Mutual Support
Gaining a Tactical Advantage on Your Opponent
Demo, 2008
1st Virtual Fighter Wing
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Mutual Support

Tactics & Strategy of a Visual Flight

The objectives of this training HOP are:

• Provide you with a basic understanding of how to react as the Engaged Fighter (EF), and the Supporting Fighter (SF) in a visual air-to-air fight
• Developing Improved SA (Situational Awareness)
• Understanding flight physics in a visual fight, and how/when to employ weapons
• Improving comms (brevity) in a fast paced fluid environment
• Have a better understanding of the “contract” between you and your wingman

“If you're in a fair fight, you didn't plan it properly.”
— Nick Lappos
Communication

The key to mutual support is Communication...

Overview:
When you are in a visual fight, things are happening EXTREMELY fast. You want to end the engagement as fast as possible. Studies show that the length of a dogfight is inversely tied to your chance of survival. This means, the longer you take to shoot down the bandit, the more likely you will lose the fight. You want to aggressively end the engagement as soon as possible. But to be able to do that, you must be able to communicate with your wingman. Things happen pretty quickly in a mach 1 jet with mach 3 missiles flying around. There’s no time to utter "Uh, Lead, I think you should make a quick turn to 350 to avoid that missile that’s inbound." Rather, your call will consist of something more like this, "Lead, Break right", and later on, you can add "missile inbound, your 5 o’clock".

There are two types of comms you will use in a visual fight:

• Directive Calls
  - Directive calls are just what they say, directive and immediate. The format for a directive radio call is:
    - Call sign of the receiver – Order
    *(ie "Cowboy 1, jink now")

• Descriptive calls
  - Descriptive calls are generally used to inform the flight of what’s going on with you or the area. The format for a descriptive (Bandit call) is as follows:
    - Call sign (your own)
    - Type threat (Bandit/Bogey)
    - Left / right
    - Clock
    - Range
    - High / low / level
    - Amplifying remarks
    *ie. "Tasty12, Bandit right 2, 3 miles level, closing fast"

“Speed is Life”  
— Anon
Communication

The key to mutual support is Communication Cont’d...

Descriptive Calls Cont’d:

Whether you are the engaged fighter or supporting fighter, you will continue to transmit descriptive calls. Especially at the beginning of the fight. Whoever ID’s the threat first must continue to transmit descriptive calls until everyone tally’s the threat. The use of the clock (ie “Bandit 7 o’clock low”) is especially important because it tells you where to snap your head. However, merely giving a clock position isn’t enough in the heat.

The use of “Continue”:

- Continue is sometimes added to the end of the call to tell your wingman that he can continue the current maneuver he is doing since it ‘looks good to you’. So if your #2 is already breaking right and that seems correct, tag on the word continue.
- Many times these calls (directive and descriptive) are combined:
- e.g. "Cowboy 1, break right NOW <pause to see if he does it> Bandit right 3, 1 mile high, shooting, continue"
- This comms info is vital to allow the other fighter to start the right BFM to engage the tally, or start his best defensive BFM, depending on what the situation calls for…

“There are only two types of aircraft — fighters and targets.”
— Doyle 'Wahoo' Nicholson, USMC.
The “Contract”
Signed and Paid in Blood…

Overview:
The contract between you and your wingman is signed and paid in blood before you ever step into the jet. The key here is to know exactly what your job is at any point in the fight, or even the flight for that matter.

Formation Integrity

- Formation integrity and flight discipline are the keys to surviving in a modern air fight. Formation integrity allows the flight to maneuver synergistically to defeat a bandit’s attack or prosecute the kill. The engaged fighter does his best BFM to kill the bandit while the supporting fighter maneuvers for the kill shot or supports the engaged fighter based on the criteria set forth before the flight (at the briefing).

- Lead makes the tactical decisions before the fight starts, but he knows what the contract was before he took off. That means he knows what you’re going to do. Lead may have an A/G load out and pre-briefed that if the flight is jumped, wing automatically moves up to be the engaged fighter while he supports. Who knows what the situation may call for? It’s better to brief this stuff in a leather chair with some coffee than it is at 20k burning JP-5/JP-8.

“The first time I ever saw a jet, I shot it down.”
- General Chuck Yeager, USAF, describing his first confrontation with a Me262.
Engaged vs Supporting

Why there can only be ONE Engaged Fighter...

In **offensive maneuvering** against a bandit, there can be only one engaged fighter. The engaged fighter is the one that is maneuvering in specific relationship to the bandit at a time. Why is there only one?

1. The chances for mid-airs, blocked shots and other nasty incidents are just too high in a 2 ship formation while doing BFM against a single adversary.

2. If you are in a 2 v 1 visual fight, you obviously have the advantage because you have a wingman. So why not put that advantage to use by having your wingman set up for an easy shot while you chase the bandit, and end the engagement quickly (Remember what I said about the length of a dogfight?). There is no such thing as a "sucker punch" in a dogfight.

3. What if the bandit is Maverick from Top Gun and can out BFM you with ease. No matter what you do he somehow gets on your six. Now you are defensive. If both you and your wingman were chasing the bandit around turning circles, who is going to bail you out? Your wingman is not only setting up for a shot on the bandit, but he is also your life raft. If you are defensive in any way, your wingman can swoop in and either kill the bandit, or force him to disengage from you and go on the defensive (more on what you should do in this situation later).

**So, what do each of you do?**

- The following slides will give you a basic understanding of what to do in these situations. I say basic because this isn’t something you can learn from a power point presentation. It takes practice and experience. This principles discussed will give you the tools you need, but it’s up to you to practice, and ASK QUESTIONS when flying the actual Mutual Support HOP with your IP.

“The only time you have too much fuel is when you’re are on fire”

-Unknown
Engaged Fighter

Roles & Responsibilities for the Engaged Fighter...

Engaged Fighter Responsibilities

The engaged fighter (EF) is the guy who is currently maneuvering against the bandit. The engaged fighter:

- Maneuvers using all the great BFM he has learned to kill the bandit (offense) or negate the bandit’s attack (defense) in minimum time. This is where you fly the best Offensive/Defensive BFM that you know.

- Clears the supporting fighter to engage if he is in a better position to shoot

- Clear the supporting fighter if defensive and the engaged fighter is not safely out of the supporting fighter’s weapon FOV, or if target debris would be a factor for the supporting fighter’s shot.

- Keep the supporting fighter informed of intentions, plans, capability and future intentions

“See, decide, attack, reverse”
- Colonel Erich 'Bubi' Hartmann, GAF
Supporting Fighter

Roles & Responsibilities for the Supporting Fighter...

Supporting Fighter Responsibilities

The supporting fighter (SF) in a fight has to play multiple roles. You have to divide your attention between a lot of duties while your wingman is engaged.

The Supporting Fighter

- Maintain visual & tally on the flight
- Inform the engaged fighter of your position
- Maneuver to stay outside the fight but also so you have an easy entry into the fight
- Sanitize the area in and around the fight using any means possible (Don’t get tunnel vision on the fight)
- Employ ordnance if the bandit is in WEZ when you won’t violate the lead’s game plan, or compromise the EF’s safety.
- Engage other bandits that become a factor to the fight you’re in, AND keep the engaged fighter informed of what’s happening as you do it
- Keep and eye on the escape window, egress avenues and fuel states (everything the EF can’t do while is engaged)
- Direct the egress from the fight (the EF’s SA will be about -2 by the time he makes a couple of turns, so he must depend on you)

The SF has a lot of work to do while the engaged fighter fights for his life or a kill. With the right coordination, a 2 ship can kill ANY single bandit made and survive a heck of a lot of defensive fights

“All warfare is based on Deception”
-Sun Tzu, Art of War
Roles Exchange

When and Why?

**Question:**
OK, but what if the engaged fighter cannot convert his BFM to a kill when the fight is offensive?

**Answer:**
Positive Exchange of Role is what you do! This calls for more comms and more flight discipline. The engaged fighter needs to call for the exchange when:

1. He feels that he can no longer achieve the kill in good time.
2. He loses sight of the bandit
3. He cannot convert his energy state to a killing shot
4. The SF tells him the he has a perfect shot

**Note:**
Be careful with #4 above…Everyone has seen Top Gun and Maverick always had the perfect shot. That was his ego talking. If you tell the engaged fighter you have the perfect shot, you better make it in one pass.

Hopefully, EF and SF have been talking, and when the EF knows that the SF can enter the fight and it’s time to change roles. How, you may wonder? Well, if you recall, the SF was doing all kinds of things, including gaining an easy entry into the fight. The following comms will give you an example.

“It was my view that no kill was worth the life of a wingman. . . .”
— Colonel Erich 'Bubi' Hartmann, GAF.
### Comms Example

**Concise Coordinated Comms...**

<table>
<thead>
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<th>Viper 51 = 1</th>
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<td>SF = Supporting Fighter</td>
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**“Viper 51, Engaged, Bandit right 3, 2 miles, Low”**

(Now the roles are now defined but the fight does not go well for Viper 51)

**“51, Neutral”** (Neither 1 or the bandit have an advantage.)

**“52, Tally, Visual, 15 seconds”** (2 is nearing entry the fight.)

**“52, In from the southeast, High, Tally, Visual”** (2 has 1 and the bandit in sight and 2 is ready to enter the fight.)

**“51, Blind, Continue”** (1 doesn't see 2. 1 remains EF. 2 continues to maneuver for a shot but remains SF.)

**“52, Right 4 o’clock, High. Come-off Left”** (2 has an immediate shot and provides a deconfliction direction. 1 remains EF.)

**“51, Blind, Continue”** (1 says tough luck this is my bandit.)

**“52, Right 4 o’clock, Level, Come-off Left”** (Same as before. 2 is letting lead know he has another chance to take a shot, and provides a deconfliction direction again)

**“51, Blind, Off Left, Press”** (1 clears 2 to engage and disengages from the fight off to the left per 2’s deconfliction instructions. Now roles will reverse by 1 becoming the SF and 2 the EF)

**“52, Engaged”** (2 is confirming he is the EF. Note: 1 said he is still blind so there is some Big Sky -- Little Airplanes Theory going on at this point.)

**“51, Visual, Out north”** (1 finally sees 2 and maneuvers to support.)

**“52, Fox Two”** (2 takes a shot)

**“52, Splash”** (2 confirms his missile hit the bandit)

**“51, Viper Flight, Egress northwest”** (1 retakes directive control of flight since the threat is neutralized.)

**“52, Visual”** (2 does a victory roll to celebrate.)
Comms Example Cont’d

Understanding Brevity...

If 51 had kept the sight, he would have called:

“52, In from the east, High, Tally, Visual"

“51, Visual, Continue” (1 sees 2 but is waiting for 2 to get into a better position. 1 remains EF.)

“51, Visual, Off Left, Press” (1 sees that 2 is in good position to engage and transfers roles.)

"Chevy 2, Engaged" (2 assumes EF role)

Some Key Brevity Codes:

- **Blind** = No visual contact with friendly aircraft/ground position. Opposite of “Visual”
- **Continue** = Continue present maneuver, does not imply clearance to engage or expend ordinance
- **No Joy** = Aircrew does not have visual contact with the target/bandit/landmark. Opposite of “Tally”
- **Press** = Directive to continue the attack; mutual support will be maintained. Supportive role will be assumed.
- **Tally** = Sighting of a target, bandit, bogey, or enemy position; opposite of “No Joy”
- **Visual** = Sighting of a friendly aircraft/ground position; opposite of “Blind”

Notes:

- Notice at the beginning of the fight, lead and his wingman say their callsigns and their number (ie Viper 51). Once they are in the fight, they only use their number (ie “51, neutral” or “52, press”).
- The only expectation is when there are two flights engaged in the same fight. For example, if Lobo flight was also in the fight w/Viper flight, you should continue to use your callsign (Viper or Lobo) and your number (51, 52, etc…) The reason you need to do that is so everyone in the flight knows who is doing what. If you just said “2 copy”, the flight leads wouldn’t know which 2 said that. Was it Viper or Lobo? You want to eliminate any ambiguity. Also, whenever you are communicating with another flight you should always use both your callsign and number.
Summary Part 1
The Key Takeaways of Part 1 Are...

So far we have learned:

• Good communication is vital, utilize brevity
• You have to know who is going to do what when the 'fight's on'
• Wingman and Lead are interchangeable in the Engaged/Supporting fighter role
• Lead is the BOSS, his plan is what the supporting fighter has to keep in mind as he maneuvers
• PLAN before you fly, not before, or in the middle of the fight
• EF BFMs, SF sanitizes and maintains SA for the flight
• Supporting fighter must be ready to exchange/enter the fight when needed
• Check your ego before getting in the jet, you don't need it up there
• Be aggressive but don’t compromise the safety of your flight

“You must take the war to the enemy. You must attack and go on attacking all the time.”
— Major Willy Omer François Jean Coppens de Houthulst, Belgian Air Service, 37 victories W.W.I.
Because air combat involves dynamic movement in three dimensions, one could conclude that it is an infinitely variable maneuver/counter-maneuver process. But this is not the case. A fighter pilot has only a limited number of options with which to meet a given situation. Which one he uses will be dictated more by the relative positions and energy states of himself and his opponent than by any potential technical advantages that his aircraft may possess. He will strive to deny his adversary the initiative, knowing that air combats are lost more often than they are won.

We will not cover ACM in detail in this HOP, however, it is critical that you understand its role in Mutual Support. Therefore, we will cover a few BFM concepts in the following slides.

"A fighter without a gun . . . is like an airplane without a wing."
- Brigadier General Robin Olds, USAF
BFM and its Role in ACM...

BFM = Basic Flight Maneuvers:

Offensive BFM is all about maneuvering to shoot down a bandit in the minimum amount of time. We will briefly discuss the theory of offensive and defensive maneuvering, and run you through some basic concepts of basic flight maneuvers, as those are what is needed to fly offensive/defensive ACM maneuvers. Once you have a understanding of those, you will be better prepared to use the Mutual Support concepts. Again, this is just a basic overview. For more in depth BFM training, sign up for one of the Freebirds IP training courses (BFT).

Overview:

It is helpful to think of offensive BFM as a series of fluid rolls, turns, and accelerations rather than a collection of set moves. Some maneuvers in offensive BFM have names, but the modern day fighter pilot thinks in terms of driving his jet into the control position from a offensive setup rather than in terms of executing a series of named “moves” to counter the bandit’s defensive maneuvering.

As you know, you want to shoot the bandit as soon as possible. In fact, you should study BVR (beyond visual range) so hopefully you won’t need to do any BFM because the bandit will already be a flaming black cloud in the sky before getting within range to do BFM. But, should you need to do BFM, your goal is to get and stay on the bandits six and put him in your WEZ (weapons employment zone).

“As long as I look into the muzzles, nothing can happen to me. Only if he pulls lead am I in danger.”
-Captain Hans-Joachim Marseille, Luftwaffe
Basics of BFM...

You can't talk about BFM without mentioning Turn Rate and Radius, Corner Airspeed, and Energy. The foundation of BFM is built on those concepts, and managing them during the fight.

**Turn Rate and Radius:**

Turn radius is simply a measure of how tight your jet is turning. If you were to look down on the aircraft as it turned, turn radius would be the distance from the center of your turn circle to the aircraft, measured in feet. Turn rate is how fast the aircraft is moving around that turn radius or circle we just talked about. An easy way to look at Turn Rate is how fast you can move the aircraft's nose. Turn rate is measured in degrees per second, and is also dependent on Gs and airspeed.

**Corner Airspeed:**

In order to maximize both turn rate and turn radius, you need to manage your airspeed. Too fast and your turn radius is too big. Too slow and your turn rate will be too slow. There is a relationship between airspeed and G's, and their effect on turn rate and radius. You want to find the best speed so you can make the smallest turn circle and move the nose around as fast as possible. In a F-16 that speed is between 330-450 knots. If you are faster than 450 knots your turn radius will be too big. Below 330 knots, and your turn rate is too slow. Good dogfighters are experts at managing their corner airspeed. Remember there are four ways to control your airspeed in a fighter: 1.) Throttle 2.) Drag devices 3.) Nose position (gravity) 4.) G's.

**Energy**

An important BFM concept is energy. Any time you maneuver a fighter, it costs you energy. Energy is simply speed and altitude. When you turn a jet at high G's, you must give up speed or altitude. If you want to maintain your airspeed you must turn with your nose down, therefore trading a high G turn for altitude. It is possible to climb and gain airspeed, however, in that case the energy that you are expending is the “stored potential” energy called jet fuel.

"When you have a hammer, all problems start to look like nails.”
In order to stay in on your bandits 6 o’clock, you must keep control of angle-off, aspect angle and range. **Angle-off** is the angle formed by the difference between your heading and the bandits heading. When a bandit turns angle off, he creates aspect and range problems for you. Aspect angle is the angle measured from the target’s tail to your aircraft. At 0 degrees aspect, your jet is right behind the bandit’s jet. At 0 degrees angle-off, you are pointing in the same direction as the bandit. If both of these values are 0 degrees, you are pointing at the bandit from dead on his six o’clock.

The following two figure on the left show how the angles work in BFM, and why you don’t just mirror everything the bandit does when you are on the offensive. To control the “angels” and stay at the 6 o’clock, you must also turn your jet. The second figure on the left shows why an immediate turn by the offensive fighter will not work. If you go into a turn to match the defensive fighter’s turn, you will simply turn out in from of him and become defensive.

A turn of some sort is the solution to solving the BFM problems of aspect-off, aspect angle and ranged caused by the bandit’s defensive turn. The problem is twofold: how to turn and when to turn..

“I was a pilot flying an airplane and it just so happened that where I was flying made what I was doing spying.”

-Francis Gary Power, U-2 reconnaissance pilot held by the Soviets for spying
ACM

**Basics of Offensive BFM...**

**Flying Offensive BFM:**

OK, so how do you stay behind an enemy aircraft and shoot him down? It’s easy if the bandit is flying in a straight line and not making high G turns. However, this is not the case in both Falcon and real life. Once the bandit knows he is defensive, he is going to quickly start turning, and therefore cause you all kinds of aspect, angle-off and range problems. You will not be able to solve these problems by just pointing at the bandit (which is the most common mistake new pilots make). You need anticipate the bandits maneuvers and employ your own BFM to stay on the offensive and kill the bandit.

**Things to Remember...**

The two biggest factors in the offensive BFM are airspeed and nose position. You must be at the corner airspeed until you close with the bandit, and get him into your WEZ. If you have good tone and separation (meaning you are not too close to fire a sidewinder), take a shot with your Aim-9 IR missile. However, once you can make out the details of the bandit’s aircraft such as wings, you are within guns range and must match speeds with the bandit. Don’t try to take a shot with a sidewinder when you are in guns range.

*Keep an eye on which weapon employment zone the bandit is in... At approx 10 – 30 miles he is in your Slammer range (Aim-120). Inside 10 miles he is in your sidewinder range (Aim-9). And within visual range he is in your guns WEZ.*

“There is no victory at bargain basement prices”
-Thomas Jefferson
ACM

Types of Pursuit in Offensive BFM...

Lead/Pure/Lag Pursuit:

**Lead Pursuit** – Lead pursuit is not just the name of the creators of Falcon 4.0: Allied Force, it is a tactic when on the offensive. Lead pursuit is basically running a intercept on the bandit your are chasing. This type of pursuit course is mainly used to close the range to the bandit or angle-off from the bandit. It is also used when maneuvering for a guns kill. You are simply putting the nose of the jet and/or gun symbology in front of the bandit.

**Pure Pursuit** – Pure pursuit is putting the nose of the jet/gun symbology directly on the bandit. In other words, its basically flying directly at your bogey, and staying there. The main use of Pure Pursuit is to close the range or to decrease the angle-off on your bandit, in order to close to within weapons firing parameters, or to get to a position where the bandit is of less threat to you or other allied aircraft.

**Lag Pursuit** – Lag Turn is basically putting the nose of the jet/gun symbology behind the bandit. Your are keeping the nose of your jet behind the aircraft, but on its flight path. Lag pursuit is mainly used to maintain position on the bandit in order to convert to a nose-on position to deploy weapons. It also can be used if you are afraid you will overshoot. You can go lag pursuit so you do not pass in front of the bandit or blow by him.
Overview

Defensive BFM is very straightforward once you actually detect that you are under attack. Most fighter pilots throughout the history of air combat, however, have been shot down by adversaries that they did not detect until it was too late. Defensive BFM is (obviously) the opposite of Offensive BFM. However, what you have learned in offensive BFM will help in defensive BFM because you know when the bandit is in a WEZ, and where he needs to be to shoot you down. So your job is to create BFM problems for the bandit. Here are some basic concepts of doing just that.

Basics of Defensive BFM:

Q: So what’s the secret of becoming hard to kill?

A: As I said earlier it’s basically creating offensive BFM problems for the bandit. Simply, put your lift vector right on the bandit and turn a max G at corner velocity. The figure to the right shows how this type of turn can create problems for the bandit.

Notice how the turn in the figure on the right causes angle-off and aspect to build and also rapidly decreased the range. This type of turn forces the bandit to make a move and, more importantly, it forces the bandit to make just the right move. Any time you force your adversary to react quickly and correctly, there is always a chance he will make a human error.
ACM

Basics of Defensive BFM Cont’d…

So you have rolled your jet to place your lift vector right on the bandit and executed your best high-G turn at corner velocity. What next?

Now you must determine if your defensive turn is working. If the bandit is being forced forward from 6 o’clock toward your 3 or 9 o’clock position, then the turn is working. A bandit that starts outside your turn circle will be forced in front of your 3/9 line if you perform the defensive turn correctly.

The stakes are high when you find yourself on the defensive. Defensive BFM is characterized by difficult, high-G combat, flown while you look out the back of the jet. Since most fighter pilots don’t do their best creative thinking twisted around in the cockpit under high G’s, it is best to have a game plan in mind before finding a bandit at your 6 o’clock. We mentioned in earlier that offensive BFM is not a set of specific moves but rather a series of fluid maneuvers. The same is true when you start with a bandit behind you.

Overall, defensive BFM is very simple: create BFM problems for the bandit, and when he BFM’s, try to counter his BFM to buy time and survive a little longer. By forcing the bandit to BFM, you may force him to make a BFM error that you can capitalize on. If he doesn’t make a mistake, he will drive into gun parameters. When this happens, you must be ready to defeat the gunshot.

"ANY TIME - ANY WHERE - ANY WEATHER“
-US Navy
So here is the situation:
So, you and your wingman spot a threat. Let’s say it’s a four ship of Mig-29’s 40 miles out. You both do your best BVR (Beyond Visual Range) and splash three of the four 29’s. One of the 29’s is still nose hot and you are about to merge with the bandit. What do you do? This is where we move into the maneuver portion of the wide world of ACM...

It is imperative that roles in this fight get established immediately. Flight lead should say his intentions:

“Viper 51, engaged, nose, 3 miles” (anchors the flight and tells 2 lead is the EF for now)

OR

“Viper 51, 52 your are cleared to engage, nose 3 miles, press” (anchors the flight, tells 2 that 2 is EF)

The EF’s job now is simple, he BFM’s the bandit to his WEZ and gets the kill. If EF goes neutral or worse, defensive, he needs to get on the horn and tell the SF immediately. The SF now has all that work that we talked about in part one to do. To set up the support for the fight, the SF needs to 'blow through' the fight and extend as quickly as possible.

“No matter how many kills you got, if you come home without your wingman, you’ve lost.”

-Unknown
Offensive ACM Cont’d

Offensive Maneuvering...

Things to Remember:

NEVER place yourself, as the SF, in a position where the bandit could get a shot at you, even a snap shot. While this seems obvious, it's more difficult than you might think. Some other areas to avoid as the SF are:

- Directly above the fight
- Directly below the fight
- Within 2NM of the fight (12,000 feet horizontal)

Why? If you're above or below the fight, you have to keep your attention on the fight and you can't clear the area (sanitizing) and do all the other duties you have to do. If you are within 2NM you are in the bandit's snapshot WEZ and may just give him a freebie. Even if he justlobsa missile at you, it forces you to fight the missile and drop your SF role. Then bandit effectively negated your support.

“The aggressive spirit, the offensive, is the chief thing everywhere in war, and the air is no exception.”
- The Red Baron
Offensive ACM Cont’d

Offensive Maneuvering…

**Breaks:**

- Blowing through the fight at the start of the 'BFM' phase of the fight is usually pretty easy. Depending on what the bandit does, your choices as the SF are somewhat cut and dry.

- If the bandit breaks away from the fight, your options here are simple. Break off the fight 30°, light the blower and get to 450 knots, and establish your separation from the fight. See the figure to the right where Viper 2 is the SF.

- If the bandit breaks into the fight, you have 3 choices, depending on the situation and the plan. You can do a straight ahead extension, lag the fight, or pull the bracket.

"Kashe baimunim, kal bakrav“ (Difficult in training, easy in combat.)

-An Israeli Military Moto
Offensive ACM Cont’d

Offensive Maneuvering...

**Straight Ahead Extension:**

- To do the *straight ahead*, keep the bandit at very high aspect with BFM, hopefully achieving a head on pass, from which you will simply continue the extension until you establish your position of advantage on the fight. The advantage here is that you can unload and gain knots while the bandit is eating up energy in his defensive BFM against the EF.

- *Lagging* the fight is more difficult but gives you a few advantages. It should only be used against an inferior opponent. You'll need a high airspeed, so use the blower if needed, and maintain that 450 knot speed. What you'll do is lag your EF through the first part of his turn to the bandit, and then split plane the fight in the opposite direction. You'll end up turning in the same direction as the fight (ready for a co-flow entry) and you'll clear the EF’s six visually as you turn. Resist the temptation to stay with the turn and ‘be a part of the fight’. Your job is to get outside the fight and support.

“There are no secrets to success. It is the result of preparation, hard work, and learning from failure.”

-Collin Powell
Offensive ACM Cont’d

*Offensive Maneuvering…*

**Forming the Bracket:**

- To bracket the fight, you'll do basically the same as if the bandit had broken away.

- You'll check turn away from the fight, but you'll also have to go vertical to get your separation. When done, you'll have the bandit between you and the EF.

- As the bandit's nose rotates through you (you'll see his apparent turn rate get a lot faster) you are then outside the fight and ready to start the support role. You'll be in a good place for an opportunity shot or an exchange here. You must do the vertical move, because if you stay in plane with the bandit, you will offer him a snapshot and maybe go defensive yourself.

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“*The Strength of the Pack is the Wolf, the Strength of the Wolf is the Pack*”

— USMC “The Wolfpack”
Offensive ACM Cont’d

Supporting the Fight...

How to Support the Flight:

- The best place to put the fight is at your left 10 o'clock or right 2 o'clock, depending on your break in direction. Keep your speed up in the 400-450 knot range and keep the sight. You can do this easily (hopefully) by turning to keep the fight visual, then rolling out wings level a few seconds, then pull back into the fight.

- Use the blower if needed to keep your energy up and always be looking for the fight entry and the egress route. What you want to do is fly straight lines and check turns, keeping the fight 2-3 miles away and 3-4000 feet above/below you. This range and altitude split will allow you to keep the area sanitized, and gives you maneuvering room to give you the shot or role change.

- Never let the bandit's extended 3/9 line get past you, it never should since you have the time and the sight to prevent this. If need be, break turn into the fight to keep your advantage in position.

NOTE: There may be a time when the bandit, because of lack of SA or desperation, may stop defending against the EF, stop his fight and turn to you. Watch his nose, it will telegraph his intentions. If you have to, use the dist/alt split you maintained to negate any shot he makes. Your position and energy advantage should guarantee your success. At this point, you must BFM to deny him his WEZ. His extension toward you should provide the EF with a shot opportunity.

“Of all my accomplishments I may have achieved during the war, I am proudest of the fact that I never lost a wingman.”

— Colonel Erich 'Bubi’ Hartmann, GAF.
Flight Entries:

Ok, life is good, the EF is BFMing the bandit and you're in a great support position. The fight's going as briefed. Then you hear on the radio that EF is neutral, he can't convert the fight into a kill, or worse, EF just went defensive. Time to go into the fight and help out the EF.

There are two types of entries into a fight:
1. Move in the vertical
2. Move from outside the turn circle (TC) of the bandit. The outside moves are defined by whether your turn will be with the turn of the fight (Co-Flow) or against the turn of the fight (Counter Flow). Keep in mind that the entry you pick also determines the BFM you will be doing, so be ready to accept your choices.

Vertical Entries

Vertical entries are easy, simply pull yourself into the bandit and maneuver for the shot (If cleared by the EF) or simply be ready to become the EF. Your energy should be better than the bandits, but don't squander that advantage. Entries from below are difficult, the fight is probably already going downhill and that's denying you turning room. All vertical entries are fleeting and have to be very accurately timed to work.
Offensive ACM Cont’d

Supporting the Fight...

Flight Entries Cont’d:

Depending on the Co or Counter flow position you are in, you will have several choices to make on entry to the fight on the same plane. When it's time to enter the fight, you'll be able to keep behind the bandit's 3/9 line and keep the fight on your 10/2 o'clock. If you are Counter-flow to the fight, remember that the bandit will cross through your position (and hopefully in your WEZ) more quickly and often than if you are co-flow. If you are co-flow on the entry, remember you have the energy advantage over the bandit (or should) so getting to WEZ should be easier. As you look at your entry opportunities, remember to NEVER put your nose on the fight unless you are taking a shot. You are not the EF yet, your just maneuvering to either become the EF or take the Opportunity Shot.

As you look for entries, remember to keep sanitizing and checking your own 6. Until you are called in and cleared in, you are still the SF. Keep an eye on your position and WEZ, but let the EF have the fight until he clears you in. When you are cleared in for the shot, or because EF has gone defensive, convert this entry into a BFM fight using all the methods you already know. Keep in mind that a Counter flow entry is a lot like a two circle fight in BFM, you'll need a lot of energy to turn it into a kill. As you are working a Counter Flow entry, you have more opportunities to employ weapons than in a Co-Flow entry (the bandit is crossing through your WEZ twice per full turn), don't waste those opportunities.

“Never fly straight and level for more than 30 seconds in the combat area.”
——Adolphus G. 'Sailor' Malan, RSAAF, August 1941
Offensive ACM  
Supporting the Fight...

Opportunity Shooting:

There are two reasons for an opportunity shot:

1. If the EF requests it from you
2. If your survival or the EF’s survival depends on it

Survival could mean that either the EF has gone defensive, or if a situation outside the fight requires it (i.e. A flight of 4 bandits is 10 miles out, heading for you. As the SF you can’t engage these offensively so it’s time to drop the bandit and bug out…)

Three things are required for your opportunity shot as the SF:

1. Bandit is in your WEZ
2. EF is not in your weapons FOV for its ENTIRE time of flight
3. Bandit debris will not affect the EF
4. You will not enter the EF’s control zone (CZ) to shoot (CZ is the space between EF’s nose and the bandit’s tail)

If you only remember two things about opportunity shooting, its:

1. YOU have to make sure that EF is clear and has cleared you for the shot
2. YOU have to make sure that EF is clear and has cleared you for the shot! UNDERSTOOD?

“Speed is the cushion of sloppiness.”  
- Commander ‘Willie’ Driscoll, USNR.
Offensive ACM Cont’d

Supporting the Fight...

How to Egress From the Fight:

- When the bandit is destroyed, the fighter who has the highest SA should direct the egress. This is normally the SF but it could be the EF if the SF took the kill shot. Get the flight moving in the same direction out of the area and get low to isolate all threats to the area above you.
- Start building back element SA with a new picture from AWACS. The fighter with more speed will be responsible for dressing up the formation, but this is secondary to gaining visual and starting to egress the area.
- Once your flight can confirm the immediate area is clear, get into RWS mode to start clearing the exit path and regaining area SA. At this point in the maneuvering, Lead starts to reassert tactical control of the flight and modifies the original mission or presses on, as the situation warrants.

NOTE: We didn’t talk about what happens if the bandit isn’t dead. In a 2v1 fight, the bandit should be dead every time. However, there are other concerns to keep in mind. What if you are low on fuel? If you must egress from the fight before killing the bandit, the EF is the guy who drives through the escape window first, then the SF goes. If the bandit pursues the EF, the SF should be presented an easy kill. If the bandit bugs out, the threat is over, not a factor. If the bandit turns on the SF, then your back to the beginning, except the roles are reversed. The SF is now the EF, and EF is now the SF. You cannot disengage from a determined bandit. What you can do as the SF is maintain your energy state while the EF bleeds the bandit of energy, leaving the SF with a sure opportunity shot. Be smart, and work as a team. The EF should be able to lead the bandit right where the SF wants him to take that opportunity shot. Communicate, maneuver, and execute.

“To be a good fighter pilot, there is one prime requisite — think fast, and act faster.”
— Major John T. Godfrey, USAAF
Summary Part II

The Key Takeaways of Offensive ACM...

Keys to Offensive ACM in Mutual Support:

- Establish your roles ASAP, before the merge, and before you start BFM’ing
- The EF BFM the bandit for the kill, the SF gains separation and uses it to get a opportunity shot
- **NEVER** place yourself, as the SF, in a spot where the bandit can take an opportunity shot at you. Be mindful of the bandit’s WEZ as well as your own
- The SF maintains SA for the EF and maneuvers to preserve an entry into the fight.
- The SF will continue to reposition for a shot/entry into the fight until the EF clears him to “Press”. The SF then provides a deconfliction direction upon entry into the fight
- For opportunity shots, the SF has to make sure he will not enter the EF’s CZ. If you’re not sure, don’t fire. Instead, reposition for a better shot.
- On egress, sanitize the area, get clear, get smart (build SA), anchor the flight, and get in formation

“I never went into the air thinking I would lose.”
- Commander Randy ‘Duke’ Cunningham, USN
Defensive ACM

The Hunted Becomes the Hunter...

Preventative Tactics to Avoid Being Defensive

First of all, you want to use all of your resources and tactics to avoid becoming defensive. A few things to keep in mind to prevent that are:

- Use line abreast formations (help keep your buddy's deep six clear)
- Sanitize with radar coverage (overlapping)
- Keep a close eye on your RWR
- Visual cross checks, and keeping your own deep six clear
- Use AWACS and any other services available to maintain SA.

Four basic priorities to think about for survival in a defensive situation:

- Detection of the bandit
- Negating the threat
- Maintaining flight integrity and mutual support
- Lethal weapon employment against the bandit

“The British were sporting. They would accept a fight under almost all conditions.”
— Gunther Rall, Luftwaffe, 275 victories.
Defensive ACM

The Hunted Becomes the Hunter...

When the flight is defensive the obvious concern is survival, (negating the bandit's initial attack). The flight must have pre-planned maneuvers that are well understood and thoroughly practiced. These maneuvers, are by nature, defensive BFM (defensive turns). Used in concert w/ Mutual Support, they provide you with the best chances of surviving the bandits attack.

Defensive situations are where mutual support is absolutely critical. The survival of yourself or your wingman depends on it. Understanding some defensive maneuvers, and quick execution of them, can be the difference between life and death. Defensive situations are also when clear concise comms are difficult to maintain when fear and adrenaline are flowing. Therefore, a flight that understands and practices Mutual Support will always have the advantage.

If you or your wingman are defensive, then the roles are already set by the bandit. Whoever is defensive is doing whatever he can to negate the bandits attack, while your wingman is supporting you by trying to kill the bandit, or forcing the bandit to disengage from you. However, if both of you are tally and blind (meaning you both see the bandit, but don’t see each other, lead needs to establish roles and tactics. Flight path deconfliction is achieved by giving references off the bandit, and knowing, through practice, what the flight is going to do. When its obvious who the bandit is engaging, it's time to split the element, either laterally or vertically, depending on the bandit. Increase airspeed and perform either a break turn or hard turn into the bandit. Break turn if the bandit is in a WEZ, hard turn otherwise to maintain energy. If you’re unsure, call the break turn, better to be safe than sorry and create maximum BFM problems for the bandit.

“I don't mind being called tough, because in this racket it's the tough guys who lead the survivors.”
— General Curtis LeMay, USAF.
Defensive ACM
The Hunted Becomes the Hunter...

Initial Maneuvers When Defensive:
The initial move in defensive ACM is the key to survival. These moves need to be part of the ACM contract that both flight members know by heart. Some things to keep in mind when defensive are:

- When defensive, avoid putting both jets in the same area, use split plane maneuvers. (Don’t give the bandit a chance to switch who he is engaging).

The Pilot who is engaged should be doing the following simultaneously:

- Do his best defensive BFM, break turn into the bandit
- Direct the flight to turn (left or right)
- Dump chaff and flares as needed

The Supporting Fighter should:

- Perform the break turn as called
- Dispense chaff and flare as required
- Attempt the acquire the tally
- Attempt to employ ordnance against the bandit, w/in safety parameters of not risking hitting his wingman

“The most important features of a fighter pilot are aggressiveness and professionalism.”
—— Colonel Gidi Livni, Israeli Air Force.
Defensive ACM

Defensive Maneuvering in Mutual Support...

Depending on where the bandit shows up, there are maneuvers you can use to maintain your 2 ship advantage against the bandit. These maneuvers depend on when and where you detect the bandit. There is no hard and fast rule (as in all of air combat) or formula to tell you when to do what. The maneuvers, as presented, should be practiced and used when the time is 'right'.

The Early Switch

- The early or late switch is available when the bandit is aware of both fighters. Switching is communicated as soon as possible so that roles can be established. Both switches accomplish the same thing, but the difference between them is the location of the bandit. If he is in the EF's turn circle (TC) then it is a late switch. If the bandit is outside the TC, then an early switch is possible. See the example in the figure to the left.

- An early switch allows the EF to start a constant rate turn defense or an extension, depending on the bandit's BFM. This allows him to back off the turn to preserve energy and keep a tally on the bandit all while keeping his tail rotated away from the bandit. All the while, the SF is maneuvering for an entry into the fight, or weapon employment opportunities.

“Everything I had ever learned about air fighting taught me that the man who is aggressive, who pushes a fight, is the pilot who is successful in combat.” - Major Robert S. Johnson, USAAF.
Defensive ACM

Defensive Maneuvering in Mutual Support...

The Late Switch

- A late switch allows the Supporting Fighter the opportunity for a high-aspect pass at the bandit, depending on what BFM the bandit does.

- If the extension opportunity is there, the Supporting Fighter needs to communicate that to the engaged fighter so he knows what to expect.

- As the bandit turns to point his nose at the flight, his ordnance capability needs to be assessed, extension may not be a viable option.

NOTE:

- Any time you are close enough to the bandit to see his armament, check to see what he has, and communicate it to your wingman. It will help you understand the threat. If you aren’t sure about his armament, assume the worst.

“*The fighter pilot's goal: the highest score within the shortest time, with the least risk to himself and his wingman.*”

— Colonel Gidi Livni, Israeli Air Force.
Defensive ACM

Defensive Maneuvering in Mutual Support...

**Same Side Break Turn:**

When the bandit's cannot be clearly judged, the same-side break or cross turn become options for your flight. The idea behind these maneuvers is:

- Deny the bandit a shot opportunity
- Present maximum BFM problems for the bandit
- Force the bandit to commit to one fighter
- Maximize your flight’s offensive potential
- Establish the EF/SF roles

The same-side break is preferred if A) the bandit is detected outside of WEZ or B) has not yet entered into either fighter’s turn circle

The advantages of the same-side break are:

- Viper one can maintain the tally through the turn
- The bandit MUST commit to only one fighter, or blow through the fight
- He no longer enjoys the same offensive potential against both fighters
- Each fighter has isolated the threat on the same side of their aircraft
- There are no flight path deconfliction problems
- The SF can keep rotating his nose back into the bandit while the EF does his best BFM

The disadvantages are:

- Viper two may lose the tally as the bandit gets pulled through his deep six.
- The bandit may take a possible snap shot at viper two as he starts his turn.

“Fight to fly, fly to fight, fight to win.”

- US Navy Weapons School Top Gun
Defensive ACM

Defensive Maneuvering in Mutual Support...

Cross Turn:
The cross turn is not the best of maneuvers, but is effective if the bandit is detected inside your turn circle where he can maximize his offensive capability on one fighter. This maneuver has many disadvantages, but can be used to 'fluster' the bandit into committing himself to a turning engagement with one fighter. Your flight's abilities here are minimized, but if you have superior equipment (or ROE), it can be used.

The advantages of the Cross Turn are:
- Each fighter maximizes the BFM problem for the bandit
- Neither fighter turns his tail to the bandit
- Both fighters increase their possibility to maintain the tally in the turn

The disadvantages of the Cross Turn:
- The bandit is not forced to commit against either fighter
- He can meet one fighter at high aspect
- The flight's role of EF/SF is delayed until the bandit commits
- If all three maneuver same plane, deconfliction becomes a factor
- Mutual support is difficult to achieve from the end position
- The bandit is on opposite sides of both a/c, making communication harder (my right, or your right?)

“He must have a love of hunting, a great desire to be the top dog.”
-Sergei Dolgushin, Russian Air Force, 24 victories WWII.
Defensive ACM

Defensive Maneuvering in Mutual Support...

Asymmetric Bandit:

All of these maneuvers assumed the bandit was deep six to your flight at detection. If the bandit is asymmetric (see figure on the right), the solutions remain the same, but the identification of the EF is easier to realize, the most threatened fighter will normally become the EF. If the bandit disregards this, your BFM problems just became worlds easier and a kill is soon to come.

Re-Entry into the Fight:

Re-entry to the fight is the responsibility of the SF. As in the offensive ACM, the SF has maintained the tally on the fight and is maneuvering all the time for an entry. When defensive, the need to clear the EF is gone, since he is defensive. As such, the separation for defensive maneuvering is lowered to about 1NM. Keep an eye on the fight and see how it develops. If the fight is dragged into a scissors, be prepared to enter the scissors, but try not to get dragged into the same slow speed maneuvering. Your goal as the SF is to employ weapons and/or be the EF's eye to a separation chance. If you see a window open for the EF, tell him, but do not expect him to take it. He is BFM'ing and may not be ready, willing or able to do it.

The entry to the fight is either co-flow or counter flow and handled just as in offensive ACM, since you are basically offensive as the SF. Your weapon of choice is the AIM-9, but be sure that you can fire it without involving the EF in any defensive maneuvering.

The role of the SF is basically the same as in offensive ACM:

1. Keep a tally on the fight
2. Employ weapons ASAP
3. Maintain SA for the flight
4. Keep looking for an exit window for the EF
5. Keep the fight area sanitized and don't get jumped yourself!

“Anybody who doesn't have fear is an idiot.”
-Brigadier General Robin Olds, USAF.
Summary Part III

Key Takeaways of Defensive ACM...

Summary of Defensive ACM in Mutual Support

- Take advantage of every resource you have to get an early detection of a threat to avoid getting defensive.

- Always maintain flight integrity and mutual support, even when fighting for your life.

- In order to negate the threat as soon as possible, your flight must know and practice some preplanned maneuvers that can be employed in an instant to defeat the bandit.

- Clear concise comms are never more critical than when you are engaged defensive.

- Both the defensive and supporting fighter need to do the break turn. The defensive fighter does his best BFM while the supporting fighter gets a tally on the bandit and re-enters the fight ASAP.

- Maximize BFM problems for the bandit while denying him a shot long enough for the SF to down the bandit.

“Yea though I fly through the valley of the shadow of death... I fear no evil ... for I fly the biggest, baddest, meanest, fastest mother@$%#@# in the whole damn valley.” -Anon

Defensive situations are where mutual support is absolutely critical. The survival of yourself or your wingman depends on it. Understanding some defensive maneuvers, and quick execution of them, can be the difference between life and death.
Practice Practice and...Practice

Time to strap on your G suit...

- Practice with a friend and do a 2 v1 dogfight. It’s not so important that you kill the bandit when practicing. Focus more on having concise, crystal clear comms. You want it to become second nature, so you don’t even have to think about it, and therefore can solely focus on the task at hand.

- Go fly with a senior wing member. Or listen in to a scheduled ATO flight. If you don’t know what a specific brevity call means, ask a question. Your lead would prefer you ask instead of not following his instructions.

- The student becomes the teacher...Once you start getting the hang of it, try to help out some of the new members of the wing. Teaching reinforces concepts learned. You really have to understand a concept to be able to explain it to a student who knows nothing about it. Also, it will make your job easier when YOU are in the lead ship. Strong concise comms by you and your wingman will make you an efficient, effective, and lethal machine... FIGHTS ON

If you don’t practice, you better know how to use your standard issue .45 caliber pistol, and be a fast runner.

“It is generally inadvisable to eject directly over the area you just bombed.”
- USAF Manual
Airman: Pitch up... Pitch down... Roll Right... Roll Left... Rudder Right... Rudder Left... Looks Good.

Pilot: OK, let me know when you're ready on the brakes.

Airman: Alright ready on the left brake, grip it, no grip it, grip it, and no grip it. And on your right, grip it, no grip it, grip it, and no grip it.

Pilot: Alright, thanks for the help. Really appreciate it. We will do a roll over in just a second.

Airman: No problem at all sir. Go get 'em and we'll see you back on deck.

Pilot: Seoul ground, Viper 51, ready to copy...
The ground school portion of Mutual Support is complete, time to get airborne...
Appendix

Brevity Terms

**ACM** – Air Combat Maneuvering

**ABORT** - Directive/informative to cease action/attack/event/mission.

**ADD** - Directive call to add a specific (system) or (EOB category) to search responsibility.

**ANCHOR(ED)** - 1. Orbit about a specific point; refueling track flown by tanker. 2. Informative to indicate a turning engagement about a specific location.

**ANGELS** - Height of friendly aircraft in thousands of feet

**ARIZONA** - No ARM ordnance remaining.

**AS FRAGGED** - Unit or element will be performing exactly as stated by the air tasking order.

**AZIMUTH** - Two or more groups primarily separated in bearing.

**BFM** – Basic Flight Maneuvers

**BANDIT** - An aircraft identified as enemy, in accordance with theater ID criteria. The term does not necessarily imply direction or authority to engage.

**BEAM(ING)** - Target stabilized within 70 to 110 degree aspect; (Direction) generally given with cardinal directions: east, west, north, south.

**BINGO** - 1. Fuel state needed for recovery. 2. Proceed/am proceeding to specified base (field) or carrier.
Appendix

Brevity Terms

**Blind** - BLIND No visual contact with friendly aircraft/ground position. Opposite of VISUAL.

**Bogey** - A radar or visual air contact whose identity is unknown.

**Bracket** - Indicates geometry where friendly aircraft will maneuver to a position on opposing sides, either laterally or vertically from the target.

**Break** - (Direction) Directive to perform an immediate maximum performance turn in the direction indicated. Assumes a defensive situation.

**Buddy Spike** - Friendly aircraft air-to-air indication on RWR. To be followed by position/heading/altitude.

**Cherubs** - Height of a friendly aircraft in hundreds of feet.

**Committed** - Fighter intent to engage/intercept; controller continues to provide information.

**Continue** - Continue present maneuver, does not imply clearance to engage or expend ordnance.

**Declare** - Inquiry as to the identification of a specified track(s), target(s), or correlated group.

**Extend** - Short term maneuver to gain energy, distance, or separation; normally with the intent of re-engaging.

**Engaged Offensive** – You are on the bandits six o’clock or have the advantage in a fight.

**Engaged Neutral** – Neither you or the bandit have the advantage.
Appendix

Brevity Terms

**Engaged Defensive** – The bandit is on your six o’clock or has the advantage.

**FOV** – Field of view

**Gimbal** - Radar target is approaching azimuth or elevation limits.

**SA** – Situational Awareness

**Splash** – A/A Target Destroyed

  A/G Weapons Impact

**Spike** - RWR indication of an AI threat in track, launch, or unknown mode. Include bearing/clock position and threat type, if known.

**Strobe** - STROBE Radar indications of noise jamming.

**Tally** - TALLY Sighting of a target, bandit, bogey, or enemy position; opposite of NO JOY

**Threat** - Untargeted HOSTILE/BANDIT/BOGEY within prebriefed range/(Direction) aspect of a friendly.

**Visual** - Sighting of a friendly aircraft/ground position; opposite of BLIND.

**WEZ** – Weapons Employment Zone. Within range of a specific armament that can be employed.