AU/ACSC OLMP/2016

AIR COMMAND AND STAFF COLLEGE

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Changing The Introduction to Fighter Fundamentals Course for 21st Century F-15C Pilots

by

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A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

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January 2016

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PREFACE

` The research and writing of this paper would not have been possible without the sacrifices and patience of my wife and children. Your dedication has never gone unnoticed. For this I am eternally grateful. I would also like to thank my research professor Dr. Ed Ouellette. You changed my entire view of research and writing. I hope other students have the opportunity to learn from you. Finally my classmates, your time, effort and energy were very much appreciated. We are the greatest Armed Forces on the planet because of people like you.

ABSTRACT

The United Sates Air Force has been using the Introduction to Fighter Fundamentals course (IFF) in relatively the same manner for the last forty years. During that time, the F-15C, its tactics and adversaries have grown dramatically. IFF has not evolved to replicate the follow-on training students will encounter in the F-15C or other fighter aircraft. Based on this fact, a decision was made to look at this problem and assess possible solutions.

A comparison between the F-15C B-course and IFF was used to evaluate the skills and experience students would receive at IFF and whether or not those skills and experiences are transferable to the F-15C. Highlighted throughout this research was the fact that based on the T-38C being used as a trainer and the time spent focusing on flying the T-38C was not producing the desired results. The F-15C has evolved to the point that no longer does the IFF experience prepare students for success in the F-15C B-course.

Based on these findings, a recommendation to move the IFF course for F-15C students to the F-15C B-course is made. Modifying the course, allowing for more exposure to the F-15C, its systems and tactics, is the preferred solution. Using the F-15C B-course as an example, other fighter training units will be able to build upon its success. IFF is a valid training course, but it needs to evolve to allow fighter pilots greater success in their follow-on aircraft.

INTRODUCTION

Introduction to Fighter Fundamentals (IFF) was first introduced to the United States Air Force as the Fighter Lead-In Program during a Curriculum Review Conference at Luke AFB, Arizona in 1969.[1] The argument was made that using the T-38A was a better training platform to use as a bridge from Pilot and Navigator training than going straight to the F-4 or the A-7 and more cost efficient.[2] Historically, once complete with Undergraduate Pilot Training / Undergraduate Navigator Training, aircrew would proceed directly to their Combat Crew Training (CCT) in their respective fighter. During this training, aircrew would be introduced to new concepts such as Basic Fighter Maneuvering and Ground Attack. Proving to be a substantial leap, Fighter Lead-In was established to bridge the gap and make the transition smoother. In 2015, the United States Air force is still using the basic Fighter Lead-In concept and T-38C as a training platform. The T-38C is an updated version of the T-38A, using a Heads Up Display and Global Positioning System as a navigation source.

What has changed dramatically since 1969 are the fighter aircraft the United States Air Force uses, the technology they employ and their tactics. Unfortunately, the IFF program and concept has not changed with it. IFF still focuses on basic formation flying, instruments and Basic Fighter Maneuvering or BFM. This is all completed in an airframe pilots will never go to war in and perhaps never fly again.

The F-15C and the arena in which it employs are extremely dynamic. The technology and tactics of the F-15C are well beyond anything the T-38 or IFF can replicate. The focus will be if the current IFF program prepares students for success in the F-15C Basic Course or if it is an antiquated training concept.

How can the current Introduction to Fighter Fundamentals course be adapted to allow improved success in the F-15C Basic Course that may ultimately lead to greater air superiority via more capable F-15C pilots? By changing the concepts and structure of IFF, greater success can be achieved in the F-15C and other fighter platforms.

The United States Air Force (USAF) should change the way it currently executes the Introduction to Fighter Fundamentals course in regards to the F-15C. So much has changed since Fighter Lead-In was first established in 1974.[3] As her adversaries have evolved in their tactics and aircraft, the USAF must ensure the same. However, IFF still uses concepts and aircraft that were developed over forty years ago. This does not set up current fighter pilots for success in their follow-on aircraft, such as the F-15C.

Because it is no longer a viable training bridge between Specialized Undergraduate Pilot Training (SUPT) and the F-15C Basic Course, IFF needs to be changed. The concept of IFF as a bridge before moving on to the F-15C is still viable. It is quite a jump to go from flying a T-38C in the pilot training environment, to sitting in a single seat fighter and using it as a weapon. There is no doubt this is a challenge. Using the same construct from 1969 because it is how things have been done things does not look at current and future aircraft and the best way to allow fighter pilots the ability to succeed in employing them.

An archaic training concept and platform reduces the F-15C student's ability to excel in their training course. The T-38C is a good airplane and has supported both pilot training and IFF for more than 50 years.[4] There is no question the United Sates Air Force has gotten its proverbial bang for its buck out of the aircraft. What the T-38C is not is a fighter aircraft. It lacks the power, technology and ability to survive in a modern combat environment. It has recently, along with pilot training and IFF, been used as an aggressor for the F-22A, at both

Langley AFB and Tyndall AFB.[5] The T-38C performs admirably in this role. It does not, however, replicate current third and fourth generation plus adversary aircraft.

Since February 1974, little has changed with the conceptual and physical execution of IFF. Students coming from IFF have complained they have thought it was a waste of time.[6] Although students were interested in learning new concepts, spending 5 weeks flying the T-38C was not the best preparation for flying the F-15C in their opinion.[7] So then, why is the United States Air Force still using IFF in the same manner they have always been if current students do not feel the training is adequate for the F-15C?

Critics may argue, that there should be no reason to change the current IFF model based on the success the USAF has enjoyed in establishing Air Superiority. There is no argument the United States has enjoyed the blanket of air superiority since the last air attack on U.S. troops in 1953, during the Korean War.[8] Changing something that is proverbially not broken goes against most logic and reason. Why would IFF need to be changed if the past has shown us that the products and result have done nothing but produce a favorable end result?

This would be shortsighted in reference to current and future challenges in the Air Dominance arena. The world is a dangerous place and so is the air superiority domain. Our country has gone to great lengths procuring new advanced weapons such as the F-22A and F-35A, meanwhile updating older aircraft with advanced technology to ensure air dominance.[9] So have her near peer adversaries, such as Russia and China.[10] As the USAF and its fighter inventory adapt and improve so must its training programs. A new aircraft to be used in IFF is another research topic entirely, one that is currently being investigated.[11] Until then, the USAF has a responsibility to give fighter pilots the best training available to ensure their success, not only in the F-15C Basic Course but ultimately in the air superiority domain.

This research paper will utilize the problem-solution research framework to determine if changes to the current Introduction to Fighter Fundamentals (IFF) course will allow for improved success in the F-15C Basic Course. Currently students are showing up to the F-15C Basic Course without the appropriate skills to succeed in the course.

IFF lacks the ability to produce realistic training and skills required for success in the F-15C. These changes would include moving the respective IFF course and T-38C aircraft for the F-15C to the F-15C Basic Course. The intent would be to focus on introduction to Basic Fighter Maneuvering concepts with minimal rides in the T-38C to apply said concepts. Meanwhile exposing F-15C IFF students earlier to simulators, academics and briefs to allow for increased exposure in their actual Major Weapon System.

The effectiveness of IFF and its current status will be analyzed, as well as the experience of IFF students in relation to their success at the F-15C Basic Course. Other Factors such as, IFF and F-15C Instructor Pilot feedback will be used to asses student performance both in the current IFF course and potential recommended changes. Cost, infrastructure and Programmed Flying Training (PFT) will also be evaluated to highlight any potential benefits or drawbacks to recommended changes. Another option would be to modify the current program but leave it intact as it currently stands. Finally, the last option would be to leave the IFF program as it is. The results of this study will be a recommendation to update the IFF program to ensure continued success in the F-15C Basic Course as the air superiority domain continues to evolve.

BACKGROUND

Currently, the United States Air Force uses the Introduction to Fighter Fundamentals course as a bridge for pilot and navigators between Undergraduate Pilot Training and Navigator Training to their follow-on fighter training.[12] The course is held at Randolph AFB, Columbus AFB, or Sheppard AFB. Depending on the aircraft students final airframe, the course is between forty to forty-three days.[13] For the purpose of this research, the focus will be on those students designated to fly the F-15C following completion of the Introduction to Fighter Fundamentals course. The data produced can be extrapolated to other fighter aircraft, as the IFF course is relatable in all fighter aircraft, with minor differences in syllabus focus. The courses are slightly different at all the training bases, but retain the same training objectives and overall end state. The 435th Fighter Training Squadron and their syllabus, AETC Syllabus B/F-V5A-K dated July 2014, Change1, January 2015, will be primarily used as the example throughout this research. Once complete with this training, students designated to fly the F-15C, move on to their Initial Qualification training at Kingsley Field in Oregon.[14]

The Introduction to Fighter Fundamentals course began almost fifty years ago at a Curriculum Review Conference at Luke AFB, Arizona.[15] The concept of a "fighter lead-in" had three purposes: First, flying modern day fighters at the time was expensive. In 1969, the T-38 cost approximately $319 per flying hour, whereas the F-4 was $1,215 and the A-7 was $947.[16] Second, the thought that a better pilot would be produced using this new training concept with the ability to "learn Basic Fighter Maneuvers (BFM), selected ground attack and tactical formations in a familiar, easier-to-fly aircraft, theoretically advancing faster than if starting these courses in a new and more difficult airframe".[17] Finally, "with fewer first-line fighter aircraft

devoted to training missions, TAC's combat posture would be strengthened."[18] These all are reasonable to understand and formed the groundwork for Fighter Lead-In Training. In June 1972, Tactical Air Command received permission for the concept and in 1974 was authorized to start a "limited" program.[19] Today this program still exists, known today as Introduction to Fighter Fundamentals.

Introduction to Fighter Fundamentals, commonly known as IFF, is executed at Randolph AFB, Texas, 12th Flying Training Wing, 435th Fighter Training Squadron.[20] A general description of the course is, "the transition course between USAF Specialized Undergraduate Pilot Training (SUPT), Euro-NATO Joint Jet Pilot Training (ENJJPT), or USAF T-38 Transition Course and fighter formal training units (FTUs)."[21] Students selected to fly the F-15C for their follow-on aircraft participate in the Track A portion of the syllabus.[22] The Track A portion consists of forty training days which includes 7 ground training days and thirty-three flying training days.[23] Track A students upon completion "will be proficient in all basic conversion, emergency, formation, and instrument tasks."[24] Track A students will also be proficient in Offensive Basic Fighter Maneuvering (OBFM), Defensive Fighter Maneuvering (DBFM) and High Aspect Basic Fighter Maneuvering (HABFM).[25]

Track A students will fly 4 formation sorties, 1 Instrument / Advanced Handling sortie, 4 OBFM sorties, 4 DBFM sorties and 5 HABFM sorties.[26] The following is a visual depiction of the flying training portion of the IFF course. As you can see in Figure 1, Track A students gain a total of 17.1 hours of flying and a total of 18 sorties. The DS column is known as Direct Support (Figure 1). This is defined when another T-38 besides the student's is required to accomplish the objectives for the mission.

Figure 1. IFF Flying Training Summary

Mission	Track (Hours)									
	A (Air-Air)		B (Dual Role)		C (Air-Gnd)		D (WSO)		E (F-22A/ADAIR)	
	Student	DS[1]	Student	DS[1]	Student	DS[1]	Student	DS[1]	Student	DS[1]
F-1	1.1	—	1.1	—	1.1	—	1.1	1.1	1.1	—
F-2	1.1	—	1.1	—	1.1	—	—	—	1.1	—
F-3	1.1	1.1	1.1	1.1	1.1	1.1	—	—	1.1	0.3
F-4	1.1	1.1	1.1	1.1	1.1	1.1	1.1	—	1.1	1.1
H-1	1.0	—	1.0	—	1.0	—	—	—	1.0	—
OB-1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	—	0.9	0.9
OB-2	0.9	0.9	0.9	0.9	0.9	0.9	—	—	0.9	0.9
OB-3	0.9	0.9	0.9	0.9	—	—	—	—	0.9	0.9
OB-4	0.9	0.9	0.9	0.9	—	—	—	—	0.9	0.9
DB-1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	—	0.9	0.9
DB-2	0.9	0.9	0.9	0.9	0.9	0.9	0.9	—	0.9	0.9
DB-3	0.9	0.9	0.9	0.9	0.9	0.9	0.9	—	0.9	0.9
DB-4	0.9	0.9	0.9	0.9	0.9	0.9	—	—	0.9	0.9
HB-1	0.9	0.9	0.9	0.9	—	—	0.9	—	0.9	0.9
HB-2	0.9	—	0.9	—	—	—	—	—	0.9	—
HB-3	0.9	—	—	—	—	—	—	—	0.9	—
HB-4	0.9	0.9	—	—	—	—	—	—	0.9	0.9
HB-5	0.9	0.9	—	—	—	—	0.9	—	0.9	0.9
S-1	—	—	0.9	0.9	0.9	0.9	0.9	—	—	—
S-2	—	—	0.9	0.3	0.9	0.3	—	—	—	—
S-3	—	—	—	—	0.9	0.9	—	—	—	—
S-4	—	—	0.9	0.3	0.9	0.3	0.9	—	—	—
S-5	—	—	0.9	0.3	0.9	—	—	—	—	—
SAT-1B/C D	—	—	1.1	1.1	1.1	1.1	0.9	0.9	—	—
SAT-2B/C D	—	—	1.1	1.1	1.1	1.1	0.9	0.9	—	—
SAT-3C	—	—	—	—	1.0	—	—	—	—	—
SAT-4C	—	—	—	—	1.0	1.0	—	—	—	—
SAT-5C	—	—	—	—	1.0	1.0	—	—	—	—
Total Hours	17.1	12.1	20.2	14.3	20.5	14.2	11.2	2.9	17.1	11.3
Total Sorties	18	13	21	17	21	16	12	3	18	13
SSR[3]	35.7		43.7		42.5		17.3		35.7	

Notes:
1.Direct support (DS) sorties flown by IPs in support of student mission (includes sorties used for WSO training).
2.How to log DS in formation with an upgrading WSO:
a.Non-PFT (Programmed Flying Training) WSO syllabus sortie flown vs. UP or UI (not B/S/FDS) =WSO: 0; UP/UI: 1
b.Non-PFT WSO syllabus sortie flown vs. DS (including B/S/FDS) = WSO: total number in formation
c.PFT WSO syllabus sortie flown vs. UP or UI (not B/S/FDS) = WSO: 0; UP/UI: 0
3.Student Sortie Requirement (SSR) = Student Sorties + Direct Support +15 percent refly. 15 percent reflyreflects non-effective sorties for maintenance, SNPs, other, and unaccomplished tasks

Depicted is the flying training portion of the syllabus. Track A students also complete ground training and simulator training while they are at IFF.[27] Ground Training consists of Aircrew Flight Equipment (AFE), Specialized Training (ST), Physical Conditioning Program, and Aerospace Physiology (AP), Aircraft Systems (AS), Aircraft Handling Characteristics (AHC), Formation (FM), Basic Fighter Maneuvers (AA), Low Altitude Operations (LA) and Mission Planning (MP).[28] The simulator is used to teach Emergency Procedures (SEP), Instruments (SI), Formation (SF), BFM (SB) and Air Combat Maneuvering (SM).[29] Any student that attends IFF at Randolph AFB is sent on Temporary Duty (TDY), which costs approximately $12,000 per student, as there is currently no pilot or navigator training co-located at this location.[30]

In the Formation phase of the course, students practice 2-ship and 4-ship formation flying.[31] All students have previously completed 2 and 4-ship formation flying in their pilot training course. Now there is an emphasis on ranging exercises, heat to guns exercises, and simulated IR missile shots that most students have not previously had experience executing.[32] These exercises focus on visually confirming site pictures to determine range and aspect angle to employ simulated IR missiles and simulated gun attacks. The instrument / advanced handling (AHC) sortie focuses on flying instrument approaches which all students have done in the T-38 as well as flying the T-38 in the AHC regime. AHC provides the student the experience of flying the aircraft in a regime which may be beyond anything students have seen to date.[33]

Upon completion of the formation and instrument phase, Track A students move onto the OBFM, DBFM and HABFM phases. These phases emphasize using the T-38 as a weapon and teach the basics of dogfighting in the T-38. OBFM focuses on starting

from behind the adversary from either 3,000 feet or 6,000 feet.[34] DBFM focuses on starting with the adversary behind the student at either 3,000 or 6,000 feet, and HABFM focuses starting from a neutral position and working towards becoming offensive.[35] These basic skill sets are used to reinforce the concepts learned in the simulator and academics. All the BFM is completed in and against another T-38. It comes as no surprise to anyone that the T-38's BFM execution or performance is not comparable to any current or future fighter. The T-38 just cannot execute or simulate the flight regimes of third generation (or later) fighter aircraft.

The T-38, is a "twin engine, high-altitude, supersonic jet trainer."[36] The current T-38C incorporates a glass cockpit with integrated avionics displays, heads-up display and an electronic "no drop bomb" scoring system.[37] It weighs approximately 12,093lbs and has a maximum thrust of 3,300lbs.[38] Conversely, the F-15C weighs 41,422lbs in the BFM configuration and has a maximum thrust of 46,900lbs or 23,450lbs per engine.[39]

While the T-38 lacks in performance, the focus is on the conceptual grasp of the BFM concepts for students.[40] Not only is IFF a training course where students demonstrate proficiency in the mental and physical execution of said BFM concepts. It is also teaching students the "fighter pilot" mentality.[41] This mentality is not something that can be measured on any scale or diagram. It is a mental and physical transition students must meet. The idea of an aircraft goes from simply being a tool to which they fly from point A to point B, to a weapon. A weapon used to achieve national security objectives and, if required, kill an adversary to achieve those objectives.

Once satisfactorily completing IFF, students then graduate and receive a Permanent Change of Station (PCS) to Kingsley Field. Located in Klamath Falls,

Oregon, Kingsley Field is the sole F-15C training base in the United States Air Force. The F-15C Initial Qualification course, also known as the B-course, along with Transition/Requalification or T-X courses and Senior Officer/Test Pilot courses are all taught at Kingsley Field. Students who are first learning to fly the F-15C are enrolled into the B-course.

The F-15C B-course consists of 130 training days which comes out to an approximate course length of 6-7 months. Figure 2 is a visual description of the training days.

Figure 2. Duration

Events	*Basic*	*Track 1*	*Track 2*	*Track 3a*	*Track 3b*	*SOC 4a*	*SOC 4b*	*SOC 4c*
Training Days*	130	84	38	18	9	18	16	14
Academic Hr	280.85 Hr	230.3 Hr	146.8 Hr	66.3 Hr	43.8 Hr	66.3 Hr	94.8 Hr	79.3 Hr
Training Device/Hr	47/69.5 Hr	37/54 Hr	22/34.5 Hr	14/21 Hr	8/12Hr	14/21 Hr	9/13.5 Hr	8/12 Hr
Flying Sorties/Hr	46/56.1 Hr	32/39.0 Hr	12/17.2 Hr	6/7.4 Hr	3/4.1 Hr	6/7.4 Hr	7/9.3 Hr	5/7.8 Hr
Direct Support Sorties/Hr	74/89.3 Hr	53/70.3 Hr	22/28.2 Hr	12/14.8Hr	9/11.8 Hr	12/14.8 Hr	8/10.2 Hr	3/4.4 Hr
Mission Support	231 Hr	165 Hr	70 Hr	38 Hr	20 Hr	38 Hr	37 Hr	28 Hr

The B-course is where students learn how to employ the F-15C in a combat environment. The F-15C will be their primary weapon system and when called upon the aircraft they will take to war. The course objectives are as follows,

> 1.1.1. The Basic, Track 1, and Track 2 Course objectives are to graduate a fighter pilot that is Basic Aircraft Qualified (BAQ) in F-15 conversion and air-to-air mission tasks. BAQ is defined as a status of an aircrew member who has satisfactorily completed training prescribed to maintain the skills necessary to fly the unit aircraft, but who does not maintain Basic Mission Capable (BMC) or Combat Mission Ready (CMR) status. To obtain BMC or CMR status, graduates typically receive Mission Qualification Training (MQT) at the gaining operational unit prior to certification by the unit commander.
>
> 1.1.2. Specifically, graduates will be qualified to employ the aircraft in the air superiority role as a single or as a wingman, day or night. Graduates will be proficient in all conversion, emergency, and instrument tasks, day/night air-to-air refueling, basic low altitude employment and the air-to-air mission tasks as indicated by the Maneuver Item File/Course Training Standards MIF/CTS.

As with IFF, the B-course is broken down into phases to allow for a walk, crawl, run approach learning to fly and employ the aircraft. Figure 3 depicts the flying training portion of the course.

FIGURE 3. Flying Training Summary

B Course						
		DIRECT SUPPORT				
STUDENT		*IP/MP*		*IP/MP*		*MISSION*
SORTIES	*HOURS*	*SORTIES*	**W/Diss*	*HOURS*	**W/Diss*	*TYPE*
TR-1	1.5					CONVERSION
TR-2	1.5					CONVERSION
TR-3	1.5					DEMO CONVERSION
TR-4	1.5	1		1.5		CONVERSION
TR-5	1.5	1		1.5		DEMO CONVERSION
5	7.5	2		3		
I-1	1.8					DEMO INSTRUMENT
I-2	1.8	-		-		QUAL/INSTM CHECK
2	3.6					
AHC-1	1.1					DEMO ADV HANDLING
AHC-2	1.1	-		-		DEMO ADV HANDLING
2	2.2	-		-		
BFM-1	0.8	1		0.8		OBFM
BFM-2	0.8	1		0.8		OBFM
BFM-3	0.8	1		0.8		OBFM
BFM-4	0.8	1		0.8		DEMO OBFM
BFM-5	0.8	1		0.8		DBFM
BFM-6	0.8	1		0.8		DBFM
BFM-7	0.8	1		0.8		DBFM
BFM-8	0.8	1		0.8		DEMO DBFM
BFM-9	0.8	1		0.8		HABFM
BFM-10	0.8	1		0.8		HABFM
BFM-11	0.8	1		0.8		HABFM
BFM-12	0.8	1		0.8		DEMO HABFM
BFM-13	1.1	1		1.1		DEMO ADV. HABFM
BFM-14	0.8	1	*-1*	0.8	*-0.8*	DEMO ADV. OBFM
BFM-15	0.8	1	*-1*	0.8	*-0.8*	DEMO ADV. DBFM
15	12.3	15	*-3*	12.3	*-1.6*	
INT-1	1.4	1	-	1.4	-	DEMO BASIC INT
1	1.4	1		1.4		
TI-1	1.4	1		1.4		1v1 TAC INT
TI-2	1.4	1		1.4		DEMO 1v1 TAC INT
TI-3	1.4	3	*-2*	4.2	*-2.8*	2v2 L&D TI
TI-4	1.4	3	*-2*	4.2	*-2.8*	DEMO 2vX L&D TI
TI-5	1.1	4	*-3*	4.4	*-3.3*	DEMO SRC 2vX
TI-6	1.4	3	*-2*	4.2	*-2.8*	DEMO 2vX L&L TI
TI-7	1.4	7	*-4*	9.8	*-5.6*	4vX L&L TI
7	9.5	22	*-13*	29.6	*-9.5*	
NINT-1	1.4	1		1.4		DEMO 1v1 BI
NINT-2	1.4	1		1.4		DEMO 1v1 TI
NINT-3	1.4	3		4.2		2v2 TI
NINT-4	1.4	3	-	4.2	-	DEMO 2v2 TI
4	5.6	8		11.2		
ACM-1	1.1	2	*-1*	2.2	*-1.1*	DACM 2v1
ACM-2	1.1	2	*-1*	2.2	*-1.1*	DEMO DACM 2v1
ACM-3	1.1	2	*-1*	2.2	*-1.1*	DEMO DACM 2x1
ACM-4	1.1	2	*-1*	2.2	*-1.1*	AACM 2v1
ACM-5	1.1	2	*-1*	2.2	*-2.2*	DEMO PRO AAACM
5	5.5	10	*-5*	11.0	*-6.7*	
ACT-1	1.3	3	*-2*	3.9	*-2.6*	DEMO 2v2 DCA
ACT-2	1.3	7	*-4*	9.1	*-5.2*	DEMO 4v4 DCA or OCA
2	2.6	10	*-6*	13.0	*-7.8*	
LASDT-1	1.3	1		1.3		DEMO 1v1
LASDT-2	1.3	3		3.9		DEMO 2v2 TAC INT
2	2.6	4	-	5.2	-	
LIVE GUN	1.3	2		2.6		LIVE GUN
1	1.3	2		2.6		
DAAR-1**	0.5					DAY AAR
DAAR-2**	0.5					DAY AAR SOLO
NAAR-1**	0.5					NIGHT AAR
NAAR-2**	0.5					NIGHT AAR
4**	2			-	-	
46	56.1	74	*-26*	89.3	*-25.6*	
			= 47		*= 63.7*	
Student Sortie Requirement (SSR)	46	+	74 +	18%	= 141.6	
Dissimilar SSR =	*46*	+ *47*	+	18%	*=109.74*	

SSR = Student + Direct Support + Refly Rate Sorties (Refly rate is 18% of student and direct support sorties).
* BFM 14-15, TI 3-7, ACM 1-5, ACT 1-2, LASDT 2 may be flown dissimilar in the event dissimilar assets are available.
** DAAR/NAAR flown in conjunction with another syllabus sortie. Does not count toward sortie total.

The TR or Transition Phase of the program is where students learn how to start, taxi, takeoff, and land the aircraft. Instrument flying and formation flying are refreshed from their pilot training course. The I, or Instrument Phase, is dedicated towards preparation for the Instrument check ride and ultimately becoming qualified to fly the aircraft in adverse weather and land with low ceilings and visibility. Students then enter the AHC and BFM phases, which are similar to IFF in their setup, with Offensive, Defensive and Hi-Aspect BFM being the focus. Upon completion, students move on to their TI or Tactical Intercept sorties, night employment, ACM or Air Combat Maneuvering, LASDT or Low Altitude training and ACT or Air Combat Training. Throughout the program the students demonstrate proficiency in air-to-air refueling, day and night flying, and employment of the 20mm Gun with live rounds.

Throughout the course, students are given academics and simulator training. The expectation is students will become experts on everything that has to do with the F-15C. The focus starts with basic aircraft systems and emergency procedures. Once mastered, students move on to academics and simulators where the focus is on weapons employment and tactical capabilities of the aircraft. The academic and simulators are extremely demanding. As you will see in Figures 4, an enormous amount of time is spent in academic classes and the simulator. Coupled with the flying portion of the course most, if not all, students are scheduled to fly and have at least 1 simulator or 1 academic class during a normal workday. As one would expect, this can be a grueling schedule with expectations set very high from the instructor cadre.

Figure 4. Device Training and Lesson Summary

1.8 Device Training Summary –

DEVICE NAME/TYPE (SIM)	B Course #	B Course Hr
CPT	1	2.0
AVI	1	1.5
INST	1	1.5
TR	8	12.0
EPE	1	1.5
BFM	3	3.8
INT	5	7.5
TI (1v1/2v2/4v4)	10	15.0
ACM (2v1)	3	3.5
NINT	3	4.5
SURFACE THREAT	1	1.5
ACT (2v2/4v4)	6	9.0
MIXED ELEMENT	3	6.0
FIGHTER INTEGRATION (OPTIONAL)	1	1.5
EP	1	1.5
TOTAL	48	72.3

1.9. Lesson Summary — All Tracks

COURSE SUBJECTS	B Course Hours
Specialized Training	23.1
Cockpit Procedures Trainer	4.0
Instrument Refresher Course	6.0
Human Factors	3.0
Aircrew Flight Equipment	11.25
Sim Academic Support	6.0
Air-to-Air Refueling	1.5
Aircraft General	24.0
Avionics	22.5
Aircraft Handling Characteristics	7.0
F-15 Radar	26.0
Weapons Employment	13.5
Advanced Theater Intel	5.0
Tactical Electronic Warfare Sys.	5.0
F-15 Identification	2.5
Intercepts	11.5
Mission Planning	9.0
Night Vision Goggles	6.5
Intelligence	11.0
Air-to-Air Employment	29.0
Combat Mission Planning	4
Academic Exams	49.5
ACADEMIC TOTALS	280.85

The mission of the F-15C is to "permit the Air Force to gain and maintain air supremacy over the battlefield."[42] The United States has enjoyed such air supremacy since April 15, 1953.[43] Dominating this domain is a must. Without it, our combatant commanders would be unable to accomplish their missions and catastrophic results would emerge. This is the reason why so much time is spent training an F-15C student pilot. The United States Air Force requires air superiority, the President demands it, and our soldiers on the ground expect it. Every major conflict since the Korea War has been based on having the ability to move freely on the battlefield under this blanket of air superiority.

Now that we have a foundation of knowledge about IFF and the F-15C B-course, the focus will move to analyzing the program. Can the current IFF program be changed to allow for greater success in the F-15C B-course? Should it be? If so, how can or should that change be

initiated? In the following sections, the intent is to highlight any problems with the current program, identify solutions if so, and make recommendations if needed.

ANALYSIS

Arguably since Desert Storm the United States and its Air Force have established air dominance in a manner not seen throughout history. The credit goes to the men and woman who support, fly, and train those responsible for such dominance. IFF is one piece of an enormous puzzle that produces the finest fighter pilots the world has ever seen. The pieces of that puzzle must be constantly refined and evaluated to ensure success in the future. This analysis is looking to do just that. Does the current IFF course give student pilots the skills needed to successfully complete the F-15C B-course?

In Fiscal Year (FY) 2014 and 2015, every student completed the IFF course at Randolph AFB, TX.[44] In that same time period seven students did not complete the F-15C B-course.[45] Reasons for a student failing to complete the B-course were airsickness, self-initiated elimination (SIE), inability to perform instrument flying, inability to fly and employ the aircraft, and G-force issues.[46] Ultimately all of the failures can be associated with the inability to multi-task while flying.[47] Did IFF not prepare these students for the next step in their path to becoming F-15C pilots? Is the forty training day and in most cases 3 month TDY worth the time and effort?[48] Does the T-38C and IFF course prepare students to fly a 4th generation fighter aircraft in 2015 as it did at its inception in 1974?

There is no argument it has always been cheaper to fly the T-38 than it has been flying a fighter. The cost benefits in 1974 are just as pronounced as they are in 2015, if not more so.[49] Feedback from pilots in 1974 going through the IFF or Fighter Lead-In programs found the

program to be “excellent,” “invaluable,” and “expected to be a safer A-7 pilot in RTU because of it.”[50] In 2015, class 15-ABK and 16-ABK also responded when asked to discuss their experience with IFF. These classes contained 6 and 7 students respectively. 15-ABK is just completing the F-15C B-course while 16-ABK has just begun the BFM phase of the program. The reason why these classes were selected was two-fold. First, the perspectives they could provide would come from both the beginning and end of the course. This would allow for those students who were close to graduating the ability to speak to their experiences throughout the B-course. On the other hand, students in 16-ABK, who are just beginning their course, still have the IFF experience relatively fresh in their mind. 16-ABK also has the initial firehose effect to compare to how their IFF prepared them to succeed at the F-15C B-course. When asked specifically to discuss their experience, most students said they enjoyed the program.[51] A few students said it was a waste of time, but a majority enjoyed the program as it currently stands.[52] So how does IFF evolve to eliminate students from washing out of the B-course?

IFF has always been on the pathway towards become a fighter pilot. Previous discussion of the IFF program included explanation of the phases and examples of what students learn while they are there. The flying portion of the course was highlighted in this discussion but there is more to it. Lt Col Jason Early, current Director of Operations for the 435th Fighter Training Squadron explains the 3 types of learning at IFF as, “the flying side, learning from each other and learning from the Instructor Pilots outside of the syllabus”.[53] The first two types of learning are expected in any flight training course. The last type of learning is more ambiguous. This is defined as students understanding their role in a fighter squadron as a wingman.[54]

The role of the “Snack-o” is the person or people responsible for additional duties such as “fini-flight” coordination, squadron morale, and informal squadron administration. They are

important aspects within a fighter squadron and in most cases carried by the younger, less experienced pilots.[55] This learning happens outside of the syllabus because it is not part of the formal course. Likewise, experienced fighter pilots pass on the heritage and mindset of a fighter pilot to the younger generation outside the classroom. The expectations of how fighter pilots should carry themselves, the examples they must set with their work ethic and mentality are all key aspects of succeeding in a fighter squadron. A fighter squadron is no place for the meek. It takes a certain mindset and attitude to survive and ultimately thrive. This mentoring is an important part of a pilot's transition into the fighter world. Although important, how do those skills apply to being more successful in the F-15C?

The IFF program evaluates a student's performance in the T-38C and whether or not they will be successful in their follow-on aircraft. Does the T-38C and the IFF program really reflect the training students will experience in that aircraft? The very first ride in an F-15C, the student is flying an aircraft with a performance envelope well beyond anything they have yet to experience. Students are wearing a Joint Helmet Mounted Cueing System.[56] This gives them the ability to see flight data normally displayed within the cockpit inside their helmet. Students are also managing APG-63 V0 radar, the Flat Panel Color Display (FPCD) and Fighter Data Link (FDL).[57] The T-38C does have integrated avionics displays used for situational awareness.[58] Any differences between the F-15C and the T-38C in terms of avionics and performance capabilities are negligible, if any. Current F-15C students commented that the avionics are "totally" different and it was "overwhelming going from the T-38C to the F-15C."[59]

The execution of the BFM in the T-38C is very two dimensional. For example, the T-38C is unable to exploit or use any vertical turning room. This is not the case in the F-15C. Most, if not all BFM conducted in the F-15C uses and exploits vertical turning room. The

aircraft has the weapons and performance capabilities to do so and is a major part of learning how to employ the F-15C in combat. The F-15C radar is also used extensively in the BFM phase. The T-38C does not have a radar and the student does not have the opportunity to use/employ a radar until they arrive at the B-course. Current F-15C students have commented that the two dimensional BFM learned at IFF is not "transferable to the F-15C."[60] They have also said that neither is the "tactics" used to employ the aircraft in the BFM phase.[61]

When a student shows up at the F-15C B-course, they have a basic understanding of BFM concepts. Most if not all students have said they appreciated the ability to learn something new at IFF.[62] Learning new concepts and getting to experience those concepts first hand is an enormous part of being a fighter pilot. Is the IFF program required to allow for successful completion of the B-course if the skills and experience are questioned by students in regards to the F-15C? Does flying the T-38C make students a better F-15C pilot? There is no data available that can be used for a comparison on students who have not done IFF and gone on to the F-15C and those that have. IFF has always been the precursor to attending the B-course. Even with the aforementioned differences, IFF and F-15C instructor pilots have managed to find common ground. By focusing on the administration portions of fighter employment and expectations of what flying fighter aircraft will be like, the instructor pilots have been able to manage the transition.

If the United States Air Force is spending time and money to send students to a program ultimately designed to prepare them for follow-on training, then the question becomes, is IFF doing what it was designed to do? In discussions with the Director of Operations at both the IFF and the 114th F-15C squadron, both have expressed a need for an IFF type program.[63] Whether or

not, the current IFF program fits that bill needs to be answered. For a program such as IFF to remain relatively unchanged for the past forty years the question is unavoidable.

Times have changed, and even more so, have fighter aircraft. From the way in which they deliver a kinetic effect, to the weapons systems themselves, both pale in comparison to the overall change in our adversaries. The F-4 is a 3rd generation aircraft.[64] The F-15C is a 4th generation fighter; potentially 4.5 generation based on updated radars etc.[65] The total number of F-15C aircraft in the inventory is 249.[66] The United States Air Force currently has 183 F-22A 5th generation aircraft, for a combined total of 432 air superiority fighters.[67] Russia and China, on the other hand, have a combined 1,981 fighter/interceptor aircraft.[68] Not all of these aircraft are 4th Generation, but they have extensive capabilities and could be, and in some circles are, considered peer or near-peer adversaries. Both countries are currently fielding 4th and 4.5 generation aircraft and have developed 5th generation as well. Having the best aircraft and weapons is no longer sole possession of the United Sates Air Force. Tactics are what continues to keep the USAF in the leader position. Has the gap between tactics, aircraft and weapons etc. grown to such a point that the T-38C and the IFF course is not a viable training program?

The United States Air Force says the T-38C is "no longer a practical trainer to prepare Air Force pilots for newer more advanced aircraft".[69] Has the time arrived for a change to the forty-year old IFF program as well? There is no argument an IFF type program is appreciated by students and instructors in the F-15C.[70] Is there a better way forward to allow for improved success in the F-15C B-Course, one that would set students up to excel in the program vice managing such a large learning curve? The data can be argued in multiple ways. What is indisputable is the fact that IFF is a training program that has remained relatively unchanged for over forty years, while everything else that pertains to air superiority in the U.S. and abroad has.

This is an opportunity to evaluate the current IFF program and potential problems with the program. In doing so, perhaps there is an alternative program or methods available that will enhance the success of students entering the F-15C B-course. The following section will examine three options that are possible ways forward. There could be more than three options, but based on current training aircraft, funding and feasibility, these three are the most likely candidates. The following solutions will focus on cost, feasibility and practicality. The intent is to maximize the time, effort and energy of F-15C students so they are successful in the F-15C B-course and ultimately their fighter squadrons.

SOLUTIONS

There are numerous options available to the U.S. Air Force on how they train their fighter pilots. Unfortunately, based on cost, feasibility, and practicality a number of them are not valid options. The three options that will be examined are, leaving the current IFF course as it currently stands, moving the IFF course to the F-15C B-course and then modifying the program in a number of ways. Finally leaving the IFF program where it is and modifying the program to reflect the needs of the student going to the F-15C. These options will be examined using cost, feasibility and practicality as a base line for the discussion.

Leaving the IFF course as it is, is without a doubt the easiest and simplest solution. The manning, infrastructure and equipment are in place. There would be no need to move any of it, or spend more money that the Department of Defense does not have. The feasibility of leaving the IFF program as it is remains an option, just not the best option for producing the best results now and for the future. The practicality of doing so could be easily argued based purely on the cost associated with it. The U.S. Air Force has dominated the air without a doubt since April 15,

1953, which is the last time a U.S. service member was killed from an enemy air attack.[71] Having enjoyed such success, why would there be a need to change at all?

The problem doesn't lie in the past, but in the future. As discussed earlier, the United States aircraft and tactics have evolved, and so have her adversaries' aircraft and tactics. Given their advances it is now to the point that the training of F-15C pilots may very well be the only aspect that preserves the tactical edge. The U.S. Air Force must ensure fighter pilots are getting the best training possible to prepare them for success in battle. Does leaving the IFF course as it is and has been for the last forty years meet that goal? Or is there a better option that improves student training and provides the elements necessary to achieve such success? A training course that gives students more experience with their weapon system makes more sense. If the training experience is potentially the only aspect maintaining the edge over her adversaries, the United States must take advantage of it.

The second option would be moving the IFF course to the F-15C B-course. The intent would be to move a small portion of the T-38's to the B-course. Enough aircraft would be needed so that the needs of F-15C students moving on to F-15C training could be met. In Fiscal Year 2015, four B-course classes completed the program for a total of 27 students, of which five did not complete the program.[72] Approximately 10 T-38Cs would be needed to support an IFF-type program at the B-course. This would allow for student training but also leave room for regular maintenance and aircraft attrition.

Infrastructure would need to be found that suits the needs of the IFF program. At Kingsley Field, there is infrastructure available, but modifications would be needed and require purchase. Either separate buildings or classrooms would be required to teach the IFF program. It is possible to utilize the current space occupied by the F-15C B-course. However,

de-confliction of scheduling that space would be required. During the interviews with the students, comments were made about flying with "multiple instructors" during IFF that did not have an air-to-air background, which led to poor training.[73] Bringing current F-15C pilots to Kingsley Field for their post F-15C assignments would allow for greater continuity and training as they prepare students to begin the B-course. Their knowledge of the aircraft and background in air-to-air training should allow for a smoother transition. Those experienced F-15C pilots would also have the added benefit of staying close to the F-15C and remain tactically proficient as they wait for their assignment back to the aircraft. The training course to prepare those experienced F-15C pilots to re-enter their fighter squadrons is also held at Kingsley Field. This potentially saves the Department of Defense money by avoiding a Temporary Duty Assignment (TDY) for returning pilots. The cost of a TDY to Kingsley Field for re-training is approximately $ 9,500.00.[74]

Not only is infrastructure and manning critical to any training program but when it concerns aircraft and the maintenance associated with it, it is a no-fail mission. T-38C specific maintainers would need to be brought in. Currently, there are no T-38C specialized maintenance professionals at Kingsley Field. It would take time to build that expertise, as current T-38C maintenance is all contract personnel located at the respective IFF bases.[75] Based on the vast maintenance knowledge pool located at Kingsley Field, there is a large group of F-15C maintainers with aircraft maintenance expertise to choose from. This could provide opportunities beyond their military service to continue employment in their career fields. There is potential for current T-38C maintainers to move to Kingsley Field. However, how many and to what degree is beyond the scope of this research.

The last portion of option two would be the IFF syllabus modification. Is there really a need for a student to fly 18 sorties in an airplane they will never take to war?[76] Would spending 40 training days and roughly three months focusing on T-38C BFM and academics truly prepare a student to fly the F-15C? When interviewing the students, most said they "enjoyed the program," that "learning new concepts" and max performing an aircraft for the first time was "thrilling."[77] Is this a conclusion that the USAF is doing it right, as it stands? On the other hand, students did say the jump from the T-38C to the F-15C was enormous in terms of aircraft performance and avionics.[78] Furthermore, the tactics they learned at IFF were "not transferable" and it was a "waste of time."[79] Ultimately, most if not all students and F-15C pilots said an IFF type program is a valid concept.[80] So then, is there another way to execute the program?

One argument could be made to keep the idea of IFF alive: Spend less time, effort and energy doing it in the T-38C. It would potentially be a shorter course, with an introduction to BFM concepts in 3-4 rides as purely an introduction. Less rides with more focus on the concepts and less emphasis on execution would be the idea. Once complete with the BFM, the student would be required to complete an Instrument Checkride to certify them in the T-38C to fly instruments solo down to their weather minimums.

Once certified, students would then get 1 Red Air sortie to practice being adversaries in the T-38C for the B-course. Then allow students to fly as adversaries in support of the B-course. This would free up F-15s that are currently being used as adversaries to allow for more student processing, ultimately yielding 3 extra B-course students a year.[81] While students are in this phase, they are also learning the academics associated with the F-15C, attending briefs and debriefs, and getting more exposure earlier, and in a non-threatening environment. On a smaller scale, this is currently being executed at Tyndall AFB, FL. The F-22A, uses T-38s as adversaries

flown by experienced pilots, as well as pilots waiting to attending F-22A training.[82] The results thus far have been lauded as a "huge step forward for this program."[83] The result could lead to a more experienced student with regards to F-15C employment and ultimately greater success in the F-15C B-course.

The final option is allow IFF to stay where it currently is. Continue its current mission, but modify the program. The program modification would be similar to that at the B-course, without the added Red Air flying. This would allow for a shorter course with more focus on concept understanding versus execution, and application of concepts in the actual aircraft. If the focus is not on T-38 BFM but on understanding the concepts, this could be the most cost efficient of all three options.

The cost, feasibility and practicality of this option are very strong. Students would still have to go TDY to the IFF location although the cost associated with it would be reduced. The students would still be flying with instructors from other weapon systems without an air-to-air background as they do now. This was discussed earlier as a negative drawback to the current IFF program. The argument against this option could be that the intent is to set them up for greater success in the F-15C B-course. Keeping them away from the F-15C, tactics and discussions does not allow for that success as it would within option two. Based on classification of tactics etc., it would be potentially difficult to replicate the atmosphere and education those students would receive being at the B-course.

Experience is often what sets people apart. In the flying community it is a major factor in someone's ability to successfully complete a course or upgrade. Allowing for growth associated with a particular experience not only improves a pilot's ability to succeed, it may also save their life one day. When traveling at supersonic speeds, decisions need to be made quickly. In most

cases delaying decisions based on the lack of experience or skill have a catastrophic, and as stated earlier, deadly result. That is why option two is the best of the three options. It allows for the experience and learning that cannot be replicated with the current IFF curriculum and basing.

RECOMMENDATION

Throughout this research, the objective has always been to examine the current IFF program and whether or not it is setting students up for success in the F-15C B-course. In doing so, three options were provided as a way forward. The best option, being the one that achieves the desired objective is without a doubt moving IFF to the F-15C B-course. All students and instructors interviewed for this research communicated this as being the best option as well.[84] It meets the intent of preparing students for the F-15C in the best way possible.

Bringing IFF to the B-course location does a number of things. The most important of all is that it exposes students to the airframe in which they will employ in combat. The more time a pilot has to learn and master their primary mission, the better off they will be. By executing the IFF mission at the B-course, students can start absorbing the F-15C earlier. By attending briefs and debriefs, utilizing the F-15C simulator, and talking with current F-15C pilots, students are exposed to their weapon system earlier, with all the benefits that additional familiarity entails. By doing so, they are given the necessary knowledge, and more importantly, the experience so that when they do begin the program they are not intimidated by the aircraft and the missions in which it executes.

The main reasons why the other options were not chosen all came down to time: The time spent in aircraft students would never take to war. The time spent fine-tuning the execution of BFM skills, recognizing sight pictures and refining lessons learned and ultimately the time it

took to complete the course. The last option did modify the time spent at IFF. What it did not do is allow for the increased exposure and experience students would get by having IFF at the F-15C B-course. So much time, effort, and energy is spent creating an F-15C pilot. It is critical that they is used wisely so that the pilot sent out the CAF can quickly transition into a Combat Mission Ready (CMR) wingman.

There is no doubt IFF fills a specific bridge towards becoming an F-15C pilot. During interviews with students and instructors, not only did they all agree that moving IFF to the F-15C B-course was the best course of action, they also agree an IFF type program is a valid training concept. By keeping the IFF program alive and modifying it to allow for greater exposure and ultimately more experience in the F-15C, students will be better prepared to complete the course.

CONCLUSION

There is no doubt air superiority is a requirement for the United States, and her allies. The F-15C plays an important role in ensuring and maintaining that superiority. The student pilots who enter and complete the B-course will ultimately move on to the fighter squadrons tasked with gaining and maintaining air superiority. Setting those students up for success in the F-15C B-course will allow them to move on and become important pieces of that puzzle. The research conducted on this topic was done so within the scope of evaluating the current IFF program and whether or not it sets students up for success in the F-15C B-course.

The IFF program has been around and relatively unchanged for over forty years.[85] Advances in aircraft, not only those of the United Sates but also those of her adversaries, drove a need to evaluate the IFF program to ensure it is still producing quality students for the B-course. Based on this research, a solution presented itself as a viable option. Current aircraft technology

and tactics have evolved beyond the point where the current IFF program can replicate what students will experience in future combat. By keeping IFF as it always has been, the United States Air Force would not be evolving in such a manner conducive to future successes.

Evaluating current tactics, techniques, and procedures to stay one step ahead of her adversaries is a must for the United Sates. Training programs are vital life lines to the Combat Air Forces (CAF). The United States must always review those training programs and decide if they are yielding the best results. If they are not, they need to be changed. If they are, her airmen must not rest on those results. The United States must continue to focus on the future and the challenges that lay beyond the horizon. Modifying the IFF program and moving it to the B-course puts the F-15C community in a position to meet those challenges now and in the future.

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[77] Class 15-ABK and 16-ABK (F-15C B-course students), interview by the author 14 Jan 16.

[78] Ibid, 2016.
[79] Ibid, 2016.
[80] Lt Col Jason Early, Lt Col Ryan Mclain, Class 15&16 ABK, interview by the author, 8 Jan 2016, 14 Jan 2016.
[81] Lt Col Geoff Jensen (114th Fighter Squadron Commander), interview with the author 14 Jan 2016.
[82] Tyndall's T-38s bring back Beagles, Aug 2014, www.tyndall.af.mil.
[83] Ibid, 2014.
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