coordinate all naval gunfire and supervise the activities of the FCTs. In addition, they advise the FSCOORD on all matters pertaining to naval gunfire employment, to include capabilities, limitations, and targets suitable for naval gunfire engagement.

Tactical Missions

Naval gunfire ships are assigned one of two missions—direct support or general support—in much the same way that field artillery is organized for combat.

ANGLICO ORGANIZATION



Direct Support

A ship in direct support usually supports a battalion. This ship can deliver both planned and on-call fires. Call (on-call) fires are normally requested and adjusted by the firepower control team of the supported unit or by an air spotter.

General support

A ship is usually placed in general support of committed brigades and divisions. The fires for a GS ship are conducted as directed by the naval gunfire officer of the unit being supported. The primary purpose of a GS ship is to allow the supported commander to add depth to the fires of the DS ships without the necessity for requests to higher echelons. An understanding of the capabilities and limitations of the naval gun facilitates its use in the ground support role. In considering the characteristics of naval gunfire, it should be remembered that the naval gun was designed for ship-to-ship combat.

Capabilities

Ammunition Variety

The variety of projectiles, powder charges, and fuzes permits selection of optimum combinations for the attack of targets.

Muzzle Velocity

The high muzzle velocity and relatively flat trajectory make the naval gun suitable for direct fire or assault fire, particularly against reinforced targets such as bunkers and hardened positions.

Rates of Fire

Some naval guns have a very rapid rate of fire.

Dispersion Pattern

The normal dispersion pattern is narrow in deflection and long in range. It permits

effective coverage of such targets as roads and runways when the GT line coincides with the long axis of the target. Very close supporting fire can be delivered when the GT line is parallel to the front line of troops.

Mobility

Within the limits imposed by hydrographic conditions, the naval gunfire ship may be positioned for the best support of the ground force. The ability of the ship to maneuver is an important factor in planning for support of separated forces. It also allows selection of the most favorable gun-target line.

Fire Control Equipment

Precision fire control equipment permits accurate direct and indirect fires while the ship is under way or at anchor.

Limitations

Range Probable Error

The relatively flat trajectory results in a large range probable error. Therefore, the dispersion pattern of the naval gun is roughly elliptical, with the long axis in the direction of fire. The GT line and its relation to the FLOT must be considered by the FSO in selecting naval gunfire as a fire support means. Friendly units should avoid the GT line. If possible, the GT line should be parallel to the FLOT.

Changing Gun-Target Line

Because of the movement of the ship while firing, the GT line in relation to the FLOT may change. This can cause cancellation of the fire mission as the large range probable errors may cause rounds to endanger friendly forces.

Communications

The sole means of communication between the ship and the shore is high-frequency (HF) radio, which may be interrupted or jammed.

Hydrography

The hydrographic conditions of the sea area in which the naval gunfire ship must operate may be unfavorable. They may cause undesirable firing positions or require firing at longer ranges.

Fixing of Ship Position

The accuracy of naval gunfire depends on the accuracy with which the position of the firing ship has been fixed. Navigational aids, prominent terrain features, or radar beacons emplaced on the shore may be used to compensate for this limitation.

Weather and Visibility

Bad weather and poor visibility make it difficult to determine the position of the ship by visual means and reduce the observer's opportunities for locating targets and adjusting fires. Bad weather also might force the ship out to sea.

Enemy Action

If the naval gunfire ship comes under enemy surface, subsurface, and/or air attack, the ship may cancel its fire mission with the ground forces and try to counter this threat.

Magazine Capacity

The shore bombardment allowance varies with the ship type (600 to 1,800 rounds). When the need arises, remaining rounds will be held for self-defense of the ship.

Control Measures

Measures used by the Navy for its operations are identical to those used by the FSCOORD to control other surface-to-surface fires. Those peculiar to naval operations which limit ship movement or affect the fire support provided are discussed below.

Zone of Fire

The objective area is divided into zones into which ships are assigned to coordinate their efforts. The zones depend on locations of boundaries, size, visibility, and accessibility to fire.

Fire Support Area

A fire support area (FSA) is a definite sea area assigned to an individual fire support ship or a fire support unit (more than one ship). These areas are selected on the basis of factors such as hydrographic conditions, minefield, antiaircraft and antisubmarine disposition, other naval activity, and the best position based on GT line, range, and observation.

Fire Support Station

A fire support station (FSS) is a specific location in which ships may be placed and maintained while providing fire support.

Communications

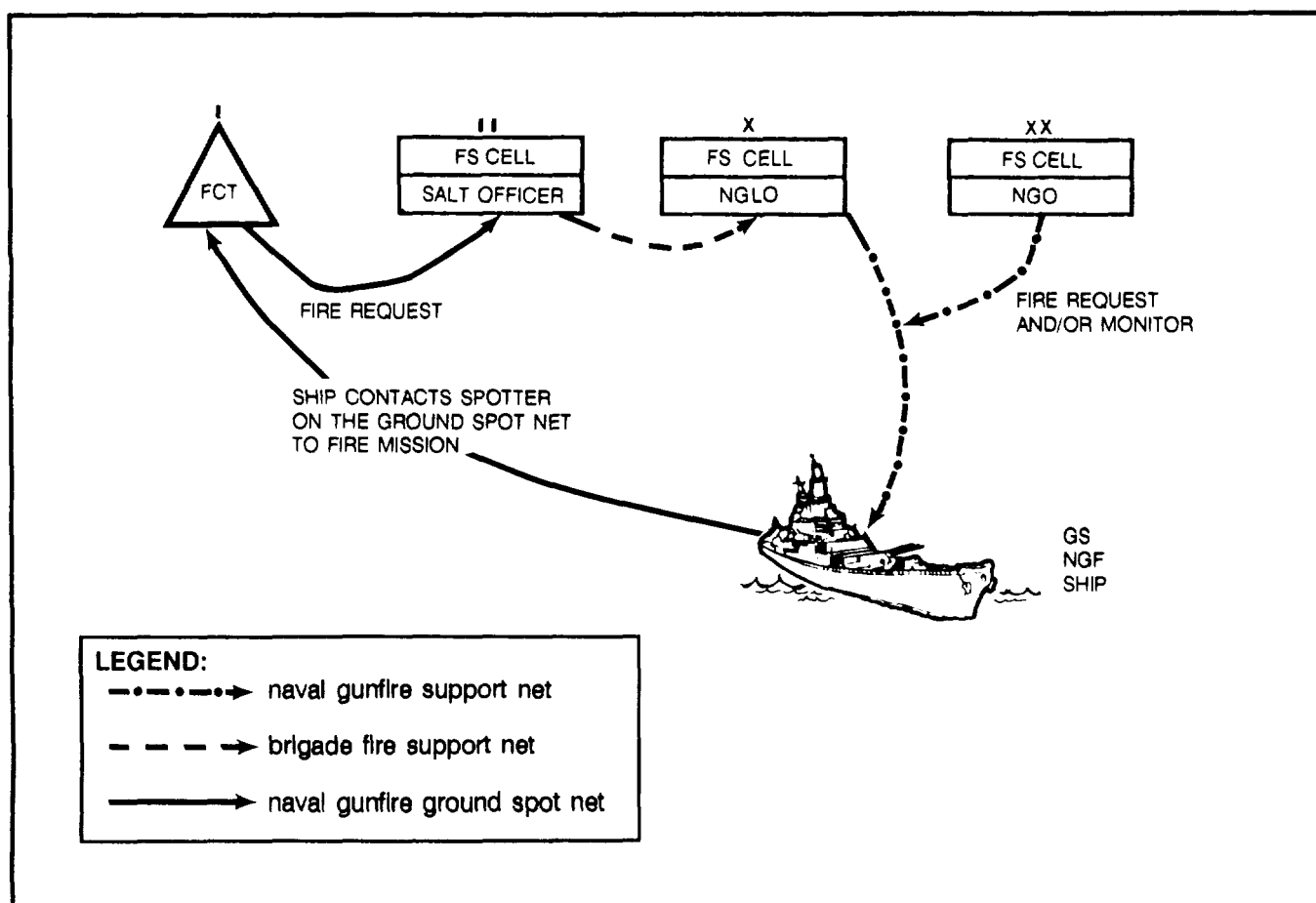
The brigade team operates on the division naval gunfire support net (HF). This net provides for communication between the division naval gunfire officer (NGO), the brigade NGLO, and the ships in support of these units. This net is used for the day-to-day planning between the units. No direct naval communications net exists between the battalion FCTs and brigade SALTs. Fire support or maneuver nets must be used for communication between these two agencies. Brigade-initiated requests for fire support are transmitted to the brigade air and naval gunfire liaison team, which then forwards the requests to the ship. A SALT officer at the maneuver battalion FS cell monitors the request and coordinates as necessary at his echelon. This coordination is much the same as for field artillery engagement. The one exception is that the SALT officer at maneuver battalion must contact the NGLO at

brigade, if brigade coordination is necessary. He does this over the FSO's communications means, as he does not have direct communication with the brigade NGLO.

Naval and Marine Corps Air

Naval and/or USMC air requests are forwarded by the respective SALTs to the aviation support unit in support of the unit. The brigade FSO submits his requests through the Marine air officer. The actual terminal control of the air is done by the firepower controller of the firepower control team. In the absence of an observer, naval and/or USMC air may be controlled by the company FSO, the ALO, or the Air Force FAC.

GENERAL SUPPORT NAVAL GUNFIRE REQUEST CHANNELS AT BRIGADE LEVEL



Section V. **ARMY AVIATION**

Fire Support Tasks

In general, attack helicopter units are not attached lower than division level, but they may be placed OPCON to a brigade. The organization and equipment of combat aviation units enable them to do several key fire support tasks. They—

- Provide limited aerial fire support to ground maneuver units.
- Coordinate and adjust indirect fires when tactical air and artillery are employed.
- Conduct joint air attack team (JAAT) operations.

The attack helicopter can mount an impressive array of weapons and can be used in a fire support role similar to that of air support aircraft. In this role, the attack helicopter battalion may—

- Ž Attack critical logistics and command and control facilities.
- Control JAAT operations.
- Perform SEAD missions,
- Ž Provide fire support for rear operations.

Capabilities

Attack helicopter capabilities include—

- Long standoff capability.
- Rapid movement to the engagement area.
- Ž Delivery accuracy.
- Ž Air-ground communications.
- Ž Quick maneuver and massed fires regardless of battlefield dispersion.

Limitations

Attack helicopters—

- Have a limited time on station and delayed response.
- Ž Are affected by weather and visibility.
- Ž Are affected by the air defense threat.

Target

The type of targets should be carefully specified to ensure that the best ordnance is used to attack the target. The objective of attack helicopter employment is to put the aircraft on station at the right time with the right munition. Scheduled or on-call SEAD fires may be required to suppress enemy air defenses for the attack and to cover helicopter withdrawal after the mission.

Section VI. **JOINT AIR ATTACK TEAM**

Description

The JAAT is a combination of scout and attack helicopters and tactical aircraft supported by field artillery, operating together to attack a single high-priority target or target array. The JAAT may operate either with or independently from ground units. When

operating with ground forces, the JAAT may be strengthened by the firepower capabilities of maneuver forces.

When to Use JAAT

The JAAT is most effective against moving targets in open areas. It is least effective when

attacking targets that are in camouflaged dug-in positions. The combination of TOWs (from attack helicopters), Maverick missiles, and 30-mm gunfire (from the A-10s) is deadly against moving armor units.

Planning Considerations

JAAT operations, whether planned or spontaneous, require a thorough understanding of the maneuver commander's intent and of factors influencing the battlefield, and a knowledge of JAAT capabilities. Key JAAT members must stringently use the time available to develop an in-depth JAAT plan and must coordinate in detail with all participants. The amount of time available will be a major factor in the complexity of the plan.

Staffs at all levels influence JAAT planning through their IPB. Through this analytical approach, appropriate targets and target areas for employment of a JAAT can be identified. Essential to effective JAAT employment is the identification of key intelligence trigger events, which signal the buildup of a likely enemy target. Also, intelligence on Threat air defense by type, amount, and location is vital to the success of a JAAT operation.

The foundation of a successful JAAT operation is the maneuver commander's tactical plan, around which JAAT plans are based. The maneuver commander's tactical plan specifies actions in the objective area to ultimately accomplish the mission and to prepare for subsequent operations. A JAAT should be planned for and used in support of this overall mission. JAAT mission assignment considerations include the following:

- Massed enemy armored and/or mechanized vehicles.
- Whether the enemy is on the move.

Ž Availability of JAAT assets.

Ž Whether the enemy can be flanked.

- Whether local air superiority can be seized.

Ž Whether enemy helicopters can be suppressed.

Ž Likely offensive operations:

- Enemy counterattacks.
- Exploitations.
- Pursuits.

• Likely defensive operations:

- Reinforcement of committed ground maneuver units.
- Destruction of enemy penetrations.

Ž Deep operations to attack follow-on elements.

Brigade should be the lowest level at which a joint air attack is planned. Coordination with the appropriate task force is required if the JAAT is to be employed in the task force sector; execution may be handed off to the task force.

The ground maneuver commander is responsible for planning, coordinating, and employing the JAAT. The plan to employ the JAAT should allow for multidirectional attack. This enhances the survivability and success of the JAAT by denying the ability of the enemy AD assets and maneuver forces to focus or orient in one direction. The key staff members who plan and coordinate for the JAAT, on the basis of the commander's guidance, are discussed below. The coordination process takes place in the FS cell under the supervision of the FSCOORD or FSO and the S3 air.

S3 Air

The S3 air plans and requests the use of close air support and attack helicopters to support the commander's concept of the operation.

S2

The S2—

Ž Provides information on the avenues of approach, target array, terrain, and weather as it applies to the time and location of the JAAT operation.

Ž Plans and coordinates the use of nonlethal attack assets to complement the JAAT.

Attack Helicopter Battalion and/or Company Commander or Liaison Officer

This officer—

Ž Provides status of Army aviation assets available.

- Begins planning the air corridors and air battle positions (ABPs) to support the operation.
- Coordinates with the FSCOORD or FSO and the air defense officer (ADO) to deconflict air corridors.
- Coordinates for the planned ACAs.

Fire Support Coordinator or Fire Support Officer

The FSCOORD or FSO—

- Ž Determines the need, availability, and positioning of artillery, commensurate with the Threat update, to support the JAAT.
- Ž Coordinates with the aviation representative to provide call signs and frequencies to the supporting FDC.

- Helps the TACP deconflict the IPs from artillery positions and develop ACAs to support the mission.

- Determines the need for SEAD.

- Determines when and how priorities of fires shift.

Ž Recommends fire support coordinating measures to enhance the success of the mission.

Ž Establishes a quick fire channel if necessary.

Air Defense Officer

The air defense officer—

- Coordinates to ensure that the AD assets know the location of air corridors, ABPs, IPs, and ACAs.

Ž Ensures these assets are informed of friendly air operations and their integration into the battle.

Tactical Air Control Party

The TACP—

Ž Develops contact points and/or initial points and ACAs in coordination with the FSCOORD or FSO and the ADO.

Ž Disseminates the contact point and/or IP and ACAs to the ASOC for dissemination to the ground liaison officer (GLO) and wing operations center (WOC) for preflight briefing.

Ž Helps the TAC-A move aircraft forward to the appropriate contact point or IP and then hand them off to the aviation commander conducting the JAAT operation.

Preparation

The preparation phase includes briefing the plan, ensuring dissemination of the plan to subordinate units that may have an impact on the mission, reconnaissance, and rehearsal.

Reconnaissance by the aviation commander is critical to the success of the JAAT. It allows him to see the terrain and determine if the ABPs need to be adjusted because of dust signature, survivability, or communications and/or to facilitate control of the JAAT. On completion of the recon, the aviation commander will provide feedback to the FSCOORD or FSO and the S3 air. If refinements to the plan are needed, they will be made and disseminated expeditiously.

Rehearsals are crucial to check communications channels, routes and ABPs to be used, time required to move assets forward, graphical control measures, and the fire plan. The JAAT rehearsal participants should be as follows:

- Aviation commander (JAAT commander).
- Attack helicopter platoon leader.
- Brigade FSO (may require TF FSO).

Ž Brigade air liaison officer.

- Aviation liaison officer.
- Battalion and/or battery fire direction center.
- Aerial observer and/or AFSO (if available).

Execution

During the execution phase, the aviation commander is the director and coordinator of the total team effort.

The flight leader and aviation platoon leaders manage their own individual elements. The aviation commander does not dictate their attack methods.

En route to the target or engagement area, the aviation commander contacts the ground commander for a tactical update.

The aviation commander should talk directly to all fire support assets involved in the JAAT operation. However, the ground commander’s staff will monitor their appropriate nets to keep abreast of the JAAT operation and to help the aviation commander as needed.

NOTE: The following checklist may aid in fixing responsibility for each facet of ACA planning and execution of CAS or JAAT operations.

RESPONSIBILITIES FOR CLOSE AIR SUPPORT AND JAAT OPERATIONS

	PLANNING	EXECUTION
S3	<p>Plan for the use of CAS and helicopters to support the commander’s concept of the operation.</p> <p>Brief FAC and FSO on commander’s concept and his intent.</p> <p>Identify the JAAT commander who will control and execute the air movement and attack.</p>	<p>Determine if the timing of the air attack is still valid and synchronized with the commander’s intent.</p> <p>Determine if the enemy situation and predicted location are valid, and make any required changes to the kill zone.</p> <p>Pass control of the air attack to the appropriate FAC or JAAT commander.</p>

RESPONSIBILITIES FOR CLOSE AIR SUPPORT AND JAAT OPERATIONS (CONTINUED)

	PLANNING	EXECUTION
S2	<p>Prioritize electronic support measures and target acquisition assets in support of the maneuver mission.</p> <p>Develop appropriate targets for inclusion in the brigade or task force FSO's SEAD program.</p> <p>Use all assets available to provide real-time enemy AD targets to FSO and FAC.</p> <p>Plan and coordinate attack of enemy targets with electronic countermeasures. Jam and disrupt enemy AD C2 links and AD radars.</p> <p>Use IPB to identify potential engagement areas to employ TACAIR and/or JAAT.</p>	<p>Initiate jamming of enemy AD radars and C2 links when FAC or JAAT commander reports that aircraft are crossing the start point (SP).</p>
Brigade or Task Force Fire Support Officer	<p>Plan the integration of indirect fires in support of the operation.</p> <p>Integrate fire support coordinating measures into the operation.</p> <p>Plan for SEAD based on intelligence from the S2.</p> <p>Develop a plan for marking the target area and employing SEAD.</p> <p>Coordinate with the S3 air and the TACP to input the required ACAs that support the operation.</p> <p>Develop fire plans for indirect fires in support of the operation.</p> <p>Request and plan for use of aerial observers or AFSSOs, if applicable.</p> <p>Coordinate with the direct support FA battalion S3 for positioning of the FA batteries to ensure minimal disruption from the proposed ACA on their support to maneuver forces.</p> <p>Coordinate positioning of the heavy mortar platoon with same considerations as FA batteries.</p> <p>Coordinate with the JAAT commander and FAC for marking rounds on the target area.</p> <p>Determine and disseminate PRF codes, as required</p>	

RESPONSIBILITIES FOR CLOSE AIR SUPPORT AND JAAT OPERATIONS (CONTINUED)

	PLANNING	EXECUTION
Forward Air Controller	<p>In conjunction with the ADO and FSO for attacking aircraft. Inform brigade or TF FSO and S3 air.</p> <p>Coordinate ACAs with FSO, plan air routes and ADO to support aircraft attack of enemy forces. Ensure ADO receives ACAs for dissemination to AD assets.</p> <p>Plan for optimum location of FAC to control attacking aircraft.</p> <p>Request that target updates from USAF sources be passed to S2 and FSO, aviation liaison officer, JAAT commander, and FAC.</p> <p>Plan air routes for attacking helicopters (in conjunction with S3 air and JAAT commander). Consider location of ABPs to facilitate control of aircraft by JAAT commander. Inform brigade or TF FSO.</p> <p>Coordinate the synchronization of the air movement and attack.</p> <p>Provide frequencies to the JAAT commander who will control the air attack.</p> <p>Coordinate with the brigade or TF FSO, JAAT commander, and other agencies to ensure expeditious activation and cancellation of an ACA.</p>	<p>Relay to brigade or TF FSO the position and movement of aircraft through communication with the controlling JAAT commander.</p>
S3 Air	<p>Plot attack routes and attack and/or loiter areas received from FAC and aviation liaison officer.</p> <p>Coordinate with brigade or TF FSO, S3, and division FS cell to deconflict air operations with maneuver operation.</p> <p>Coordinate with supporting AD units for appropriate weapon status during the air operation.</p>	
JAAT Commander	<p>Coordinate directly with the FSO and FAC. Receive from these agencies call signs, frequencies, target lists, proposed ACAs, priority target types, and so forth.</p> <p>Plan with the FSO and TACP for priority calls for fire, aerial observation tasking, net usage and assignment, and so forth.</p>	<p>Report aircraft IP inbound to FSO.</p> <p>Report entering attack area.</p> <p>Report clearing attack area.</p> <p>Report aircraft departing maneuver sector.</p>

RESPONSIBILITIES FOR CLOSE AIR SUPPORT AND JAAT OPERATIONS (CONTINUED)

	PLANNING	EXECUTION
JAAT Commander (Continued)	Pass all USAF graphics (IPs and so forth) and known aircraft weapon configurations. Receive enemy AD locations to pass to appropriate agency.	Coordinate direction of fires on targets of opportunity with the attack helicopter FSO. Report any intelligence received from the aircraft to FSO and S2.
JAAT Commander or Aerial Fire Support Officer		Initiate SEAD program in synchronization with air movement. Initiate the fire plan in coordination with the attack helicopter FSO and the FAC. Activate ACAs when aircraft are about to enter the attack area. Activate air corridors as necessary. Cancel the ACA when the aircraft have cleared.
Air Defense Officer	Help the FAC identify friendly air routes for CAS and attack helicopters. Provide input to ACA and IP location based on location of AD assets and posture.	
DS Artillery Battalion and Mortars		Plot all active ACAs onto firing charts. Maintain status of those ACAs that are active and those that have been cancelled.