NAVAL AIR TRAINING COMMAND

NAS CORPUS CHRISTI, TEXAS **CNATRA P-828 (New 08-17)**

FLIGHT TRAINING INSTRUCTION

ADVANCED NFO CAS PROCEDURES T–45C

2017

DEPARTMENT OF THE NAVY
CHIEF OF NAVAL AIR TRAINING
250 LEXINGTON BLVD SUITE 102
CORPUS CHRISTI TX 78419-5041

CNATRA P-828
N712
14 Aug 17

CNATRA P-828 (New 08-17)

Subj: FLIGHT TRAINING INSTRUCTION, ADVANCED CAS PROCEDURES, T-45C

1. CNATRA P-828 (New 08-17) PAT, "FLIGHT TRAINING INSTRUCTION, ADVANCED CAS PROCEDURES, T-45C" is issued for information, standardization of instruction, and guidance for all flight instructors and student aviators within the Naval Air Training Command.

2. This publication shall be used as an explanatory aid to support the Advanced Strike Fighter UMFO Curriculum. It will be the authority for the execution of all flight procedures and maneuvers herein contained.

3. Recommendations for changes shall be submitted via the electronic TCR form located on the CNATRA website.

4. CNATRA P-828 (New 08-17) PAT is a new publication.

T. H. SHEPPARD
By direction

Distribution:
CNATRA Website

FLIGHT TRAINING INSTRUCTION

FOR

ADVANCED CAS PROCEDURES

T-45C

P-828

LIST OF EFFECTIVE PAGES

Dates of issue for original and changed pages are:
Original…14 Aug 17

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 80 CONSISTING OF THE FOLLOWING:

Page No.	Change No.	Page No.	Change No.
COVER	0	2-1 – 2-51	0
LETTER	0	2-52 (blank)	0
iii – vii	0	A-1 – A-4	0
viii (blank)	0		
1-1 – 1-15	0		
1-16 (blank)	0		

INTERIM CHANGE SUMMARY

The following Changes have previously been incorporated in this manual:

CHANGE NUMBER	REMARKS/PURPOSE

The following interim Changes have been incorporated in this Change/Revision:

INTERIM CHANGE NUMBER	REMARKS/PURPOSE	ENTERED BY	DATE

TABLE OF CONTENTS

TABLE OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER ONE
STANDARD CAS DIVISION PROCEDURES

100. INTRODUCTION

In Strike, you learned to operate in a section formation. In CAS, division flight operations will be your first exposure to flying with more than two aircraft in the formation. Leading a division requires higher situational awareness (SA) and more forethought than previously required, since maneuvering is inherently restricted with more aircraft in the flight. Therefore, basic division procedures must be thoroughly understood before we can achieve mission success.

Division formations have three or four aircraft and are comprised of two sections. If a division has only three aircraft, it is called a "light division." For example, Dash One (Hammer-11) is the Lead for the first section and is the overall Division Lead. Dash Two (Hammer-12) is Hammer-11's wingman. Dash Three (Hammer-13) is Lead for the second section. Dash Four (Hammer-14) is Hammer-13's wingman. Division formations are commonly used for both administrative and tactical military flights.

During CAS events at VT-86, you will transit to and from the operating area in a division, split into single ships for the conduct portion, and then rejoin the division for the RTB. Although separated, you are still considered a "flight" and you must maintain SA as to each aircraft's position and altitude. Proper procedures, communications, and strict radio discipline are required to make this happen. As a reminder, SNFOs may choose their tactical call signs, e.g., Hammer, Rage, etc., for CAS events.

101. DIVISION FORMATION BASICS

1. Division Formation Responsibilities

Division formation responsibilities are very similar to two-plane formation except now there are more wingmen to consider and to back up Lead. Additionally, it is common to detach the second section:

a. During severe weather

b. For tactical employment

c. In the event an aircraft is having mechanical problems or difficulties

As such, Hammer-13 and Hammer-14 should always be ready to detach as a section to complete the mission. Additionally, Hammer-13 should be ready to assume the responsibilities of the Division Lead in the event Hammer-11 is unable to lead the flight. However, Hammer-13's pilot must have a Division Lead qualification, so consult your instructor to assess Instructor Pilot qualifications.

2. Division Formation Communication

Passing hand signals in division is very similar to passing hand signals in section except Lead cannot see all wingmen all the time. Therefore, it is incumbent on each aircraft to repeat passed hand signals up and down the formation.

Radio communication in division formation is slightly more difficult because of the number of aircraft involved. In VT-86, we will utilize positive check-ins as discussed in the ***TAC SOP*** (P-821 Appendix D). Due to the size of the formation, positive check-in will take longer to execute and are somewhat cumbersome on the radio. Each wingman must expeditiously check-in when prompted. Once Lead has initiated a check-in, each wingman should wait for the aircraft ahead in the formation to check-in. If the preceding aircraft has not checked-in after a few moments, succeeding aircraft should continue with the check-in. This procedure enables Lead to keep track of who is on the frequency and who is not. This makes tracking down the errant wingman easier for Lead.

Lead should refer to the flight as a "flight of three/four" during initial communications with every new ATC controller. On subsequent transmissions with the same controller, the standard call sign (i.e. ROKT 11) may be used. Identifying the formation as a flight of four will assist controllers and other aircraft to plan for the large formation. On the ground, this clarification should prevent other aircraft from taxiing between members of the formation.

3. Non-Tactical Formations

a. Echelon - the standard division formation used when the flight can be critically viewed from the ground (Figure 1-1) and is most common during the initial join-up after takeoff as well as for division breaks. The division echelon formation is cumbersome because turns into the echelon are difficult for the wingmen (especially Hammer-14). The division echelon formation may be flown in either parade or cruise position, and the positioning of the wingmen is the same as for section parade (30-degree bearing) and section cruise (45-degree bearing). However, in echelon cruise, wingmen may fly slightly acute to facilitate the passing of visual signals.

Figure 1-1 Division Echelon Formation

b. Balanced Cruise or Fingertip - The balanced cruise formation, commonly referred to as 'fingertip', is a division formation that allows for more maneuverability and ease of flying when compared to division echelon. As depicted in Figure 1-2, fingertip formation is flown with Hammer-12 on one side of Lead and Hammer-13/-14 on the other side. Fingertip formation is the most common division formation used during the transit phase of the flight. It allows Hammer-11 to maneuver the division easily in any direction. Typically, Hammer-13 will pick the side of the formation desired while Hammer-12 will move to the opposite side to balance the formation, hence the name, balanced cruise. In balanced cruise formation, Hammer-13 should leave enough room between his aircraft and Lead's so that Hammer-12 can cross under into echelon formation if required (Figure 1-2).

Figure 1-2 Balanced Cruise Formation (Fingertip)

The division can transition from echelon to fingertip in one of two ways (Figure 1-3):

a. Have Hammer-12 execute a cross-under

b. Have the Hammer-13/-14 execute a section cross-under

In the first case, Lead will signal Hammer-12 to cross under. When the cross-under is complete, Hammer-13/14 will move into position.

In the second case, Lead will signal for a section cross-under. Hammer-12 and Hammer-13 will pass the signal down the line, and the Hammer-13/-14 section will execute a section cross-under. For a section cross-under, Hammer-13 executes a cross under on Lead while Hammer-14 simultaneously executes a cross under on Hammer-13 by controlling relative motion so that Hammer-13 is always between Hammer-14 and Lead. Hammer-13 should not rush this maneuver because his wingman must travel a greater distance; doing so may cause the wingman to lose proper position or to be spit out.

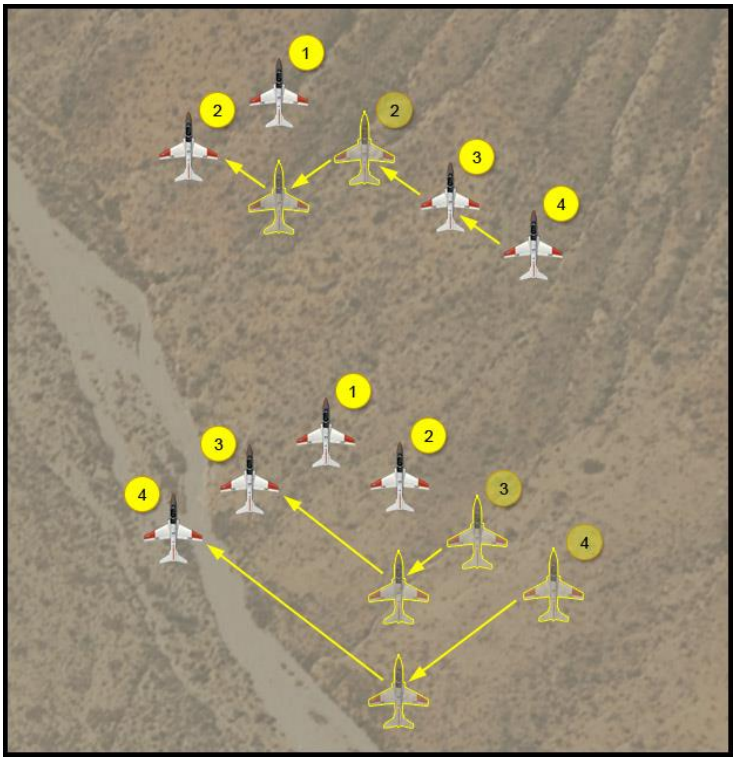


Figure 1-3 Echelon to Fingertip Transitions

If the division encounters inadvertent IMC, wingmen will tighten into parade positions. Hammer-13 will match Hammer-12's spacing off Lead (Figure 1-4). This division formation is called balanced parade because each aircraft is flying a parade position on their respective interval. Note that division formations should not purposely fly into IMC. If IMC is expected, the flight lead should establish two separate sections prior to encountering IMC. The key is to

1-4 STANDARD CAS DIVISION PROCEDURES

avoid IMC all together, if possible. The balanced parade formation may also be used when the division formation performs a flyover.

Figure 1-4 Division Balanced Parade or Fingertip Formation

4. Tactical Formations

Tactical formations generally offer mutual support to the formation and prevent compromise of the entire formation. There are many different formations used in tactical operations, but it is not practical to list them all here. During CAS at VT-86, the two most common tactical division formations are discussed below as one or both may be used during while training.

a. Battle Box - The Battle Box formation (Figure 1-5) is normally used on division low-level ingress to the target area. As with all division formations, it is comprised of two sections. To form the Battle Box, the first section will push into Combat Spread. The second section will establish 1 NM in trail in Combat Spread. Recall that Combat Spread is 1 NM abeam and +/-1000-3000 feet of altitude separation. These distances can vary based on threat and posture (i.e., offensive or defensive). Additionally, the trail section can offset to the left or right as necessary for maneuvering or other tactical considerations.

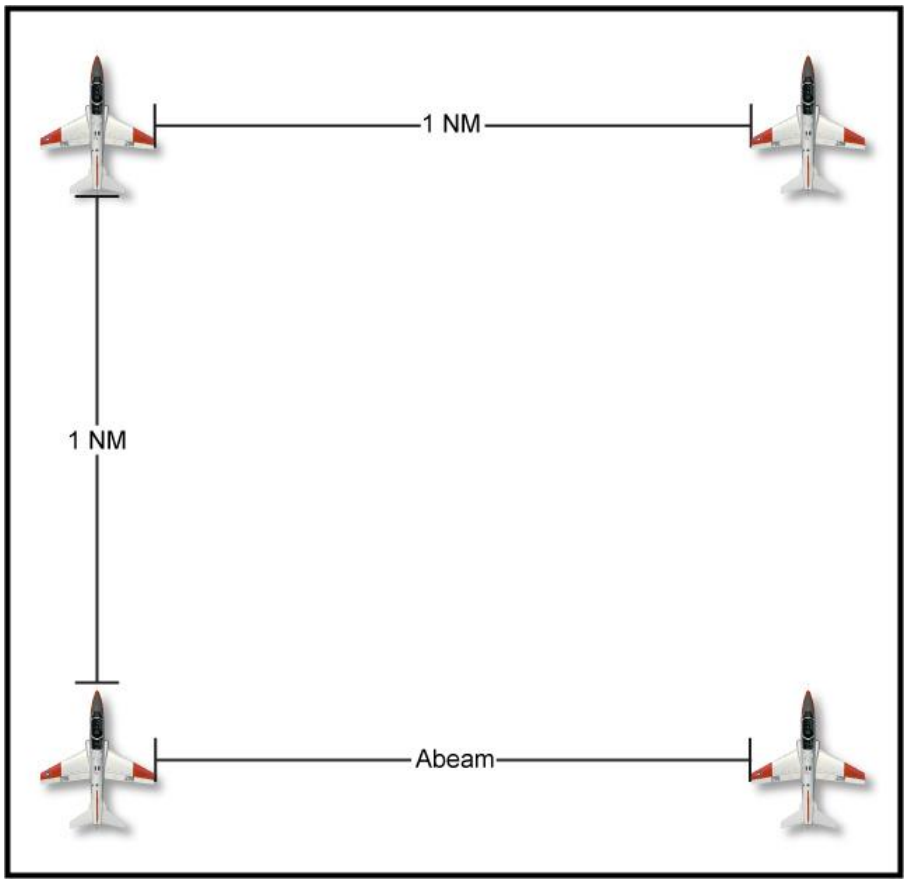


Figure 1-5 Battle Box Formation

1-6 STANDARD CAS DIVISION PROCEDURES

b. Wall - The Wall formation (Figure 1-6) is a tactical formation in which all four aircraft in the division fly abeam.

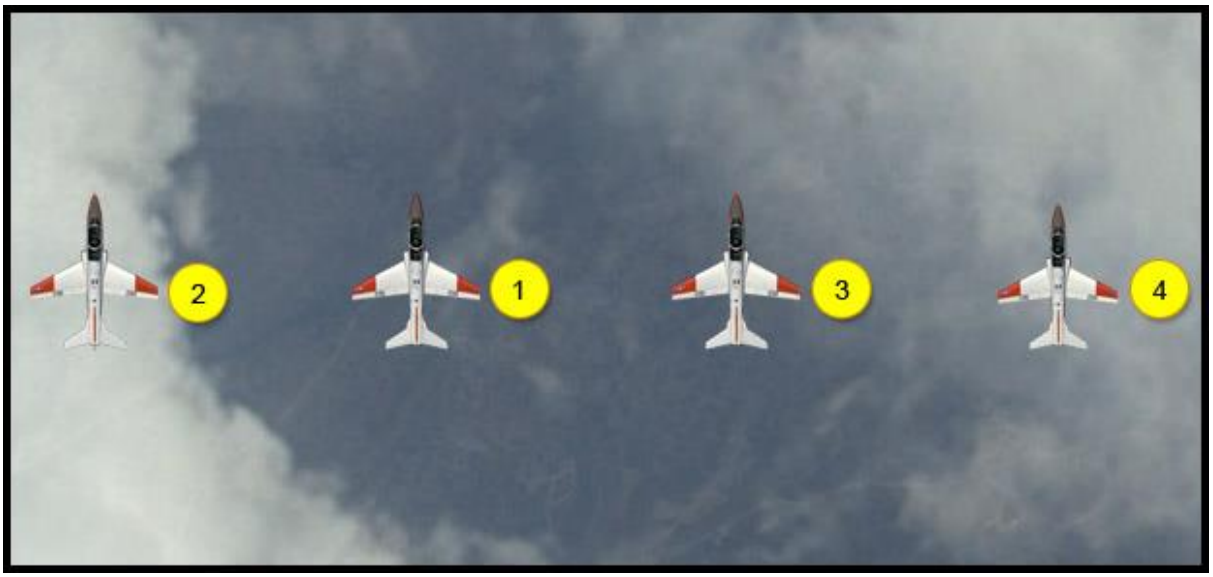


Figure 1-6 Wall Formation

To form the Wall, Hammer-13 will fly Combat Spread off Hammer-11. Hammer-12/-14 will fly combat spread off their respective lead. The distance between aircraft will be dependent on the enemy threat, as well as the friendly posture. Depending on the situation, the Wall can be modified and the wingmen can close to a Tac Wing or even a Cruise position on their respective lead. Figure 1-7 illustrates a formation called "Fluid Four." Fluid Four is often used for admin transits to/from tactical areas and for battle damage checks.

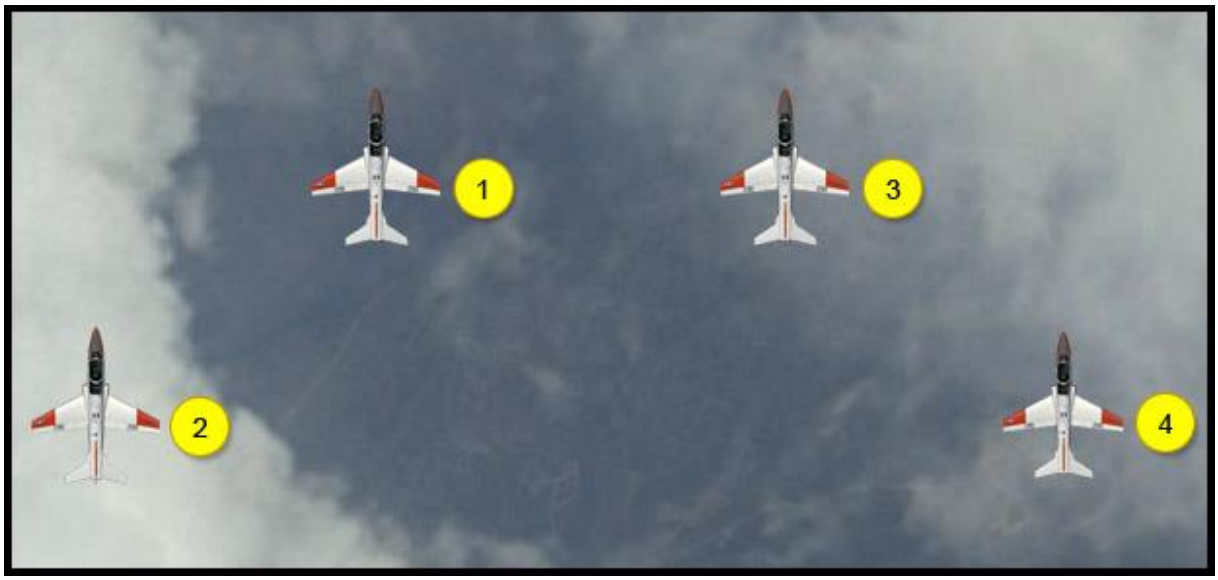


Figure 1-7 Fluid Four Formation

102. GROUND/DEPARTURE PROCEDURES

As with section procedures, each aircraft will conduct individual pre-flight inspections and engine starts.

1. Division Line, Taxi, and Hold Short Procedures

Start up and line procedures are identical to those used in Familiarization and Section formation flights. The Division Lead will obtain clearance for the entire flight. If weather precludes a division takeoff, the Lead SNFO will coordinate individual clearances for the sections or for individual aircraft as necessary.

Radios will be set in the same way as a section per the TAC SOP. Once all aircraft are complete with final checks, Lead SNFO will initiate a positive check-in on AUX per the TAC SOP.

Division formations will taxi on alternate sides of the taxiway (staggered) to reduce the length of the formation and reduce the hazard of FOD. For a staggered taxi, the Division Lead will take the downwind side of the taxiway, and the wingman will alternate sides in sequential order. If the division is unable to stagger, the division will taxi on centerline. Figure 1-8 illustrates both of these taxi options. The SOP will define the minimum taxi distance for both staggered and centerline taxi profiles.

If not cleared for takeoff approaching the hold-short line, Lead will position the aircraft approximately 45 degrees off runway heading close to the hold short line if able. The other aircraft in the flight will follow lead so that they line up as depicted in Figure 1-9. However, this may not be possible depending on other aircraft in the hold-short area; as such, the positioning of the aircraft in the flight will be at the discretion of the respective IPs. It is incumbent on the Lead SNFO to maintain SA on the location of all aircraft in the flight.

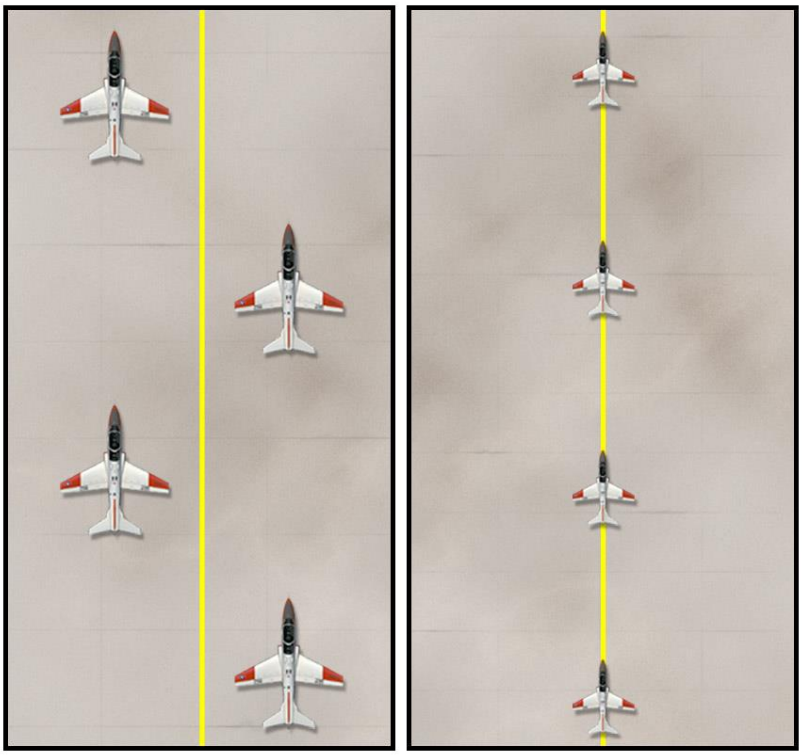


Figure 1-8 Division Taxi; Staggered and Centerline

Figure 1-9 Division Hold Short Procedures

2. Division Takeoff

There are numerous division takeoff scenarios. The weather and runway available are key factors in determining the specific takeoff procedure. Regardless of the type of takeoff, proper coordination is paramount due to the formation size.

The primary division takeoff procedure is the interval go. Expect to execute the division interval go unless specifically briefed otherwise during training at VT-86. The runway width will determine if all four aircraft can take the single runway at once. The required width is 200 feet or 50 feet per aircraft. Therefore, if the runway is only 150 feet wide, only three aircraft can be on the runway with Hammer-14 waiting at the hold short as the "stinger" aircraft. When space permits, the stinger (Hammer-14) will take the runway and takeoff. Regardless, the aircraft will lineup on the runway in an Echelon formation (Figure 1-10) that will permit an un-obstructed view between pilots. If Hammer-14 is a stinger, the IP will call "*Hammer 14 set*" on the radio when the aircraft is in position and ready to take the runway.

Once all aircraft are lined up on the runway and cleared for takeoff, Lead will initiate the run-up and each aircraft will conduct their individual MRT checks. After MRT checks, and with a good thumbs-up from all wingmen, Lead will give the "kiss-off" signal and begin the takeoff roll. Wingmen aircraft will initiate their takeoff rolls in order and in accordance with the SOP mandated intervals.

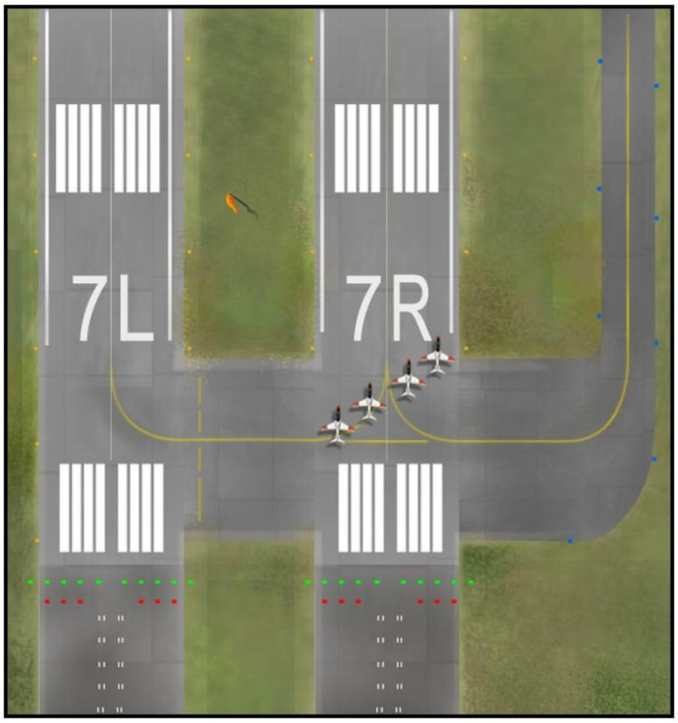


Figure 1-10 Division Take-off (Interval Go)

3. Division Departure

Lead SNFO should wait long enough for all wingmen to get airborne prior to contacting Departure. A good technique is to first execute departure procedures prior to contacting Departure. After takeoff, the flight will normally rendezvous in parade at 250 KIAS and each SNFO will monitor closure and airspeed during the division rendezvous. Once all aircraft are joined, Lead will give the "take cruise" signal, the flight will auto balance, and the Division will proceed on the departure as directed.

103. ENROUTE PROCEDURES

The division will proceed enroute as briefed, normally in the balanced cruise formation. Each member of the division will maintain a position that allows Lead to keep sight and pass hand signals.

Depending on the mission and working area, the Lead SNFO will be required to check in with range control and obtain clearance into the MOA or range. Entering a MOA as a division formation is similar to previous flights in the syllabus, except there are more wingmen. If operating in a range that has a separate range agency, it is prudent to clear the FAC(A) off frequency to coordinate range check in for the division. Once range entry clearance is obtained, the FAC(A) will report back on Tac Freq with the range clearance and restrictions. The Lead SNFO is required to read back the range restrictions ***verbatim*** over Tac Freq in this scenario.

The Lead SNFO should strive to receive clearance to enter the MOA or range as early as possible. In addition, the Lead SNFO must initiate the Fence-In checks, make a "99" call prior to entry, contact range control (if applicable), cancel IFR (as necessary), descend the flight (as necessary), execute the G-Warm (as necessary), and report Fenced-In (Depending on airspace restrictions, you may not be able to execute the G-Warm until inside the working area). Aviate, navigate, communicate is key. Descending a division is more difficult than a section; staying ahead of the flight is required. Figure 1-11 illustrates a recommended timeline for descending the division.

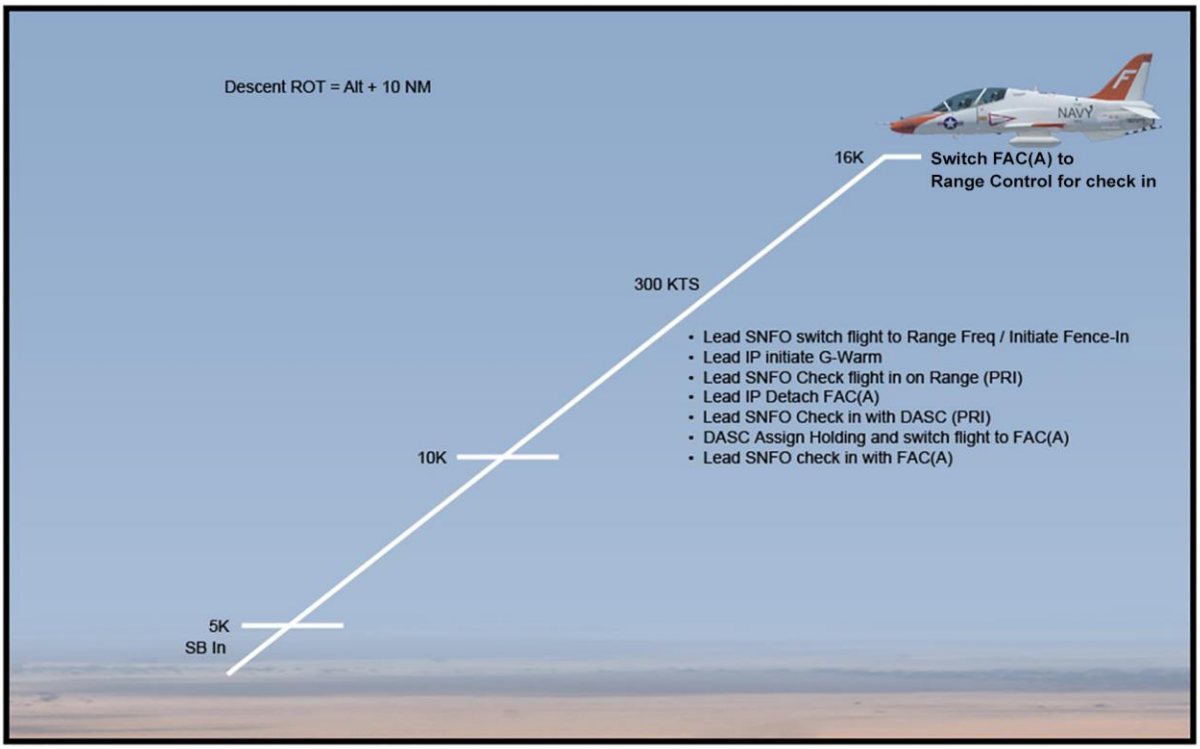


Figure 1-11 CAS Division Descent Timeline Example

104. FENCE-IN/OUT

1. Fence-In

Approaching the working area, target area, or range, the SNFOs shall complete the appropriate A/S checklist as required by the mission. This is accomplished by fencing in the flight with a "Fence-In" call over Tac Freq. As with section formations, this directs the flight to switch from an administrative mindset to a tactical mindset. The Fence-In checks should be directed by Lead SNFO in an effort to assure that the division has ample time to complete the Fence-In checks prior to entering the area or approaching the target. This will alleviate distractions in the working area and allow total focus on the task at hand once the flight is established in the range.

2. Fence-Out

After the tactical portion of the flight is complete and 'Knock it Off' has been called, the Lead SNFO will direct the flight to Fence-Out. The Lead IP shall be responsible for ensuring the rendezvous is conducted as briefed or coordinating the rejoin as required. Each SNFO should monitor the rendezvous while Lead SNFO begins the process of exiting the working area; tasks include getting ATIS (as required), checking out of the MOA, and switching the flight to ATC. Again, remembering to aviate, navigate, and communicate is key. The Lead SNFO must prioritize which task takes precedence; administrative tasks should not be accomplished until a safe rendezvous is assured.

105. DIVISION RECOVERIES

Upon completion of the tactical portion of the flight and rejoin, the division will return to base. The type of recovery conducted will be dependent upon the weather and individual aircraft fuel states. As with section formation events, the lowest fuel state in the division becomes the fuel state of the flight. Weather may preclude the break, and if that is the case, Lead must coordinate splitting the division into two sections for visual straight-ins or approaches. Individual approaches may be necessary if the ceiling is below circling minimums or 1,000/3 in the absence of a circling approach.

As previously discussed, due to the number of aircraft in a division, it is inherently less maneuverable than a section or single aircraft. Additionally, Lead is limited in the maximum and minimum power settings allowed in flight, which means accelerations and decelerations take longer to affect, and the allowable angle of bank used in turns is more restricted. These considerations require Lead to anticipate climbs, descents, speed changes, and turns in order to have the division properly configured for recovery. Timely and effective communication with ATC is essential for a successful division recovery.

1. VFR Recovery

The overhead break is the most desirable recovery for a division formation and therefore, it is the most common. Normally, a two-second interval break will be used from the echelon formation (Figure 1-12), although many variations may be briefed and flown.

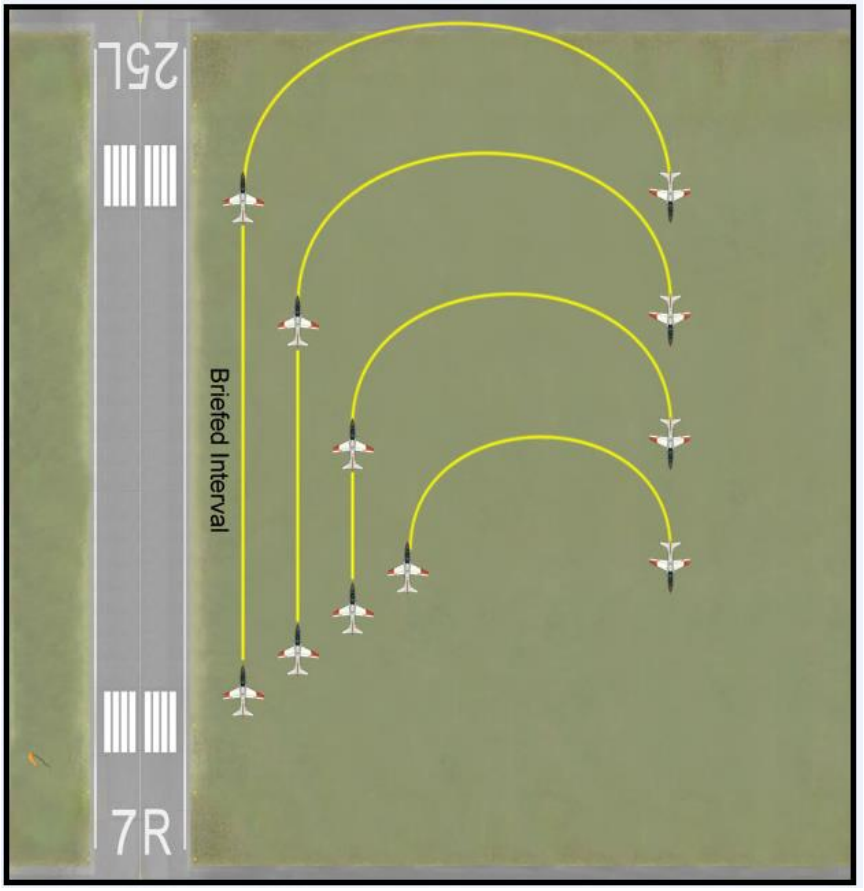


Figure 1-12 Echelon Break

2 IFR Recovery

Division IMC recoveries are prohibited because of the risks associated with configuring the flight and achieving flight separation in instrument conditions. Therefore, division formations should be split into two sections prior to reaching IMC during the recovery. Each section will execute a section approach in accordance with established procedures.

If weather dictates, the division Lead may elect to break up the flight into individual aircraft for recovery. Lead will coordinate sequencing and obtain individual wingman squawks with Approach Control. Headwork dictates that the aircraft be sequenced in order of fuel state with the lowest state being the first to recover.

106. DIVISION EMERGENCIES

1. Aborts

An aborted takeoff during a division takeoff creates a dangerous situation when other aircraft are following. This is especially true if the arresting gear is required. Even though the procedure is the same as in section formation, the complexity increases with four aircraft. Wingmen still

completing normal takeoff checks/scans must remain alert to the possibility of aircraft aborting ahead of them.

If you need to abort your takeoff with flight members behind you, the IP will call "*C/S aborting*" on AUX and will remain on his/her side of the runway until either all other aircraft are airborne or s/he is cleared to centerline by the remaining aircraft behind you. If you are aborting as the last aircraft in the flight, the IP will call "*C/S aborting*" on AUX and ease the aircraft to the centerline in preparation for taking the long field arresting gear if needed. Wingmen not involved with the abort should remain off the radio. To avoid any possible confusion, "c*lear"* should be the only word spoken after an aborting call has been made.

2. Inadvertent IMC/Lost Sight

If a formation flight inadvertently enters IMC and it is obvious that this condition will prevail more than for a very short period, the flight Lead will transition to instrument flight and level his wings. Once wings level and steady, Lead may coordinate detaching the second section with ATC by having them assign an additional squawk

Another option for a division Lead is to reverse his heading in a shallow, gentle turn to exit IMC conditions. Turns should be made away from the section in a division, in this case, Hammer-13.

While divisions should avoid flying into IMC, it may not be possible to do so and lost sight procedures remain the same as in a section. Lost sight wingmen should be judicious in executing the procedures to help prevent other wingmen behind them from also losing sight or causing a mid-air collision.

3. Mid-Air Collision

As in section maneuvering, the first consideration after a mid-air collision is to ascertain if the aircraft is controllable. If it is, maintain control and maneuver as necessary. If it is not, you must quickly determine if control can be regained and if the aircraft can still be flown. If your aircraft is out of control, follow NATOPS OCF procedures and adhere to NATOPS ejection criteria.

If a mid-air occurs in division flight, the involved aircraft will separate and not rejoin. Non-involved aircraft can assist by providing visual inspections and being ready to be "book readers" as required. The division flight will split into sections at Lead's discretion and RTB or divert to the nearest suitable airfield as circumstances dictate. Consideration should be given to which aircraft is more severely damaged and to whether arresting gear(s) is required and available.

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER TWO
DIVISION CAS TACTICS AND PROCEDURES

200. INTRODUCTION

Close air support (CAS) can be conducted at any place and time friendly forces are in close proximity to enemy forces. The word "close" does not imply a specific distance; it is situational. Detailed integration due to proximity, fires, or movement is the determining factor. At times, CAS may be required to exploit tactical opportunities; it provides firepower in offensive and defensive operations to destroy, disrupt, suppress, fix, harass, neutralize, or delay enemy forces.

Each service prepares to employ CAS within its roles as part of the joint force. As a result, varieties of aircraft are capable of performing CAS. The Joint Force Commander (JFC) and staff must be capable of integrating all CAS capabilities into the Operational Plan.

201. PRINCIPLES OF CLOSE AIR SUPPORT

CAS is used to attack the enemy, and to augment other supporting fires, in a variety of environmental conditions, both during the day and at night. The speed, range, and maneuverability of aircraft allow them to attack targets that other supporting arms may not be able to engage effectively. In order to accomplish this complicated mission, certain terms and ideas must be understood by ground forces and aircrew.

The CAS Joint Publication and JFIRE are used to provide guidance to aircrew in CAS planning, definitions, and tactics. When questions arise, reference the Joint Publication and/or JFIRE provided on the VT-86 E-brief website. You will find these labeled as:

- Close Air Support Joint Publication 3-09.3 series
- JFIRE 3-09.32 series

1. Definitions/Concepts

   a. CAS - Close air support (CAS) can be defined as air action by fixed and rotary wing aircraft against hostile targets in close proximity to friendly forces, requiring detailed integration of each air mission with the fire and movement of those forces.

   b. Controller - All references to "controller" in the rest of this FTI can refer to a Joint Terminal Attack Controller (JTAC), a Forward Air Controller (FAC), or a Forward Air Controller (Airborne) (FAC(A)). If a specific type of controller is required, it will be referenced directly.

   c. Types of CAS - Close Air Support missions are divided into two distinct mission categories; preplanned and immediate.

i. Preplanned - CAS in accordance with a program planned in advance of ground operations.

ii. Immediate - CAS to meet specific, real-time requests that arise during the course of battle and by nature cannot be planned in advance.

d. Preplanned - Preplanned CAS missions are further categorized into Scheduled and On-call missions.

i. A Preplanned Scheduled CAS mission is an air strike that has been requested by a supported ground unit sufficiently in advance to permit detailed mission planning and coordination prior to takeoff. These missions are flown against a predetermined target and executed at a precise Time-On-Target (TOT) specified by the supported unit.

ii. A Preplanned On-call mission is a mission where the aircraft are preloaded for a particular type of target and then placed in a standby ground or airborne alert status. On-call missions are then executed only when the requesting unit calls for them. Detailed mission planning and briefing of aircrews on all mission essential information is normally not possible prior to takeoff.

e. Immediate - An Immediate CAS mission is an air strike on a target that was not requested sufficiently in advance to permit any mission coordination or planning. These missions are executed in response to urgent requests by the supported ground unit to strike targets of opportunity. Urgency often requires that aircraft be diverted from a preplanned mission supporting one-ground unit to an immediate mission for a different ground unit. Mission coordination is often accomplished while the flight is enroute and the aircraft is usually briefed by the terminal controller. Most immediate CAS requests are filled with on-call missions.

2. Tactical Risk Assessment

In addition to proper battle tracking, the supported commander and staff make continuous tactical risk assessments. Risk assessments involve the processing of available information to ascertain a level of acceptable risk to friendly forces or civilians. ***Based on the current risk assessment, the supported commander will weigh the benefits and liabilities of authorizing CAS employment. CAS may not always be the best option.***

3. Troops in Contact

JTACs/FAC(A) s and aircrew should regard friendly ground forces receiving effective fire as "troops in contact" or "TIC." JTACs and aircrew must carefully weigh the choice of munitions and types of Terminal Attack Control (TAC) against the risk of friendly fire (e.g., "troops in contact" does not necessarily dictate a specific type of control). "Troops in contact" is an advisory call to increase awareness and to highlight the urgency of the ground situation; however, the call does not remove the aircrew's/JTAC's responsibility to avoid civilian and

2-2 DIVISION CAS TACTICS AND PROCEDURES

friendly troop casualties. "Troops in contact" requires the supported commander to determine priority of CAS with respect to other mission impacts. Types of TAC will be discussed later in this FTI.

4. Risk Estimate Distance

   a. Risk estimate distances allow the supported commander to estimate the potential danger to friendly troops from the CAS attack. They are defined as 0.1 percent Probability of Incapacitation (P_i). A 0.1 P_i indicates that 1 in 1,000 troops would be injured if the particular ordnance impacted at the specific distance. Many factors go into determining the risk assessment distances, factors such as delivery profile, target elevation, terrain, buildings, trees, and the calculation of these numbers is beyond the scope of this course.

   b. **Danger Close**. Ordnance delivery inside the 0.1 percent P_i distance is considered "danger close." The supported commander must accept responsibility for the risk to friendly forces when targets are inside the 0.1 percent P_i distance. Risk acceptance is confirmed when the supported commander passes their initials to the attacking CAS aircraft through the JTAC/FAC(A), signifying that they accept the risk inherent in ordnance delivery inside the 0.1 percent P_i distance. When ordnance is a factor in the safety of friendly troops, the aircraft weapon's axis of attack should be parallel to the friendly force's axis or orientation, to reduce the risk of munitions impacting long or short of the intended impact point onto friendly positions.

5. Collateral Damage

Avoidance of collateral damage during CAS operations begins in the planning phase and is continuous throughout the preparation and execution phases. Collateral damage is unintentional or incidental injury or damage to persons or objects that would not be lawful military targets in the circumstances ruling at the time. A civilian casualty is a narrower term used to refer to unintentional injury or death to civilians who would not be lawful military targets. When referring to CAS, civilian casualties are a type of collateral damage. Discussion in this publication will focus on minimizing collateral damage during CAS operations.

6. JTAC/FAC(A) Responsibilities

All CAS planners employ available resources, within the constraints of mission accomplishment, time, and friendly force protection, to minimize collateral damage. The primary cause of collateral damage is positive identification (PID) failure. Therefore, JTACs physically present at the point of air weapons employment have a responsibility to work with the supported ground commander to ensure PID is attained and strikers have SA to both friendly and civilian locations. JTACs/FAC(A)s often provide final terminal control of CAS weapons, which ensures weapons employment is correct and safe, in order to limit collateral damage. JTACs/FAC(A)s can help minimize and mitigate collateral damage in the following ways:

   a. Understand the major causes of collateral damage

i. Failure to positively identify targets as hostile and geospatially define their location, or failure to identify civilians in the vicinity of the target.

ii. Improper weapon-to-target match in a given operational environment. Ordnance, fuzing, and delivery method can all have large impacts on the level of collateral damage and must be appropriately selected based on mission accomplishment, friendly force protection, and proximity of collateral entities.

iii. Weapon Malfunctions. Failure to properly plan attack axis to mitigate weapon guidance failures or miss distances. Human error or technology failure can lead to weapons landing off target or large miss distances resulting in increased collateral damage.

iv. Occasionally, certain targets are of such high strategic importance that a conscious decision is made by military and political leaders to engage the target despite the collateral risk. These cases are not typical in the CAS environment and require a specialized review and approval process.

b. Apply the proper mitigation techniques

i. JTACs/FAC(A)s must be vigilant to identify the presence of noncombatants and incorporate pattern-of-life into their targeting decisions and recommendations to the supported ground commanders. JTACs/FAC(A)s must be proactive and especially careful when using any form of remote targeting (scout, JFO, VDL).

ii. JTACs/FAC(A)s can select ordnance with lower explosive yield, greater precision, or which have less fragmentation potential if it still achieves the ground commander's intent. In addition, JTACs/FAC(A)s can specify fuzing combinations that lead to lower collateral damage such as delay fuzing to minimize fragmentation, or airburst fuzing to minimize the weapon's penetration and effect of blast against a structure. However, using secondary fuzing options may increase the risk of weapon failure (dud or low order detonation) or decrease the weapon's effectiveness. JTACs/FAC(A)s can also select an aimpoint offset to bias weapons effects away from nearest collateral concerns if the ground commander's desired effect will still be met.

iii. JTACs/FAC(A)s must take, not only friendly locations, but collateral concerns into account when planning attack axes to mitigate the effects of weapons landing off target due to human or technological failure. Properly orienting attack axes, so the weapon is moving away from the nearest collateral concern at the point of impact, accounts for possible misses, and orients fragmentation patterns away from the nearest collateral concern.

iv. JTACs/FAC(A)s must use all means available to ensure target location is accurate and of sufficient fidelity to achieve mission objectives. They must also

exercise appropriate diligence in target correlation to ensure the correct target is attacked.

7. Weapons Release Authority

The intent is to offer the lowest level supported commander, within the constraints established during risk assessment, the latitude to authorize weapons employment. Prior to CAS target engagement, supported commanders also delegate weapons release authority to JTACs/FAC(A)s for specific engagements. ***The authority and responsibility for the expenditure of any ordnance on the battlefield rests with the supported commander.*** Weapons release authority grants JTACs/FAC(A)s the authority to provide the following clearance calls to attacking aircraft:

a. **ABORT:** Term used by a JTAC/FAC(A) during all types of control to terminate the attack prior to weapons release.

b. **CLEARED HOT:** Term used by a JTAC/FAC(A) during Type 1 and 2 control when granting weapons release clearance to an aircraft attacking a specific target. For example, "*Hammer-11 CLEARED HOT.*"

c. **CONTINUE:** Term used by a JTAC/FAC(A) during all types of control to authorize the aircraft to proceed with the attack profile, but weapons release is not granted.

d. **CLEARED TO ENGAGE:** Term used by a JTAC/FAC(A) during Type 3 control, granting a weapons release clearance to an aircraft or flight to attack a target or targets within the parameters prescribed by the JTAC/FAC(A).

e. **CONTINUE DRY:** Continue present maneuver; ordnance release is not authorized. Used to provide approval to aircraft to continue the pass without expending ordnance during Type 1, 2, or 3 controls. Given in place of a cleared hot when weapons release is not intended, such as during training or a show of force.

WARNING

The word CLEARED will only be used when ordnance is actually to be delivered. This will minimize the chances of dropping ordnance on dry passes, further reducing the risk of friendly fire incidents. Nonstandard calls must be avoided at all times.

JTAC to FAC(A) Coordination. The responsibilities of the JTAC and the FAC(A) must be determined prior to the attack. These responsibilities may include coordination with maneuver elements, attack aircraft briefing, target marking, airspace deconfliction, SEAD execution, and the person who provides final attack clearance.

9. Types of Control and Methods of Attack

Types of Control. Types of TAC are tools that give the ground commander the greatest chance of accomplishing the mission while mitigating friendly fire and collateral damage. The tactical risk assessment determines which type of control (1, 2, or 3) is used. Type of control shall be passed as part of the game plan before the attack brief for aircrew SA, but imposes no requirement on the aircrew. ***There are three types of control (Types 1, 2, and 3).*** The type of control conveys the JTAC's/FAC(A)'s intent on how best to mitigate risk and the need to control individual attacks.

Terminal Attack Control (TAC) - There are three types of terminal attack control or weapons release authorization: Type 1, Type 2 and Type 3.

a. Type 1 Control

Type 1 control is used when the JTAC/FAC(A) requires control of individual attacks and the situation requires the JTAC/FAC(A) to visually acquire the attacking aircraft and the target for each attack. Type 1 control ***should be*** utilized when the visual acquisition of the attacking aircraft and analysis of attacking aircraft geometry by the JTAC/FAC(A) is the best means available to ensure mission success and reduce the risk of the attack affecting friendly forces and/or collateral concerns. The intent is that the JTAC/FAC(A) is able to assess the attack geometry of the aircraft to predict the weapon trajectory from release to impact, helping to ensure friendly positions and collateral damage concerns are safe from undesired weapons effects***. The JTAC/FAC(A) will withhold clearance until the attacking aircraft has completed maneuvering on the target.***

NOTE

Attack aircraft are required to validate target locations by any and all means necessary; map plot, visual recognition, etc.

Type 1 control procedures are as follows:

i. The JTAC/FAC(A) visually acquires the target.

ii. The JTAC/FAC(A)passes the game plan and CAS brief to the attacking aircrew.

iii. The attack aircrew validates target location by crosschecking that the position is coincident with the expected target area, using all appropriate means.

iv. The aircrew will read back Line 4, Line 6, and any restrictions provided by the JTAC/FAC(A).

v. The JTAC/FAC(A) will conduct correlation as required.

vi. Aircrew will provide an "IP INBOUND" call if requested.

2-6 DIVISION CAS TACTICS AND PROCEDURES

vii. Attack aircrew will provide "IN" call, indicating entering terminal phase of air-to-ground attack prior to weapons release. The terminal controller may require the CAS aircraft to "Call 'IN' with direction" during the remarks/restriction portion of the CAS brief.

viii. The JTAC/FAC(A) will visually acquire the attacking aircraft.

ix. The JTAC/FAC(A)will analyze attacking aircraft geometry to ensure mission success and reduce the risk of the attack affecting friendly forces and/or collateral concerns.

x. The JTAC/FAC(A) will provide a "CLEARED HOT," "CONTINUE DRY," or "ABORT," based on the above procedures being met.

b. Type 2 Control

The JTAC/FAC(A) must visually acquire the target or utilize targeting data from another asset with accurate real-time targeting information. Type 2 control requires control of individual attacks. ***While not required, if the tactical situation allows, the JTAC/FAC(A) should make every effort to visually acquire the attacking aircraft and assess attack geometry in order to provide an additional measure of safety, enhance SA, and be able to abort the attack if necessary.*** Examples of when Type 2 control may be applicable are troops in contact, night, adverse weather, and high altitude or standoff weapons employment.

Type 2 control procedures are as follows:

i. The JTAC/FAC(A) visually acquires the target or acquires targeting data from another asset with accurate real-time targeting information.

ii. The JTAC/FAC(A) passes the game plan and CAS brief to the attacking aircrew.

iii. The attack aircrew validates target location by crosschecking that the position is coincident with the expected target area, using all appropriate means.

iv. The aircrew will read back Line 4, Line 6, and any restrictions provided by the JTAC/FAC(A).

v. The JTAC/FAC(A) will conduct correlation as required.

vi. The aircrew will provide an "IP INBOUND" call if requested.

vii. The attack aircrew will provide the JTAC/FAC(A) with an "IN" call, indicating entering terminal phase of air-to-ground attack, prior to weapons release. Aircrew should make this call at the appropriate time to allow clearance before

entering the release window. If a restriction in the form of a direction or final attack heading (FAH) was given in the CAS brief, then it will be included with the IN call.

Example: "*IN from the South*" or "*IN heading 360*." All attacking aircraft are required to provide an IN call unless coordinated otherwise.

viii. JTAC/FAC(A) will provide a "CLEARED HOT," "CONTINUE DRY," or "ABORT" based on the above procedures being met. In the case of a flight conducting attacks together, the JTAC/FAC(A) may elect to either provide a single clearance for the flight or each attack aircraft individually, based upon the tactical scenario.

c. Type 3 Control

Type 3 control is used when the controller requires the ability to provide clearance for multiple attacks within a single engagement and any or all of the following conditions exist:

i. Controller is unable to visually acquire the attack aircraft at weapons release

ii. Controller is unable to visually acquire the target

iii. Attack aircraft is unable to acquire the mark/target prior to weapons release.

NOTE

Type 3 control procedures are not used during training at VT-86.

Methods of Attack.

The method of attack and type of control are separate and independent constructs. The method of attack is an agreement between the supported commander, the JTAC/FAC(A), and the aircraft, regarding the aircrew's correlation requirement, and is completely independent of the type of control. In CAS, correlation is the process by which the JTAC/FAC(A) coordinates and confirms that the attacking aircrew, and/or a third-party contributor, has acquired the correct target or mark. Correlation is required on each and every CAS attack. Method of attack conveys the JTAC's/FAC(A)'s intent for the aircraft prosecution of the target. The method of attack is broken down into two categories, Bomb on Target ***(BOT)*** and Bomb on Coordinate ***(BOC)*.** These two categories define how the aircraft will acquire the target or mark. Any type of control can be utilized with either method of attack and no type of control is attached to one particular method of attack.

Summary of Types of Control and Methods of Attack	
Type of Control	**JTAC/FAC(A) Requirement**
Type 1	JTAC/FAC(A) will visually acquire the target and the attacking aircraft during the terminal phase of an attack, prior to weapons release, and assess attack aircraft geometry while maintaining control of individual attacks.
Type 2	JTAC/FAC(A) will utilize other measures to mitigate risk while maintaining control of individual attacks.
Type 3	JTAC/FAC(A) will utilize other measures to mitigate risk and assesses that the measures in place will allow multiple attacks within the same engagement.
Method of Attack	**Requirement**
BOT	Aircraft/aircrew will acquire the target or intended aimpoint using the best method available.
BOC	Aircraft/aircrew will employ weapons on the specified coordinates given in the CAS brief.
BOC bomb on coordinate BOT bomb on target CAS close air support FAC(A) forward air controller (airborne) JTAC joint terminal attack controller	

Figure 2-1 Summary of Types of Control and Methods of Attack

BOT and BOC. JTACs/FAC(A)s will state the method of attack, whether BOT or BOC, as part of the game plan prior to the CAS brief. These methods of attack apply to all types of control and all ordnance employed in CAS missions. JTACs/FAC(A)s and CAS aircrews should think of and use these methods of attack as a clear, concise, effective manner to communicate the requirements for correlation from CAS aircraft employing ordnance. Effective use of BOT and BOC constructs to clarify JTAC/FAC(A) and CAS requirements for a CAS engagement will result in more expeditious attacks and help mitigate friendly fire and collateral damage. The misapplication of BOT and BOC in tactical scenarios will often result in confusion between CAS aircraft and JTAC/FAC(A), increased time to kill, and potentially cause friendly fire or collateral damage.

A BOT attack requires that the JTAC/FAC(A)'s intended target or mark is TALLY/CONTACT/CAPTURED by the aircrew. Coordinate accuracy and precision are not as important as the JTAC's/FAC(A)'s ability to aid CAS aircraft in acquiring the target. Coordinates provided in the attack brief must be of sufficient fidelity to provide initial cueing to the attacking aircraft and be used for fires approval. ***If at any point during the CAS engagement, the attack aircrew is required to gain TALLY/CONTACT/CAPTURE the target, it is a BOT attack.*** This delivery method is advantageous in numerous tactical situations such as mobile target sets (whether stationary or moving); low threat environments that support continuous target observation by CAS aircraft; situations where controllers are not able, or do not need, to generate low Target Location Error (TLE) coordinates; or when TALLY/CONTACT/CAPTURED by the aircrew. If a BOT attack is planned based on the tactical scenario**,** then time should not be wasted conducting detailed precision and/or accurate target coordinate generation. ***In many tactical scenarios suited to BOT attacks, delaying the***

attack in order to generate a coordinate for BOC employment will increase the time to kill or result in missed targeting opportunities.

– For BOT missions, only the lead aircraft is required to read back Line 4 and Line 6, in conjunction with other required restrictions. All attack aircraft will conduct read-backs if requested by the JTAC/ FAC(A).

A BOC attack is used when the JTAC/FAC(A) determines that the desired effects can be created against the target with CAS aircraft employing ordnance on a specified set of coordinates. The coordinates must be of sufficient fidelity/mensuration to produce the desired effect on the target and be used for fires approval. If the aircraft is never required to be TALLY/CAPTURED the target or CONTACT the mark, it is a BOC attack. The JTAC/FAC(A) does not need to delay the CAS attack in order to build CAS aircraft awareness to achieve target TALLY/CAPTURE. If a BOC attack is planned based on the tactical scenario, then unnecessary exposure to the threat by CAS platforms is avoided and time is not wasted conducting targeting confirmation. Great care must be taken to ensure that the target location with the required precision and accuracy determined in the commander's tactical risk assessment is obtained and entered into the weapon/navigation system. Aircrew will not modify coordinates once read back. For a BOC attack, aircrew read-back will be from the weapon or aircraft system.

– For BOC missions, all aircraft delivering ordnance must read back Line 4 and Line 6 from their system or weapon, as appropriate, in conjunction with other required restrictions.

10. Introduction to 9-Line CAS Brief

JTACs/FAC(A)s will use a standardized briefing to pass information rapidly. The 9-Line CAS brief, also known as the "9-Line Briefing," is the standard for use with Fixed Wing (FW) and Rotary Wing (RW) aircraft. The CAS briefing form helps aircrew to determine whether they have the information required to perform the mission.

a. Line 1—IP. The Initial Point (IP) is the starting point for the run-in to the target.

b. Line 2—Heading and Offset. The heading is given in degrees magnetic from the IP to the target. The offset is the side of the IP- to-target line on which aircrews can maneuver for the attack.

c. Line 3—Distance. The distance is given from the IP to the target.

d. Line 4—Target Elevation. The target elevation is given in feet mean sea level (MSL) unless otherwise specified.

e. Line 5—Target Description. The target description should be specific enough for the aircrew to recognize the target.

f. Line 6—Target Location. The JTAC/FAC(A) provides the target location.

g. Line 7—Mark Type/Terminal Guidance. The type of mark the JTAC/FAC(A) will use (for example, smoke, laser, or IR). If using a laser, the JTAC/FAC(A) will also pass the call sign of the platform/ individual that will provide terminal guidance for the weapon and laser code.

h. Line 8—Friendlies. Cardinal/sub-cardinal heading from the target (N, NE, E, SE, S, SW, W, or NW) and distance of closest friendlies from the target in meters (e.g., "South 300").

i. Line 9—Egress. These are the instructions the aircrews use to exit the target area.

j. Remarks/Restrictions. Supplies additional information important to the conduct of the attack.

11. Advantages of CAS

a. Greater destructive power

b. Ability to attack targets that are safe from other supporting arms (i.e., beyond the range of naval gunfire and artillery)

c. Ability to employ a wide variety of ordnance and tactics

d. Ability to engage moving targets

e. Ability to re-attack if threat environment is permissive

f. Ability to observe the battle area and engage targets unseen from the ground

12. Requirements for effective CAS

In addition to offering many advantages over other supporting arms, CAS also has some very strict requirements that must be satisfied in order to be effective.

a. Requires local air superiority to provide security for the strike aircraft

b. Requires suppression of enemy air defenses

c. Ground commanders must provide the FACs with a responsive and effective means of marking the targets for the CAS aircraft

d. Generally requires favorable weather

e. Requires flexible control

f. Requires effective two-way communication

g. Requires a prompt response by the CAS aircraft to the ground commander's request

h. Requires aircrew and terminal controller proficiency in order to successfully execute the complex CAS mission

13. Fire Support Coordination Measures (FSCM)

Within their operational areas, commanders employ permissive and restrictive FSCMs to expedite attack of targets; protect forces, populations, critical infrastructure, and sites of religious or cultural significance; clear joint fires; deconflict joint fire support operations; and establish conditions for future operations. Along with other control measures, FSCMs and their associated procedures help ensure that joint fire support does not jeopardize troop safety, interfere with other attack means, or disrupt operations of adjacent units. The primary purpose of permissive measures is to facilitate the attack of targets, while the primary purpose of restrictive measures is to safeguard friendly forces.

Restrictive Measures. Restrictive measures restrict the use of supporting arms for various reasons. These include to safeguard friendly forces, protect religious sites, and deconflict fires.

a. No Fire Area (NFA). An NFA is land area designated by the appropriate commander into which fires or their effects are prohibited. Two exceptions are:

i. When the establishing HQ approves fires temporarily within the NFA on a mission-by-mission basis.

ii. When an enemy force within the NFA engages a friendly force and the engaged commander determines there is a requirement for immediate protection and responds with the minimal force needed to defend the force.

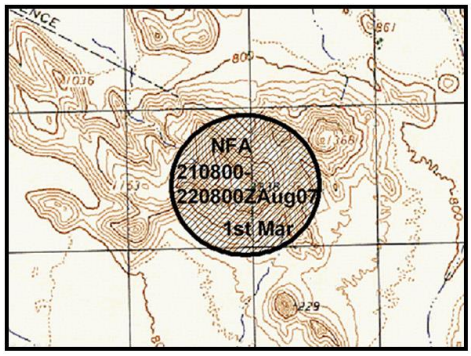


Figure 2-2 No Fire Area (NFA)

b. Airspace Coordination Area (ACA). A three-dimensional block of airspace in a target area, established by the appropriate commander, in which friendly aircraft are reasonably safe from friendly surface fires. There are two types of ACAs; formal and informal.

i. Formal ACA. The airspace control authority establishes formal ACAs at the request of the appropriate commander. Formal ACAs require detailed planning. The vertical and lateral limits of the ACA are designed to allow freedom of action for air and surface fire support for the greatest number of foreseeable targets.

ii. Informal ACA. Informal ACAs can be established using separation plans and may be established by any supported commander. An informal ACA is an expedient measure designed to provide immediate, yet temporary control and deconfliction. As such, informal ACAs are normally short-lived and not as widely disseminated as formal ACAs. Aircraft and surface fires may be separated by distance (lateral, altitude, or a combination of lateral and altitude), or by time.

NOTE

ACAs are required read backs whenever given.

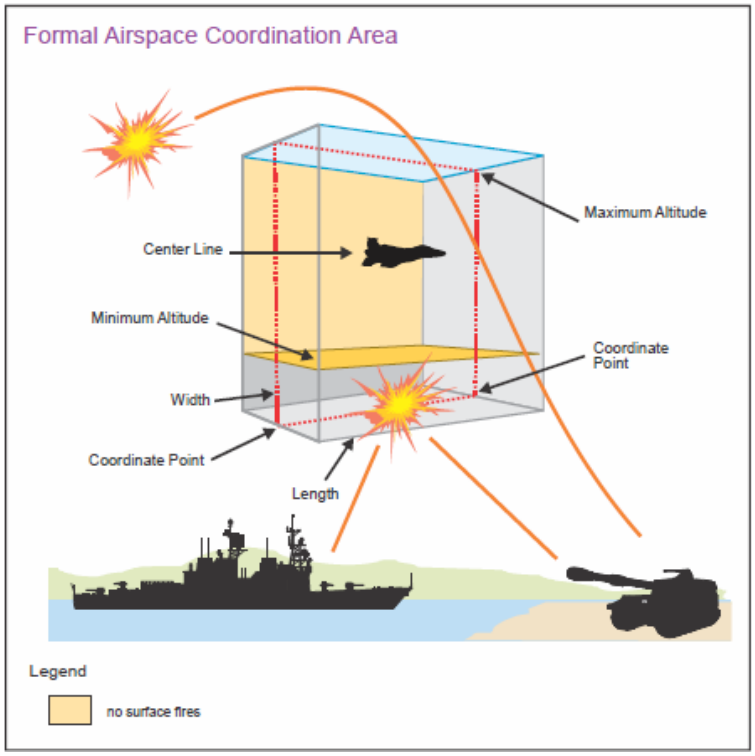


Figure 2-3 Formal ACA

An ACA is normally established using lateral, altitude, or time separation, or a combination thereof. The ACA is the primary FSCM that reflects the coordination of airspace for use by air support and indirect joint fires.

i. **Lateral Separation**. Lateral separation is effective for coordinating fires against targets that are adequately separated from flight routes to ensure aircraft protection from the effects of friendly fires. Lateral separation allows coordinated attacks against two adjacent targets. The informal ACA should be big enough to allow aircraft to operate over the target yet small enough to minimize restrictions on supporting fire. JTAC/FAC(A)s can use lateral separation to divide the target area into two or more engagement zones. While the separation measure may be described by an MGRS, grid line, or latitude/longitude reference, terrain features have the added advantages of simplicity and constant visual reference. This is an appropriate technique when aircrews and firing units engage separate targets, and aircraft will not cross Gun-Target Lines (GTL). JTACs/FAC(A)s must know the GTLs so they can prevent aircraft from flying through trajectories.

For example: "*Stay west of the 62 gridline*" or "*Remain west of the river*."

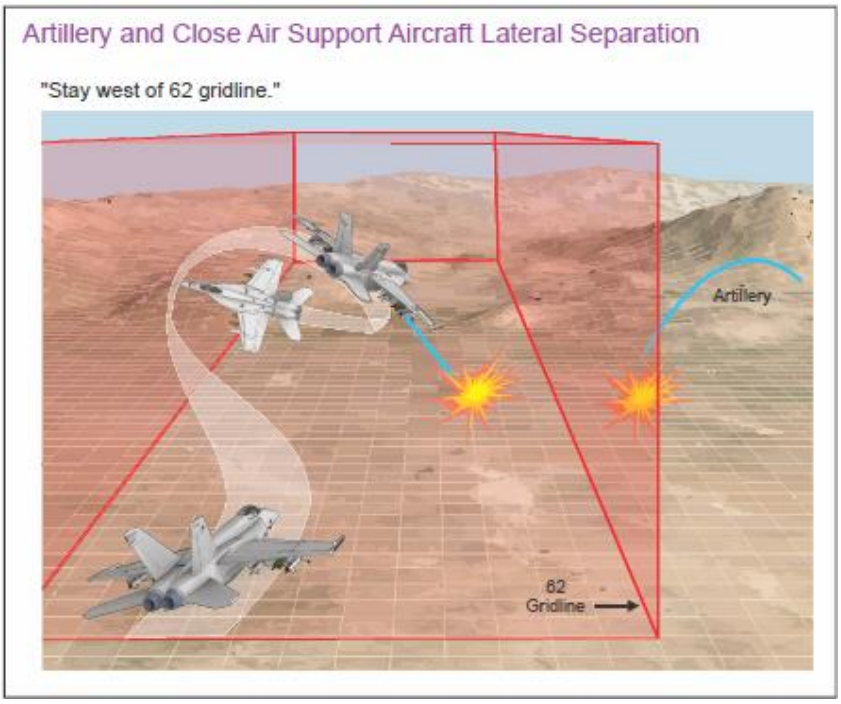


Figure 2-4 Lateral Separation of Artillery and Aircraft

ii. **Altitude Separation.** Altitude separation is effective for coordinating fires when aircraft remain above or below Indirect Fire (IDF) trajectories and their effects. This technique permits IDFs to continue when the aircraft must cross the GTL. Avoidance of the IDF trajectory and fragmentation pattern is provided by "stay above" or "stay below" altitude restrictions. The JTAC/FAC(A) will coordinate with the firing unit to determine the appropriate entry argument data to use when referencing the firing tables.

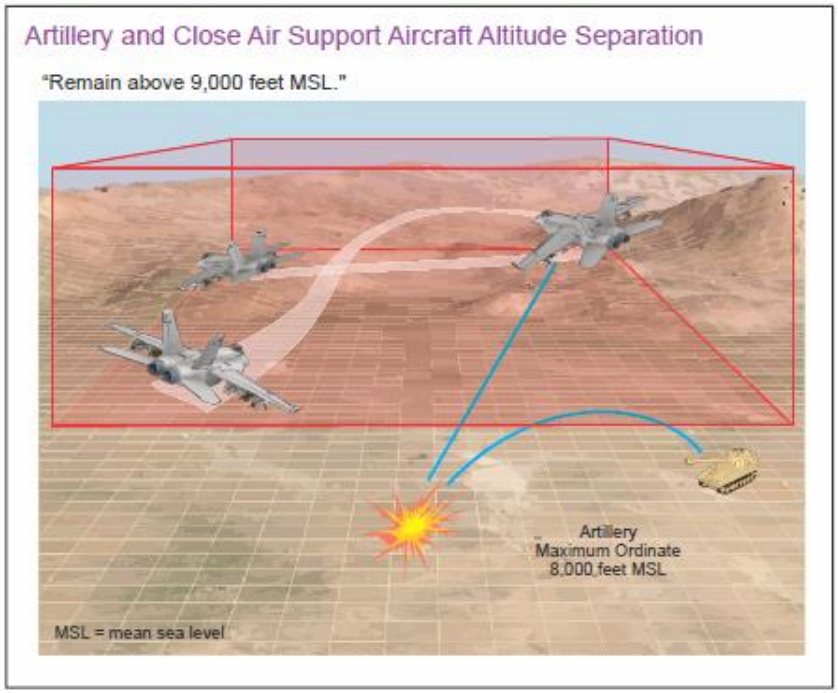


Figure 2-5 Altitude Separation of Artillery and Aircraft

iii. **Time Separation.** Time separation requires the most detailed coordination and may be required when altitude restrictions from IDF trajectories adversely impact aircraft ordnance delivery (e.g., mortar trajectory). The timing of surface fires must be coordinated with aircraft routing. This technique is appropriate when aircrews and firing units engage the same or nearby targets, when IDF is providing SEAD in coordination with the aircraft attack, or when the target is being marked by IDF. When deconflicting sorties, the JTAC/FAC(A) must consider the weapons fragmentation envelope and the likelihood of secondary explosions.

14. Time on Target (TOT)

Time on Target is a time at which the aircraft bombs are to impact the target and around which supporting surface fires can be coordinated. TOT requires minimum communication. All participants, air and ground, must understand the time standard in use (Zulu or local), and the JTAC/FAC(A) may need to ensure all clocks are synchronized by providing a "time hack." ***GPS time is the standard for US and allied forces*** in establishing a common time reference and for setting TOT. Strict adherence to timing by participants is required for aircraft safety. If a CAS aircrew is unable to comply with the TOT, the CAS aircrew must inform the terminal controller and should consider requesting an alternate TOT that can be achieved. Aircrews can update the clock on check-in with air control/fire support coordination agencies.

15. Procedural Control Measures

Procedural control measures provide target orientation to aircrew, align aircraft for the attack and/or egress, provide separation from other supporting fires, and provide separation from enemy air defense assets. Procedural control measures include Control Point/Initial Point (CP/IP) selection, keyhole, offset direction, and Final Attack Heading (FAH).

a. **CP/IP Selection.** The JTAC/FAC(A) selects the CPs/IPs based on enemy capabilities, target orientation, friendly location, weather, aircraft capabilities, and FSCMs. CPs and IPs should be visually significant geographic points whenever possible so that aircrew can visually acquire them in the event of a degraded navigation system or GPS denied environment. IPs are normally located 5 to 15 nautical miles from the target for FW aircraft.

b. **Keyhole.** Keyhole template is an efficient method for establishing an IP in the absence of control points or when their location does not sufficiently support target engagement. When CAS aircraft are passed to a JTAC/FAC(A) from a CP, the JTAC/FAC(A) should immediately pass an "Echo" point (typically the target) to those CAS players, and then anchor their hold point off of the Echo point with a direction and distance in nautical miles. Aircraft should hold outside the distance given. The standard keyhole method is to label each of the cardinal directions with a letter: A—North, B—East, C—South, D—West, and E—Overhead Target and use radials when cardinal directions are not appropriate (Figure 2-6). The JTAC/FAC(A) selects the IP based on enemy threat capabilities, target orientation, friendly location, weather, aircraft capabilities, and fire support coordination requirements.

i. If the tactical situation dictates that an IP north of the target is necessary, then holding instructions for the CAS players might sound like this:

Halo-11: "*Hammer- 11, advise when ready to copy Echo point*."

Hammer -11: "*Hammer- 11, ready to copy*."

Halo-11: "*North 31 10 30, West 088 36 20*."

Hammer-11: "*Copy, North 31 10 30, West 088 36 20*."

Halo 11: "*Hammer-11, proceed to Alpha 8, angels 15, report established*."

Hammer-11: "*Hammer-11, established Alpha 8, angels 15*."

ii. A cardinal direction may not always be appropriate for an IP. In these situations, any radial from the target can be used for holding instructions. For example:

Halo-11: "*Hammer-11, proceed to the 240 at 8, angels 15, report established*."

Hammer-11: "*Hammer-11, established 240 at 8, angels 15*."

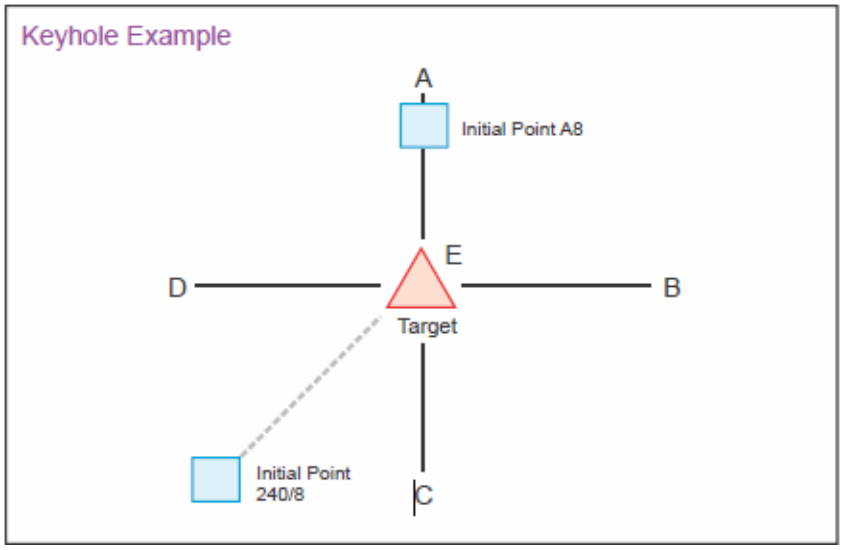


Figure 2-6 Keyhole Example

This template allows for unlimited flexibility in IP selection and precludes the need to generate IPs for an entire operational area, many of which may never be used. However, by choosing the keyhole method, the JTAC/FAC(A) will probably not have a visually/geographically significant hold point on which attacking aircraft can orient.

i. Overhead: "From the overhead" From the overhead is an attack from an orbit over the target area.

ii. For FW level-laydown, or bunt deliveries, the distance required for the attack should be considered and used in lines 1-3. The airspace required for these attacks does not support "from the overhead." For example, a FW Precision Guided Munition (PGM) delivery run will typically begin about 8-10 nautical miles from the target.

iii. If the aircraft is attacking from an orbit over the target area, then Lines 1-3 can be "from the overhead" or "Lines 1-3 N/A."

c. **Offset Direction.** The offset direction tells the aircrew on which side of the IP-to-target line they can maneuver for the attack. JTACs/FAC(A)s can use an offset direction to ease fire support coordination, align the aircraft for the attack or egress, or keep aircrews away from known threats, but they are not required. An offset

direction aids fire support coordination ***by restricting*** aircrews from using airspace on the side of the IP-to-target line where there might be a conflict with a GTL. The offset direction regulates the attack quadrant without assigning a specific attack heading. When given, aircrew are required to adhere to the restriction of the offset direction.

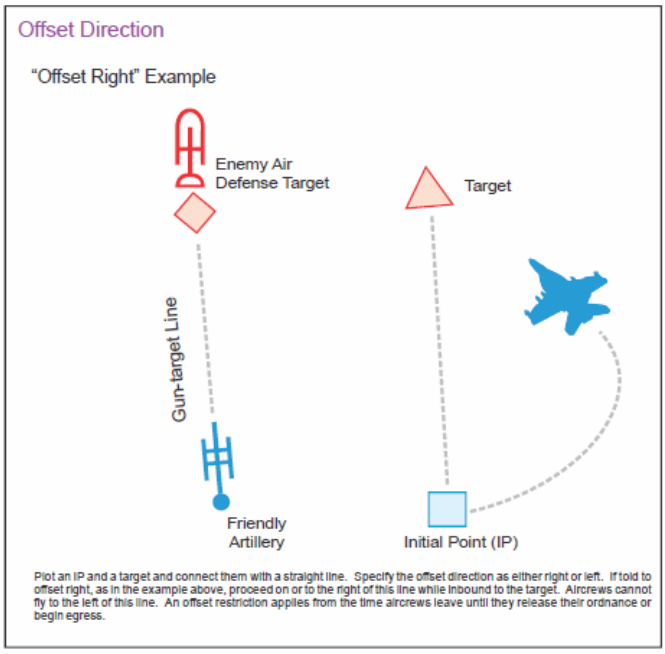


Figure 2-7 Offset Direction Example

d. **Final Attack Headings.** JTACs/FAC(A)s assign attack headings for several reasons: to increase ground troop safety, aid in aircraft acquisition by the JTAC/FAC(A), aid aircrews in target acquisition, mitigate collateral damage, meet laser safety cone attack restrictions, and facilitate fire support coordination. Controllers may employ FAHs/windows that allow aircrews to maneuver on either side of the attack heading. This gives aircrews more flexibility in prosecuting the target while maintaining the required degree of restriction on the aircraft heading. ***Final attack headings are not issued when there is no requirement.*** JTAC/FAC(A)s should attempt to place as few restrictions as possible on attacking aircraft. Unnecessary or overly restrictive run-in restrictions often increase the time required to attack, decrease the flexibility and survivability of the flight, and increase the likelihood of an aircraft not expending its ordnance because it was outside of parameters. JTAC/FAC(A)s should limit restrictions to the minimum required; however, any final attack geometries provided as part of the CAS briefing in the form of headings or directions are by definition "restrictions" and therefore must be read back. FAHs should be given in increments in 10 to avoid unnecessary comms. The following are examples of briefed final attack geometry:

i. Magnetic heading: "*Final attack heading 230*."

ii. Magnetic headings with a cone: "*Final attack heading 240-300*" or "*Final attack heading 270 plus-or-minus 30 degrees*."

iii. Use of cardinal/sub-cardinal directions: "*Hammer-11, make your attack from northeast to southwest.*"

iv. Use of a geographical reference: "*Make all attacks parallel to the road.*"

202. MISSION PLANNING

As with all missions, pre-flight planning is critical for success in CAS. The factors involved are varied, complex, and dynamic. The overall main planning factors involved are:

a. Mission objective

b. Friendly situation

i. Deep, close, or rear ops

ii. Offensive/defensive ops

c. Ground Combat Element (GCE) scheme of maneuver

i. Supported unit positions

ii. Attack axis

iii. Control measures

iv. Timing

d. Enemy Situation

i. Potential targets

ii. Ground air capabilities

iii. IADS (Integrated Air Defense System) locations/capabilities

iv. Assessment of threat (discussed in detail later)

(a). Low

(b). Medium

(c). High

1. Target Area Study/Chart Preparation

CAS missions require precision and coordination; being familiar with the target area is one of the keys for success. The first step in planning a CAS mission is to prepare a chart of the AOR or target area. Use a TPC (1:500,000) or preferably a JOGAIR (1:250,000). Plot all the CPs/IPs that are listed by Lat/Long or UTM grid in the Air Annex of the Air Tasking Order (ATO). Remember CPs/IPs are easily identifiable geographical reference points from which the FAC can coordinate a CAS mission and deliver aircraft to the target. At VT-86, all mission planning is done and published on the VT-86 E-brief website**.** ***All SNFOs shall be thoroughly familiar with all CAS products and TGT areas prior to each event.***

Once in the aircraft, enter each CP/IP under a waypoint so that GPS/INS steering to each is available. Plot all friendly locations, if given by the DASC, as soon as you get them. This information can change rapidly depending upon the speed of the advancement of friendly forces so get the latest updates from the DASC or the JTAC/FAC(A).

Effective tools for the aircrew in CAS are the 1:50,000 and gridded imagery charts. The target area minimum safe altitude (MSA), terrain funneling features, possible threat locations, and avenues of approach (roads, trails, river washes, etc.) should be annotated. In the absence of a 1:50,000 chart, for this syllabus we will use satellite imagery of the target complex to mark and identify targets passed by the FAC(A) via talk-on.

Due to the dynamic nature of CAS, not all missions will allow for extensive pre-flight target area or map study. However, if aircrews have the potential to be re-directed to CAS missions, being familiar with regional CAS procedures and potential target areas cannot be overemphasized.

It is essential for aircrew to have the information available to them in the cockpit while conducting CAS. "Smart Packs" are commonly used with CAS missions due to the complexity of the mission and the precision required for its execution. Smart Packs normally include target area imagery (Figure 2-8), 9-Line cards, CP/IP matrix, waypoint plans, frequency plans, and weaponeering cards.

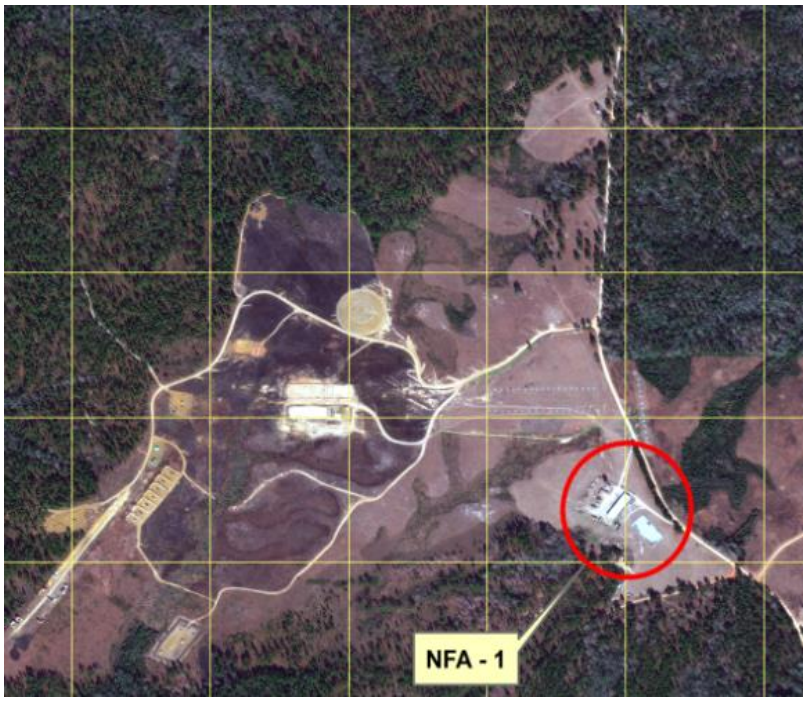


Figure 2-8 Shelby Range Target Area Imagery with Friendly Forces/Potential Targets

CAS missions in VT-86 are normally conducted in the DeSoto/Bullseye MOAs, Shelby Range (R-4401), Camden MOA, or the Pensacola South MOA. Sequences 2 and 3 in the aircraft waypoint loads are reserved for DeSoto and Pensacola South MOA and are not to be changed; the applicable sequence will be boxed throughout the mission. Camden MOA sequences or other MOAs if on detachment are to be constructed per the In-Flight guide if executing a CAS event there. Sequence 1 is open for SNFO manipulation, and will be used for setting up the CP-IP-TGT-ECP sequence after receiving a Joint Tactical Air Request (JTAR) or 9-Line.

2. CP-IP Matrix

Once each CP and IP is plotted, build a heading and distance matrix. Take a blank CAS Briefing Card and list all the CPs down the left side and all IPs across the top. Next, measure the heading and distance from each CP to each IP and enter it in the appropriate box. This matrix provides a quick reference for determining the distance from each CP to each IP. Simply add the IP to target distance to the CP to IP distance to determine the total distance to the target.

3. Distance/Groundspeed Matrix

The Distance/Groundspeed Matrix is a quick reference for computing the enroute time from the CP to the target, depicting Time-to-Go (TTG). TTG reflects the time required to fly a given distance, based on a groundspeed of 360 knots (6 NM/min). TOT is the time at which ordnance will impact the target, not the time the aircraft will be overhead the target. Because of this, the aircrew must take into account the effect that the delivery maneuver and bomb time of fall will have on timing to the target. SNFOs shall be within +/- 10 seconds to the TOT. If unable to make the TOT within 10 seconds, notify the JTAC/FAC(A) as soon as possible.

TIMING TABLES			
NM	240G	300G	360G
1	0+15	0+12	0+10
2	0+30	0+24	0+20
3	0+45	0+36	0+30
4	**1+00**	0+48	0+40
5	1+15	**1+00**	0+50
6	1+30	1+12	**1+00**
7	1+45	1+24	1+10
8	**2+00**	1+36	1+20
9	2+15	1+48	1+30
10	2+30	**2+00**	1+40

Figure 2-9 Distance/Groundspeed Matrix

4. Briefing

The following items should be present or completed prior to the CAS briefings:

a. File a DD 175 flight plan or put appropriate stereo route on file

b. Set up the briefing board with Z diagrams (in MSL and AGL) and safety data

c. Prepare a kneeboard card for the instructor with Z diagrams in MSL and AGL

d. Ensure kneeboard packs include all charts and planning materials covered above

e. Have a briefing guide and T-45C models in briefing room

f. Have a tactical call sign for the flight

g. Check weather, NOTAMS, TFR, and BASH for all working areas and applicable diverts.

SIM events (CAS 3101-3104)

a. SNFOs will brief Admin, Emergencies, TAC Admin, and CAS brief.

b. The instructor will conduct a FAC-to-Fighter briefing outlining general CAS Area of Responsibility (AOR) procedures, deconfliction, and safety.

Flight events (CAS 4101-4290)

a. SNFOs will brief an Admin overview, weather (with recommendations), and CAS brief.

2-22 DIVISION CAS TACTICS AND PROCEDURES

b. Lead IP will brief Admin, Emergencies, and TAC Admin with a more in-depth discussion of formation coordination and tactics with all aircrew. SNFOs shall be prepared to brief weather, NOTAMS, TFR, BASH, TOLD data, and training rules.

c. FAC (A) instructor will conduct a FAC-to-Fighter briefing outlining general CAS AOR procedures, deconfliction, and safety.

203. EXECUTION

1. Request of Air Support

Once a rough location for the target has been determined, and commander's desired effects are known, JTACs should request air support at the earliest possible opportunity due to the transit time required for CAS aircraft to arrive on station.

Joint Tactical Air Requests (JTAR)s (Figure 2-10) are preplanned CAS missions utilized by Direct Air Support Centers (DASC) and FACs to expedite the passing of target information for preplanned targets in the CAS environment. JTARs incorporate mission information utilizing the same 9-line format. If strikers have a specific JTAR onboard, FACs will have strikers execute the appropriate JTAR, changing any of the information as necessary. As with a 9-line briefing, strikers have the same obligation to read back lines 4 and 6 as well as any restrictions.

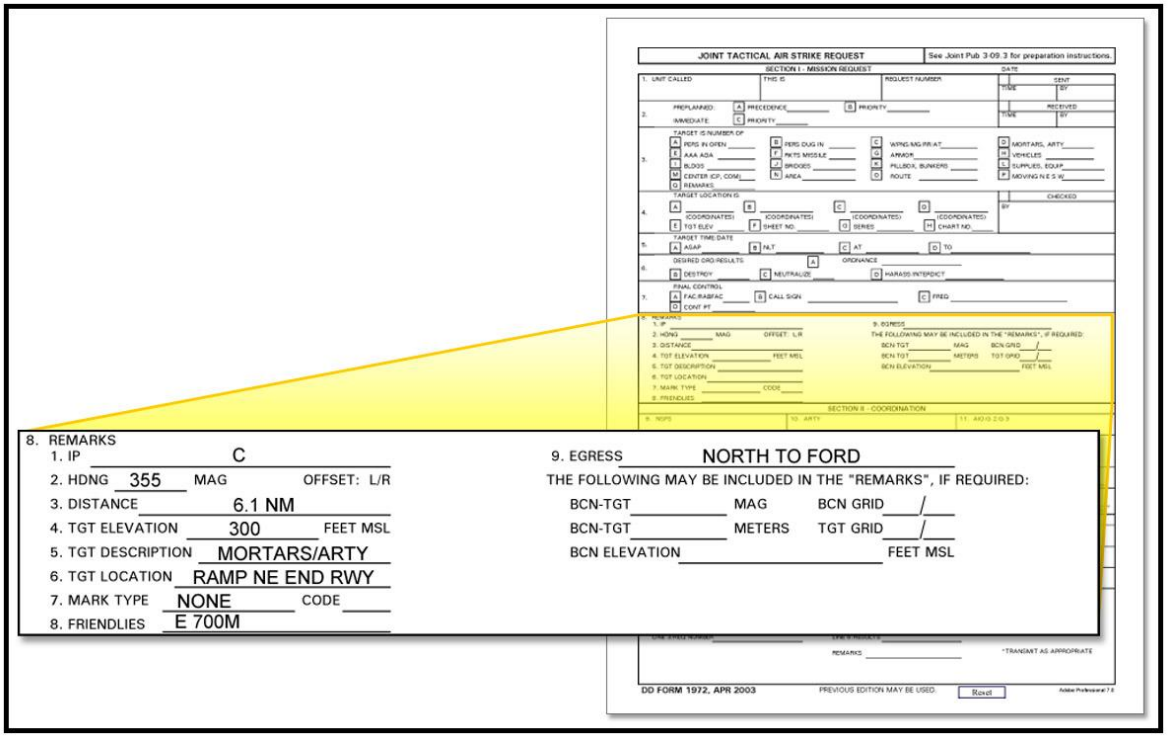


Figure 2-10 Joint Tactical Air Request Form (JTAR)

2. Check-In Briefings

DASC Check-in: Lead SNFO will check-in with the simulated DASC on the assigned TAC frequency after the initial check-in on deck. Upon successful completion of the DASC check-in, Lead SNFO will call base and ground for taxi instructions. Figure 2-11 illustrates the check-in using the MNPOPCA format:

M Mission Number

N Number/Type Aircraft

P Position and Altitude

O Ordnance

P Playtime or Time on Station

C Capabilities / Type Sensor

A Abort Code

Close Air Support Check-In Briefing
(Aircraft transmits to controller) Aircraft "_____," this is "_____" (e.g., "Heartless 52, this is rumble 31") (JTAC c/s) Aircraft c/s)
1. Mission Number _____. (e.g., "Mission number 1541") ATO assigned MSN #)
2. Number and type of aircraft: _____. (e.g., "2 by F/A-18C")
3. Position and altitude: _____. (e.g., "Currently 20 NM north of Ford, block 20-21")
4. Ordnance: _____. (e.g., "500 rds of 20mm, 1 by GBU-12, 1 by GBU-38 each aircraft, laser codes Rumble 31-1688, Rumble 32-1731, instantaneous and delayed fuzing for GBU-12s and GBU-38s")
5. Playtime or Time on Station: _____. (e.g., "We have 25 minutes time on station")
6. Capabilities: FAC(A), Type of Sensors, Link-16, VDL code, SITREPs on board, map version or GRGs, UAS Lost Link Procedures/Route: (e.g., "Rumble 31 is FAC(A) capable. Both aircraft are ATFLIR, and CAT II coordinates generation capable. Timber Sweet, Rumble 31 VDL code 4927. Rumble 32, VDL code 4977. We have SITREP C and micro-GRG 15-17 onboard.")
7. Abort code: _____. (e.g., "Abort code none, Ready to copy your updated SITREP.")

Figure 2-11 CAS Check-in (MNPOPCA)

An example of DASC check-in on deck is as follows:

a. Hammer-11 (AUX): "*Chieftain, Hammer-11*"

b. Chieftain (AUX): "*Hammer-11, Chieftain, Go Ahead*"

c. Hammer-11 (AUX): "*Chieftain, Hammer-11, Mission number 31-11, on deck-Navy Pensacola, up as fragged*" (with exception if A/C fallout)

d. Chieftain (AUX): "*Hammer-11, Chieftain copies all, proceed to R4401 at OLDS blocks 2-4, and contact Halo-11 once established*."

e. Hammer-11 (AUX): "*Hammer-11*"

JTAC/FAC(A) Check-in: Lead aircraft shall contact the DASC prior to entering the airspace for handoff to the FAC and for airspace holding instructions ONLY if holding instructions were not given during the initial DASC check-in. An example of FAC check-in airborne (utilizing MNPOPCA format) is as follows:

a. Hammer-11 (AUX): "*Halo-11, Hammer-11, 20 miles south of R4401 ready for check-in*"

b. Halo-11 (AUX): "*Hammer-11, Halo-11, proceed to OLDS, blocks 2-4 and call established, go with your check-in*"

NOTE

If the SNFO has already been given holding instructions from the DASC, then the position shall be repeated in the check-in as below.

c. Hammer-11 (AUX): "*Hammer-11, mission number 31-11, 3xT-45, proceeding to OLDS blocks 2-4, 2xMK-82, 2xGBU-12 code 1688, and 350 rds of 20 mm per aircraft, 30 minutes of playtime, I have WGS-84, GPS time hack, SITREP Kilo, Abort will be abort, ready to copy*"

d. Halo-11 (AUX): "*Hammer-11, Halo-11 copies all, advise when ready for SITREP update*"

NOTE

Once the Lead SNFO has contacted the controller, then control of all aircraft in the operational area resides with the JTAC/FAC(A) until KIO.

After receiving the check-in, the controlling agency (DASC, JTAC, FAC(A)) will update the SITREP and pass amendment to holding instructions if required.

3. Situation Reports (SITREPS)

SITREPS give strikers the current information dealing with friendly and enemy positions, threats, ordnance required or restricted, and restrictions. SITREPS are usually identified by a letter (managed similarly to ATIS information). Example: The current SITREP is SITREP G (Golf). SITREPs will be passed by the DASC, JTAC or FAC(A) in numerous formats, including the TTFACORLH format as follows:

T – Target area and/or Targets

T – Threats

F – Friendlies

A – Artillery

C – Clearance Authority

O – Ordnance

R – Restrictions

L – Localized SEAD efforts

H – Hazards

An example of a SITREP (utilizing TTFACORLH format) is as follows:

Halo 11 (PRI) *"SITREP G is current"*

T – "*Targets in the vicinity of the Shelby Airfield"*
T – *"Cutlass, Slingshot, and an un-located SA-2 in the area"*
F – *"All friendlies in NFA-1"*
A – *"B5S is at Gun Position 3"*
C – *"Falcon 51 has overall clearance authority"*
O – *"1 bomb per pass, no CBUs"*
R – *"All fixed wing aircraft stay East of HWY 29 for threats"*
L – *"B5S providing interrupted suppression 1 km north of your target area"*
H – *"No other hazards of flight"*

Updates to recent information are often passed as changes-only, instead of restating the entire SITREP. Regardless, TTFACORLH is a mnemonic used to remember all the pieces of information that need to be passed/considered; the order used to convey all the information is largely a matter of technique.

4. Game Plan

The game plan, at a minimum, will contain the type of control and method of attack. In addition, the following can be part of the game plan or passed in remarks: the ground commander's intent, the ordnance effects desired, or the ordnance and fuze combination required, if known. Aircraft interval can also be specified by the JTAC/FAC(A). At VT-86 and in the fleet, the TMOI format (Type, Method of Attack, Ordinance, and Interval) has become the standard initial game plan format.

The JTAC/FAC(A)'s intent is not to dictate aircraft tactics, but to offer a plan that meets the commander's intent. Developing the game plan in the following order provides a logical flow working backwards from the target:

a. Type of TAC. Type of TAC is based on several factors that include the type of ordnance employed, the JTAC's ability to observe either the aircraft or the target, the best method to mitigate risk, and the speed of target engagement.

b. Method of Attack (BOT or BOC). The optimum method of attack are chosen based on which method allows the quickest target engagement and is dependent on the target type, how the target will be acquired, and the situation.

c. Aircraft Ordinance and Interval. JTACs can request specific ordinance and impact intervals based on target, threat, friendlies, artillery/SEAD/laser deconfliction, ordnance, restrictions, weather, etc. The aircrew, in coordination with the JTAC, is responsible for deriving its own tactics in meeting the ground commander's intent.

NOTE

At VT-86, interval will be a minimum of 1 minute for safety.

An example of a Game Plan is as follows:

a. Halo-11 - "*Hammer, advise when ready for game plan."*

b. Hammer-11 - "*Hammer-11, ready to copy."*

c. Halo-11 - *"This will be a Type 1, BOT, 1xMK-82 per aircraft, one minute interval, advise when ready for 9-Line."*

d. Hammer-11 - "*Hammer-11, ready to copy 9-line."*

5. 9-Line Briefing

The 9- Line briefing is transmitted to the aircrew by the controller who will read only the information necessary to fill in the 9-line briefing. The full 9-line briefing will be given in groups of 3 lines with a pause between each group of 3-lines. After the 9-lines are given, the

controller will pass remarks (if any) and restrictions, including TOT. After typing in or verifying target coordinates, aircrews are required to read back lines 4 and 6 ***(from the aircraft's waypoint page)*** as well as restrictions.

The first priority for SNFOs is to ensure the target coordinates are entered correctly. Once this is accomplished, the timing from the CP – IP – TGT must be calculated quickly; if this timing is not known, SNFOs cannot accept or reject the given TOT. A great time to calculate this is when wingmen are reading back Lines 4, 6, and restrictions.

Aircrew should use a kneeboard card to copy the 9-Line as the FAC(A) reads it (Figure 2-12). During and following the 9-line Briefing, the aircrew has the following options:

a. During the 9-line briefing, if the aircrew missed one or more lines of information, respond once the 9-line brief is complete with "*Say again line 1*" or "*Say again lines 4 and 5*." Anything greater than two missed lines, respond with "say again 9-line." ***Never*** use the word "REPEAT" (it is a term used exclusively for artillery, meaning to fire another salvo on the same target location).

b. If the aircrew is unable to make the given TOT, then respond with *"C/S unable."* If you are unable to make the TOT, then pass a TOT you ***can*** comply with in order to keep the situation efficient and get you to the target as quickly as possible. Example: "*C/S unable time 22, but can make time 24*."

c. If you are able to comply with the given TOT, then respond by repeating the TOT, "*C/S TOT 22*." This is now the contract between the aircrew and the FAC that your ordnance will hit the target at this agreed upon time.

An example of a 9-Line brief is as follows:

Halo-11 - "*Hammer-11, advise when ready to copy 9-Line."*

Hammer-11 - "*Hammer-11, ready to copy."*

Halo-11 - *"AUDI, 180 right, 4.5"* (Pause)

Halo-11 - "*3-0-0 feet, SPEAR, North 31 08 40 West 088 59 00"* (Pause)

Halo-11 - *"No mark, East 800, egress east to OLDS Angels 2 and 3. Advise when ready for remarks and restrictions."*

Hammer-11 - *"Hammer-11, ready."*

Halo-11 - *"Final Attack Heading 100-180, remain east of Highway 29."*

Hammer-11 - *"Hammer-11, copies all."*

Hammer-11 - *"Hammer-11, ready for readbacks."*

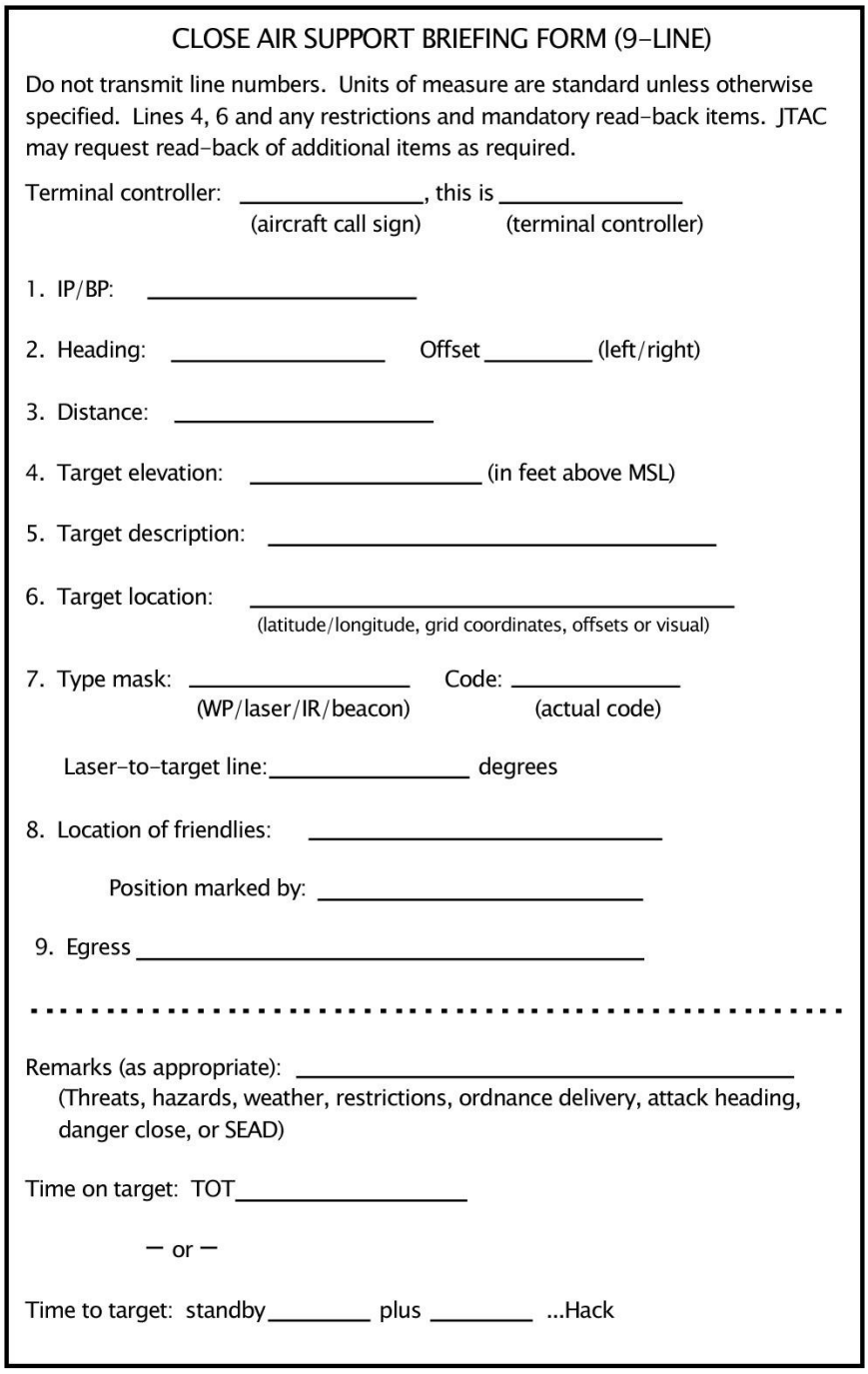
Halo-11 - *"Hammer-11, go with read-backs."*

Hammer-11 - *"Hammer-11, 3-0-0 feet, North 31 08 40 West 088 59 00, Final Attack Heading 100-180, remain east of Highway 29."*

Halo-11 - *"Hammer-11 good read-back, Hammer 12 go with read-back."*

Hammer-12 - *"Hammer-12, 3-0-0 feet, North 31 08 40 West 088 59 00, Final Attack Heading 100-180, remain east of Highway 29."*

Halo-11 - *"Hammer-12 good read-back."*



CLOSE AIR SUPPORT BRIEFING FORM (9-LINE)

Do not transmit line numbers. Units of measure are standard unless otherwise specified. Lines 4, 6 and any restrictions and mandatory read-back items. JTAC may request read-back of additional items as required.

Terminal controller: _____, this is _____
(aircraft call sign) (terminal controller)

1. IP/BP: _____

2. Heading: _____ Offset _____ (left/right)

3. Distance: _____

4. Target elevation: _____ (in feet above MSL)

5. Target description: _____

6. Target location: _____
(latitude/longitude, grid coordinates, offsets or visual)

7. Type mask: _____ Code: _____
(WP/laser/IR/beacon) (actual code)

Laser-to-target line: _____ degrees

8. Location of friendlies: _____

Position marked by: _____

9. Egress _____

Remarks (as appropriate): _____
(Threats, hazards, weather, restrictions, ordnance delivery, attack heading, danger close, or SEAD)

Time on target: TOT _____

— or —

Time to target: standby _____ plus _____ ...Hack

Figure 2-12 Standard 9-Line Kneeboard

6. Mandatory read backs per JP 3-09.3

   a. Aircrew are required to read back lines 4, 6, and restrictions.

   b. If issued, FAHs, ACAs, danger close, and TOTs shall always be considered

restrictions and will be read back. In addition, if the JTAC/FAC(A) requires additional information to be read back, the aircrew shall do so.

NOTE

For Line 4, MSL is understood; if using any other datum, it must be stated.

7. Correlation / Talk-on / Enhanced target description

Target correlation is the process by which the controller ensures the attacking aircraft is planning to attack the desired point of impact. Correlation is at the discretion of the controller and can be satisfied by any means. At VT-86, you will most commonly find the following forms of correlation:

a. Bomb On Target: chart talk-on OR visual talk-on

b. Bomb On Coordinate: read-back from the aircraft's waypoint page

A chart or visual talk-on will be executed by the JTAC/FAC(A) with the strikers on all BOT missions. All talk-ons will be performed between the JTAC/FAC(A) and Lead SNFO. SNFOs ***shall*** annotate all targets on chart imagery for debriefing purposes and for overall SA.

Talk-on descriptions and directions should be simple and short, driving the aircrew's eyes from one point to another. JTAC/FAC(A)s should consider the best way to begin the talk-on. Generally, talk-ons should be conducted big-to-small. A technique for doing this is to give directions in the following format, known by the mnemonic, "FIDO:"

a. **F**rom a point (easily recognizable start point)

b. **I**n a direction (cardinal/sub-cardinal direction)

c. **D**istance to travel (established unit of measure or meters)

d. **O**bject seen (target or object the JTAC/FAC(A) wants the aircrew to see)

Some standard calls during talk-ons are:

a. *"Contact*" – Acknowledges sighing of a specified reference point (either visually, via chart, or sensor)

b. *"Anchor Point"* – Starting point

c. *"Unit of Measure"* – Used as a visual measuring tool, i.e. length of a runway

d. *"Visual"* – Friendly aircraft/troops in sight

e. *"Tally"* – Target in sight

f. *"Chart Contact"* – Plotted target on chart

g. "*Not in sight, but I see…"*

An example of a talk-on comm is as follows:

Halo-11 - *"Hammer-11, call contact the Shelby airfield"*

Hammer-11 - *"Hammer-11, I see a northeast / southwest runway, with a road extending east from the north end of the runway."*

Halo-11 - *"Hammer-11, using the runway as one unit of measure, the target is half a unit from the north end of runway along that east running road, target is a tank pointed east."*

Hammer-11 - *"Hammer-11, tally target." Or "Hammer-11, chart contact."*

8. Danger Close Mission

Any mission within ***close proximity*** to any friendly forces regardless of weapons requested will be deeming a "***Danger Close*****"** mission.

NOTE

Air-to-Surface Danger Close numbers are as follows:
Mk-82 = 305m **GBU-38** = 290m
GBU-12 = 275m **20mm** = 95m

It is permitted for SNFOs to read back 9-line and be correlated but not accept a TOT until after Ground Force Commander's (GFC) initials have been given. This is a TECHNIQUE in order to not overlook GFC initials during an attack. For example:

Hammer-11 - "*Halo-11, Hammer-11, this appears to be a danger close mission, request Ground Forces Commanders initials*"

Halo-11 - "*Hammer-11, Halo-11, Ground Commanders initials are Juliet, Lima*"

Hammer-11 - "*Hammer-11, copies Juliet, Lima*"

An example of a Danger Close mission read back comm is as follows:

Halo-11 - "*HALO-11, Standing by for readbacks*"

Hammer-11 - "*Hammer-11, 121 Ft,*
North 31 04 31,
West 087 45 44,
Final Attack Heading 180 through 210,
Stay Above 11 thousand,
Ground Force Commanders Initials are Juliet, Lima"

Or

"Standing by for Ground Force Commanders Initials" (Only If GFC initials were not passed during restrictions).

Halo-11 - "*Hammer-11, good read-back*"

9. Timing

Time of weapon impact shall be within +/- 10 seconds of planned Time on Target (TOT). To make this happen the SNFO shall calculate a "push time" working backwards from the TOT. CP/IP and keyhole push times will be calculated using the appropriate matrix. Once this has been calculated, the SNFO should pass the push time to the pilot over the ICS and continually update the time to go.

a. SNFO (ICS) - *"Push time, 51+46"*

b. SNFO (ICS) - *"1 minute to push…… 30 seconds to push…… Push"*

There are no minimum or required number of ____ to push calls, but should be given when time allows to enhance pilot SA.

At time of weapon release, the SNFO shall record the time the bomb was released (noted by the audible release tone and weapons release cue on the HUD repeater). From this time, the SNFO shall calculate the time of impact by adding the time of fall of the weapon. For time of fall, SNFOs shall use the times below.

a. *Pop-attack:* add 10 seconds

b. *Dive:* add 15 seconds

c. *Level laydown:* add 30 seconds

If the SNFO recognizes at any time that TOT will not be met (taking into consideration throttle and geometry manipulation), then the SNFO shall announce this to the controller and request either a new TOT or a "rolex." However, if the aircraft fails to cross the push point at calculated push time but is ***still able to meet TOT*** via a change in ground speed or ingress route, then the aircraft is ***on time*** and does not need a rolex or to announce pushing late.

If passing a push point or IP AND unable to make the planned TOT with manipulation of either ground speed or ingress route, then the SNFO shall announce this to the controller. Pushing comm examples:

Hammer-11 - "*Hammer-11, pushing*"

Halo-11 - "*Hammer-11, continue*"

(if recognized at push point)

Hammer-11 - "*Hammer-11, pushing 30 seconds late*"

Halo-11 - "*Hammer-11, continue*" OR "*Hammer-11, abort*"

NOTE

If *"continue"* is given, then the controller accepts the late/early push and the striker is safe to proceed with the later TOT.

(if recognized at IP)

Hammer-11 - "*Hammer-11, IP inbound 30 seconds late*"

Halo-11 - "*Hammer-11, continue*" OR "*Hammer-11, abort*"

NOTE

Be vigilant of timing and inform the JTAC/FAC(A) as soon as possible for safety of flight if outside of ± 30 seconds TOT.

10. DASC Checkout Briefing (In-flight Report)

Following the attack the JTAC/FAC(A) will provide the flight with a Battle Damage Assessment (BDA). SNFOs should copy BDA ***verbatim*** as this data must be relayed to the DASC during the checkout (DASC checkout brief/In-flight Report). The BDA is extremely important, as CAS agencies must decide whether more aircraft are necessary to attack the target. A sample of the information contained in a DASC checkout briefing is shown in Figure 2-13.

INFLIGHT REPORT (INFLTREP)

Aircrew transmits:

" _____ , this is _____ , INFLTREP, over."
(addressee) (aircraft call sign)

(authentication requested here, as required)

"This is _____ , INFLTREP."

Line One/Call Sign _____

Line Two/Mission Number _____

Line Three/Location _____
(latitude/longitude, UTM grid, place name)

Line Four/Time-on-Target _____

Line Five/Results _____

Remarks _____
(Target area weather, significant sightings, essential elements of information)

Figure 2-13 In-flight Report

DASC checkout is normally conducted during the enroute portion of the RTB. If time and workload prevent an in-flight report to be performed during the RTB, it should be conducted during the Tactical debrief on deck. As discussed earlier, TOT is calculated from time of weapon release by adding 30" for a level release, 15" for a dive, or 10" for a pop-attack.

204. FLIGHT CONDUCT/FLOW

The conduct of each CAS flight in VT-86 will be highly standardized to maximize training in the range area.

1. On Deck/Enroute/Range Check-in

Each SNFO should set their recorders to Left Aft MFD and setup STRS page accordingly on deck:

a. Bomb selected with quantity per mission brief (e.g. 2xGBU-12 and 2xGBU-38 = quantity 4).

b. CCIP boxed

c. Coordinates in degrees-minutes-seconds

After setup, SNFOs will re-select NAV mode for the enroute portion.

After initial flight check-in and a nav check to the prebriefed point, Lead SNFO will check-in with the DASC on Tac Freq prior to taxi and will be passed the current SITREP, holding instructions and FAC frequency. The FAC(A) aircraft will normally be "dash last," however if there are more than four aircraft in the flight, the FAC(A) will proceed as a single. The flight will adhere to the IFR clearance and division flight procedures outlined in Chapter 1.

Clearance into the range will be obtained from Range Control. This procedure only pertains if working in a range that has a range controller. The R-4401 (Shelby Range) is the only range in the local area that requires a clearance, but others may be encountered on detachment or in the fleet. A restricted area may not be entered without clearance from the appropriate controllers. Clearance to enter the Range will be requested from the FAC(A) aircrew after JERYS; however, the SNFO shall be prepared to make the range check-in if necessary. The following flight information will be passed to Range Control on check-in:

a. Flight call sign

b. Number and type of aircraft in the flight

c. Position (relative to the target)

The FAC(A) aircraft will proceed overhead the target for check-in while the remaining aircraft in the division proceed to the holding CP/IP as assigned by the DASC/JTAC/FAC(A). Once Tac Admin complete, the flight will check in utilizing the previously outlined communication procedures while proceeding to their briefed holding point.

2. Fence-In/Range Procedures

Lead SNFO will ensure the division is fenced-in via the procedures outlined in the TAC SOP (P-821 Appendix D). Once in the range, the FAC(A) will run the CAS scenario and will be the overall coordinator for safety and deconfliction. All dive clearances in the target area will be given by the FAC(A). All instructions given by the FAC(A) and/or range controller are mandatory, including assigned altitudes or directive communications. CAS specific Fence-in procedures are as follows:

a. MSTR ARM – SAFE

b. A/A TACAN – SET as required

c. DISPLAYS – LMFD – HUD repeater, RMFD – HSI

d. BINGO – SET to JOKER

e. RECORDER – ON (Left Aft MFD)

f. MSTR MODE – A/G master mode (remain in A/G master mode until KIO call)

g. SQUAWK/STROBE – 4000 (or as assigned)/ON

NOTE

(All aircraft shall squawk 4000 or ATC assigned squawk within the confines of the MOA. If operating in a MOA IFR, then lead retains ATC assigned squawk. All aircraft shall operate with Strobes – ON until KIO).

3. CAS Overall Flow

CAS missions at VT-86 will be either Low-, Medium- or High-Threat scenarios with associated tactics. The JTAC/FAC(A) will brief surface to air threat and threat level, SNFOs should determine the associated tactics for the threat level (explained in a later section). All runs will be planned to be flown at 360kts groundspeed. The overall flow for the VT-86 CAS missions is as follows:

a. Check in with DASC on deck

b. Check in with JTAC/FAC(A) airborne after flight is "Fenced In"

c. Report Established in holding stack at CP/IP

d. Execute a fuel check

e. JTAC/FAC(A) passes mission Game Plan/9-Line

f. SNFOs enter target coordinates into waypoint 1 and read back lines 4, 6, and restrictions

– Read back elevation and coordinates off waypoint page

g. Plot coordinates onto imagery and ask yourself three questions

i. Does it make sense regarding the TGT description?

ii. Does it make sense in regards to friendly location?

iii. Am I currently correlated? BOC vs BOT

h. Complete Air-to-Surface checks including CRS set-up (FAH)

i. Set-up SEQ 1 if using CP/IP tactics (CP-IP-TGT-ECP)

j. JTAC/FAC(A) initiates talk-ons (for BOT missions)

– Once TGT is acquired, striker will make the "Chart contact" or "Tally" comm

k. JTAC/FAC(A) passes TOTs

l. SNFOs read back TOTs

i. Calculate Push Time

ii. If unable to accept a TOT, offer a new TOT

m. SNFOs direct IP to ***push on time!!!***

n. Aircraft will push in 1 minute intervals or per the Game Plan

o. Execute Target attack and egress to Egress Control Point (ECP)

p. After last striker calls "Off safe," Lead SNFO will make the "Established" comm. Give the last striker 10-15 seconds to ensure a valid safe escape has been accomplished.

q. Execute a Fuel check

r. JTAC/FAC(A) passes BDA

s. New TGT as required

NOTE

SNFOs are reminded to push on time. Although using the entire system with the CP-IP-TGT-ECP sequence is desired, do not forget the priority. A common mistake is to be heads down typing in the sequence and miss the push time.

NOTE

The above sequence of events is **ONE** example of how the event will flow. SNFOs must be ready to flex based on the needs of the FAC(A), the mission being executed, and the myriad factors that could affect the mission execution.

4. Knock it off (KIO)/Fence-out

Once all training objectives have been completed, the controller will give a "FAC recommends terminate" call on the control frequency. If the Lead IP agrees, the Lead IP will call KIO over the common frequency, then give a KIO roll call on AUX which will be echoed by all players. Lead SNFO should then initiate the Fence-out.

a. MSTR ARM – SAFE

b. A/A TACAN – SET as required (Remain in A/A until rendezvous complete).

c. DISPLAYS – SET as required

d. BINGO – SET to Divert

e. RECORDERS – ON

f. MSTR MODE –NAV Master mode

g. SQUAWK/STROBE – Lead – ATC assigned, Wingmen – STBY (direct IP to set squawk and secure strobes as required).

5. Final Rendezvous/RTB

At the end of the scenario, all aircraft will be directed to an egress point to rendezvous for the RTB. All aircraft will maintain their assigned altitude until they have all preceding aircraft in sight. The FAC(A) aircraft will join as Hammer-13 or 14 as appropriate or RTB as a single if more than four aircraft are in the flight. Once the flight is rejoined, the Lead SNFO will switch the flight to ATC and begin the RTB. The FAC(A) aircrew will check out with Range Control as required. Battle Damage Checks will be conducted per the TACSOP or as briefed. Lead SNFO will coordinate the division RTB as outlined in Chapter 1.

205. MISSION CONDUCT

1. Holding and Stack Instructions

At VT-86, each striker will be assigned an individual altitude for holding and will push to the target as singles. There are two different types of holding techniques: Perpendicular and Parallel.

a. Perpendicular Holding

Perpendicular holding orients the aircraft in an oval or "figure 8" pattern over the CP and perpendicular to the CP/IP run-in line. Turns of 180-degrees are standard, but the tactical situation, number of aircraft and formation must be considered. Advantages are that the aircraft are kept closer to the CP and it allows for larger timing corrections; if the FAC(A) needs an immediate push, a perpendicular pattern will allow for it. Disadvantages are that it may require aircraft to turn hard prior to push, resulting in slower initial airspeeds. Also, aircraft are not oriented toward the target or threat area to aid in pre-push visual lookout or sensor employment. Figure 2-14 illustrates a perpendicular holding pattern.

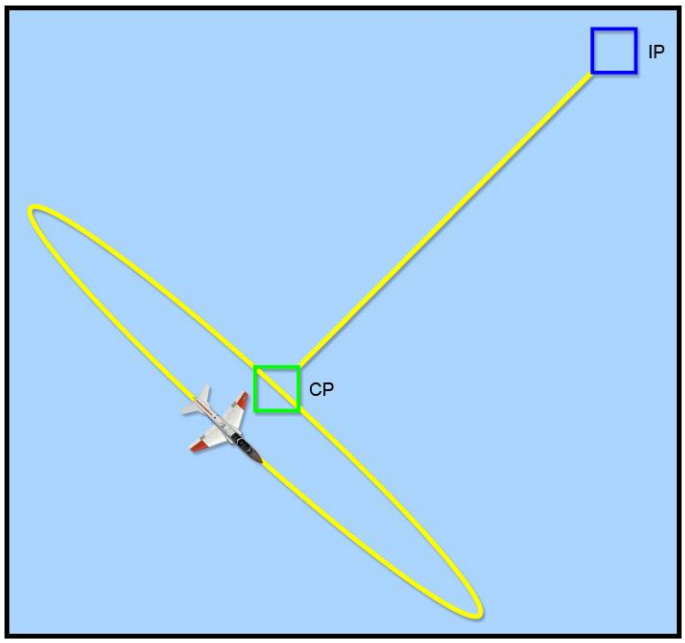


Figure 2-14 Perpendicular Holding at CP

b. Parallel Holding

Parallel holding orients the flight in a racetrack pattern over the CP, parallel to the CP/IP run-in line (Figure 2-15). An advantage of parallel holding is that it enables aircraft to approach the CP on the correct CP/IP heading. Additionally, it allows for sensor usage and visual lookout oriented toward the threat while flying inbound to the CP. Disadvantages are that it can place aircraft a minute or more away from the CP, and if for some reason the time hack is shortened, it may present a serious timing difficulty.

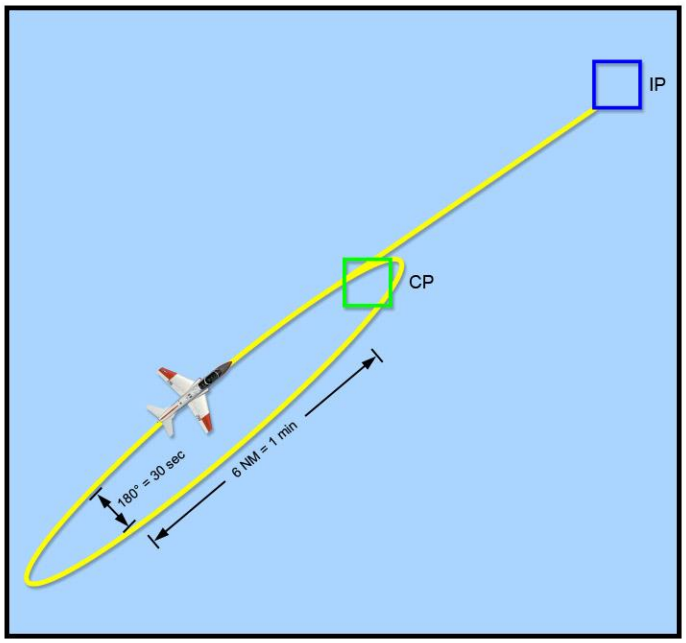


Figure 2-15 Parallel Holding at CP

The JTAC/FAC(A) is responsible for providing routing and safety of flight instructions to aircraft entering and departing the target area. This provides safe passage for entering and exiting aircraft, and allows the JTAC/FAC(A) to maintain a picture of the CAS stack and positions of all assets.

Upon initial contact, the JTAC/FAC(A) shall at least give "maintain" current holding instructions (if provided by the DASC) in order to establish control of aircraft and/or provide holding instructions. The FAC(A) will provide de-confliction for assets upon check-in to include holding areas, ingress and egress routings, and target areas.

All aircraft shall report "established" at their assigned altitude and holding point. Aircraft should hold to the outside of their holding point or the distance given i.e., hold outside of 10 NM on the 360 radial when holding at A10. During an attack, strikers shall maintain their holding altitude until the aircraft has passed the holding point and be at their ingress altitude prior to passing the Initial Point for CP/IP tactics. For keyhole tactics, strikers shall maintain their holding altitude until IP inbound. From the IP to the target, the attacking aircraft shall be on the offset side of the ingress heading directed by the controller in line 2 of the 9-line brief. During egress, strikers shall be at their assigned holding altitude within 2 NM from their egress holding point. Ensure you are clear of the FAC(A)'s airspace (3 NM outside the target area) prior to climbing. An example of established comm is as follows:

Hammer-11 - "*Hammer-11, established OLDS, angels 2*"

Hammer-12 - "*Hammer-12, established OLDS, angels 3*"

Hammer-13 - "*Hammer-13, six miles west of OLDS, angels 4*"

(Hammer-13 has yet to reach OLDS. Notice that Hammer-13 did not use the word "established")

Halo-11 - "*Halo-11*" (acknowledging established calls from all strikers)

NOTE

The FAC(A) owns de-conflictions, altitude stack, target area, and off target flow. Aircrew shall adhere to all restrictions. If any questions arise or safety of flight is in question, ***ASK and/or INFORM the FAC(A).***

2. FAC(A)'s Holding

The FAC(A)'s holding pattern will vary greatly throughout the time on station in order to accommodate such tasks as target identification, coordinate generation, or visual acquisition of CAS assets. If the threat and weather allows, the FAC(A) may wish to orbit over or near the target. This will allow the FAC(A) to be in a position to accomplish talk-ons, provide final clearance, and conduct other tasks previously listed.

NOTE

During a high threat scenario, the FAC(A) owns the airspace above 3,000' AGL or 5,000' AGL within 3NM of the target. The altitude will depend on which pop diagram is being executed and will be briefed during the FAC to Fighter brief.

NOTE

If the FAC(A) calls "visual," this implies he/she sees the striker, now owns deconfliction, and the fighter may maneuver unrestricted while in the target area.

3. Air-to-Surface Checks

Prior to each target attack, SNFOs will conduct Air-to-Surface checks. A normal sequence will have the SNFOs completing the A/S checks before the "Pushing" call. The A/S checklist should be initiated NLT the IP. Different tactics and weapon selection will dictate when the Master Arm will be placed to Arm. Aircrew should discuss when the pilot will select Master Arm.

4. Types of Delivery

There are three delivery methods: dive attack, pop attack, & level laydown

a. The three dive attack options at VT-86 are 30 degree roll-in, 15 degree roll-in, and 10 degree roll-in. Roll-ins are typically used in Low to Medium Threat situations.

i. 30-degree roll-in is the primary tactic used for MK-82 employment.

ii. 15-degree and 10-degree roll-ins are secondary delivery methods used because the roll-in altitudes are lower which allows for lower cloud ceilings, however greater exposure to enemy threat.

NOTE

Any time a jet executes a dive or pop attack, the SNFO shall monitor dive angle, release altitude, airspeed, and time of weapon release ***but will not announce it to the pilot while in the dive*** unless conditions warrant an abort. If questioned by an instructor, the SNFO shall be able to recite what these parameters were AT ***time of weapon release*** for the most recent attack conducted. Most commonly, this will be asked during the egress or at the egress holding point.

b. Pop attacks lower detection from enemy surface to air defense systems radars. They are typically used in High Threat situations. The 10-degree pop attack is the primary pop used at VT-86.

NOTE

The dive and pop attack delivery methods are used almost exclusively with non-precision weapons i.e. MK-82s due to the increased accuracy of employing from a dive delivery. Delivering MK-82s from the dive or pop is what you will see at VT-86. However, Precision Guided Munitions (PGMs) can be employed from a dive attack in the fleet.

c. For level laydowns, ensure the target designation tic mark is within ± 5 degrees of FAH in the HUD/ADI at time of release. Take note of the time at weapon release. Level laydowns are typically associated with Low / Medium Threat situations.

i. Release Point

(a). Level laydown release window for all weapons is 3 ± 0.2 NM from the target for all weapons. Pilots and CIs will strive to employ in the heart of the window (i.e. 3 NM) in order to maximize probability of weapon impact on Desired Point of Impact (DPI).

(b). If the weapons is released outside the employment window (i.e. >3.2 NM or <2.8 NM), then the drop is deemed invalid and will not achieve a simulated impact on the target. SNFOs should use CRM to ensure no release outside of employment window.

NOTE

It is acceptable if you have received clearance to drop AND your pilot or CI has not released by 2.9 NM, then call "pickle" over ICS

ii. Laser Guided Bomb (LGB)

(a). Level laydowns with a laser guided weapon (i.e. GBU-12) require a preparatory call for the laser operator to be ready to begin firing the laser at weapon release. This preparatory call is made 10 seconds prior to release of the weapon (i.e. 4 NM).

(b). After release of a laser guided bomb, the command "laser on" shall be added to the end of the off-safe call.

NOTE

Level laydowns are used almost exclusively with PGM i.e. GBU-12 & GBU-38. At VT-86 you will deliver PGMs using a level laydown

5. The "In" call

a. Authority to drop will be requested by the striker via calling at a minimum "*In*" or "*In Dry*." This call can be either "*In Dry, heading XXX*" or "*In Dry from the* (cardinal direction)." There is no distance limitation for the "In" call. "In" shall be called as early as possible ONLY after the aircraft has completed maneuvering and on parameters to employ the current weapon.

b. When employing simulated ordnance, all aircraft shall call "*In Dry*" (i.e. flight events).

c. When employing actual ordnance, all aircraft shall call "*In*" (i.e. simulator events).

d. For dive or pop deliveries: the "*In*" or "*In Dry*" call will be called by the pilot

e. For level laydown deliveries: the "*In*" or "*In Dry*" call will be called by the SNFO. Prior to calling "In" to employ PGM, the following parameters must be met:

i. Straight and level flight

ii. Heading within ± 5 degrees of target designation

f. If clearance is not given by the FAC(A) after the *"In" call* and the weapons release solution is approaching, the *"In"* call can be made again with voice inflection. This cues the FAC(A) into the fact that clearance is needed immediately.

6. Threat level

There are three threat levels: Low, Medium, and High. Determining the threat level will also determine the type of holding and delivery, as discussed below.

a. Low Threat

The Keyhole template works well in a low-threat environment; it allows the JTAC/FAC(A) to stack numerous aircraft near the target in different directions, giving a more expeditious flow from stack to TGT. This method was used quite effectively in the town of Fallujah. The FAC first reads the target location, and then gives a bearing and distance from the target to hold or from which to commence the attack. At VT-86, expect to do Keyhole or overhead holding and 30 degree roll-in deliveries or level laydowns in a low threat environment.

NOTE

Any type of holding or delivery is permitted in a low threat environment.

b. Medium Threat

There may be certain scenarios where the threat level in the target area prohibits the loitering of friendly aircraft overhead the battlefield. Those threats could consist of heavy Air Defense Artillery (ADA) or unsophisticated mobile SAM batteries. In those cases, strikers will generally hold outside the target area at an assigned CP/IP and ingress into the target area at high altitude to provide an altitude buffer above those threats, allowing sufficient time and airspace to defend against such a threat as required, as well as good overview of the target area for target acquisition. After completing their attack, strikers are directed to egress back to a CP/IP outside the threat ring for follow-on tasking or RTB. At VT-86, expect to do CP-IP/Keyhole holding and 30 degree roll-in deliveries or level laydowns when medium threat is present.

NOTE

Keyhole holding and/or pop attacks may still be utilized.

b. High Threat

When there is a significant surface-to-air threat in and around the target area, comprised of multiple SAM systems (or a low ceiling combined with small arms and/or MANPAD threats), the use of high-threat tactics becomes necessary. High-threat tactics usually consist of a low-level ingress to utilize terrain masking, as well as SEAD support, while providing limited exposure to the threat.

Utilizing low pop tactics, strike aircraft are only vulnerable for a short period of time, but at the expense of target acquisition time. For that reason, chart talk-on is generally a FAC technique to provide SA of the target area prior to striker ingress. Strikers are generally directed to egress at low altitude back to a CP outside the threat ring for follow-on tasking or RTB. At VT-86, expect to do CP-IP/Keyhole holding and pop attacks when high threat is present.

7. Types of Attacks

At VT-86, methods of weapons employment are as follows:

a. MK-82/Gun (Non-Precision) - Dive or pop delivery

b. GBU-12 (LGB) & GBU-38 (JDAM) - Level laydown

SNFOs will select the ingress tactic best suited to avoid enemy detection, Surface to Air threats, and/or weather using the controlling agencies (JTAC/FAC(A)) recommendations and SITREPs passed for the Target area. As described earlier, the three types of attack utilized at VT-86 will be CP/IP, keyhole, and overhead. Z-diagrams utilized are the same as provided in the Strike FTI and on the VT-86 E-brief website.

a. CP/IP Tactic

An example of High Threat / low-level delivery attack (pop attacks) comm is as follows:

"*Hammer-11, Pushing*"	SNFO will make call departing CP at calculated push time. Begin descent to ingress altitude (500').
"*Continue*"	JTAC/FAC(A) acknowledges strikers call.
"*Hammer-11, IP Inbound*"	SNFO will make call departing IP. A/S checks should be completed minus "Master Arm."
"*Continue*"	JTAC/FAC(A) acknowledges strikers call.

"*Hammer-11, popping*"	Pilot will make call at the proper time.
"*Hammer-11, tally target*"	Pilot makes call once tally target. Not a required comm.
"*Hammer-11, In dry, HDG XXX*"	Pilot will make call once aircraft is pointed towards target.
"*Hammer-11, continue dry*"	JTAC/FAC(A) will give strikers final clearance.
"*Hammer-11, off safe, sim 1 away*"	Pilot will make call after weapons release and safely executing safe escape procedures.
	OR
"*Hammer-11, Abort, Abort, Abort!*"	JTAC/FAC(A) may deem an attack unsafe and "Abort" the attacking striker.

An example of Low-Medium threat / dive delivery attack comm is as follows:

"*Hammer-11, Pushing*"	SNFO will make call departing CP at calculated push time.
	Begin descent to ingress altitude as briefed.
"*Continue"*	JTAC/FAC(A) acknowledges strikers call.
"*Hammer-11, IP Inbound*"	SNFO will make call departing IP. A/S checks should be completed minus "Master Arm."
"*Continue"*	JTAC/FAC(A) acknowledges strikers call.
"*Hammer-11, tally target*"	Pilot makes call once tally target.
"*Hammer-11, In dry, HDG XXX*"	Pilot will make call after roll-in and once aircraft is pointed towards target.
"*Hammer-11, continue dry*"	JTAC/FAC(A) will give strikers final clearance.
"*Hammer-11, off safe, sim 1 away*"	Pilot will make call after weapons release and safely executing safe escape procedures.
	OR

"*Hammer-11, Abort, Abort, Abort!*"	JTAC/FAC(A) may deem an attack unsafe and "Abort" the attacking striker.

An example of Low-Medium threat / Level Laydown delivery attack comm is as follows:

"*Hammer-11, Pushing*"	SNFO will make call departing CP at calculated push time. Begin descent to ingress altitude as briefed.
"*Continue"*	JTAC/FAC(A) acknowledges strikers call.
"*Hammer-11, IP Inbound*"	SNFO will make call departing IP. A/S checks should be completed minus "Master Arm."
"*Continue"*	JTAC/FAC(A) acknowledges strikers call.
"*Hammer-11, In dry, HDG XXX*"	SNFOs will make call as early as possible once on parameters to give JTAC/FAC(A) ample time to give clearance.
"*Hammer-11, continue dry*"	JTAC/FAC(A) will give strikers final clearance.
"*10 seconds*"	SNFOs will make call at 4 NM to simulate 10 seconds prior to weapons release. ***LGB deliveries ONLY.***
"*Hammer-11, off safe, sim 1 away, 30 seconds, laser on"*	**SNFOs** will make call after weapons release. Pilots safely executing safe escape procedures. ***"Laser On" comm ONLY required for LGB's.***
"*HALO-11, Lasing 1688*"	JTAC/FAC(A) will make lasing comm once strikers release weapon and make "Laser On" comm for LGB deliveries. OR
"*Hammer-11, Abort, Abort, Abort*"	JTAC/FAC(A) may deem an attack unsafe and "Abort" the attacking striker.

NOTE

At VT-86 expect all ***PGM deliveries*** to be Level Laydowns.

NOTE

"Cleared Hot" may be used in place of "Continue Dry" at instructor discretion during simulator events to simulate actual weapons release.

b. Keyhole Tactics

During Keyhole tactics, level lay down, dive deliveries, and pop attacks can all be utilized dependent on threat level. SNFO will determine the type of delivery contingent on weapon requested, weather, and/or target area threat.

An example of Low-Medium threat / Level Laydown delivery attack comm is as follows:

"*Hammer-11, IP Inbound*"	SNFO will make call departing keyhole holding instructions, e.g., departing A10. A/S checks should be completed minus "Master Arm."
"*Continue"*	JTAC/FAC(A) acknowledges strikers call.
"*Hammer-11, In dry, HDG XXX*"	SNFOs will make call as early as possible once on parameters to give JTAC/FAC(A) ample time to give clearance.
"*Hammer-11, continue dry*"	JTAC/FAC(A) will give strikers final clearance.
"*10 seconds*"	SNFOs will make call at 4 NM to simulate 10 seconds prior to weapons release. **LGB deliveries ONLY.**
"*Hammer-11, off safe, sim 1 away, 30 seconds, laser on"*	**SNFOs** will make call after weapons release. Pilots safely executing safe escape procedures. ***"Laser On" comm ONLY required for LGB's.***
"*HALO-11, Lasing 1688*"	JTAC/FAC(A) will make lasing comm once strikers release weapon and make **"**Laser On" comm for LGB deliveries.
	OR
"*Hammer-11, Abort, Abort, Abort*"	JTAC/FAC(A) may deem an attack unsafe and "Abort" the attacking striker.

NOTE

At VT-86 expect all ***PGM deliveries*** to be Level Laydowns.

An example of Low-Medium threat / dive delivery attack comm is as follows:

"*Hammer-11, IP Inbound*"	SNFO will make call departing keyhole holding instructions, i.e., departing A10. A/S checks should be completed minus "Master Arm."
"*Continue*"	JTAC/FAC(A) acknowledges strikers call.
"*Hammer-11, tally target*"	Pilot makes call once tally target. Not a required comm.
"*Hammer-11, In dry, HDG XXX*"	Pilot will make call after roll-in and once aircraft is pointed towards target.
"*Hammer-11, continue dry*"	JTAC/FAC(A) will give strikers final clearance.
"*Hammer-11, off safe, sim 1 away*"	Pilot will make call after weapons release and safely executing safe escape procedures.
	OR
"*Hammer-11, Abort, Abort, Abort*"	JTAC/FAC(A) may deem an attack unsafe and "Abort" the attacking striker.

c. Overhead Tactics

Recall "from the overhead" is a tactic in which strikers orbit over the target area. The overhead position allows the aircrew to maintain high SA, look down into urban settings, maintain a constant weapons solution, and maintain "Tally" and/or "Visual" throughout the entire attack. Aircrew should strive to not depart and reenter during an overhead mission. Departing the target area defeats the purpose of the tactic unless the aircrew can maintain "Tally." Strikers will remain at their altitudes as assigned by the JTAC/FAC(A) and will intercept a Z-diagram from their current altitude to execute a safe attack. The JTAC/FAC(A) may also elect to descend aircraft in the stack to the roll-in altitude once the airspace is clear. Either way, RIP distance must be adjusted based on altitude and winds.

For SA purposes, the JTAC/FAC(A) may ask for a "30 second" or "pushing" call. The SNFO should use CRM with the IP to determine 30 seconds prior to roll in. A/S checks shall be completed prior to rolling in. The "In" call will be made by the IP.

206. CAS SAFETY

The dynamics of CAS requires additional attention. The FAC(A) aircraft is the overall safety observer in the range complex, and will provide for deconfliction of aircraft.

1. Lost Communication and Aircraft Malfunctions

If an aircraft loses radio communication after the CAS mission has started:

a. Prior to push – maintain last assigned holding instructions and wait for FAC(A) or other aircraft to join on you.

b. After pushing – execute ingress at expected ingress altitude, do not execute any dive or pop attacks; rock wings over the target area and proceed with your egress instructions making all calls in the blind. Hold at your egress point as assigned and wait for the FAC (A) or other aircraft to join on you.

In either case, do not hold below Joker fuel. At or before reaching Joker fuel, if no other aircraft can find you, squawk 7600, exit the MOA at your assigned altitude, and RTB complying with the FIH and/or IFG.

If an aircraft experiences a serious problem while NORDO, the aircrew has the option to squawk emergency and RTB or divert to an emergency airfield as required. Lead may dispatch a wingman to assist.

2. Target Fixation

Every crew would like to get a bullseye on every run, but unfortunately, some have become so engrossed in achieving a release solution that they have flown into the ground by fixating on the target and disregarding the release altitude. This is especially a problem with forward firing ordnance where it is easy to "follow" the projectile's flight path. Last-second corrections usually result in both a false sight picture and a loss of altitude. NFOs have traditionally played a large part in preventing mishaps due to pilot target fixation. Safety requires a continual scan of the altimeter in the low-altitude environment. Aborting a dangerous dive run is the responsibility of each member of an attack aircrew.

3. Exceeding "G" Limits

Overstressing the aircraft is usually the result of a high onset rate of G, instead of applying it smoothly when beginning the safe escape. An overstress is determined by the G pulled relative to the aircraft weight and altitude. It is important to verify max G remains at or below NATOPS limitations during fuel checks after each run. See the NATOPS manual for limitations. If an overstress occurs, the aircrew will knock it off, notify the flight lead and proceed as instructed by the FAC(A).

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A
GLOSSARY

A100. GLOSSARY OF CLOSE AIR SUPPORT TERMINOLOGY

Airspace Coordination Area (ACA) - The three-dimensional block of airspace in a target area, established by the appropriate ground commander, in which friendly aircraft are reasonably safe from friendly surface fires. The airspace coordination area may be formal or informal. Informal ACAs may be assigned real-time by the DASC, TAC(A), or controller and include phrases such as "remain east of the river," "remain at or above 7000," or "remain north of N 32° 18.0 feet."

Air Tasking Order (ATO) - Normally a joint publication, the ATO provides mission air tasking, assignments, and related coordination information for all air assets operating in the campaign, also known as the mission frag.

Battle Damage Assessment (BDA) - After conducting an attack, aircrew should receive BDA from the FAC. BDA should include number of targets suppressed, destroyed, or neutralized, as well as the number of targets remaining and is used to update the enemy order of battle.

Contact Point (CP) - A CP is a point normally outside the range of enemy surface-to-air weapons where CAS aircraft contact the terminal controller. Marked by coordinates (latitude, longitude), conspicuous terrain feature, or other identifiable object which is given a name or number, it is used as an aid to navigation or control of aircraft. It also serves as a place for aircraft to hold so they can receive the target briefing and coordinate an attack plan.

Coordinating Altitude - A procedural airspace control method to separate fixed-wing (FW) and rotary wing (RW) aircraft by determining an altitude below which FW aircraft normally will not fly and above which RW aircraft normally will not fly. The coordinating altitude is normally specified in the airspace control plan and may include a buffer zone for small altitude deviations.

Direct Air Support Center (DASC) - The principal air control agency of the US Marine Air Command and Control System (MACCS) responsible for the direction and control of air operations directly supporting the ground combat element. It processes and coordinates requests for immediate air support and coordinates air missions requiring integration with ground forces and other supporting arms. It normally co-locates with the senior fire support coordination center (FSCC) within the ground combat element, and is subordinate to the tactical air command center. (Non-radar capable)

Egress Control Point (ECP) - A point located just outside the enemy air defense area that is used to control aircraft egress from the target area.

Fire Support Coordination Center (FSCC) - A single location for centralized communications facilities and personnel incident to the coordination of all forms of fire. Each FSCC is staffed with representatives of the various supporting arms such as artillery, air, and naval gunfire.

Fire Support Coordination Line (FSCL) - A line drawn on easily identifiable terrain and established by the senior ground commander. It serves as a limit to all supporting fire not directly under the ground commander's control and prevents ordnance from being delivered into that area of responsibility without authority. Targets may not be attacked between the FSCL and FLOT without first obtaining approval of the local ground commander.

Fire Support Coordination Measures (FSCM) - Measures employed by land or amphibious commanders to facilitate the rapid engagement of targets and simultaneously provide safeguards for friendly forces. Examples are forward line of own troops (FLOT), fire support coordination line (FSCL), restrictive fire areas (RFA), free fire areas (FFA) and no fire areas (NFA).

Forward Air Controller (FAC) - An officer (aviator/pilot) member of the tactical air control party (TACP) who, from a forward ground or airborne position, controls aircraft in close air support of ground troops. (Commonly, but incorrectly used interchangeably with JTAC.)

Forward Air Controller (Airborne) (FAC(A)) - A specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in close air support of ground troops. The FAC(A) is normally an airborne extension of the tactical air control party (TACP).

Forward Edge of the Battle Area (FEBA) - The foremost limits of a series of areas in which ground combat units are deployed, excluding the areas in which the covering or screening forces are operating. FEBA is designated to coordinate fire support, the positioning of forces, or the maneuver of units.

Forward Line of Own Troops (FLOT) - A line that indicates the most forward positions of friendly forces in any kind of military operation at a specific time. The forward line of own troops normally identifies the forward location of covering and screening forces.

Fratricide - Fratricide is the killing of friendly forces, often referred to as "Blue on Blue." All CAS tactics, procedures, and techniques are designed to avoid fratricide while maximizing CAS effectiveness. Uncertainty, loss of SA, misidentification of targets, incorrect target coordinates and weapons malfunctions can cause fratricide. It is the responsibility of all participants to mitigate this threat. Training and proficiency are the keys.

Free Fire Area (FFA) - A specific area into which any weapon system may fire without additional coordination with the establishing headquarters.

Ground Combat Element (GCE) - Combat troops engaged on the ground; GCE stands to benefit the most from CAS missions.

Gun-Target Line (GTL) - An imaginary straight line from gun to target.

High Density Airspace Control Zone (HIDACZ) - Airspace overlaying a tactical area and subject to high use. A ground commander may activate a HIDACZ to restrict a volume of airspace from those not involved in the operation; effective only for the time needed to fulfill the tactical requirement.

A-2 GLOSSARY OF CLOSE AIR SUPPORT TERMINOLOGY

Initial Point (IP) - An IP is a point designed to direct and control the flight path of attack aircraft. IPs are often visually significant and used to funnel aircraft toward the target from a specific bearing. It can also be used to avoid a surface threat for inbound attack aircraft. FAC(A)s can use the "IP inbound" call from attacking aircraft as a means of visually acquiring the attackers by scanning the area around the IP. Timing and coordination are paramount.

Joint Terminal Attack Controller (JTAC) - A qualified Service member who, from a forward position, directs the action of combat aircraft engaged in CAS and other offensive operations. A qualified and current JTAC will be recognized across the Department of Defense as capable and authorized to perform terminal attack control.

Marine Air Command and Control System (MACCS) - A functional duplicate of NTACS, but operates ashore supporting the landing force through control of air operations. The MACCS maintains two centers: TAOC and DASC.

Minimum Risk Route (MRR) - A route established that poses minimum hazard to transiting friendly aircraft in the vicinity of a specified tactical area. This route provides safe passage of aircraft through Missile Engagement Zones and Fighter Engagement Zones.

Navy Tactical Air Control System (NTACS) - Maintains command and control of all air operations during the initial phase of the assault until MACCS is established ashore.

No Fire Area (NFA) - An area designated by the appropriate commander into which fires or their effects are prohibited. NFAs usually exist around areas of strategic importance or around churches, hospitals, and schools, or any other area with a high percentage of noncombatants.

Permissive Threat - Threat exists at a predominantly low level; which permits CAS operations and support to continue along traditional lines with little interference from enemy EW, SAMs, AAA, fighters, etc.

Restrictive Fire Area (RFA) - An area in which specific restrictions are imposed, and into which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters.

Restricted Operations Area/Restricted Operations Zone (ROA/ROZ) - Specified airspace within which air operations are limited, established in response to specific situations and requirements such as CSAR or aerial refueling.

Restrictive Threat - A threat environment in which specific aircraft performance and weapons systems capabilities are allow for acceptable exposure time to enemy air defenses.

Sophisticated Threat - Integrated massing of heavy combat power to include EW, SAMs, AAA, and fighters. Sophisticated threats can seriously degrade CAS capability.

Standard Use Army Aircraft Flight Routes (SAFFRs) - Normally a route established below the coordinating altitude. These allow the Army commander to safely route the movement of

aviation assets performing combat support. These routes do not cross the FLOT and normally do not restrict target area tactics.

Suppression of Enemy Air Defenses (SEAD) - Measures taken to neutralize or reduce enemy air defense effectiveness prior to or during CAS execution. This may be accomplished using HARM, EW, artillery, attack helicopters, infantry, or any combination thereof.

Tactical Air Control Party (TACP) - Headed by an air officer who is responsible for employment and coordination of all assigned supporting aircraft. Accompanies frontline rifle companies and provides terminal control of CAS aircraft with two Forward Air Control (FAC) parties.

Tactical Air Coordinator (Airborne) (TAC(A)) - The TAC(A) is an airborne extension of the DASC. The TAC(A)'s authority and responsibility can range from simple radio relay to having launch (takeoff), delay, and divert authority over other assets. In order to be effective, TAC(A)s must conduct detailed planning and integration with all supported units, including aviation, ground, and C2 units.

Tactical Air Operations Center (TAOC) - Detects, identifies, and directs the destruction of hostile aircraft and missiles (possesses radar capability). Also provides navigational aid and control of friendly aircraft to ensure their safety while in the AOA.