

**BY ORDER OF THE
COMMANDING OFFICER OF
THE 185th RESERVOIR DOGS
VFS**

**185th VFS INSTRUCTION 14-5
28 DECEMBER 2006**

Operational Conversion



Basic Fighter Manoeuvres Practical Lessons

NOTICE: This publication is available on the 185th WWW site at:
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Months of preparation, one of those few opportunities, and the judgment of a split second are what makes some pilots an ace, while others think back on what they could have done. Colonel Gregory 'Pappy' Boyington, USMC

This document is designed to accompany the BFM Theory Package and contains a series of Lessons that pilots can use to practice the BFM Techniques.





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BFM INTRO LESSON V1-0.tac							
By <i>Vosene</i>							
Falcon Version	Patch Status	Theatre of Operations (Check one)					
Allied Force	V1.09	Balkans		Balkans 2005		Balkans 2010	
		Korea		Korea 2005	X	Korea 2010	
Package Information							
Takeoff time	Callsign	Task	Target	Time on Target	Package #	AC # & type	
0818	Chalis1	AWACS	North Korea	0830	1417	1x E-3	
0903	Cowboy1	BARCAP	Border Area	0911	1031	4x F-16C-52-CCIP	
0905	Falcon1	BARCAP	Border Area	0913	1031	4x F-16C-52-CCIP	
(1) Blue colour indicates for human use. Red colour indicates for AI only.							
Mission Success criteria		Cowboy1	Complete Training Material				
		Falcon1					
Mission Partial Success criteria		Cowboy1	Complete Training Material				
		Falcon1					
Air to Air Weapon Loadout (Free or Fixed)		Fixed					
Air to Ground Weapon Loadout (Free or Fixed)		Fixed					
Mission Flight plan (Free or Fixed)		Fixed					

Aim

To revise pilots on the use of avionics and weapons associated with aerial combat in the F-16.

Time Required

1.45 hrs (30 mins ground school, 1 hr in cockpit, 15 mins debrief).

Topics to be Covered

Radar Modes: RWS & TWS (including SAM+STT), ACM (including all submodes).

How to Fire Cannon (inc HUD symbology and Gun Sight Modes)

How to Fire AiM-120 (inc HUD symbology and difference between B,C-4 and C-5 variants)

How to Fire Sidewinder (inc HUD symbology and different between M and X variants)

Briefing Material

Pilots should read the following material before the practical lesson:

185th BFM Lesson 1: The Geometry of Air Combat

Allied Force Manual: Page 85-115

Briefing Notes

The mission starts on the taxi-way at Seoul airbase. After take-off you should proceed to Stp 3 as the BARCAP is operating between Stp 3 and Stp 4. Before you arrive at Stp 2 you should pickup contacts with your radar in RWS mode at 80 miles scan, they will be at Angles 28. The contacts are enemy An-124 and there will be regular flights of four running parallel to your BARCAP for the duration of your sortie.

During the ingress take the opportunity to explore the RWS and TWS modes (including SAM and STT) using the An-124 as targets. You should also review the AiM-120 AMRAAM HUD symbology and missile operation. Pay particular attention to: the WEZ and factors that affect it, range, aspect angle and angle off.

Once you are within 10 miles of the bandits you should switch to ACM mode and review its operation, including radar sub-modes. During this time you should also explore the AiM-9 Sidewinder symbology and use, including the caged and uncaged modes. You should review how you can lock up a target without using radar and the advantages of the AiM-9x high off-boresight capability.

Finally switch to the gun and review the different gun sights and associated HUD symbology. There is no need to review how to line up for a shot as this will be covered in detail in the Offensive BFM lesson.

If the bandits move out of range of the BARCAP area at any point then simply head back towards Stp 3 and you should pickup the next group of bandits within a few minutes.

Once you have finished the engagements land back at Seoul and conduct a short debrief.



OFFENSIVE BFM LESSON V1-0

Aim

To teach pilots how to employ basic offensive BFM techniques.

Time Required

1.45 hrs (30 mins ground school, 1 hr in cockpit, 15 mins debrief).

Topics to be Covered

BFM Turns, Energy Management, Corner Velocity, Fight Entry, Gun Shot Procedures.

Briefing Material

Pilots should learn the meaning of the following brevity code words:

- a. Tally.
- b. Visual.
- c. No Joy.
- d. Blind.
- e. Offensive.
- f. Defensive.
- g. Fight's On.
- h. Knock-It-Off.

Pilots should read the following material before the practical lesson:

185th BFM Lesson 2: Offensive BFM.

Setup

The Offensive BFM lesson is flown using the dogfight mode and requires a minimum of two human pilots, the instructor should take the role of the defensive fighter in red flight and students, the offensive fighters, in blue flight. Setup the dogfight as shown in Figure 1.



Figure 1 – Dogfight Settings for Offensive BFM

Briefing Notes

The mission will start with the aircraft head-on at 5 nm. The manoeuvring floor is 5,000 feet AGL. Call "Knock-It-Off" when one or both reach the floor and set-up again. The instructor should position himself at Angels 25 and 450 knots while the first student moves to a position 1 nm (6,000ft) in trail as shown in Figure 2. The easiest way to do this is to start line abreast and then both aircraft executing a turn towards the instructor's side.

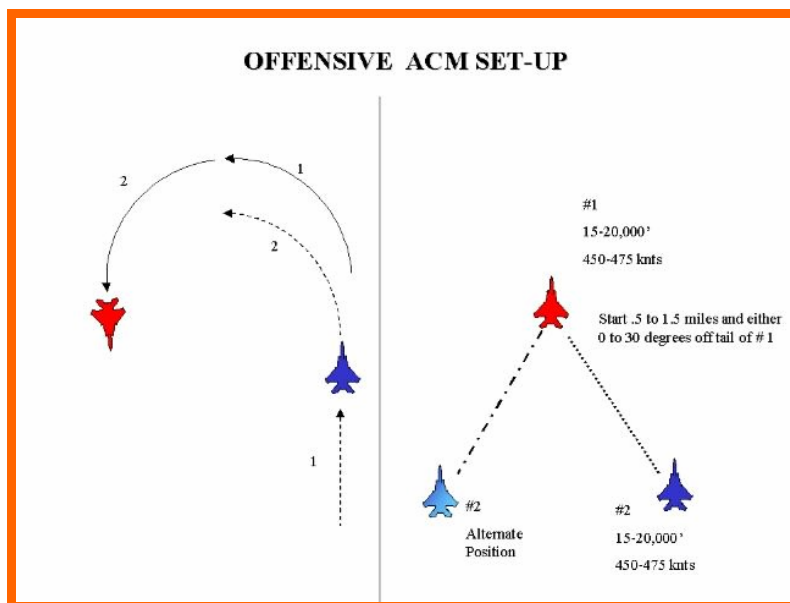


Figure 2 – Initial Offensive Setup

The fight will start when the trailer calls "Two is established at 1 nm and ready" with the instructor responding "One is ready – fight's on". **You should also switch on the ACMI.**

With the "Fight's On" call the defender should crank into a defensive turn, forcing the offensive aircraft to BFM and use lead pursuit to close the range if necessary or go lag to increase the range. If the offensive fighter cannot get into a guns position and achieve a kill, the fight should be set up again, with the defender pulling a 5G level turn. If he still cannot achieve a guns kills then set up once more but this time the defender should pull an easy 30° banked turn. Once the kill is successfully achieved then go back to a more dynamic engagement. The fight should be called off by the Instructor when the kill is achieved or the offensive fighter becomes defensive with the call "Knock-It-Off".

After the setup has been completed three times you should exit dogfight mode and conduct a debrief using the ACMI. Pay particular attention to speed management including corner velocity, understanding of the entry window (especially from 1.5nm setup), the correct use of pursuit to get to the elbow and the technique used when firing the gun.

When ready you should move onto the next setup as shown in the figure below and repeat the process.

Setup	Range	Speed	Special Actions @ Fight's On
1	1 nm (6,000ft)	450 kts	
2	0.5 nm (3,000 ft)	300 kts	
3	1.5 nm (9,000 ft)	450 kts	
4	1nm	450 kts	Attacker flies best BFM using Mil Power only

Figure 3 - Offensive Setups



DEFENSIVE BFM LESSON V1-0

Aim

To teach pilots how to employ basic defensive BFM techniques.

Time Required

1.45 hrs (30 mins ground school, 1 hr in cockpit, 15 mins debrief).

Topics to be Covered

BFM Turns, Energy Management, Corner Velocity, Fight Entry, Gun Shot Procedures.

Briefing Material

Pilots should learn the meaning of the following brevity code words:

- a. Break.
- b. Spike.
- c. Beam(ing).

Pilots should read the following material before the practical lesson:

185th BFM Lesson 3: Defensive BFM.

Setup

The Defensive BFM lesson is flown using the dogfight mode and requires a minimum of two human pilots, the instructor should take the role of the offensive fighter in red flight and students, the defensive fighters, in blue flight. Setup the dogfight as shown in Figure 3.



Figure 4 – Dogfight Settings for Defensive BFM

Briefing Notes

The mission will start with the aircraft head-on at 5 nm. The manoeuvring floor is 5,000 feet AGL. Call "Knock-It-Off" when one or both reach the floor and set-up again. The first student should position himself at Angels 25 and 450 knots while the instructor moves to a position 1 nm (6,000ft) in trail as shown in Figure 5. The easiest way to do this is to start line abreast and then both aircraft executing a turn towards the student's side.

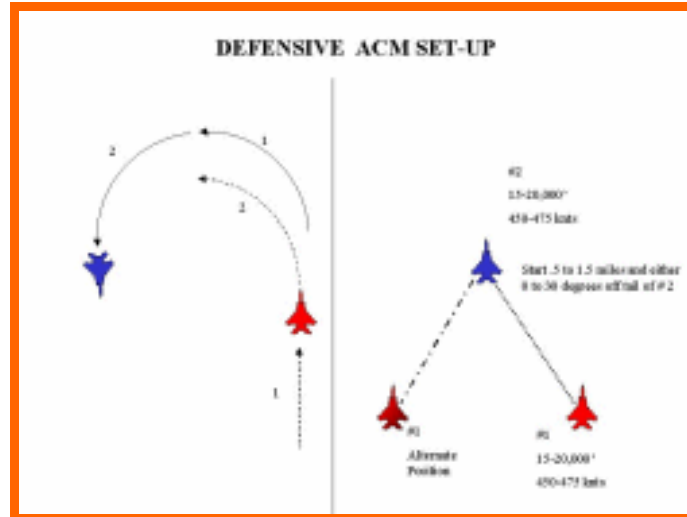


Figure 5 – Initial Defensive Setup

The fight will start when the trailer calls "One is established at 1 nm and ready" with the student responding "Two is ready". The Instructor then calls "Fight's on". **You should also switch on the ACMI.**

With the "Fight's On" call the defender should crank into a defensive turn, forcing the offensive aircraft to BFM and use lead pursuit to close the range if necessary or go lag to increase the range. The objective of the defender is to survive, go neutral, gain the offensive and kill the instructor if able or else separate. If the defender cannot avoid being killed, the fight should be setup again, with the attacker pulling a 5G level turn. If he still cannot avoid being gunned then setup again but this time the attacker should pull an easy 30° banked turn. Once the defender completes his objectives then go back to a more dynamic engagement. The fight should be called off by the Instructor when the defenders objectives are met or the defender is destroyed with the call "Knock-It-Off".

After the setup has been completed three times you should exit dogfight mode and conduct a debrief using the ACMI. Pay particular attention to the quality of the initial defensive break, achieving the head-on pass (with the 1.5nm setup) maximising advantages in the overshoot and scissors; and quality of the guns defence.

When ready you should move onto the next setup as shown in the figure below and repeat the process.

Setup	Range	Speed	Special Actions @ Fight's On
1	1 nm (6,000ft)	450 kts	
2	0.5 nm (3,000 ft)	300 kts	Defender @ Corner Velocity (350 kts)
3	1.5 nm (9,000 ft)	450 kts	
4	1 nm	450 kts	Attacker pulls in vertical till 40° nose-high then free to manoeuvre
5	1nm	450 kts	Attack flies lead pursuit until overshoot
6	1nm	450 kts	Attacks flies best BFM using Mil Power only

Figure 6 - Defensive Setups



HEAD ON BFM LESSON V1-0

Aim

To teach pilots how to employ basic Head On BFM techniques.

Time Required

1.45 hrs (30 mins ground school, 1 hr in cockpit, 15 mins debrief).

Topics to be Covered

Escape Window, Types of Lead Turns, One & Two Circle Fights.

Briefing Material

Pilots should read the following material before the practical lesson:

185th BFM Lesson 4: Head On BFM.

Setup

The Head On BFM lesson is flown using the dogfight mode and requires a minimum of two human pilots, the instructor should take a fighter from red flight and students take fighters in blue flight. Setup the dogfight as shown in Figure 7.



Figure 7 - Dogfight Settings for Head On BFM

Briefing Notes

The mission will start with the aircraft head-on at 25 nm. The manoeuvring floor is 5,000 feet AGL. Call "Knock-It-Off" when one or both reach the floor and set-up again. No manoeuvring is allowed until the aircraft pass each others 3-9 line then "Fight's On" should be called by the Instructor and both pilots should fly their best BFM. **You should also switch on the ACMI.**

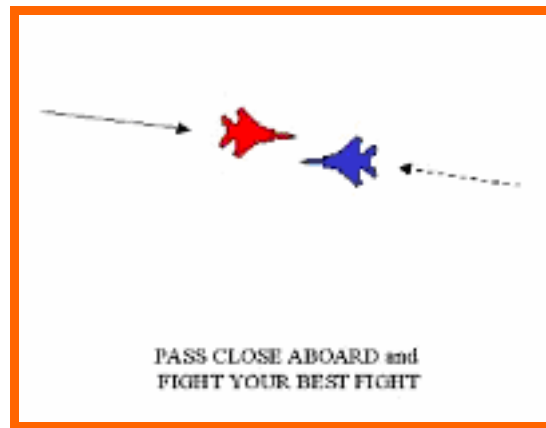


Figure 8 – Initial Head On Setup

The student's objective is to create an offensive BFM position and kill the instructor. If he gets Defensive he should avoid being killed. The fight should be called off by the Instructor when the student's objectives are met or he is destroyed with the call "Knock-It-Off".

After the initial setup has been completed three times you should exit dogfight mode and conduct a debrief using the ACMI. Pay particular attention to the quality of any Lead Turn, maintaining corner velocity and making intelligent decision about where to take the fight in order to gain an advantage.

When ready you should move onto the next setup as shown in the figure below and repeat the process. Depending on how well the student is progressing you can apply the setup restrictions to either the Instructor or Student.

Setup	Range	Speed	Special Actions @ Fight's On
1	25 nm	450 kts	Fight's On after 3-9 line crossed
2	25 nm	450 kts	Fight's On after 3-9 line crossed, one aircraft restricted to Mil power only
3	25 nm	450 kts	Fight's On when both aircraft have Tally
4	25 nm	450 kts	Fight's On when both aircraft have Tally, one aircraft restricted to Mil power only
5	25 nm	450 kts	Fight's On after 3-9 line crossed, one aircraft restricted to max 6g

Figure 9 - Head On Setups