

**NAVAL AIR TRAINING COMMAND**



**NAS CORPUS CHRISTI, TEXAS**

**CNATRA P-367 (Rev. 04-10)**

# **FLIGHT TRAINING INSTRUCTION**



**TALON PREP  
USAF T-38C TRACK  
T-34C**

**2010**



## DEPARTMENT OF THE NAVY

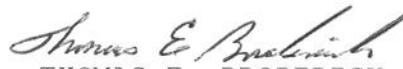
CHIEF OF NAVAL AIR TRAINING  
CNATRA  
250 LEXINGTON BLVD SUITE 102  
CORPUS CHRISTI TX 78419-5041

CNATRA P-367  
N711  
24 JAN 2011

CNATRA P-367 (Rev. 04-10)

Subj: FLIGHT TRAINING INSTRUCTION, USAF T-38C TRACK T-34C

1. CNATRA P-367 (Rev 04-10) PAT, "Flight Training Instruction, USAF T-38C TRACK T-34C" is issued for information, standardization of instruction, and guidance of all flight instructors and student naval aviators within the Naval Air Training Command.
2. This publication shall be used as an explanatory aid to the Primary Multi-Service Pilot Training Curriculum. It will be the authority for the execution of all flight procedures and maneuvers therein contained.
3. Recommendations for changes shall be submitted via CNATRA TCR form 1550/19 in accordance with CNATRAINST 1550.6E.
4. CNATRA P-367 (Rev. 06-02) PAT is hereby cancelled and superseded.

  
THOMAS E. BRODERICK  
Chief of Staff

Distribution:  
CNATRA N71 (10) Plus Original  
COMTRAWING FIVE (400)

**USAF T-38C TRACK T-34C  
FLIGHT TRAINING INSTRUCTION**

**T-34C**

**Q-2A-0058**



## LIST OF EFFECTIVE PAGES

*Dates of issue for original and changed pages are:*  
 Original...0...30 June 01 (this will be the date issued)  
 Revision 1...0...03 July 02  
 Revision 2...0...24 Jan 11

**TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 174 CONSISTING OF THE FOLLOWING:**

Page No.	Change No.	Page No.	Change No.	Page No.	Change No.
COVER	0	E-12 (blank)	0		
LETTER	0	F-1 – F-6	0		
iii – xii	0	G-1 – G-5	0		
1-1 – 1-9	0	G-6	0		
1-10 (blank)	0	H-1 – H-2	0		
2-1 – 2-2	0		0		
3-1 – 3-10	0		0		
4-1 – 4-7	0		0		
4-8 (blank)	0		0		
5-1 – 5-14	0		0		
6-1 – 6-14	0		0		
7-1 – 7-44	0		0		
8-1 – 8-4	0		0		
9-1 – 9-9	0		0		
9-10 (blank)	0		0		
A-1 – A-3	0		0		
A-4 (blank)	0		0		
B-1 – B-7	0		0		
B-8 (blank)	0		0		
C-1	0		0		
C-2 (blank)	0				
D-1 – D-6	0				
E-1 – E-11	0				

## INTERIM CHANGE SUMMARY

*The following Changes have been previously incorporated in this manual:*

CHANGE NUMBER	REMARKS/PURPOSE

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

INTERIM CHANGE NUMBER	REMARKS/PURPOSE	ENTERED BY	DATE

## **SAFETY/HAZARD AWARENESS NOTICE**

This course does not require any special safety precautions other than those normally found on the flight line.

## HOW TO USE THIS WORKBOOK

1. Read and become familiar with the objectives. These objectives state the purpose of the chapter of instruction in terms of **WHAT YOU WILL BE ABLE TO DO** as you complete the unit. Most importantly, your end-of-course examination is developed directly from these objectives. Therefore, it is to your benefit to know all information the objectives are asking you to comprehend.
2. Read and comprehend the information in each chapter, using the objectives as a guide.
3. After comprehending all facts and information indicated by the objectives, answer the workbook questions and check your answers. If you answer the questions correctly, continue to the next chapter. If you incorrectly answer any question(s), review the objective and information covering that subject area.

## TABLE OF CONTENTS

LIST OF EFFECTIVE PAGES.....	iv
INTERIM CHANGE SUMMARY.....	v
SAFETY/HAZARD AWARENESS NOTICE.....	vi
HOW TO USE THIS WORKBOOK.....	vi
TABLE OF CONTENTS.....	viii
TABLE OF FIGURES.....	xii
<b>CHAPTER ONE - INTRODUCTION TO USAF T-38C TRACK INTERMEDIATES....</b>	<b>1-1</b>
100. INTRODUCTION.....	1-1
101. TRANSITION FROM NAVY TO AIR FORCE FLIGHT TRAINING.....	1-1
<b>CHAPTER TWO - BASIC MISSION PLANNING.....</b>	<b>2-1</b>
200. INTRODUCTION.....	2-1
201. MISSION PLANNING.....	2-2
<b>CHAPTER THREE - NORMAL OPERATIONS.....</b>	<b>3-1</b>
300. INTRODUCTION.....	3-1
301. FENCE CHECK.....	3-1
302. ANTI-G STRAINING MANEUVER (AGSM) DEMONSTRATION.....	3-1
303. G-AWARENESS EXERCISE.....	3-3
304. ENERGY MANAGEMENT.....	3-4
305. WINGWORK DEMONSTRATION.....	3-6
306. CLOVERLEAF.....	3-7
307. COMBINATION MANEUVER.....	3-9
308. MAINTAINING AN AREA USING RADIAL/DME/ALTITUDE.....	3-10
<b>CHAPTER FOUR –LANDING PATTERN PROCEDURES.....</b>	<b>4-1</b>
400. INTRODUCTION.....	4-1
401. LESSON TOPIC LEARNING OBJECTIVES.....	4-1
402. OVERHEAD PATTERN.....	4-1
403. CLOSED PATTERN.....	4-2
404. STRAIGHT-IN-APPROACH.....	4-4
405. GO-AROUND PROCEDURES.....	4-5
<b>CHAPTER FIVE - FORMATION PRINCIPLES.....</b>	<b>5-1</b>
500. INTRODUCTION.....	5-1
501. MISSION PREPARATION.....	5-3
502. BRIEFING/DEBRIEFING PROCEDURES.....	5-3
503. FORMATION ENERGY MANAGEMENT.....	5-4
504. COMMUNICATIONS.....	5-4
505. KNOCK IT OFF/TERMINATE.....	5-5
506. VISUAL SIGNALS.....	5-7
507. COLLISION AVOIDANCE.....	5-7
508. VISUAL LOOKOUT.....	5-8
509. IN-FLIGHT CHECKS.....	5-8

510. JOKER/BINGO FUELS .....	5-9
511. LOST WINGMAN .....	5-10
512. ASPECT/ANGLE-OFF AND PURSUIT CURVES .....	5-11

**CHAPTER SIX - T-38C BASIC FORMATION..... 6-1**

600. INTRODUCTION .....	6-1
601. FINGERTIP .....	6-1
602. ROUTE POSITION.....	6-1
603. CHASE .....	6-3
604. FIGHTING WING/EXTENDED TRAIL ENTRY POSITION .....	6-3
605. AIR FORCE TACTICAL FORMATION .....	6-4

**CHAPTER SEVEN - T-38C FORMATION NORMAL OPERATING PROCEDURES.. 7-1**

700. INTRODUCTION .....	7-1
701. GROUND OPERATIONS.....	7-1
702. FORMATION TAKEOFF.....	7-2
703. FORMATION TAKEOFF ABORTS.....	7-4
704. FORMATION DEPARTURE.....	7-5
705. REJOIN.....	7-5
706. STRAIGHT AHEAD REJOIN .....	7-5
707. OVERSHOOT FROM STRAIGHT AHEAD REJOIN .....	7-7
708. TURNING REJOIN .....	7-7
709. HIGH YO-YO/LAG REPOSITION.....	7-9
710. LOW YO-YO/LEAD REPOSITION .....	7-11
711. OVERSHOOT FROM A TURNING REJOIN.....	7-13
712. CROSSUNDER.....	7-14
713. PITCHOUT .....	7-15
714. FORMATION G-EXERCISE.....	7-16
715. ECHELON TURNS .....	7-19
716. PRACTICE LOST WINGMAN .....	7-20
717. WINGWORK.....	7-22
718. WINGWORK CROSSUNDER .....	7-24
719. FORMATION BREAKOUT .....	7-25
720. EXTENDED TRAIL EXERCISE.....	7-27
721. EXTENDED TRAIL ENTRY .....	7-30
722. RANGING EXERCISE.....	7-31
723. ET LAZY 8 .....	7-32
724. ET BARREL ROLL .....	7-32
725. ET CLOVERLEAF .....	7-34
726. ET HALF CUBAN EIGHT .....	7-35
727. ET TECHNIQUES .....	7-35
728. LEAD CHANGE.....	7-37
729. BATTLE DAMAGE CHECK .....	7-39
730. FORMATION APPROACH AND LANDING.....	7-39
731. FORMATION LANDING RESTRICTIONS.....	7-40
732. FORMATION LOW APROACH/GO AROUND .....	7-43

<b>CHAPTER EIGHT - T-38C INSTRUMENT NAVIGATION .....</b>	<b>8-1</b>
800. INTRODUCTION .....	8-1
801. PLANNING YOUR T-38C INSTRUMENT FLIGHTS .....	8-1
802. SINGLE SEAT CRM .....	8-1
803. TECHNIQUES.....	8-2
804. FLYING INTO AN AIR FORCE BASE.....	8-2
805. CONDUCT OF THE FLIGHT .....	8-3
<b>CHAPTER NINE - T-38C LOW LEVEL NAVIGATION.....</b>	<b>9-1</b>
900. INTRODUCTION .....	9-1
901. LOW ALTITUDE ENVIRONMENT .....	9-1
902. LOW ALTITUDE TASK MANAGEMENT.....	9-2
903. MISSION PLANNING.....	9-3
904. UPDATING CHARTS FOR TOWERS AND OBSTRUCTIONS.....	9-4
905. AP/IP, IR/VR ROUTES.....	9-4
906. DRAWING YOUR ROUTE.....	9-5
907. FLYING THE LOW LEVEL.....	9-6
908. FORMATION LOW LEVEL .....	9-7
909. LOW LEVEL EMERGENCIES .....	9-7
<b>APPENDIX A - GLOSSARY OF TERMS USED IN THIS SYLLABUS.....</b>	<b>A-1</b>
<b>APPENDIX B - USAF AIRCRAFT FORMATION FLIGHT SIGNALS .....</b>	<b>B-1</b>
<b>APPENDIX C - GENERAL BRIEFING GUIDE .....</b>	<b>C-1</b>
<b>APPENDIX D - T-38C FORMATION COMMUNICATIONS GUIDE.....</b>	<b>D-1</b>
<b>APPENDIX E - VT-3 AFORM FORMATION STANDARDS .....</b>	<b>E-1</b>
E100. INTRODUCTION.....	E-1
E101. MISSION PREPARATION .....	E-1
E102. FLIGHT BRIEFINGS .....	E-1
E103. GENERAL ADMIN.....	E-2
E104. GROUND OPERATIONS .....	E-3
E105. TAKE-OFF.....	E-4
E106. DEPARTURE .....	E-4
E107. AIRSPACE ENTRY .....	E-5
E108. AREA .....	E-6
E109. RECOVERY .....	E-6
E110. PATTERN OPS .....	E-7
E111. FORMATION LANDINGS .....	E-8
E112. AFTER LANDING/TAXI BACK.....	E-8
E113. ABNORMAL PROCEDURES (SINGLE SHIP) .....	E-8
E114. ABNORMAL PROCEDURES (FORMATION) .....	E-9
E115. SPECIAL SUBJECTS/PILOT COORDINATION .....	E-10
E116. DEBRIEF.....	E-11

**APPENDIX F - STAND-UP EMERGENCY PROCEDURES GUIDE ..... F-1**  
F100. INTRODUCTION..... F-1  
F101. HOW TO HANDLE A “STAND-UP” EP SCENARIO ..... F-2  
F102. MAINTAIN AIRCRAFT CONTROL ..... F-2  
F103. ANALYZE THE SITUATION AND TAKE PROPER ACTION ..... F-2  
F104. LAND AS SOON AS CONDITIONS PERMIT ..... F-3  
F105. ONCE ON THE GROUND..... F-3  
F106. STAND-UP EP CHECKLIST ..... F-4

**APPENDIX G - INSTRUCTIONS FOR PREPARING LOW-LEVEL MAPS..... G-1**

**APPENDIX H - ADDITIONAL INFORMATION..... H-1**

## TABLE OF FIGURES

<b>Figure 4-1 Traffic Pattern Map .....</b>	<b>4-6</b>
<b>Figure 4-2 Typical USAF VFR Pattern .....</b>	<b>4-7</b>
<b>Figure 5-1 Aspect/Angle-Off Pursuit Curves .....</b>	<b>5-12</b>
<b>Figure 5-2 Maneuvering Fundamentals (Aspect Angle Versus Angle-Off) .....</b>	<b>5-13</b>
<b>Figure 5-3 Pursuit Curves.....</b>	<b>5-14</b>
<b>Figure 6-1 Two Ship widths.....</b>	<b>6-2</b>
<b>Figure 6-2 Fighting Wing/Extended Trail Entry Position .....</b>	<b>6-3</b>
<b>Figure 6-3 Horizontal Separation.....</b>	<b>6-5</b>
<b>Figure 6-4 Line Abreast .....</b>	<b>6-6</b>
<b>Figure 6-5 Delayed 90° Turn .....</b>	<b>6-8</b>
<b>Figure 6-6 Delayed 45° Turn .....</b>	<b>6-9</b>
<b>Figure 6-7 Hook Turn .....</b>	<b>6-10</b>
<b>Figure 6-8 The Shackle .....</b>	<b>6-11</b>
<b>Figure 6-9 The Cross Turn .....</b>	<b>6-12</b>
<b>Figure 6-10 Cross Turn with Shackle.....</b>	<b>6-13</b>
<b>Figure 6-11 In-Place 90° Turn .....</b>	<b>6-14</b>
<b>Figure 7-1 High Yo-Yo.....</b>	<b>7-9</b>
<b>Figure 7-2 Lag Reposition.....</b>	<b>7-10</b>
<b>Figure 7-3 Low Yo-Yo.....</b>	<b>7-11</b>
<b>Figure 7-4 Lead Reposition.....</b>	<b>7-12</b>
<b>Figure 7-5 The Overshoot .....</b>	<b>7-13</b>
<b>Figure 7-6 Options for Turns Away From Wing in Fingertip.....</b>	<b>7-20</b>
<b>Figure 7-7 Aspect Angle.....</b>	<b>7-29</b>
<b>Figure 7-8 Angle-Off.....</b>	<b>7-30</b>
<b>Figure 7-9 The Fighting Wing/Extended Trail Cone.....</b>	<b>7-31</b>
<b>Figure E-1 Simulated Departure Procedure for Duke/Rosehill MOA .....</b>	<b>E-5</b>
<b>Figure G-1 Example Map .....</b>	<b>G-5</b>

## **CHAPTER ONE**

### **INTRODUCTION TO USAF T-38C TRACK INTERMEDIATES**

#### **100. INTRODUCTION**

This Flight Training Instruction (FTI) is a Naval Air Training Command directive in which the Chief of Naval Air Training (CNATRA) publishes information and instructions relative to all Instructors and Student Pilots operating the T-34C aircraft in USAF T-38C Track Intermediate flying.

The Student Undergraduate Pilot Training (SUPT) syllabus T-38C track is the next step of a long challenging journey from that first contact hop to the seat of a multi-million dollar Air Force Fighter. The following quotes serve both as a motivator and as reminders of the long heritage of fighter pilots that precede you. Their experiences, even today, are valuable. As we've seen in recent conflicts, our country places a lot of faith in the capabilities and professionalism of our fighter and bomber pilots and therefore you must enter this training with the utmost commitment and dedication. The responsibility you will eventually bear is too precious to allow anything less than complete commitment. Your only focus from this point on should be to immerse yourself in the quest to transition to air force life and air force flying so that you can make it through the T-38C syllabus and follow-on training. The training pipeline for a fighter pilot is very tough and is not for the faint of heart. There will be successes like those that you have had thus far and yes, there will be failures. Fighter pilots are a very "yeah, but what have you done for me lately" kind of crowd and you are only as good as your last mission, no matter how good you think you are. Granted, the T-34/T-6/T-38C are not that complex, but very quickly, life will get more challenging as you strap on your weapon system for the first time at the Flying Training Unit (FTU). So get your mind right, seize the offensive with the "aggressive spirit," and keep "twisting your head in all directions" and look for ways to improve. Hang on, you are starting your journey to become an Air Force Fighter Pilot!

***"The aggressive spirit, the offensive, is the chief thing everywhere in war, and in the air is no exception."***

*Baron Manfred Von Richthofen*

***"Whenever you're over the lines you have to keep twisting your neck in all directions every minute, or you're sure to be surprised."***

*Captain Edward "Eddie" Rickenbacker, USAF*

#### **101. TRANSITION FROM NAVY TO AIR FORCE FLIGHT TRAINING**

The purpose of our Air Force T-38C Intermediate program is to introduce you to the Air Force training environment as soon as possible. Make no mistake about it, your task is very challenging. Your T-6 brethren have been brought up under this system for six months and they are experts at it. Our goal is to make you as close to on par with them as we possibly can. The transition to the Air Force training environment is one of the greatest challenges for T-34

students going to T-38Cs. Not only are you going from the Navy to the Air Force way of life, but you are trying to tame the “White Rocket” (T-38C), flying at much faster airspeeds than you are used to, as well.

Now that you have been selected for the specialized fighter track, you will fly only with fighter pilots, bomber pilots or T-38C-trained First-Assignment Instructor Pilots (FAIPs) after you arrive at Vance. The T-38C instructors are going to be tough and they will expect you to be totally committed to making it through the program. If you give anything less than that, you will be identified and eliminated. The IPs at Vance, like Whiting, are not expecting you to be “Chuck Yeager,” but they are expecting hard work and effort. Attitude is everything in the fighter world and if you have a reputation as a hard charger, then everyone will break their backs trying to help you; likewise, if you have a reputation as less than a hard charger, no one will want to waste their time with you. Now, let us identify some aspects of this new world you are about to enter.

## 1. Your Flight

Unlike students at Whiting, you will go through the syllabus together as a class. Your class will be about 6-9 students. The Air Force pilot training system is very fast paced and very exact about when you will start training and when you will graduate. In Air force pilot training, the timeline is everything. You can expect to hit the ground running once the formal syllabus starts. The good news is that you are not going through all this by yourself; you are going through with your flight mates/classmates. The whole class will be on the same schedule for the majority of your time there. The entire class will all show up at the same time for the formal brief (more on this later) and all will leave at the same time (when you are on “formal release”). You can expect to spend all day at the squadron, about 10-12 hours per day, but do not worry, you will be busy all day. As soon as you start flying, you will be “opted” (optioned for, meaning you can be scheduled for one or the other of at least two types of events, i.e., flight and EP or instrument sim) for at least two events a day (flight/sim, sim/sim, flight/flight). Your flight mates are crucial; you will all have to work together to get through this challenging syllabus. Teamwork applies; group studying, “pattern parties,” etc. are not just good ideas, but essential to making it through the program. Your class goal is to get everyone through to graduation. Someone who is struggling in one area might be able to help you in another area where you may be weak. Remember, your T-6 brethren have been raised in this culture for six months, they have their own group chemistry; you are being thrown in with them, hopping in at “halftime.” Use your time wisely before your T-38C training begins and try to meet and get to know as many students as you can in your class. Attach yourself to someone in the class and get the “gouge”. Practice standup EPs, and ask about daily life; they will be more than willing to help you out.

## 2. Your Flight Commander and IPs

Your T-38C Flight Commander is the person in charge of all students and instructors in your flight (equivalent to the Flight Leader at Whiting). Once you start flying at Vance, you will fly only with instructors in your flight and a few guest IPs attached to your flight. Your Flight Commander is your immediate supervisor and if you have any problems, that person is the person to contact. Many of your IPs at Vance will be former fighter or bomber pilots. They have a wealth of knowledge about how to fly the T-38C and what it is like to fly in the Tactical

Air Force. Pick their brains during your training about what weapon system to put on your Assignment Sheet. The IPs in your flight will have several responsibilities in addition to flying student sorties. The most “notorious” job that you will become intimately familiar with is the flight Unit Stan Eval Monitor (USEM). The USEM conducts all standup EPs during the morning brief and is the “hatchet man”, if you screw it up. Other jobs in the flight include the Gradebook Officer and the Scheduler. Some say it is not you that graduates from pilot training but your gradebook. You are responsible for the upkeep of your gradebook and like your Navy ATJ for Jacket Reviews, you’d better have all the signatures required, fail to do so and you will get to know the Gradebook Officer very well; attention you do not want. Another job is the Flight Scheduler; this person is right in your flight room and “slings the pucks” for the student flight schedule. If you have a scheduling issue, talk to this person. Some cultural differences between the Navy and the Air Force arise with how your schedule is written. You might as well forget “sniveling,” it does not exist! Your schedule is easy to remember, you will be on the flightline all day.

### 3. The Duty Desk

The Duty Desk is like the FDO Desk here at Whiting. There is a senior IP at the desk that oversees flight operations and the execution of the day’s schedule. The Duty Desk is going to be important to you because that is where you will get weather, sign off your Flight Crew Information Card (FCIF), and sign out airplanes. You will have to go through the Duty Desk before the morning brief to get your weather and NOTAMS and you will have to go by there to get your aircraft assignment before you step.

### 4. The Squadron Command Structure

Since this is your first exposure to an Air Force flying squadron, you should be familiar with the command structure. For the most part, this same structure is consistent through all of the Air Force flying squadrons with the exception of the Check Flight.

#### a. The Squadron Commander (CC)

The Squadron Commander is equivalent to the Commanding Officer and is responsible for the Squadron. The Squadron Commander is an O-5.

#### b. The Operations Officer (DO)

The Operations Officer (DO) is the second in command in an Air Force squadron, there is no “XO”. The DO is responsible for the flying operations in the squadron and is usually the “hammer” for things like late takeoffs. The DO is an O-5.

#### c. Assistant Ops O (ADO)

ADOs are usually Majors and are senior people in the squadron. They report to the DO and will sit the Duty Desk during flying ops or will be the Supervisor of Flying (SOF).

d. Your Flight Commander

The squadron is divided into flights. Each flight has a Flight Commander who is responsible for their students and IPs; you work for this person. Also, you may have an assigned IP, but this is not like your On-Wing. You may fly your dollar-ride with your IP but are not required to fly any specific sorties together.

e. Check Flight

Check Flight is similar to the Standardization Department here at Whiting. The difference is, only check Flight IPs give checkrides to students. When your checkride comes up, you will go to Check Flight with all your flying publications, and report to your IP in a military manner to receive your checkride. The checkpilot is an observer and will not instruct you whatsoever. Air Force checkrides are conducted in a very formal manner. You will not ask for guidance from the checkpilot unless it is a safety of flight issue. It is better if you just disregard their existence in the cockpit except for challenge/response items in the checklist.

f. Life Support

Your life support equipment will be stored in the squadron. You will have to be fitted for a G-suit and an Air Force helmet. As soon as you arrive at Vance, report to Life Support to get these items issued to you. In the T-38C world, you will step to the jet with your parachute on your back with your helmet bag, G-suit, and pubs. Get the Life Support technicians to show you how to preflight your helmet and parachute. You will need to do it before every flight. This might be your first time around Air Force enlisted personnel, and like their Navy counterparts, they are extremely sharp and highly motivated. They are looking up to you as an officer to set the example, so conduct yourself accordingly; act professionally and look sharp.

## 5. The Morning Brief

You will start every day in Air Force pilot training with the morning brief. You will get plenty of instruction on how it is conducted in your flight, but here are some highlights. One of the students in your flight will get the weather/NOTAMS and time hack. All students will be in the flight room ten minutes prior to the formal brief time. All students will be sitting around periphery of the room with their chairs pointed to the center. Have your checklist, in-flight guide (blue brains), and some scrap paper (everything you would have in the jet). Be familiar with and have all current changes. When the Flight Commander walks into the room the senior ranking student will call the flight room to attention and formally report to the Flight Commander. The flight room will be put at ease and all students will sit. One student will get up to brief the weather and NOTAMS for the day and will give a time hack. When that is done, the Flight Commander will get up and brief any of the day's announcements and flying considerations. Then the Flight USEM will get up and ask general knowledge questions. If you are called upon, you will stand at attention and give the answer. You had better be on the ball because you will be answering in front of all IPs and your fellow students. With enough shortcomings in general

knowledge, you will be grounded for the day. Next will be the morning standup. The USEM will give a situation, call sign, and the weather, and then it's "Lt (insert your name), you have the aircraft!" When you are called upon, stand-up before you reply, "I have the aircraft" (the Air Force uses "I have the aircraft" instead of "I have the controls" for transfer of aircraft control). Make sure you have all the facts. If you have any questions, ask the USEM before you start handling the situation. If you are not called upon, you should be taking notes and keeping up with what is going on because at any time the USEM could stop the student with the EP and give it to you. If you stand up and do not know what is going on, you can expect to not fly that day. If you do get the EP in the middle of the situation, the USEM will ask you if you want to change anything before you assume the situation. This is your chance to right any mistakes the previous student made. If you do not correct their mistakes, you assume their mistakes and you could be grounded as well. Refer to the 25 FTS Standardization Handbook for more details on how Vance conducts their Standup EPs

## 6. Intermediate Training at Whiting

The focus of this FTI is to transition you from Whiting to the T-38C syllabus. Every ride you do in your intermediate syllabus should be viewed as preparation for that challenge. Your T-34 jet formation (AFORM) is geared to prep you for T-38Cs. On every sortie you will brief in the Air Force Standup Format, conduct the entire flight with the O<sub>2</sub> mask on using hot mic, and the flight will be conducted with a similar flow as at Vance. The debrief will be like Vance as well. You will have some academic sessions at Whiting to introduce you to the Air Force flight pubs that you will operate under, but for clarification, while flying Navy aircraft, you are still responsible for Navy publications and the T-34 NATOPS. In general, your remaining flights at Whiting will include working a Military Operating Airspace (MOA) in radial/DME/Altitude. You will be introduced to single seat Crew Resource Management (CRM) (Navy equivalent is Aircrew Coordination Training (ACT)). You will coordinate for and fly instrument approaches to a full stop at Whiting. You will plan and execute the entire mission. While at Whiting, start getting into the Air Force flying publications hard. Your T-6 brethren are going to know these documents in depth and you are going to be way behind if you are not in "chapter and verse" mode when asked about Air Force flying publications. Many Air Force students (and Whiting Air Force Instructors) have made libraries of hundreds of index cards picking these regulations apart sentence by sentence so they can quiz themselves – that is the kind of detail expected at Vance.

## 7. Prior to Starting Training at Vance

You will have some time between Whiting and Vance to PCS, find a place to live and get settled, pick up publications, etc. As previously mentioned, you are going to be lumped into a group of people (your class) who have been well indoctrinated into the Air Force training environment, so use your time wisely before training begins.

Once you are settled in at Vance, immediately find out who your T-38C Flight Commander is and establish contact with your flight mates. You will go through "rebluing" at Vance, which consists of gathering your publications and attending some classes about mission planning and Air Force aircraft maintenance forms plus two days of physiological training (ejection seat and

parasailing). You will still have a good chunk of free time before you start. Here are some ideas to help you use this time effectively:

- a. Go to stand-ups/morning briefs.

Before you go, look at the 25 FTS Stan handout on how to conduct a standup and learn! Preferably go with another T-34 trainee and then go home and practice together. There is a very specific way to go about this and the earlier you learn, the better; practice! practice! The penalty for screwing up standup is public embarrassment and no flying for the day. You will not fly again until you “clear your name” by passing another standup attempt. Fail enough stand-ups and you are going to find yourself on the way to washing out of the program.

- b. Get copies of, and take as many, ops limit quizzes/boldface quizzes as you can!

The quizzes are easy, but you have to realize that any mistakes, i.e., punctuation, etc. are grounds for failure and not flying until you “clear your name” by doing it correctly. Not flying due to a failed boldface/ops limit quiz is especially painful because they are so easy.

- c. Get the T-38C checklist and go to the T-38C cockpit procedural trainers (CPTs) and start running the checklists.

Figure out what your instrument scan may be like, and practice the Preflight, In-flight and Post-flight Checklists, repeatedly. Ask a Senior Class T-38C student to show you the procedures. The more familiar you are with the cockpit the better. Flights in the T-38C are typically 1.1 to 1.3 hours at the most, so the faster you can operate (while being thorough), the more time you will have in the MOA to practice.

- d. Go to the RSU (Runway Supervisory Unit) to watch the pattern.

First read the “T-38C Radio Procedures Guide, Vance AFB” handout and Vance AFB Instruction 11-201, Local Procedures (their course rules book). Get familiar with the Air Force pilot training pattern. The Air Force runs its pilot training pattern radically different from the Navy. The Air Force does not have several OLFs to conduct pattern training; they do all their pattern training at home field (this will be discussed later). Air Force students have only one duty and that is RSU duty. You can either be a wheels watch, or you document takeoffs and landings with tail (side) numbers. The RSU is a small building near the respective runway (Air Force pilot training bases usually have three parallel runways, one small T-6 runway, a large center and a medium length, outside runway for T-38Cs). The RSU has two instructors who watch/run the pattern and the two previously mentioned students. Visiting the RSU is a great way to learn the USAF Pattern short of actually flying in it. Learn all the calls and potential conflicts so when you are learning to fly the T-38C, the pattern is one less thing you have to learn from scratch.

- e. Get your T-6 trained flight buddies and do a “pattern party.”

They are going to look at you funny because they did that at the beginning of T-6 training, but ask them to do it for you. A “pattern party” is putting a diagram of the pattern on the ground (say in the flight room) and have five to six students walk around in the “pattern” making calls, entering and “breaking out” of the pattern.

- f. Study the Air Force and Vance flying instructions.
- g. Here is a list of required reading that you want to get started on.

- i. *T.O. 1T-38C-1, T-38C Flight Manual*

The “Dash-1” for any Air Force aircraft is the Air Force’s equivalent to the NATOPS. The Dash-1 is something you are going to be intimately familiar with very early on as you learn your systems and operating limits for the T-38C. As with NATOPS, the Dash-1 is going to have some pertinent information on operating the T-38C.

- ii. *Air Force Instruction 11-202, Volume 3, General Flight Rules*

AFI 11-202, Volume 3 is the Air Force’s OPNAV 3710. It is the Air Force’s all encompassing instruction on flying Air Force aircraft. Scour all the chapters for pertinent information, but pay special attention to Chapter 8 for the Air Force version of whether an alternate is required and what weather you need in order to file to a destination and alternate.

- iii. *Air Force Instruction 11-205, Aircraft Cockpit and Formation Flight Signals*

AFI 11-205 is the source document for the signals found in Appendix A of this FTI.

#### NOTE

Many USAF instructions are available via the Internet. Try the website at <http://www.e-publishing.af.mil/>

- iv. *Air Force Manual 11-217, Instrument Flight Procedures*

AFM 11-217 is the Air Force’s equivalent to NAVAIR 00-80T-112, NATOPS Instrument Flight Manual. It is an excellent reference on instrument flying and you need to get into this book deeply. AFM 11-217 is full of Instrument Flight procedures and is tailored to you as a flight student operating in the real IFR world. 11-217 is a good document to get “chapter and verse” on because it is information you will be able to use for the rest of your flying career.

v. *Vance AFB Instruction 11-201, Vance AFB Local Flying Procedures*

VAFBI 11-201 is Vance's course rules book and you should get into this pretty heavily as well. A lot of VAFBI 11-201 is not going to make sense to you at first, but if you go out to the RSU during your time before starting the syllabus, you will be able to make some sense of what you are reading. Get with your flight mates and ask them as many questions as you can about local flight procedures.

vi. *71 FTW T-38C In-Flight Guide*

The In-Flight Guide you use in pilot training is going to be completely different from the "blue-brains" you flew with here at Whiting. Air Force In-Flight guides are in-flight publications that are locally generated at the wing level and are basically an in-flight version of the "course rules." In-Flight Guides are set up in very specific ways, the pages are color coded for easy in-flight reference, and they are chock full of everything you are possibly going to need in flight. In-Flight Guides are always part of any Air Force flying operation and you will be expected to have Vance's with you during standup.

vii. *AFMAN11-251v1, T-38C Flying Fundamentals*

AFMAN11-251V1, is the T-38C "FTI" The T-38C program is not going to have separate books for different phases of instruction; all the syllabus instruction is going to be discussed in the T-38C Procedures Manual. T-38C Contact, Aerobatics, Formation, Instruments, etc., are all in the T-38C Procedures Manual.

viii. *AFI 11-2T-38 Vol III, T-38C Operations Procedures*

This publication is the general overall guidance to the T-38C procedures manual. General T-38C General Operating Procedures.

h. Some other "nice to have" documents:

i. *25 FTS Squadron Standards*

Squadron Standards are used heavily during your life as a fighter pilot and are basically the agreed way the squadron is going to operate. They are written in the format of a preflight brief. Everything from showing up for the brief, stepping to the jets, starting, checking in, etc. is discussed in the standards. Squadron Standards are a way of using the preflight brief time more effectively. If there is something that is done every day, then it should not have to be discussed every brief; the Flight Lead should just be able to say, "Check-in will be standard," and everyone in the flight should know what that means.

ii. *25 FTS Comm Standards, Vance [AFB]*

The Radio Procedures Guide is a great book to help you get into the “Air Force speak” at Vance. Read through it and take it to the RSU when you go watch the pattern.

iii. *25 FTS Stan Handout*

The 25 FTS Stan handout is great “gouge” to help you get through the “culturalisms” that you are going to have to get used to at Vance. Information on Standup, Takeoff and Landing Data, and Checklist challenge and response flow are just some of the great things that are covered in this document. The Stan handout is written by Check Flight and you are going to want to read what they have to say.

i. *Finally, RELAX!*

Your training at Whiting was not worthless, it was time well spent and just because you went through Primary at Whiting, do not think you are bound to fail. As long as you work hard at Whiting and before you start at Vance, then you will do fine. Navy and Marine Corp students successfully transition to T-45 Strike training every week without the benefits of a T-34 Intermediate syllabus. T-38C Track Intermediates will give you the tools necessary to make this same transition to flying high performance aircraft the Air Force way. Whiting students have finished at, or near, the top of their class at Vance, so it is up to you as to how successful you will be.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **CHAPTER TWO BASIC MISSION PLANNING**

### **200. INTRODUCTION**

The purpose of this Chapter is to provide a general guidance to the AFORM program and typically sortie execution. It will help prepare you for the AFORM syllabus. Specific sortie profiles are at the discretion of the IP and shall incorporate necessary and effective student training. Refer to the Syllabus/MPTS for specific requirements.

### **STAN BRIEF**

Required indoctrination brief given by any Stan Qualified AFORM IP. It will be given primarily by the AFORM stage manager unless scheduling conflicts prohibit it. This brief will cover all expectations and requirements of the student for the AFORM program. Students will be given all necessary pubs, or access to pubs, required for the successful completion of the program.

### **F4301**

**Introduction.** This sortie will be flown as a single event. Every attempt will be made to expose the student to the entire AFORM profile to include formation takeoffs/landings, USAF pattern, and all airborne maneuvers. Typical sortie profile might include: Formation Takeoff, Formation Departure Procedure, Formation Approaches and Landings at USAF airfield, USAF Pattern Ops, Area Work in MOA or Alert Area, Recovery to a Formation Instrument Approach and Landing. With limited sorties in the block, it is desired to get as much exposure as possible. WX and/or other circumstances may prohibit certain phases of flight. IP discretion shall be used to accomplish effective training.

### **F4302 – F4305**

These sorties can be tied together as an out & in. There are no requirements for going to the pattern every sortie. Students will plan and execute the entire sortie profile to include profile/area management, to/from outlying airfields, etc. If the student has made MIF, there is no longer a requirement to go to the USAF pattern for additional formation takeoff and landings. IP discretion shall be used to ensure effective training.

### **F4306**

**End of Block.** Students must meet MIF for all required items by the end of this sortie. If students have made MIF by F4305, this sortie has the **option** to be flown as a Single Ship or Formation Low Level. This option will be determined the day prior, if scheduling permits, to allow for proper mission planning.

AFORM sorties have high priority in scheduling due to transition requirements for students leaving for Vance AFB. WX, availability, or other factors will influence sortie profiles. Specific sortie profiles are at IP discretion as long as the overall requirements of MPTS are met. Sorties

will be scheduled with students to the max extent possible.

## 201. MISSION PLANNING

The objectives of every sortie in undergraduate flying training (UFT) are to achieve proficiency in flying maneuvers, maximize situational awareness, increase decision making skills, and successfully apply task management skills. Preparation for any training mission should be based on these objectives. The overall mission objective should give the “big picture” of what needs to happen to accomplish a successful sortie. More specific objectives should be used to determine success in relation to the syllabus, course training standards, continuation training requirements, etc. A valid objective is realistic, achievable, and measurable.

During briefings and debriefings, the briefer is in charge and should be the only one speaking until he or she asks for inputs. Any questions or comments should be saved until requested by the briefer. Generally, no food or drink is allowed during briefings without the approval of the briefer. See VT-3 standards for further guidance.

**Briefing.** The Aircraft Commander (AC) or Flight Lead must ensure the mission is thoroughly briefed. Other members of the flight or formation should be prepared for the brief and assist the AC or Flight Lead as directed. The brief should focus on successfully accomplishing all the objectives. Mission elements may be briefed as “standard” provided they are published, and the proficiency level of all flight members would allow them to be briefed as such. On student training sorties the student is expected to obtain relevant notices to airmen (NOTAMs), weather, airfield status, threat of the day, emergency procedure of the day, etc., and have a lineup card prepared. On nonstudent training sorties, the briefer will assign these responsibilities. Before the brief, all crewmembers should ensure all go/no-go items are accomplished.

The debriefer should curtail time spent on administrative items based on the experience or proficiency level of the flight members, and avoid an item-by-item description of every event that occurred. Instead, the debriefer should cover what went right and what went wrong, with emphasis on the root cause of relevant errors and how to improve on subsequent missions. The debriefer should relate everything back to the mission objectives. For student sorties, the instructor pilot (IP) will identify areas of emphasis for the next sortie, and provide focused instruction on them in this sortie’s debrief. The IP should summarize at the end with emphasis on the major learning points and considerations for future missions.

**Formation Debrief.** The Flight Lead should focus on formation-specific items, leaving single-ship execution for individual aircraft debriefs. The amount of debrief allotted to the entire flight is also affected by the skill level of the flight members, the presence of solos in the flight, and the potential benefit to the entire flight of the items being discussed.

## CHAPTER THREE NORMAL OPERATIONS

### 300. INTRODUCTION

The purpose of this Chapter is to provide guidance for normal operating procedures, alternate missions and other single ship exercises. In the event the sortie cannot be executed as a formation and the syllabus allows, single ship profiles are an option although not desired. It will be flown as an AHC (Advanced Handling Characteristics) flight.

Sorties flown as single-ship shall maximize training. USAF pattern work is desired at any available USAF airfield. If unavailable, AFORM sorties will exercise discretion but should not conduct USAF patterns at non-USAF airfields if avoidable. Airwork should be conducted in any airspace available, with priority given to airspace where flight following is available. Options include but are not limited to Rosehill MOA, Eglin MOA, Area 2F.

### 301. FENCE CHECK

All tactical aircraft entering a working area conduct what is known as a FENCE check prior to execution. For AFORM, the Fence Check will include:

F	Fuel	Check quantity and balance
E	Engine Instruments	Check proper operation, AUTO-IGN ON
N	NAVAIDS/NACWS	Correct NAVAIDS and 20 nm range on NACWS
C	Comm	Proper UHF/VHF freqs and volume adjustment
E	Equipment	Normal O2, Harness and Control Lock Locked, Bilges

For AFORM sorties, all aircraft will “FENCE IN” prior to conducting any area work. The FENCE check incorporates the Pre-Aerobatic Fence Check from Primary. Aircraft will “FENCE OUT” when area work is complete and prior to the RTB.

### 302. ANTI-G STRAINING MANEUVER (AGSM) DEMONSTRATION

Combat aviation is a very mental and **very physical** job, and pulling Gs is part and parcel to using an aircraft as a weapon. Third and fourth generation fighters can pull Gs at high onset rates and maintain G levels that can easily exceed the pilot’s capability. Survival in the high G environment is a function of the most fundamental weapon the fighter pilot has to combat the effects of Gs on the body, the AGSM. Air-to-Air combat entails not just pulling high Gs momentarily, but also sustaining a high level of G throughout a maneuver. The AGSM demonstration is meant to show how important the AGSM is in the initial pull and throughout a high G maneuver. NATOPS limits us to 4.5 positive Gs, which is not much more than a roller coaster, but if you do not work on the basics now, when you get to aircraft that can pull, 6, 7, up to 9 Gs, you are going to be in for a big surprise when you find out your AGSM is lacking (it may not be that big of a surprise, because you will be asleep with a weak AGSM!). The IP is going to take the aircraft and demonstrate the maneuver.

After clearing in the direction of turn, the IP will roll and set 4.0 Gs and maintain this for about three 360-degree turns. You need to anticipate the Gs coming on by simultaneously flexing your legs like a leg press, tightening your stomach muscles and taking in a big breath while holding it against a closed glottis. You can use the “hick” maneuver if that works for you, but the Air Force does not teach this. The idea is the same, you are trying to trap a higher level of pressure in your chest and maintain that pressure during the higher Gs; this increases the partial pressure of oxygen in your blood and therefore makes your blood oxygen-rich to a level that can maintain consciousness. It is not just flexing the muscles that work here, you can trap the blood in your upper half of the body by flexing the leg and stomach muscles, but you also have to have the blood oxygen-rich to be of value to you. The way you breathe is vital in the sustained G environment. Trap the air for 2-3 seconds, no more, no less, then make a quick exchange of air so you do not lose pressure in the lungs – you must maintain lung pressure! Exchange only 10-20% of your total air with each breath. Do not get lulled into complacency: “Well, I’m not really going to need this because I will have my G-suit to protect me.” That is a flawed game plan because the G-suit is not designed to protect you from the initial high G onset; it does not fill up fast enough. It is designed to help you maintain the G, but only adds about 1-1.5 G of capability over your natural AGSM, so at 9 Gs, you will have to cove that other 8 Gs! The IP will demonstrate this first and then give you a chance to practice. While practicing you need to realize your limitations, if you start getting behind the Gs, let up on the stick, get back on your strain and then reapply the G to 4.0.

### 1. Procedure

- a. Climb to 9500’ MSL with 1015 ft-lbs.
- b. Smoothly push over and begin a shallow descent (no more than 5-7 degrees). Allow the airspeed to increase to 190 to 210 knots. Check above and below you, and clear with the NACWS. Clear in direction of turn.
- c. With airspeed, roll with rudder and aileron and set the lift vector slightly below the horizon, get on your AGSM and pull slowly to 4 Gs and maintain. You want to sustain 4.0 Gs and 190-210 knots for approximately three turns.
- d. Rollout with rudder and aileron.
- e. Climb to 9500’ MSL and repeat the maneuver with the student flying.

### 2. Common Errors

- a. Over-banking. You only need to bank 80-100 degrees initially to maintain energy throughout the turn. Maintain G and airspeed, no more, no less.
- b. Pulsing the stick with every exchange of air during AGSM. Your AGSM and stick inputs should be independent of each other; keep a nice uniform nose rate throughout the turn.

## 3-2 NORMAL OPERATIONS

- c. Getting behind the G and not letting up. Pulling until you start to “gray out” and getting behind on the AGSM is very dangerous! Remember, the mentality is single seat, you have to be able to recognize yourself getting behind the G, if you are, LET UP, GET BACK ON THE STRAIN, and reapply the G!
- d. Over-G of the aircraft or yourself. Do not try to manhandle the airplane into 4 Gs, the T-34 has a lot of elevator authority and will over-G in a second. Roll, set the lift vector and pull smoothly and maintain Gs. The idea is not to over-G yourself and have the IP save you; remember, this is a single seat world.

### 303. G-AWARENESS EXERCISE

Every Air Force fighter and trainer aircraft does a G-awareness exercise before they start maneuvering. By regulation, any sortie that will require over 4 Gs to be pulled requires a G-awareness exercise. The intent behind the G-awareness exercise is to do two 180 turns; the first is a “**G-warm up**” pulling **3-3.5 Gs** while practicing the AGSM, working on muscle flexing, and breathing. This turn tests the aircraft systems (i.e. G suit inflation, mask fit, etc). Your IP will be listening and critiquing your breathing. Remember, do not breathe too fast, and do not hold your breath too long either; use 2-3 seconds between quick exchanges. One technique is to count “one thousand one, one thousand two, one thousand three, (exchange air).” The second turn is the actual “**G-awareness turn**” and will be more like the G you are going to pull during the sortie. Make a good sustained **3.5-4 G turn**, working the AGSM under some G, getting the heart pumping and the blood flowing. This turn is meant to test you. The G-awareness exercise is a good opportunity to assess how your G-tolerance is that day (it changes from day to day) and practice your AGSM before you get into higher G-levels. If you need another G-awareness turn, then by all means speak up; your life depends on it.

#### 1. Procedure

- a. Enter the working at 9500 MSL (weather and ATC dependent) with 850 ft-lbs.
- b. Make ICS call, “PUSH IT UP, PUSH IT OVER, STANDBY G-EXERCISE”. Smoothly push over for a shallow descent (no more than 5-7 degrees), increase torque to 950 ft/lbs, and allow the airspeed to build to approximately 190 to 200 knots.
- c. Make ICS call, “READY IN THE FRONT”. Your IP will acknowledge with a “READY IN THE BACK” ICS call. Check airspeed, altitude, and clear in direction of turn.
- d. With airspeed, quickly roll with rudder and aileron and set the lift vector slightly below the horizon, set 1015 ft/lbs, begin your AGSM and pull smoothly to 3-3.5 Gs and maintain. The aircraft will need to be in a slight descent during the turn to maintain 190-200 KIAS. You want to sustain 3-3.5 Gs and 190-200 knots for the entire 180 degrees. (ROLL-POWER-STRAIN-PULL)

- e. Rollout with rudder and aileron on heading. Maintain airspeed with a shallow descent. Check Gs and engine instruments.
- f. The procedure for the second G-awareness turn is similar. Over ICS, check again both cockpits are ready: “READY IN THE FRONT” with a “READY IN THE BACK” acknowledgement. No need for a push it up/over call because you should still be in a slight descent with the energy from the first turn. Recheck airspeed, altitude, and clear in direction of turn. Maintain 3.5-4 Gs and 190-210 knots throughout the turn.
- g. Rollout with rudder and aileron on heading. Initiate a climb as required.
- h. Report over ICS “GOOD IN THE FRONT, X.X Gs”. Your IP will respond “GOOD IN THE BACK, X.X Gs” By reporting “GOOD,” all systems/instruments/G limits look good and the individual is good for any Gs the profile might require. If not good, consideration should be given to limit Gs for the remainder of the sortie or RTB.

## 2. Common Errors

- a. Over-G the aircraft or yourself. Do not try to manhandle the airplane into 4 Gs; the T-34 has a lot of elevator authority and will over-G in a second. Roll, set the lift vector and pull smoothly to 4 Gs and maintain. The idea is not to over-G yourself and have the IP save you; remember, this is a single seat world.
- b. Failing to start the AGSM before onset of Gs. The AGSM must begin before application of Gs in order to prepare your body for the effects of high G maneuvering.
- c. Not maintaining a shallow descent after first 180 degree turn. You want to keep the energy so you can smoothly roll into the next G turn without delay to build airspeed back up.

## 304. ENERGY MANAGEMENT

Energy management tends to be a hard concept to visualize airborne but it is very relevant, particularly when working in the vertical plane during heavy maneuvering flight. Your total energy state is always going to be a function of the sum of your potential and kinetic energy.

$$TOTAL\ ENERGY = KINETIC\ ENERGY(airspeed) + POTENTIAL\ ENERGY(altitude)$$

This is very relevant during T-38C FORM because you will be exchanging kinetic and potential energy while you stay in the area. Your neutral energy parameters are 7500 feet MSL, 170 knots, and 850 ft-lbs. With that energy state you can virtually do anything with the aircraft and stay in the area. Good energy planning for yourself and your Wingman is essential to mission accomplishment. Knowing your energy state will tip you off when you need to knock off the maneuvering to climb back up and get energy back. As an example, if you are 150 knots at 6000

## 3-4 NORMAL OPERATIONS

feet, and you are working the block 5-10K, you do not have enough power available and altitude available to get “over the top” airspeed without the floor of the area being a factor. Likewise, you do not need to be 190 knots at 9500 feet MSL because you cannot do anything but descend and lose energy. You will get too fast and risk overstressing the aircraft. Good energy management will result in a neutral energy state throughout the profile. You may be low in the block, say 6000 feet, but have over the top airspeed at 200 knots. You may be near the top of the block, say 9500 feet, but have only 100 knots in the inverted portion of your Barrel roll. An equal exchange of airspeed and altitude that results in a “neutral” energy state throughout the profile is desirable. Typically this is going to be no more than 200 knots at the bottom of any over the top maneuver, and no less than 100 knots at the top of any maneuver. If you need to gain energy, then advance your power to higher than 850 ft-lbs; if you need to lose energy, you can set power to something less. Good energy planning and execution is key in the T-38C so you must learn the basics now. In the T-38C, at most you are going to have 20 minutes of time in the area to complete the entire set of area work so **you do not have a lot of time for droning due to poor energy awareness**. If you have to knock off maneuvering to get back in the neutral state so you can continue your profile, then so be it, you really have no choice. Realize, you do not want to have to do that. Here is an example of energy planning for your T-38C Talon Prep ride:

1. Enter at the top of the working area block.
2. Fence-in, Ops check.
3. 2 x G-exercise (energy loser, pulling Gs, losing altitude).
4. Wingwork (energy neutral, similar to Wingovers in PA).
5. Extended Trail Wingover (energy neutral to energy gainer, see extended trail maneuvering section).
6. Barrel Roll (energy neutral).
7. Cloverleaf (approximately energy loser, 100 feet per leaf).
8. Half Cuban Eight (energy neutral, good kinetic and potential energy exchange).

Keep abreast of your energy state throughout the profile. Use chair-flying on the ground to plan how you would like to string all the mission requirements together. The T-34 does not have the same fuel limitations the T-38C does, so you are in for a big surprise when you start your T-38C training. In T-38Cs, you will be given the requirements for the flight, and then you will be expected to run the entire show on your own, getting out to the area, executing the profile while maintaining the area, and orchestrating the Return to Base (RTB). **Accomplishing all the requirements in the T-38C within one fuel load makes energy awareness essential.**

### 305. WINGWORK DEMONSTRATION

Wingwork is done as an exercise, training you to be able to maintain formation position at much higher bank angles and G than you are used to, namely 80-90 degrees and approximately 2 Gs. The format for wingwork is done under the guise of a series of wingovers where you never pass 90 degrees of bank and no less than 100 knots at the apex of the turn. The IP will first demonstrate how to pull up into wingwork with a Wingman following you. You do not want to roll too fast or get too fast on the acceleration phase nor do you want to get slower than 100 knots on the apex of any wingover. Always keep positive G on the aircraft. At 90 degrees AOB, keep backstick pressure as the nose falls through the horizon. Unloading can cause a dangerous situation for your Wingman. As a technique, always telegraph to your Wingman that you are beginning the wingwork profile. Always try to make your first turn into him so he can maintain position and do not go right to 90 degrees of bank on the first apex. Instead, go to 70-80, and then work 90 degrees on subsequent pulls. Of course, you will always have to monitor your Wingman. If he is out of position, do not keep doing turns away from him. At the same time you must maintain the area boundaries, so plan accordingly. The format is four pulls on one wing, cross under, then four pulls on the other wing.

#### 1. Procedure

- a. Work yourself to the center of the area at a neutral energy state, 7500 feet MSL with 180 knots, straight and level. Neutral energy state may depend on weather and ATC restrictions.
- b. Make a shallow descent to obtain about 190-200 knots and smoothly set power to 750-800 ft-lbs. A common technique is to start a smooth roll and let the pitch decrease to gain airspeed.
- c. Approaching 150-160 knots, smoothly roll wings level while maintaining a slight pull. Approaching 190-200 knots smoothly raise the nose until the exhaust stacks start to cross the horizon, then start a roll to approximately 70-80 degrees on the first pull. Aim for approximately 30 degrees in pitch and increase bank to maintain airspeed above 100 knots. **It is very important to maintain your pull (Positive G) throughout the turns.**
- d. Allow the nose to continue down and roll out so you reach wings level, approximately 30 degrees nose low at, 190-200 knots.
- e. Begin your next pull and perform the maneuver in an appropriate direction for wing/area considerations.
- f. During your fourth pull, give the Wing a cross under from high to low.

## 2. Common Errors

- a. Rolling too fast; remember, an aircraft is on your wing, roll at a rate which allows the Wingman to maintain position.
- b. Not getting the nose high enough and not getting down to 100 knots. Time your roll so you reach 100 knots at 90 degrees of bank. If you are going to err anywhere make sure you observe the minimum airspeed; get no slower than 100 knots.
- c. Getting the nose too high and getting slower than 100 knots. This is mainly a function of not rolling fast enough. Do not let Wingman consideration make you fly a bad platform! Increase bank to control the pitch angle and maintain positive back stick pressure.
- d. Unloading during wingwork. **MAINTAIN POSITIVE G DURING WINGWORK!** Unloading the aircraft with a Wingman near you, particularly when you get slow, is unsafe! You should be flying the wingwork so that if you had a cup of coffee on the glare shield you would not spill it and it would always remain in the same place, always keep positive G. Trim as required.

## 306. CLOVERLEAF

### 1. Description

The Cloverleaf maneuver combines the first half of a Barrel Run with the last half of a loop.

### 2. General

This maneuver combines the smooth coordinated rolling control of the Barrel Roll and the pull control of the basic Loop. It will help develop your timing, planning and coordination. You will do only one of these maneuvers at a time until you are introduced to the Combination maneuver, after which you **may** do a series of four back to back (for a full four-leaf clover). You must keep clearing throughout the entire series. Review the Description and General paragraphs for both the Barrel Roll and the Loop in the Contact FTI.

### 3. Procedures

- a. Transition to aerobatic cruise and complete the Aerobatic Checklist. Accomplish a clearing turn and roll out with a parallel and perpendicular reference, in the direction you intend to maneuver.
- b. Commence the maneuver by smoothly raising the nose while keeping the wings level. At 30-40 degrees nose high, bank approximately 10-20 degrees from horizontal and pull so the nose travels around in an arcing path towards the selected 90 degree checkpoint. After 45 degrees of turn, the angle of bank should be 90 degrees and the nose will be at its highest point during the maneuver (approximately 55-60 degrees above the horizon).

- c. The AOB should continue to increase at a constant rate until reaching the canopy bow/OAT gauge on the inverted horizon, heading directly at the 90 degree reference point. Your nose should be slightly above the horizon and the airspeed should be no less than 100 knots. Fly the aircraft through the inverted position, stopping the roll at wings level and set your lift vector.
- d. Tilt your head back and visually locate your parallel reference. Correct with aileron as necessary to maintain the wings parallel to the horizon. Check the nose in relation to the parallel reference (opposite from your 90 degree reference point) while correcting for directional deviations as necessary by adjusting the rudder inputs.
- e. Airspeed will reach its slowest point at the top. The greatest amount of right rudder input will be required at this point in order to maintain balanced flight. Maintain positive G-loading and wings parallel to the horizon.
- f. Set your lift vector and pull the nose through the opposite horizon, adjusting the amount of aft stick pressure to maintain a constant pitch rate. Fly the aircraft's nose along the section line, relaxing right rudder pressure as airspeed is regained.
- g. Continue to relax right rudder pressure as the airspeed increases and smoothly increase aft stick pressure as necessary to maintain a constant pitch rate. The recovery will again require approximately 3.5 Gs, so remember to resume the AGSM. Quickly scan the altimeter in order to return to straight and level flight at approximately the same altitude and airspeed, but offset 270 degrees from the original heading, tracking along your 90 degree reference.
- h. Commence the next "leaf" (if applicable) as described above. As you recover from the even-numbered maneuvers, you will fly perpendicular (vice parallel) across your section line.

#### 4. Common Errors

- a. Failure to check and report the altitude prior to entry. It is hard to recover on the same altitude when you do not know what it is.
- b. Failure to raise the nose high enough during the initial pull. Generally, this will result in a correspondingly nose low attitude and proportionally high airspeed when recovery is made.
- c. Improperly coordinating the rate of roll with the rate of pitch. An insufficient roll rate will result in an overshoot of the intended reference point, while an excessive roll rate will result in an undershoot.
- d. Failure to maintain balanced flight. Too much or too little rudder will produce essentially the same results as too fast or too slow a rate of roll, respectively, on the first half of the maneuver. Poor rudder control is easily detected by checking the

alignment of the nose and the section line. Remember that the required rudder input varies as airspeed varies. Almost constant rudder adjustment will be required during the last half of the maneuver.

- e. Relaxing too much backstick pressure while passing through the inverted position at the top of the loop. This error will result in a "floating" sensation. Remember to maintain some positive G-loading throughout the entire maneuver. Conversely, failure to relax sufficient backstick pressure over the top will result in excessive angle of attack and rudder shakers. If this result occurs, relax the backstick pressure slightly and regain nose track.
- f. Failure to initiate the pullout soon enough during the second half of the loop. This error results in excessive airspeed and recovery below the initial altitude.
- g. Failure to scan ahead for the reference point and/or section line; thereby losing orientation.

### 307. COMBINATION MANEUVER

#### 1. Description

Combination Maneuvers, as the name implies, is nothing more than combining a series of aerobatic maneuvers into a single evolution. A maximum of FOUR maneuvers may be "linked" together.

#### 2. General

The aerobatic training you receive is NOT intended to prepare you for the air show circuit! As previously discussed, aerobatic training IS taught to allow you to make the aircraft perform precise and controlled maneuvers, flying the aircraft throughout more of its envelope. By combining maneuvers, you will need to plan ahead to the second maneuver while completing the first. As always, maintain a constant and vigilant VFR scan, especially during the maneuvers. Energy management should be a part of the discussion. Plan maneuvers to maximize aircraft airspeed/altitude, while staying within the assigned airspace. Airspace management should be a major consideration for which maneuvers are linked together and in what order.

Example: Wingwork, Barrel Roll, Cloverleaf, ½ Cuban 8

#### 3. Procedures

Perform all maneuvers IAW the procedures previously set forth for the maneuvers you intend to fly. You will pre-plan the Combination Maneuver and thoroughly brief your intentions to the IP during the pre-flight briefing. While modifications and variations are authorized during the flight, the intent is that impromptu and non-briefed Combination Maneuvers be avoided.

**308. MAINTAINING AN AREA USING RADIAL/DME/ALTITUDE**

In the Air Force, you will be departing and arriving on an IFR clearance almost always. You are not cleared to maneuver until in your block of the MOA in VMC. Maintaining the boundaries of the area is the bottom line in UPT and your IP will not allow you to go out of the area because that will result in an IFR violation. If you have to "knock off" a maneuver to stay within the boundaries of the area then so be it, you must not go out of the area. In T-38C Formation, you are going to go to the Rosehill MOA, R2915A at Eglin, or Area 2F primarily. You may have to work these areas in Radial/DME and from 5-10K MSL. You can use visual references if you want, but the area is defined by specific Radial/DME and altitude. At SUPT, go out of the area, and you can expect to UNSAT the ride. The secret to maintaining an area boundary is determining the "meat" of the area. Some areas are wider than they are long, meaning that they are better to work back and forth on radials keeping a fairly constant DME, or they are longer than they are wide, namely, you can work along a center radial dialed in the CDI, and then work back and forth in DME. Set up inner limits for yourself when working the area so that you do not go past the real boundaries: "I won't go above 9k, unless I know what I'm doing, and I won't go below 6K unless I have a handle on things." Likewise, "I won't go any farther east than 38 DME in Rosehill and no farther west than 46 DME," that way you will stay within the 37 to 47 DME boundaries and if you work along the center radial, you should have no problem. Work your in-flight planning/area orientation as well. If you are approaching a boundary, think of a maneuver you can knock out when you are doing your tight turn to work back to the "meat" of the area. String your maneuvers together so that you can maintain your area easily. If you "paint" yourself in the corner in the area, you may have to change the sequence you had planned. Be flexible, see these conflicts early, and plan accordingly. WX and other factors will drive you to adjust your profile. Be aware of the winds when planning.

## CHAPTER FOUR LANDING PATTERN PROCEDURES

### 400. INTRODUCTION

N/A

### 401. LESSON TOPIC LEARNING OBJECTIVES

1. **Description.** The USAF landing pattern is the standard VFR pattern for the USAF. It is commonly referred to as the overhead pattern and closed pattern.
2. **General.** The USAF landing pattern will be flown in the no-flap configuration due to NATOPS restrictions on flap retraction altitude and the potential to over speed the flaps.
3. **Gear Clear.** In order to prepare you for USAF advanced training, pilots will inform the other crewmember of intended gear actuation by stating “gear clear” prior to raising or lowering the gear. After stating “gear clear,” the pilot will hesitate momentarily prior to actuating the gear. The IP will respond “clear” if gear restrictions are met.

### 402. OVERHEAD PATTERN

1. **Description.** A landing pattern entered from initial.
2. **General.** This procedure outlines the standard entry to a USAF pattern.
3. **Procedures**
  - a. After determining the active (duty) runway, maneuver to a point approximately two miles from the approach end of the runway 170 KIAS, 1000 feet AGL or specified pattern altitude. Use no more than a 45-degree intercept to initial to clear for traffic. Make your initial call

*“Duke Tower, Red Knight 123, 2 mile initial”.*

Place your Wingman on the opposite side of the break NLT initial. There is only one altitude – pattern altitude. Break altitude and pattern altitude are the same.

- b. Plan to break in the first third of the runway. With clearance to break from the tower, clear off your Wingman (with salute or as briefed), roll into bank (usually around 80-90 degrees) and reduce power to idle and turn to attain approximately ½ wingtip distance (WTD) on downwind. Maintain pattern altitude and use G to bleed off airspeed. Wing will delay 5 seconds before executing the break.
      - i. Adjust your inside downwind spacing for winds. Set a crab to maintain a ground track that parallels the runway and maintain ½WTD. The runway is your PRIMARY visual reference.

- ii. Fly the inside downwind at 140 KIAS (500 ft-lbs should hold this airspeed). Abeam the desired touchdown point, lower the gear and start the Landing Checklist.
- iii. Adjust power as required to maintain 120 KIAS until the perch.
- iv. When your intended point of touchdown is 45 degrees behind you (no-wind day), you are at the “perch point.” Report:  
  
“123 right/left base, gear down, option/touch-and-go/full stop”, and begin your final turn.
- v. Adjust the perch point as necessary to correct for winds. Strong winds may require an early perch to achieve the desired final approach length.
- vi. Fly the final turn at 120 KIAS, slowing to 100 KIAS on final. Bank as necessary to roll out on at least a minimum final of 1500 feet. Maximum final length is 3000 feet. Don’t forget to “pull” the aircraft around the turn with G.

#### NOTE

Monitor AOA throughout the turn. If rudder shakers are activated, execute a go-around. When you pull, do so as necessary, but do not forget to add power so that you do not get slow or exceed 22 units AOA.

- vii. Execute a normal T-34 no-flap landing.

#### 4. Common Errors

- a. Getting slow in the final turn, banking and pulling without adding power.
- b. Not bleeding off enough energy in the break and delaying configuration.
- c. Late adding power on downwind after configuring and getting slow at the perch.

#### 403. CLOSED PATTERN

1. **Description.** A landing pattern initiated from a takeoff, low approach, or touch and go.
2. **General.** The closed traffic pattern allows the pilot to get the aircraft on the ground expeditiously using a minimum amount of fuel. You may accomplish a closed pattern from an initial takeoff, touch-and-go, or low approach. There is no specific way to pull closed. Greater than 140 KIAS, pull closed to inside downwind. Do not get below 100 KIAS or more than 90 degrees AOB.

### 3. Procedures

- a. Ensure power is set at 1015 ft-lbs. After the aircraft has become safely airborne, accelerated, and a positive rate of climb has been established, check airspeed between 90 and 120 KIAS, announce “gear clear” and retract the gear. Confirm flaps up. Accelerate to 140 KIAS. If 140 KIAS has not been attained upon reaching 300 feet AGL, pilots may elect to reduce rate of climb at 300 feet AGL to facilitate acceleration.
- b. **MAINTAIN A POSITIVE RATE OF CLIMB** below 300 feet AGL during the acceleration to 140 knots. Leveling off below 300 feet AGL or descending at any time after retracting gear to attain the 140 KIAS required for the subsequent closed pull-up is prohibited.
- c. Request clearance for closed traffic on climb out. Initiate the closed pattern no sooner than the departure end of the runway (unless present position closed is specified by the controller) and at an airspeed no slower than 140 KIAS. A typical call is:  
  
*“123, Request Closed” or “123, Request Present Position Closed” or “123, Request Sequential Closed”.*
- d. When you have received clearance, check pattern spacing, clear the area, and start a climbing turn to the downwind leg. Check power set at 1015 ft/lbs, raise the nose to approximately 15-20 degrees up, then roll into approximately 60 degrees of bank. *There is no specific way to fly the closed pattern.* You want to arrive on the downwind displaced ½ wingtip away from runway at altitude. Maintain a constant climb to pattern altitude, use 1000 feet AGL if no pattern altitude is specified. At Duke Field or Choctaw NOLF, use 1200 ft MSL.
  - i. If winds are overshooting, move your downwind spacing away from the runway. If winds are undershooting, adjust your downwind spacing toward the runway. Set a crab on downwind to maintain a ground track that parallels the runway.
  - ii. Minimum airspeed during the closed pull-up is 100 knots. Maximum bank is 90 degrees.
  - iii. Pattern Spacing: For a touch-and-go, the preceding aircraft must be abeam your position. Following a full stop, do not initiate the closed pull-up until preceding aircraft is 45 degrees aft of your position.
  - iv. When you roll out on downwind, leave power at 1015 ft/lbs and accelerate to approximately 140 knots, then reduce power to maintain 140.

- v. Once established on downwind, procedures for approaching the perch and for the final turn are the same as following an overhead break.

#### 4. Common Errors

- a. Getting slow in closed pull-up.
- b. Being too slow in airspeed initiating closed pull-up.
- c. Overshooting pattern altitude.
- d. Undershooting pattern altitude and climbing on downwind.

### 404. STRAIGHT-IN-APPROACH

1. **Description.** A landing pattern displaced from the runway. Fly a normal outside downwind, base, and arrive on a 1.5-2 mile final.
2. **General.** The straight-in pattern allows for an extended final. Straight-ins can be flown in emergency situations, for formations approaches/landing, civilian/non-towered airfields, etc.

#### 3. Procedures

- a. Fly the downwind at 150 KIAS and 1 to 1 ¼ wingtip spacing.
- b. Normally, slow to approximately 140 knots or less on base or approximately 3 to 5 miles from touchdown on an extended straight-in. Local procedures or traffic deconfliction may require adjustments.

*“123 right/left base, gear down, option/touch-and-go/full stop”, or “124 2 mile final, gear down, option/touch-and-go/full stop”,*

Avoid slowing to less than final turn airspeed for the current flap setting until established on final. Prior to intercepting the glide path, establish the landing configuration and trim while allowing the airspeed to gradually decrease to the final approach airspeed (120 KIAS). Strive to be configured at final approach speed upon intercepting the glide path. From this point, follow procedures outlined in “Normal Final Approach/Landing”.

- c. Execute a normal full stop, touch-and-go or go-around as required. Formation approach and landings will be covered in the formation section.

#### 4. Common Errors

- a. Misjudging glide path and descent rate and arriving on short final high.

## 4-4 LANDING PATTERN PROCEDURES

- b. Too tight or too wide on downwind.
- c. Extended/long final.

#### **405. GO-AROUND PROCEDURES**

1. **Description.** Go-around procedures are equivalent to Naval Aviation's "wave-off."
2. **General.** Go-around procedures are to be used whenever an approach to landing is discontinued.
3. **Procedures**
  - a. Advance power as required, check airspeed below 120 KIAS, retract gear, and comply with Tower instructions or established local procedures.
  - b. Formation flights will be covered in formation approaches and landings.
4. **Common Errors**
  - a. Over speeding the gear or flaps.
  - b. Not recognizing an unsafe situation and failing to initiate a go-around.

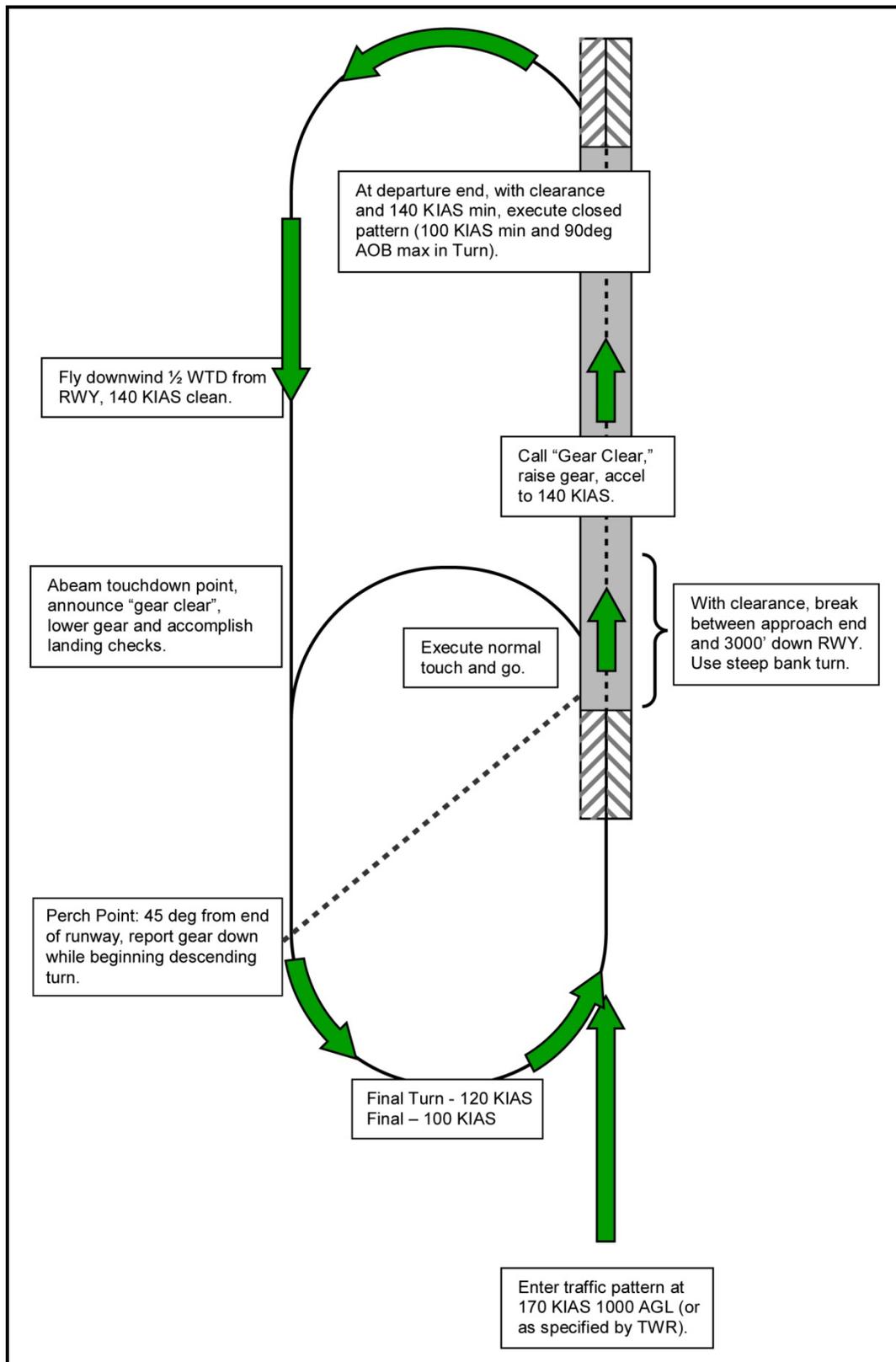


Figure 4-1 Traffic Pattern Map

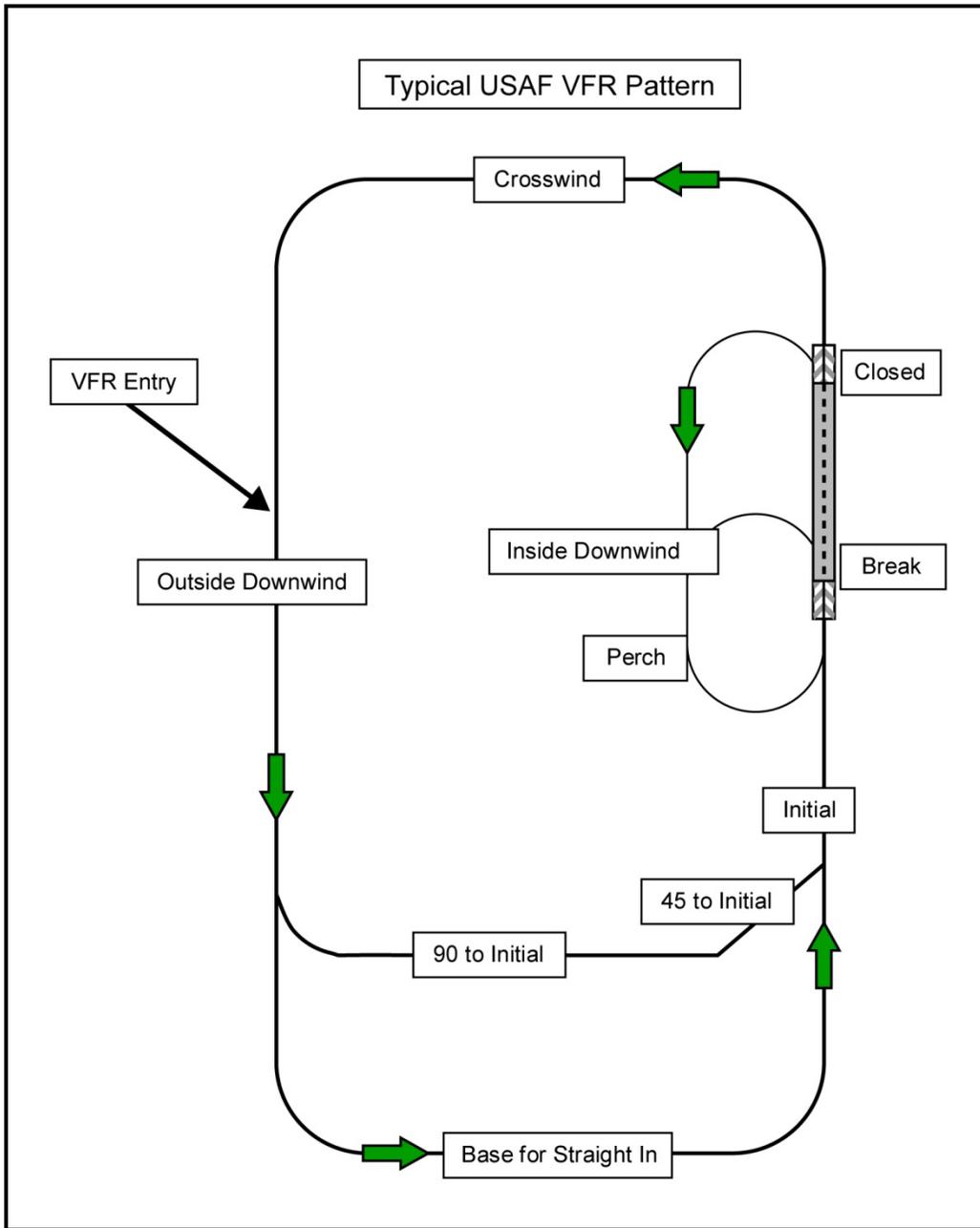


Figure 4-2 Typical USAF VFR Pattern

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **CHAPTER FIVE FORMATION PRINCIPLES**

### **500. INTRODUCTION**

#### **1. Philosophy**

The Air force Jet formation stage of training is the primary focus of your intermediate “top-off” at Whiting. Air Force formation will tie in all your previous training into one mission. You will use elements of your Contact, INAV, and FORM hops in successful execution of the T-38C FORM syllabus. Formation is the longest stage of training at Vance and will be weighed heavily in the final determination of your class standing. All the fundamentals taught in your T-38C FORM rides here at Whiting will carry over into T-38Cs and into whatever operational aircraft you end up flying.

The T-38C FORM rides you will fly during this syllabus closely resemble what you are actually going to do in the real world: take a formation of airplanes to a working area (or hostile airspace), safely execute planned mission requirements, and return that formation safely. The effectiveness of formation mission execution is highly dependent on solid flight discipline. Flight discipline originates in mission preparation, transitions to the flight briefing, ground operations, work area, and terminates after the debriefing. Strict flight discipline is absolutely essential for successful mission execution.

More than any other phase of training, T-38C FORM builds confidence and teaches discipline and the proper application of aggressiveness in military flying. Aggressiveness is an attitude not to be confused with abrupt flight control movement or reckless abandon. Aggressiveness in flying is an attitude toward perfect execution, being exactly on altitude or exactly in position during formation with no deviations whatsoever. The T-38C Intermediate syllabus is your first exposure to the mindset of using an airplane as a weapon, not just as a conveyance from one point to another. The maneuvers introduced and flown in this phase of training will allow you to explore the performance envelope of the aircraft, while building confidence and improving your formation flying abilities.

In this phase of training, the procedures are not as rigid as they were in Primary. This phase will require adaptability and flexibility on the part of all flight members. The students will be responsible for planning and executing the flight sequence. A solid plan will help eliminate “droning” or wasting time, a luxury you will not have in the T-38C. When planning the sequence, consider energy management, airspace requirements, event length, and transit times. The T-38C will be fuel limited. There will be no time for delays due to poor planning and execution.

#### **NOTE**

Factors such as weather or airspace restrictions may force deviations from the planned sequence. It is Lead’s responsibility to adapt and complete all required maneuvers if possible.

## 2. Responsibilities:

- a. **Flight Lead.** *The Flight Lead is ultimately responsible for the safe and effective conduct of the mission.* He or she plans, briefs, and debriefs the flight. This position gives both the authority and the responsibility to ensure the flight proceeds as intended. Lead must concentrate efforts on accomplishing the mission, achieving objectives, and returning with the flight intact. He or she must consider the capabilities of the Wingman in planning a sortie. Taking this into consideration, Lead should optimize training for all flight members and plan missions accordingly, to include briefing mission-specific parameters.
- b. **Nav Lead.** This may be used when the Flight Lead wants the Wingman to navigate and clear. The Flight Lead will fly the Wingman position, deconflict within the flight, and keep the radios.
- c. **Admin Lead.** This is used to pass Lead responsibilities to another member of the flight. The Admin Lead is expected to run all aspects of the profile to include navigating, managing radios, and making changes to the profile if external conditions dictate. With an Admin Lead change, the call signs within the flight are administratively renumbered to match the position being flown. However, the Flight Lead still retains ultimate authority for the formation. Admin Lead changes are what you will execute during your AFORM sorties when swapping Lead.
- d. **Tactical Lead.** This may be used when the Flight Lead needs the Wingman to lead an event (for example, Fighting Wing) or segment of the flight. In this case, the Wingman picks up tactical, navigation, and radio responsibilities, but not overall Flight Leadership responsibility. Individual call signs do not change.
- e. **Wingmen.** Commensurate with their skill, Wingmen will be tasked to achieve the mission. Tasks include mission planning, threat study, and providing information in the brief. Once airborne, each Wingman must execute the plan as briefed. Whether the flight is taxiing out to the runway or flying up initial, the Wingman must look and sound good, match Lead's configuration, and always anticipate but never assume. To contribute successfully, Wingmen must prioritize the following responsibilities:
  - i. First and foremost, CLEAR! (Deconflict from Lead, the ground, and other aircraft.)
  - ii. Maintain visual with Lead and other aircraft in the flight, as applicable.
  - iii. Maintain proper formation position (as briefed or IAW published guidance).
  - iv. Accomplish cockpit tasks (radio channel changes, ops checks, NAVAIDs, etc.).

- v. Accomplish mission tasks (area orientation, route timing, target identification, etc.).
- vi. Strive to maintain high SA – be able to assume Lead at any point. Be a thinking Wingman!

## 501. MISSION PREPARATION

Mission preparation begins the day prior. All training requirements will be identified and planned for. Students should contact their IPs the day prior to discuss any specific issues. At Whiting, students will prepare the briefing board with pertinent information for the flight. Include line-up card data, e.g., call signs and formation members. List desired learning objectives (DLOs) for the flight, e.g., - No area busts, - No missed Joker/Bingo calls, - No over-G, - Timely maneuver execution, - Efficient energy management, - Clear, concise and correct communications, etc. Reference Appendix D, Formation Standards, for additional requirements.

### Flight Lead Responsibilities

A thorough formation briefing is absolutely essential to ensure safe and effective mission accomplishment. Flight Leads should start the briefing on time and emphasis should be placed on overall mission objectives and individual flight member responsibilities. Flight Leads will review all pertinent information to include grade-book, NOTAMS, etc and plan for effective training.

### Wingman Responsibilities

Be prepared for the brief and be on time, no excuses. Assist the Flight Lead as necessary and brief items required (e.g., EP of the day). See Squadron Standard for more specific information.

## 502. BRIEFING/DEBRIEFING PROCEDURES

The briefing guide contained in Appendix B is TRARON THREE Squadron Standard for T-38C FORM. If Flight Leads want to brief something other than standard, then it is Lead's prerogative to do so, but Lead is responsible for making sure all members of the flight are fully briefed on non-standard items. Appendix B is similar to briefing guides used by many USAF units and also reflects the NATOPS requirements for required briefing items. The day's mission objectives will be briefed so that these objectives can be referenced during the debrief. The AFORM briefing space in the squadron will be the primary briefing location unless otherwise dictated by Flight Lead. All flight members are required to be in attendance unless otherwise pre-coordinated. Stand-Up EP should be conducted at the beginning of the brief. In T-38C FORM, the Lead IP will brief the flight. Squadron standards will be used to the max extent possible; as students, you need to be familiar with the standards and write questions down to ask when the briefing is over. Do not leave the brief and step to fly with any questions about the flow of the mission.

As you will come to see, the debrief is arguably the most important part of the sortie. It is where

the learning points from the sortie can be discussed and understood. All AFORM sorties will include a proper debrief. The debrief will be conducted in a timely manner following the sortie. Students will set-up a debriefing space with all required by Flight Lead. At a minimum the student will have the DLOs written on the board. IPs are responsible for running an effective debrief.

### **503. FORMATION ENERGY MANAGEMENT**

Energy management in formation is crucial for smooth flow of the planned maneuvers. Terminating maneuvering to fix your energy state, while may be necessary, is not optimal. Lead should in-flight plan so all the required items are done in a sequence that results in an orderly flow of maneuvers. Lead is passed to #2 with good energy and plenty of area to get his or her bearings. As mentioned so many times before, the T-38C is fuel limited so you will have to split the gas in the area with your flight mate. Bring the formation into the area at or near the top of the block, Fence-in, and accomplish the G-awareness exercise. This will bleed energy down to the neutral state of 850 ft-lbs, 7500 feet, 170-180 knots. With that energy you can do anything with the formation. At the end of your maneuvering, set up the Lead change so the new Lead is at the neutral energy state, with the longest look at the area.

Good energy planning involves using the available energy of your aircraft to perform a series of maneuvers. As discussed earlier, available energy is a combination of airspeed (Kinetic) and altitude (Potential). Most maneuvers will require trading potential energy, in the form of altitude, for kinetic energy or airspeed. Due to the T-38C's limited ability to gain energy quickly, care must be taken to preserve your energy level once attained. High 'G' loading and/or maintaining airspeed above the max level flight airspeed will deplete energy. During T-38C FORM maneuvering, some maneuvers will require higher airspeeds and "G" loads. You must be aware of how each maneuver affects the overall energy level. For example, to fly a Half-Cuban Eight, Lead must use stored energy by trading altitude for airspeed.

### **504. COMMUNICATIONS**

Communications are an excellent indicator of flight discipline. All communication must be clearly understood by every flight member. During this phase of training, Lead may direct radio frequency changes with a visual signal or radio call, whichever is most convenient. Lead will initiate a positive check-in on all new frequencies. Wing does not repeat visual signals, but should acknowledge with a head nod. If unsure of a signal, do not respond, and Lead should repeat it. If unable to comply with a signal, shake it off. Radios can be used to avoid confusion or anytime it is required for safety of flight.

Radio discipline requires not only clarity and brevity in the message, but limiting unnecessary transmission as well. The first part of any radio call should always be the tactical call sign. This step serves to alert the listener (Wingman) that a message is coming (the attention step) and specifies who is making the call or to whom it is directed. The second part is the execution step and tells the flight member the action to be taken. Relying on voice recognition or tone/inflection to identify another aircraft is not adequate. Wingmen should acknowledge with position number and repeat any specific data required unless briefed otherwise.

## **5-4 FORMATION PRINCIPLES**

Lead: *“TALON, go channel 5”*

Wing: *“Two”*

Lead: *“TALON, push channel 5”*

Wing: No verbal confirmation required

If calls are unclear, query the Flight Lead. Use complete call signs and make commands, directions, or information clear and concise. Limit radio use to essential calls. To keep radio calls to a minimum, use visual signals when practical.

### **Flight Lead**

Ensure calls are clear and concise, and combine calls when practical. Radio channel changes may be directed at any time. Delay flight check-in as necessary based on Wingman capability or flight conditions. Based on proficiency, Flight Leads should consider putting Wingmen in Route to perform cockpit tasks.

### **Wingman**

Change radio channels only when directed by the Flight Lead and only after all flight members have acknowledged. When performing a channel change, maintain your formation position unless otherwise briefed. A technique would be to count clicks while rotating the selectors and then confirm proper mode and frequency. Wingmen will mimic the format of the Flight Lead's calls, but provide accurate information.

*“TALON, Ops check, 1's 5.0, 4.2 Gs”*

*“2's 5.0, 4 Gs”*

Unless briefed, the Flight Lead speaks for the flight when communicating with other agencies until flight split up. Wingmen will respond to all directive calls that cannot be visually confirmed by Lead (Unless briefed otherwise). An example of this is tactical maneuvering.

*“TALON, 90 left”* (no response required)

- No response is necessary since Lead can see movement to the position.

*“TALON, fence-in”*

*“Two.”*

- Lead cannot normally witness switch actuation.

### **505. KNOCK IT OFF/TERMINATE**

According to AFI 11-214, *Aircrew and Weapons Director Procedure for Air Operations*, the term “Knock-it-Off/Terminate” will be used to direct all aircraft to cease maneuvering. If danger is imminent, directive calls should be made. Typically, “Knock-it-Off” calls are reserved for safety of flight issues, “Terminate” is commonly used to cease maneuvering when the desired learning objectives (DLOs) have been met. For example, when maneuvering in Extended Trail,

and all the briefed maneuvers have been accomplished, a “Terminate” should be called. When the flight is approaching an area boundary or cloud clearance becomes a factor, a “Knock-it-Off” will be called.

**Any flight member can initiate a KIO or terminate. Make directive radio calls if danger is imminent. Call KIO when safety of flight is a factor or where doubt or confusion exists. Call terminate when safety of flight is not a factor.**

**Initiation of a KIO or terminate will start with flight call sign, followed by each flight members transmitting his or her position number – in order – with “Knock-It-Off” or “terminate.” Aircraft with radio failure will signal KIO with a continuous wing rock.**

#### **KNOCK IT OFF:**

*“TALON Knock it OFF”* (anybody can call this).

*“TALON One Knock it Off.”*

*“TALON Two Knock it Off.”*

*“TALON 1 or 2 with reason”* (AS APPROPRIATE)

Lead can now initiate a rejoin by rocking his wings or a radio call (for example).

Flight members will transmit “Knock-it-Off” and cease maneuvering when any of the following situations occur:

1. A dangerous situation is developing (including over-G or G-LOC).
2. Approaching area boundary.
3. Unbriefed or unscheduled flight enters the working area and is detrimental to the safe conduct of the mission.
4. Minimum altitudes are approached.
5. Weather conditions below minimums.
6. Minimum cloud separation approached.
7. Minimum Range to other flight member approached.
8. Situational awareness is lost.
9. Radio failure is recognized.
10. Bingo or Minimum Fuel State is reached.
11. Wing rock is observed (unless signaling a Rejoin).

#### **5-6 FORMATION PRINCIPLES**

**TERMINATE:**

Terminate calls are used when specific DLOs are reached. A terminate call can be initiated by Lead or requested by the IP.

“TALON Two request Terminate.” – optional call from #2 IP

“TALON Terminate.” – called by LEAD

“TALON One terminate.”

“TALON Two terminate.”

**506. VISUAL SIGNALS**

*Reference the Appendix and AFI 11-205 for USAF visual signals.*

When using visual signals, use AFI 11-205, Aircraft Cockpit and Formation Flight Signals, to the maximum extent possible. Any nonstandard visual signals must be briefed. Do not hesitate to use the radio to avoid confusion. To minimize confusion, only the pilot at the controls should give visual signals to another aircraft in the formation. Visual signals must be clear and appropriate for range (for example, slight wing rock to reform from route versus large wing rock from Tactical).

Wingmen should acknowledge all visual signals. This acknowledgment may take the form of a head nod, a thumbs-up, or a change in formation position as appropriate. To minimize confusion, make your head nod big and clear. If a Wingman does not acknowledge a signal, it should be interpreted as a request for clarification. Repeat the signal or make a radio call. Pass visual signals down the line, if appropriate.

Refer to Appendix B for Visual Signals.

**507. COLLISION AVOIDANCE**

Each aircrew member shares the responsibility to avoid collision. The Wingman retains primary responsibility for deconfliction between flight members. This responsibility transfers to the Flight Lead if the Wingman goes blind.

**Flight Lead**

Flying in the Lead position allows the most flexibility to clear visually for the flight while interpreting traffic calls from ATC. Lead should focus on avoiding traffic and maintaining a safe altitude above the ground. If a Wingman becomes padlocked, blind, or placed in a blind cone during tactical maneuvering, Lead will assume responsibility for intraflight deconfliction.

**Wingman**

Normally, Wingmen will deconflict high and/or outside of Lead's flight path. If any conflict exists between flight members, the Wingman should transmit personal intentions affording the other aircraft a means to deconflict. Example: the Wingman transmits, "TALON Two is going high," while crossing Lead's flight path in a delayed turn nearly in-plane. The transmission indicates that Wing will be maneuvering above the Flight Lead to remain well clear. The Flight Lead then may maneuver anywhere away from the new plane of motion. This technique prevents an aircraft from directing a course of action that the other aircraft may be unable to perform. While maintaining position in formation, Wingmen also have standard visual lookout responsibilities. If the Wingman detects a traffic conflict, initiate a DIRECTIVE call to Lead. Follow up the directive call with a DESCRIPTIVE call to allow other flight members to acquire the traffic and maneuver appropriately.

*"TALON climb, traffic 12 o'clock, 1 mile, level"*

*"TALON continue, traffic 12 o'clock, 3 miles, no factor"*

Wingmen should also provide mutual support by maintaining situational awareness through calls from controlling agencies describing the position of potential traffic conflicts.

### **508. VISUAL LOOKOUT**

All flight members share visual lookout responsibilities. While employing a Tactical Formation, lookout priorities change based on the mission, weather, threat, altitude, formation, etc.

Lead must clear in the direction of flight. While employing a Tactical Formation, the Lead shares responsibility with the Wingman to visually clear for threats and avoid any traffic conflicts. If traffic conflicts arise, then Lead will be directive and maneuver the formation accordingly.

The Wingman's primary job is to execute disciplined visual lookout without sacrificing proper formation position or deconfliction responsibilities. When operating in Fingertip, primary attention should be focused on formation position. Outside of Fingertip, Wingmen must carefully keep their visual lookout active and systematic, with an emphasis on deconflicting with other flight members. Visual lookout priorities will be briefed by the Flight Lead.

### **509. IN-FLIGHT CHECKS**

In-flight checks will be periodically initiated by the Flight Lead to keep abreast of the flight's fuel status for mission planning purposes. At a minimum, execute an Ops-check on departure, checking into the area, after Lead change, and before RTB.

#### **Flight Lead**

Wingmen should be given an appropriate amount of time to complete in-flight checks. Adjust formation if necessary based on Wingman skill level. Flight Leads should also avoid any abrupt maneuvering to afford the Wingmen time to accomplish cockpit tasks without compromising deconfliction abilities. Flight Leads must be able to adjust the profile and accomplish required

## **5-8 FORMATION PRINCIPLES**

training based on the fuel state for the flight.

### **Wingman**

While performing in-flight checks, continue to focus your attention on the Lead, using only short glances to perform cockpit duties.

Use the radio or the appropriate visual signal for an Ops check. Ops checks should include a fuel check, Gs, engine, instruments, and oxygen. The check will be initiated verbally by the Lead. The Wingman will respond with fuel remaining, in hundreds of pounds, in the same format as Lead's original call.

*“TALON, Standby Ops check”*

*“2”*

*“TALON Ops check, TALON 1's 5.8,”*

*“TALON 2's 5.5” or “TALON 2's same” (if within .2)*

Ops checks may be conducted in conjunction with the Fence check entering and leaving the work area.

## **510. JOKER/BINGO FUELS**

The T-38C will almost always be gas limited. There is a lot of planning and flexibility required to accomplish effective training during the sortie. Joker and Bingo fuels will need to be calculated and adhered to. Factors such as fuel burn, altitude, WX, alternates, etc will all factor into calculating an appropriate Joker/Bingo. Remember you are now in formation so in-flight planning must be adjusted off of the aircraft with the least amount of fuel.

### **JOKER FUEL**

Joker fuel is defined in Chapter 1. It is a planned point to transition from one stage of training to the next. There can be multiple joker fuels: fuel state to leave the pattern and proceed to MOA, fuel state to swap Lead to accomplish training, fuel state to depart MOA and join a pre-planned low-level route, etc. Joker fuels can be adjusted as necessary but are planned for a reason. A typical Joker fuel for an AFORM sortie might be the gas needed to leave Duke Field and proceed to Rosehill MOA and accomplish all required air work. Failure to depart Duke at Joker fuel might leave the flight without enough gas to accomplish all the training required in the MOA.

### **BINGO FUEL**

Bingo fuel is also defined in Chapter 1. It is a fuel state to terminate training and RTB to land with the required amount of fuel. Bingo fuel can vary depending upon weather, distance to base, etc. Bingo fuels must be adhered to. There isn't much more of an uncomfortable feeling than being airborne and running low on gas trying to figure out where to go and how to get there.

Flight Lead should mission plan carefully to determine “Joker” and “Bingo” fuels. The T-38C is a more fuel intensive aircraft so you will be provided simulated Joker and Bingo fuels in the T-34 to get used to keeping track of your fuel state. Flight Leads must continuously monitor the flight’s fuel state and adjust the profile to guarantee safe recovery according to OPNAV 3710 fuel reserves. Flight Leads should increase the frequency of Ops checks during maneuvering when fuel flows are high (high speed, low altitude maneuvering, etc.).

Wingman should monitor fuel frequently throughout the flight. Inform the Flight Lead when reaching Joker and Bingo and get an acknowledgment. If fuel drops below Joker, before informing the Flight Lead during an Ops check, reference the fuel state from Bingo. Example: Joker is 600 lbs and Bingo is 400 lbs, Wingman notices he is 580, tells the Flight Lead, “*TALON 2, Bingo plus 1.8*” rather than “*TALON 2, Joker minus .2*”).

Remember to cross-check fuel frequently during high fuel flow conditions. Cease maneuvering with a Knock-it-Off call upon reaching Bingo. Finally, Wingman must understand what factors the Flight Lead considered when determining Joker and Bingo. These factors will determine what degree of fuel conservation is required to continue with the mission after reaching those fuel states. Once the recovery has been initiated, reference total fuel in hundreds of pounds during Ops checks (not Bingo), give individual tank quantities if a fuel imbalance greater than 50 pounds exists.

### 511. LOST WINGMAN

1. **Description.** Lost Wingman is similar to Lost Sight in Primary.
2. **General.** Lost Wingman procedures shall be briefed for every formation flight. Lost Wingman procedures are very specific maneuvers that will be executed should the Wingman lose sight of Lead while in IMC. In any lost Wingman situation, immediate separation of aircraft is essential. On losing sight of the Lead, the Wingman will execute applicable lost Wingman procedures while simultaneously transitioning to instruments. Smooth application of control inputs is imperative to minimize spatial disorientation effects. Once Lost Wingman procedures have been executed, permission to rejoin the flight must be obtained from the Lead.

### **SIMULTANEOUSLY TRANSITION TO INSTRUMENTS AND EXECUTE LOST WINGMAN PROCEDURES!**

If the weather encountered during a formation flight is either too dense or turbulent to ensure safe flight, the Lead should separate the aircraft under controlled conditions. This action may be better than having a Wingman initiate Lost Wingman procedures at a time that may be dangerous or, worse yet, when the wingman is severely disoriented.

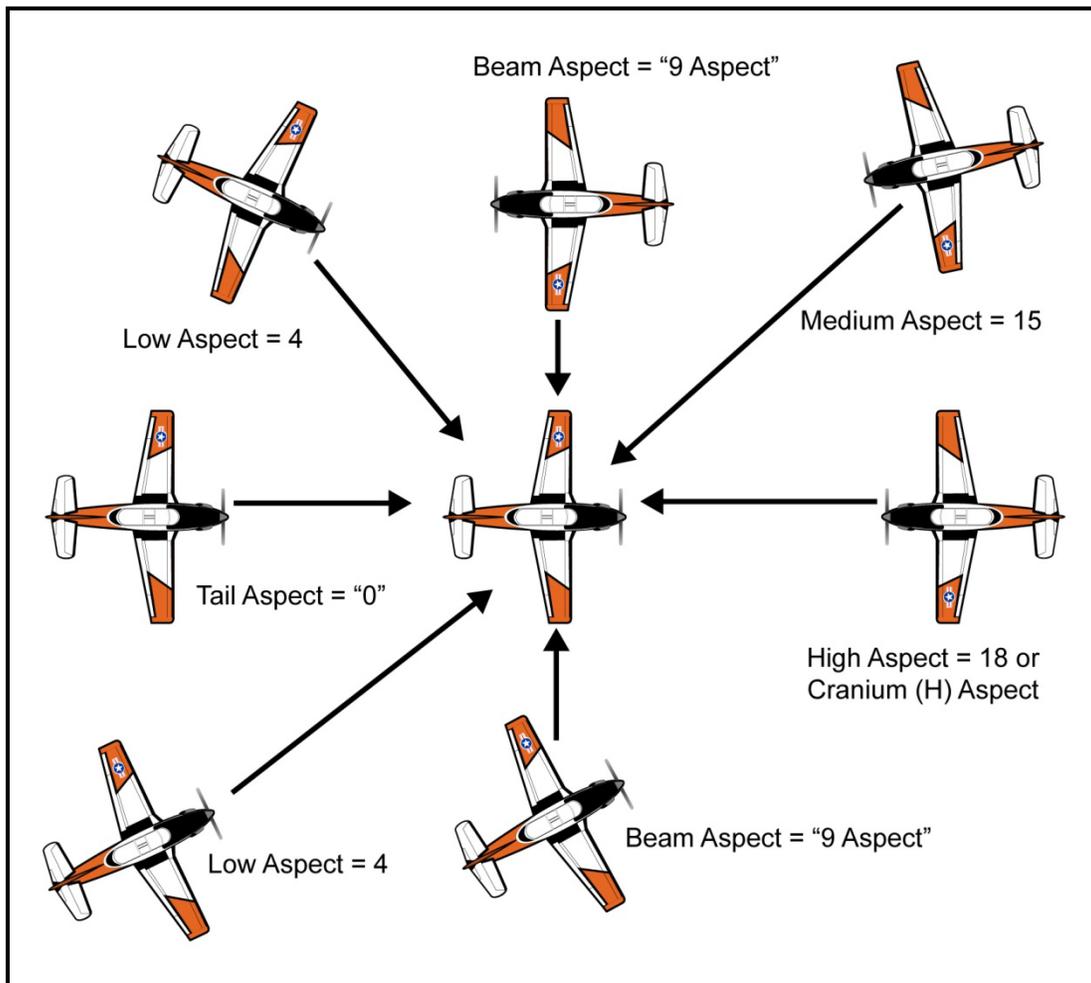
3. **Procedures.** The procedures below are for 2-SHIP actual situations. Practice Lost Wingman procedures will be covered in the next chapter.

- a. **For Two- Or Three Ship Flights**
  - i. Wings-level flight (climb, descent, or straight and level) simultaneously inform the Lead and turn away, using 15 degrees of bank for 15 seconds. Then resume the heading and obtain a separate clearance.
  - ii. When outside the turn, reverse the direction of turn, using 15 degrees of bank for 15 seconds and inform the Lead. Continue straight ahead to ensure separation prior to resuming the turn. Obtain a separate clearance.
  - iii. When inside the turn, momentarily reduce power to ensure nose-tail separation and inform the Lead to roll out of the turn. Maintain angle of bank to ensure lateral separation and obtain separate clearance. Lead may resume the turn only when separation is ensured.
  - iv. Lead should acknowledge the lost Wingman's radio call and transmit attitude, heading, altitude, airspeed, and other parameters as appropriate. Care must be taken to observe published terrain clearance limits.
- b. **Instrument Approach:**
  - i. Prior to FAF. For a precision or non-precision approach, the Wingman will turn away momentarily to ensure separation, commence a climb, inform Lead, proceed to the missed approach point, and carry out the published missed approach procedure while obtaining a separate clearance from approach control.
  - ii. Inside the FAF or on Missed Approach, the Wingman will turn away momentarily from Lead to ensure separation, commence or continue a climb, inform Lead, and carry out the published or assigned missed approach procedure while climbing to 500 feet above the missed approach altitude. Add 500 feet to published altitudes until complying with an ATC clearance.

## 512. ASPECT/ANGLE-OFF AND PURSUIT CURVES

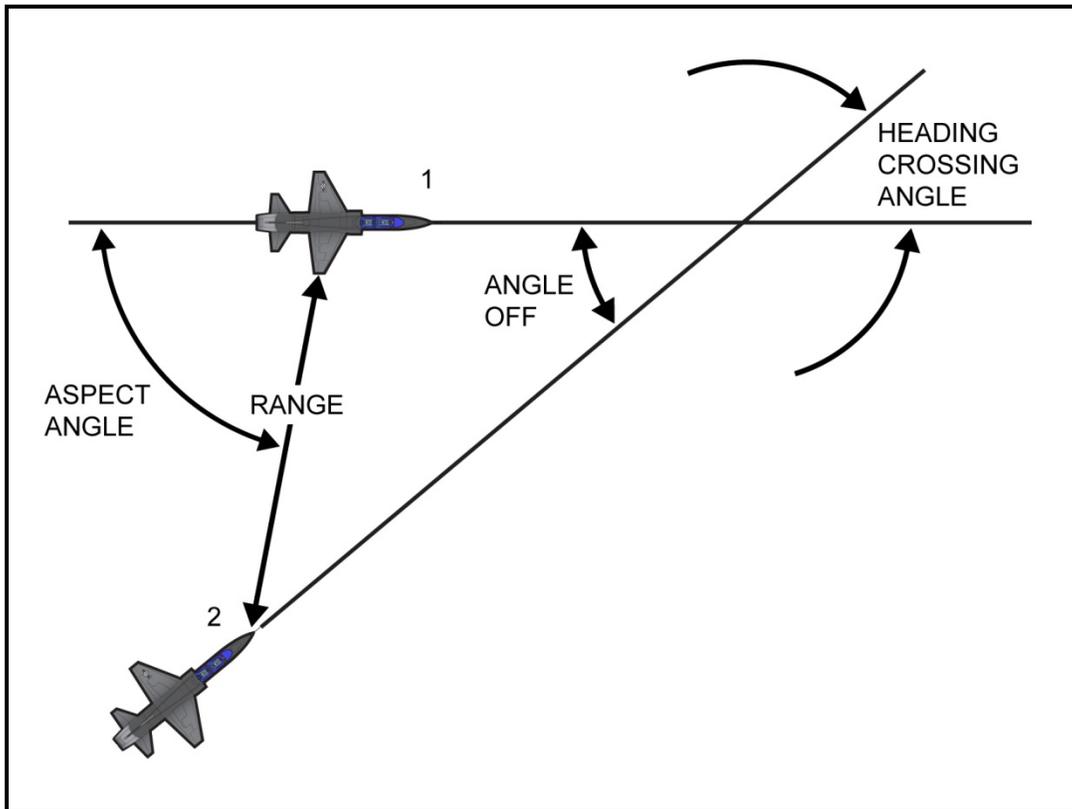
Aspect Angle and Angle-Off are two basic parameters that apply to every situation where two or more aircraft maneuver three-dimensionally in relation to each other.

1. **Aspect Angle** (Figure 5-1) is a relative position irrespective of heading and it is measured from another aircraft's six o'clock. Aspect is a reference system to Lead, 0 degrees aspect is Lead's tail, 18 is Lead's nose (short for "180") and 9 is for Lead's wingtip. The concept is three-dimensional so "9 aspect" on Lead can be either wingtip, or Lead's belly, or the top of his canopy – it is Lead perpendicular to Wing in every case. Aspect can be further broken down into intermediate numbers as well; the Rejoin line, for example, can be thought of as a 4-5 aspect (meant to be 40 or 50 degrees off the tail) in either direction. You notice from Figure 5-1 that Aspect Angle is independent of Wing's heading; Aspect is merely the picture Wing sees on Lead.



**Figure 5-1 Aspect/Angle-Off Pursuit Curves**

2. **Angle-Off** (Figure 5-2) (also known as heading crossing angle) is the heading difference between the two aircraft. As Angle-Off decreases, the fuselages of the two aircraft become more aligned. You will be reducing Angle-Off gradually throughout your Turning Rejoin as you get closer to Lead. You need some Angle-Off early in the Rejoin to get closure on Lead, but as you get closer, decrease Angle-Off to align fuselages and help control closure.



**Figure 5-2 Maneuvering Fundamentals (Aspect Angle Versus Angle-Off)**

3. **Pursuit Curves** (Figure 5-3). Specific pursuit curves (Lead, lag, and pure) control Aspect Angle and Angle-Off. The following basic rules apply in the controlled training environment:

- a. **Lead Pursuit.** With Lead pursuit, the Wingman points in front of Lead. This action decreases Angle-Off, increases Aspect Angle, and creates closure. If carried to an extreme, Lead pursuit will result in the Wingman flying in front of Lead.
- b. **Lag Pursuit.** With lag pursuit, the Wingman points behind Lead. This action decreases Aspect Angle, increases Angle-Off and decreases closure. If carried to an extreme, Wing will pass behind Lead.
- c. **Pure Pursuit.** With pure pursuit, the Wingman points to Lead. This action does little to control Aspect Angle or Angle-Off, but does create closure. The initial closure rate created by pure pursuit is less than that created by Lead pursuit. If carried to an extreme, that is, if Wing held pure pursuit he would crash into Lead.

Pursuit Curves are used along with Aspect and Angle-Off as a way of managing the rejoin (bearing) line. In Primary, if you started to get “acute,” you maneuvered to Lead’s tail to get back on the line. Using this new language, you should be able to understand that as you got more “acute” you were really seeing an increasing “aspect.” You maneuvered to “lag” to get

back on the Rejoin line and then reset the “Angle-Off,” to re-establish the original closure rate.

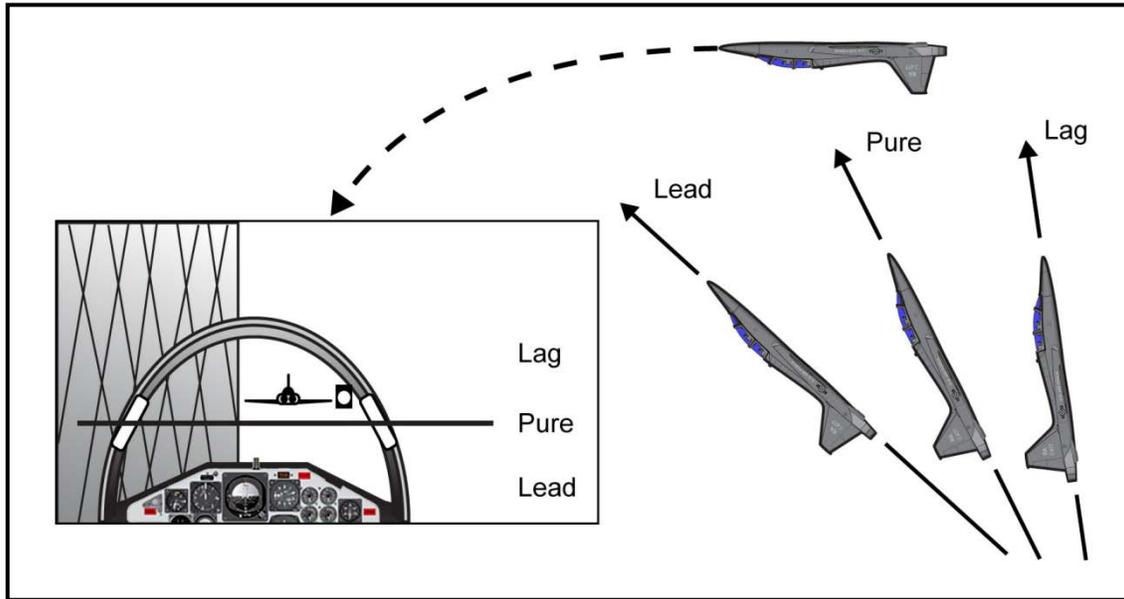


Figure 5-3 Pursuit Curves

## CHAPTER SIX T-38C BASIC FORMATION

### 600. INTRODUCTION

The purpose of flying formation is to provide the mutual support required to accomplish a given mission. Whether the mission is air superiority, interdiction, or close air support, mutual support is essential for mission accomplishment. Procedures used in formation typically remain the same whether in two-ship or larger formations. The following positions are some but certainly not all USAF, formation positions. These positions will be utilized in AFORM.

### 601. FINGERTIP

1. **Description.** The Fingertip position is the same as the Parade position flown in Primary. Fingertip is used for weather penetration, aerodrome arrivals/departures, and show formations.
2. **General.** In Fingertip, the Wingman always maintains a fixed position relative to Lead regardless of aircraft attitude. Wing always rotates about Lead's longitudinal axis. Turns into the Wingman are the same as in Primary. In turns away, maintain the Primary Parade references. The key is to maintain the Fingertip checkpoints just as in straight and level flight in either case. Fingertip Formation is always flown as if the formation is operating in the weather, so it is incumbent on Lead to be smooth with power and attitude changes. During the T-38C FORM missions, practically all formation maneuver will commence from Fingertip. There are no signals for climbs or descents or power changes. If Lead is flying a smooth platform, any changes in power or aircraft attitude should be imperceptible to Wing.
3. **Procedures.** Not applicable.
4. **Common Errors**
  - a. Not trimming the aircraft.
  - b. Gripping the controls too tightly, resulting in pilot-induced oscillations.
  - c. Overcorrecting with power changes.

### 602. ROUTE POSITION

1. **Description.** A position two ship-widths to approximately 500 feet out; level with Lead, remaining on the assigned side of Lead (no undirected crossunders). Wing will fly no farther aft than the normal Fingertip line and no farther forward than line abreast. While in the Route position, the Wingman will execute Echelon Turns during turns away and Route references during turns into.
2. **General.** The Route position (Figure 6-1) may be utilized whenever flying in VMC and the Fingertip position is not desired. Route is flown to enhance clearing and visual lookout,

increase flight maneuverability, and ease the completion of in-flight checks, radio changes, and other cockpit tasks. Lead should always have the Wingman in Route unless there is a reason to have Wing in Fingertip.

3. **Procedures.** Lead will signal the Route position with a radio call or by visual signal. The visual signal for route is a rudder wag. Another widely used signal in T-38 training is a visual pushing away with your hand against the canopy bow to #2. A good reference for Route is Lead's same side wingtip, aft tip (near the static wires) on Lead's nose NACWS antenna. Wing will space his Route position so that he can see and respond to Lead's visual signals. Wing will always ensure that the Lead aircraft is bisecting the horizon so that both aircraft are level. The Wingman should remain as level with Lead as possible during turns into the Wing without losing sight of Lead under the canopy rail. Wing will remain in the Route position until Lead signals for Wing to move back into the Fingertip position with a wing rock (Appendix A).

#### 4. Common Errors

- a. Wing flying too far aft.
- b. Wing flying too wide and unable to see visual signals.
- c. Wing flying too low.
- d. Lead causing Wing to look into the sun.

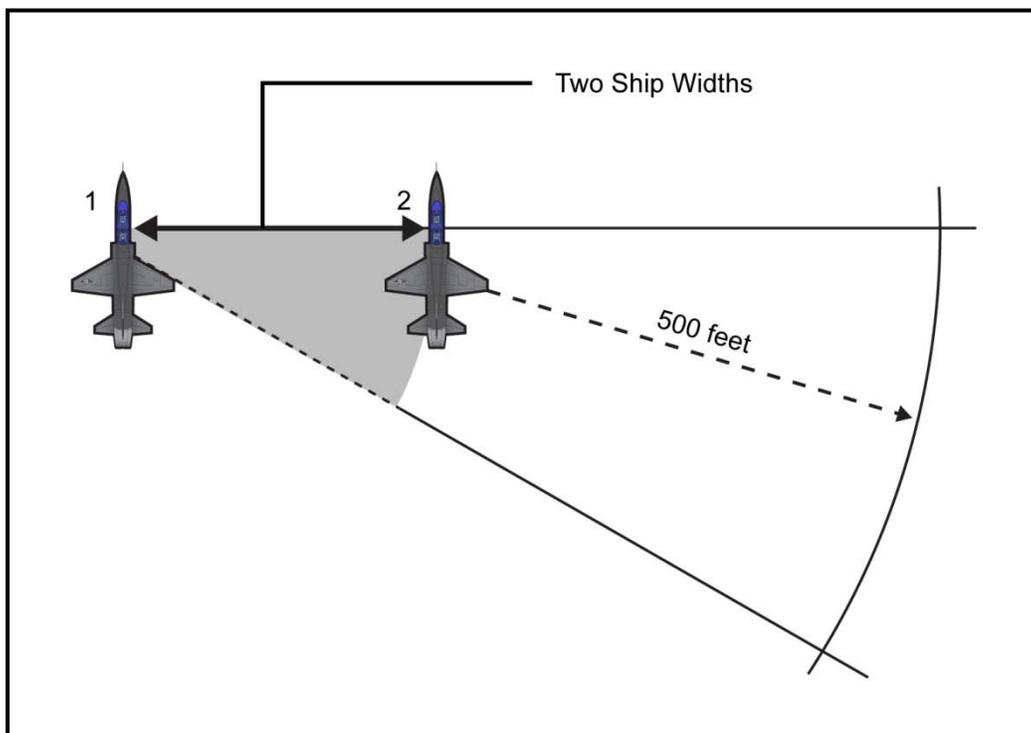


Figure 6-1 Two Ship widths

### 603. CHASE

**Description.** Chase is used for a variety of reasons, including performance assessment and assistance during an emergency. **Chase observers will maneuver in a 30- to 60-degree aspect cone out to 1,000 feet. Below 1,000 feet AGL, chase pilots will stack no lower than the aircraft being chased, and in no case will they fly below 300 feet AGL.** The chase pilot is primarily responsible for aircraft separation.

### 604. FIGHTING WING/EXTENDED TRAIL ENTRY POSITION

1. **Description.** Fighting Wing is flown as a maneuverable administrative formation.
2. **General.** The Fighting Wing position is a cone 30-45° aspect angle from Lead, 300-500 feet aft. The Wingman modulates power as required to maintain position. The Wingman may maneuver within the cone to enhance formation flexibility, maximize clearing, or simply to give an alternate departure, cruise, or recovery position. This “in-plane” position affords good visibility and maneuverability. During turns, climbs, and descents, the Wingman may use different parts of the cone to enhance clearing. To “clear through Lead,” the Wingman can fly on the side opposite Lead’s direction of flight.
3. **Procedures.** Lead directs Wing to the Fighting Wing position with a radio call or prebriefed visual signal. Wing acknowledges the radio call. There is no requirement to call in position. Even though the Fighting Wing position is defined as a cone, the Wingman should typically remain on or near the plane described by Lead’s wings (the plane defined by Lead’s lateral and longitudinal axis). The Wingman should not stagnate in Lead’s high or low 6-o’clock position while maneuvering within the cone.

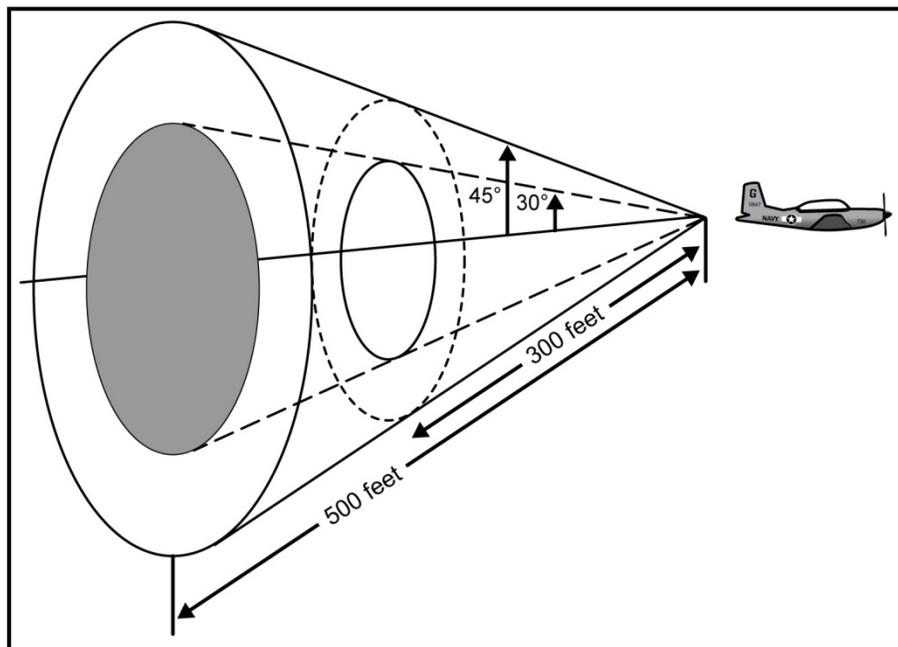


Figure 6-2 Fighting Wing/Extended Trail Entry Position

## 605. AIR FORCE TACTICAL FORMATION

“Tactical” is an umbrella term covering several formations characterized by increased separation between the members of the flight. Tactical is the primary formation flown when employing fighter aircraft. It is designed to optimize weapons and radar employment while improving visual lookout and increased maneuverability. Not unlike other formations that you have learned thus far, each member of the flight has roles and responsibilities in Tactical Formation. Tactical Formation is going to be the last thing you learn in T-38C FORM Area Work.

### 1. General

Send the flight to Tactical when VMC can be maintained for an extended period of time. For two-ships, tactical formations include line abreast and wedge. Both may be referred to on the radio by their separate names; however, if the Lead refers to “tactical,” this is understood to mean “line abreast” or “LINE”.

To enter tactical formation, Lead may use a radio call (e.g., “TALON 2, tactical left side”) or a visual signal by porpoising the aircraft. The Wingman then moves out into the tactical position, clearing the flight path while moving out. In order, the priorities for correcting formation position are for and aft positioning, lateral separation, and vertical stack. Strive to fly line abreast – no further aft than 10 degrees – by varying power and trading altitude for airspeed (or vice versa) to make fore and aft corrections.

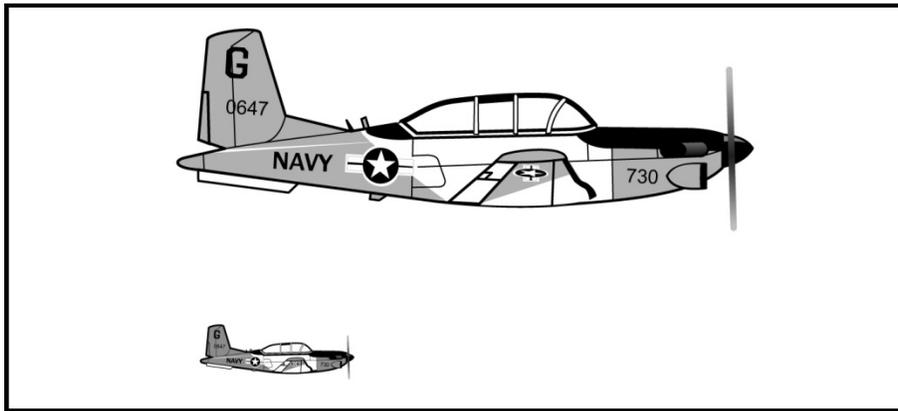
Flying Tactical Formation on the Wing is more difficult than flying Wing in other formations. In Tactical, Wing has more time to get cockpit duties done, execute visual lookout procedures, get ready for the next phase of the flight, etc. However, the task of maintaining position becomes more difficult because of the distance between the two aircraft. Relative motion is harder to detect and corrections are harder to gauge. Often this results in frequent position changes and increased fuel consumption.

### 2. Tactical Position and Contract

The Tactical position for the T-34 is defined as line abreast with 1200-1800 feet horizontal separation, stacked either high or low off of Lead. At low altitude (below 1500 ft AGL), Wing will fly above Lead at all times, keeping the Lead aircraft on or below the horizon. Lead will maintain 150 knots as a Tactical “contract” at high altitude, using 1015 ft-lbs and pulling G to maintain 150 knots in turns. At low altitude Lead will use power as required to hold 180 knots ground speed, pulling G in turns as necessary to maintain 180 knots with 1015 ft-lbs torque set. Lead should strive to maintain altitude in turns, unless a climb or descent is necessary for area orientation or low-level navigation. The Wingman’s primary reference is the Lead or ground references, not the RMI! At low altitude the Wingman should anticipate the required heading change for pre-planned turns to maintain course, but should still reference the Lead to maintain position.

### 3. Visual References

As you slide out to the Tactical position, you will see the detail of Lead's aircraft start to diminish. Key in on the star and stripes, on the side of Lead's fuselage. At about 1200-1800 feet (.2 to .3 miles on the NACWS) of horizontal separation (Figure 6-3), you are going to notice that the star is going to go from a five-pointed star to a white dot and the blue and white stripes are going to blend together. Go no further out than the star looking like a white dot and you are in the proper position. If you close in, you will start to see the detail in the star again and the different color stripes, and the Lead aircraft will just look bigger. Too far out, the white dot will fade away and you will not be able to make out any detail on Lead's insignia.

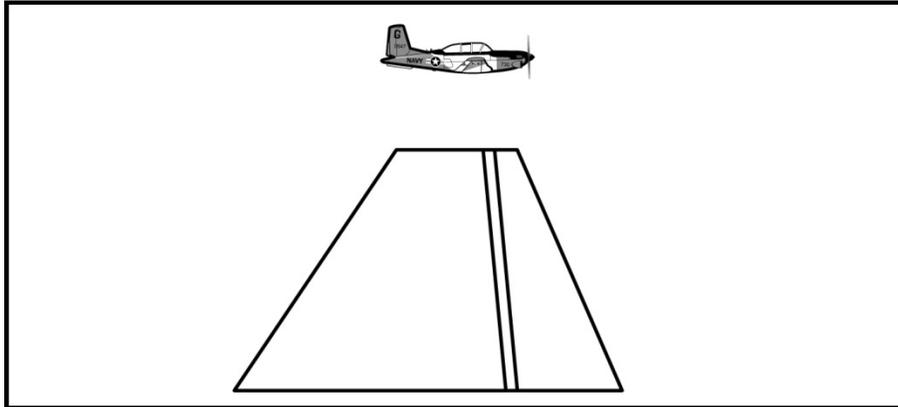


**Figure 6-3 Horizontal Separation**

Have Lead "stacked" either above or below the horizon. You can be level for en route formations, but stack inside the area. If anything, try to stack high on Lead (Lead below the horizon), that way you have some vertical to use for line abreast corrections.

### 4. LINE

After achieving the Tactical position, you will make your corrections in three steps; first, you will fix line abreast (Figure 6-4) from Lead, then horizontal distance, then elevation. For line abreast references, you want to have Lead over your rank, over the wing spar running out to the wingtip, with Lead's prop as a perfect up and down line.



**Figure 6-4 Line Abreast**

Lead should give you a stable platform and may give the flight check turns as appropriate to help Wing regain line abreast. Two references, the wing spar and the prop are great aids for assessing line abreast. If you keep Lead on the wing spar and keep the prop as a vertical straight line, then you will be line abreast. If you see Lead ahead or behind the wing spar or you see any of the prop arc, then you are not line abreast.

### 5. Flying Tactical on the Wing

Your IP is going to show you some techniques for flying Tactical on the wing, but use the order of corrections first. If you are ahead of line abreast, do not necessarily pull your power. Instead, use some vertical or horizontal angles to achieve the line abreast position without pulling your power. You will find that flying Tactical is more a function of using angles than using power; the T-34 is too power deficient to rely on power to always fix your problems. Lead is going to have to look for opportunities to give check turns or tactical turns to help Wing achieve the line abreast position, but in the end guess who is wrong if the Wingman is out of position...*the Wingman!*

### 6. Tactical Turns

Tactical turns are a way for the formation to maneuver in the airspace and in en route phases of flight. Some basic concepts apply to all tactical turns (except fluid turns). First, radio calls or visual signals may be used to signal tactical turns. For example, the radio call for a delayed 90° would be "TALON, 90 left/right". No radio response is required from the Wingman. Second, the aircraft need to adhere to a "contract" during the turn to ensure turn radii are similar. Use the following parameters for contract turns: Constant airspeed, 1015 ft lbs, roughly 60 degrees AOB and G to hold contract airspeed (150 unless low level and then 180). Plan to fly level turns, however, Wingmen may vary altitude and G as necessary to maintain formation position.

The Wingman takes the initiative to deconflict from Lead. If the Wingman is stacked high or low, he or she should maintain that stack when commencing the turn especially if he or she is the first to turn. The Wingman should attempt to stack high throughout the mission (unless in-flight visibility or other environmental factors dictate otherwise) to maintain a potential energy

advantage. If there was no stack at turn initiation, the Wingman should “telegraph” his or her intentions for vertical deconfliction by positively maneuvering the jet. Bottom line, both Lead and Wing are ultimately responsible for flight path deconfliction and must clear during turns and take appropriate evasive action if required. If the formation is assigned a hard altitude (no altitude block), the Wingman should climb or descend slightly for deconfliction – both aircraft must adhere to the cleared altitude.

Tactical turns can be commanded over the radio or conducted “comm out” Example radio calls that do not require radio acknowledgement are as follows:

*“TALON, 90 right/left”*

*“TALON, cross turn”*

*“TALON, shackle”*

*“TALON, 45 right/left”*

*“TALON, hook left/right” or “TALON, in place 180 left/right”*

*“TALON, in-place 90 right/left”*

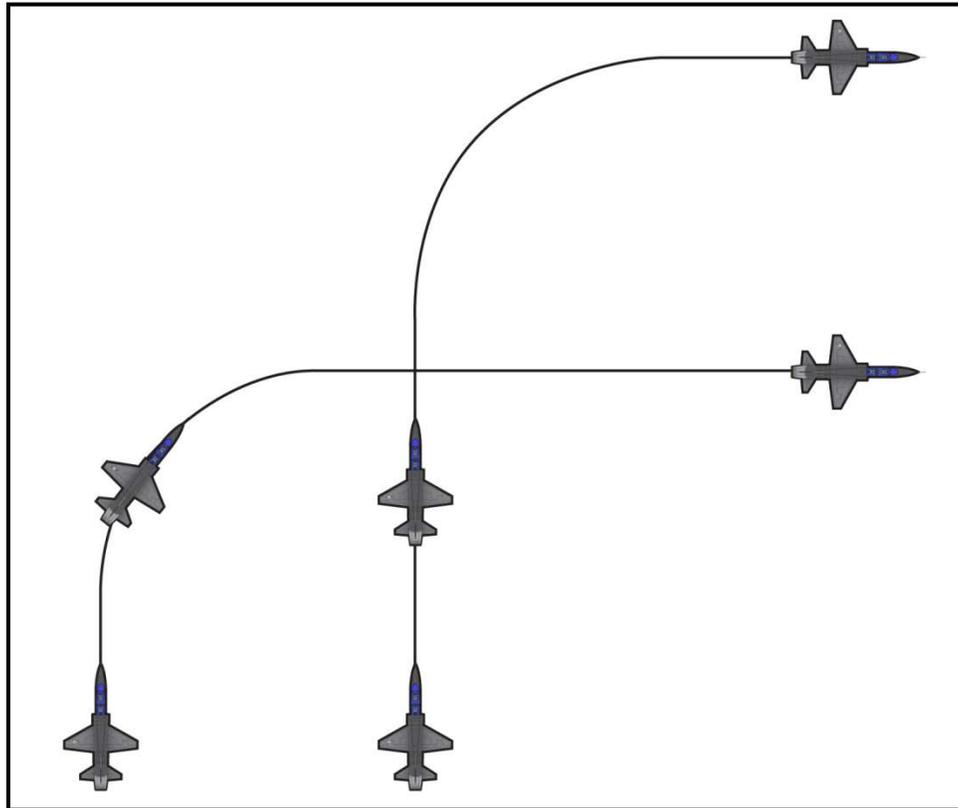
COMM-OUT tactical turns can be initiated with visual signals. All tactical turns except a cross turn or hook turn into the Wingman may be signaled with a wing flash in the direction of turn.

**Turns Into.** For turns into, Lead’s contract turn into the Wingman signals the turn. As Lead begins the turn, the Wingman continues straight ahead and deconflicts the turn by maintaining or obtaining sufficient vertical clearance. The Wingman should use this opportunity to clear Lead’s new 6 o’clock position. The Wingman initiates a 90-degree contract turn to rollout in Tactical on the other side of Lead. The timing for starting this turn occurs just prior to observing a rapid increase in Lead’s LOS. If the Wingman is in position, the increase in LOS will occur after Lead has turned approximately 45 degrees or just prior to looking down Lead’s intakes. This reference does not work if Wing is out of position. If out of position, the Wingman must vary the timing and G loading of the turn, based on Lead’s LOS, to finish the turn in position.

**Turns Away.** For turns away, Lead should show the Wingman the full plan form (~90° bank) when signaling a tactical turn to avoid confusion with minor course corrections (usually use 30° bank or less). If needed to attract the Wingman’s attention, two quick mic clicks, commonly called a “zipper”, may be combined with the visual signal. The 90 degree wing rock signals the Wingman to begin the contract turn into Lead. Assume a 90 degree contract turn.

### **Delayed 90° Turns**

The 90 (Figure 6-5) turn can be either into or away from the Wingman. The aircraft that turns first is opposite the direction of the turn, the aircraft that turns second will wait until he/she can see down the intakes of the other aircraft. Lead is responsible for the final heading of the formation; Wing is responsible for flight path deconfliction and should show his/her bid to high or low early in the turn.



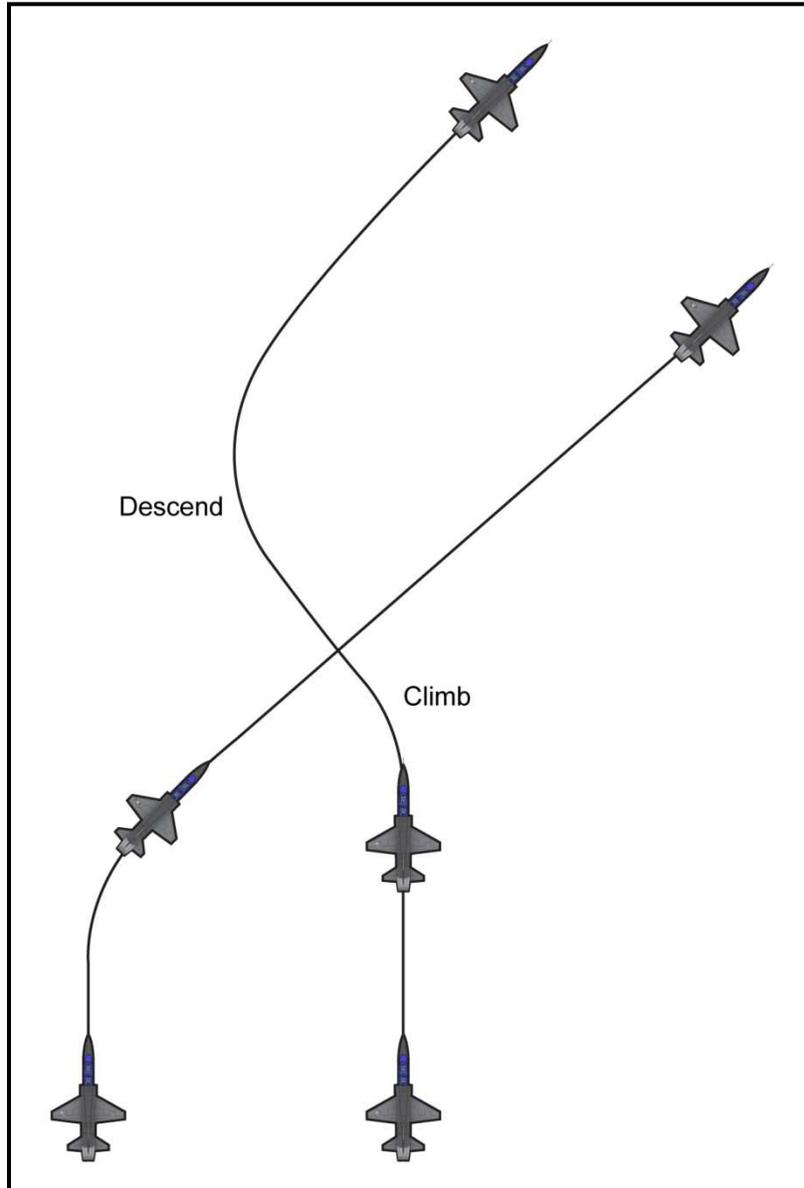
**Figure 6-5 Delayed 90° Turn**

**Lead** – If the turn is towards you, continue straight ahead until you can see down Wing’s fuselage, then start a contract turn to the new heading, visually reacquire Wing on the inside of the turn. Lead is responsible for the final heading of the flight. If position allows, let the Wingman correct any tactical position errors before continuing maneuvering.

**Wing** – If the turn is towards Lead, then start a contract turn initially to cross behind Lead perpendicular to his/her flight path, pick up Tactical on the new side; if Lead gives a reference heading, use that heading to help you attain the Tactical position.

### **Delayed 45° Turns**

The Tactical 45 (Figure 6-6) is used to turn the flight 30-60 degrees. Lead is responsible for the heading of the flight and could call out a reference heading if he wants Wing to roll out on an exact heading.



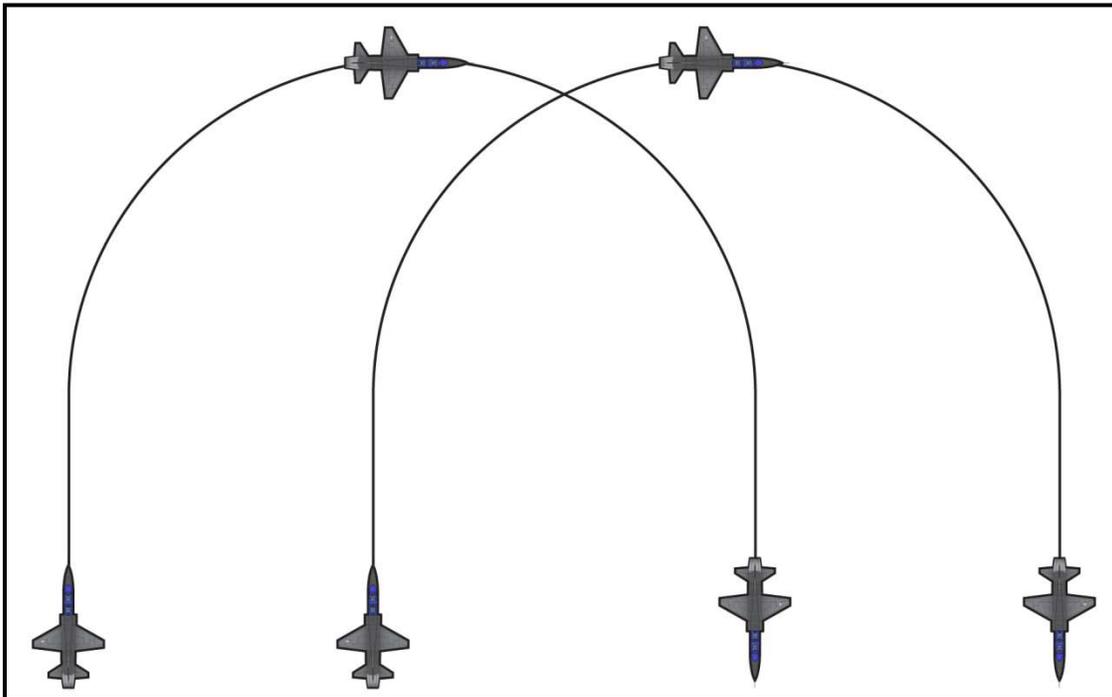
**Figure 6-6 Delayed 45° Turn**

**45° Turns Into the Wingman.** If called over the radio, Lead begins turn into the Wingman, otherwise Lead signals the turn (if “comm out”). As Lead begins the turn, the Wingman continues straight ahead and deconflicts by obtaining vertical clearance. The Wingman should use this opportunity to clear Leads new 6 o’clock position. When Lead rolls out, the Wingman maneuvers as required to achieve a tactical position on the other side of Lead’s aircraft by either delaying the turn until Lead crosses the 6 o’clock position or immediately maneuvering to the other side of Lead. During “comm-out” turns, Lead must ensure the roll out occurs before the Wingman begins a delayed 90° turn. If the Wingman begins a 90° turn, Lead should use the radio to achieve the desired turn (“TALON 2, rollout”).

**45° Turns Away From the Wingman.** This turn is a mirror image of the 45° turn into the Wingman. The Wingman begins a contract turn into Lead when directed. Lead signals the Wingman's roll out by beginning a contract turn into the Wingman. Lead will maneuver to the opposite side of the Wingman in a line abreast position. After Lead rolls out, the Wingman is responsible for obtaining the correct spacing and position.

### Hook Turns

During a hook turn, the formation turns 180° with both aircraft performing a contract turn at the same time in the same direction, ending up on the opposite side of the formation.

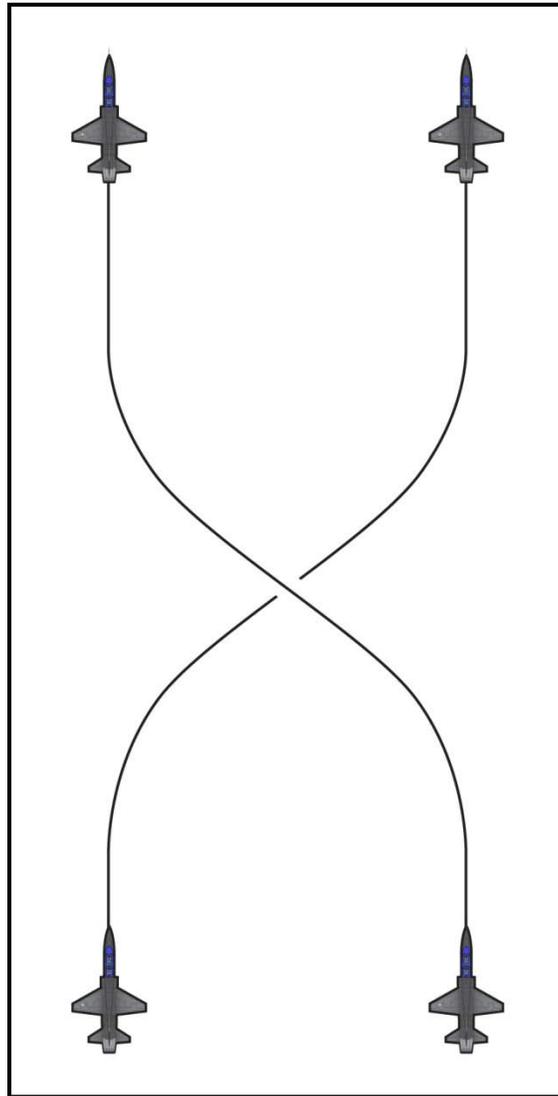


**Figure 6-7 Hook Turn**

Lead is responsible for heading, Wing is responsible for flight path deconfliction. The aircraft being turned into will execute a contract turn for 180 degrees. The aircraft being turned away from will make sure that when the formation is 90 degrees through the turn, the two aircraft are right behind each other. The aircraft being turned into will be temporarily responsible for flight path deconfliction from the "belly-up" aircraft and set formation spacing until both aircraft are rolled out on the new heading.

### Shackle

The Shackle (Figure 6-8) is used to have both aircraft swap sides and remain in Tactical Formation on the same heading. The Shackle is commonly used by Leads who want to reset the formation if Wing is having a hard time staying in position or if the flight is just coming out of a turn that has put Wing in an awkward position or on the wrong side.

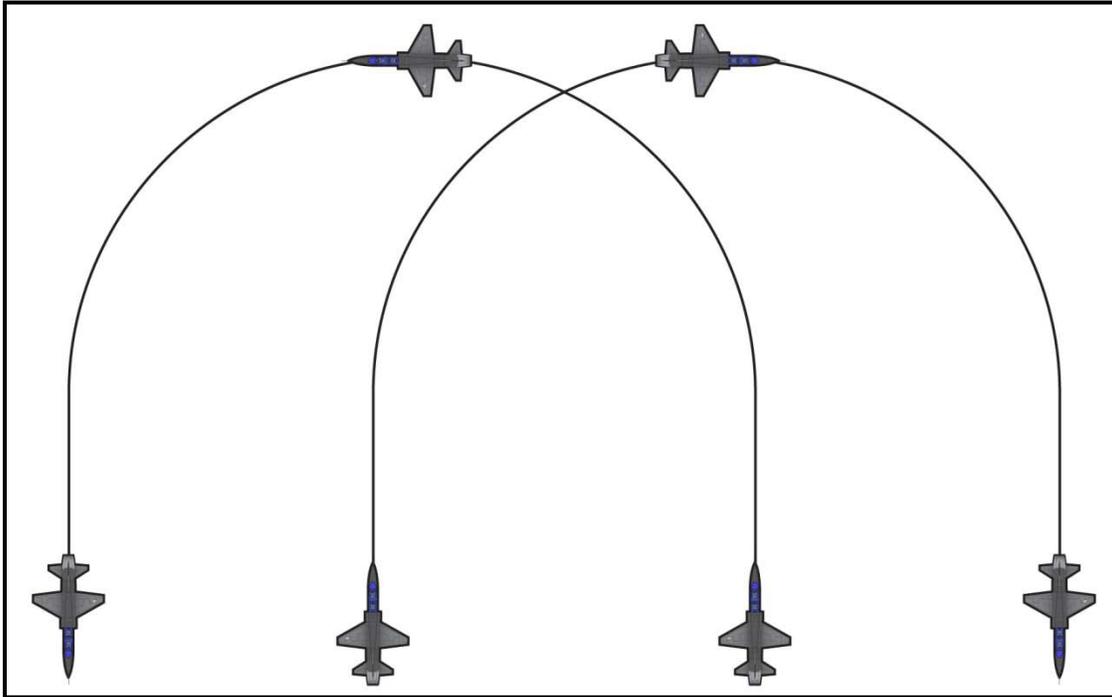


**Figure 6-8 The Shackle**

Lead is responsible for heading; Wing is responsible for flight path deconfliction and formation spacing. Flight path deconfliction is critical during the Shackle since the Wingman plans to cross directly over/under the Lead. Wing must make it obvious early in the turn whether he is going high or low. As a technique, Wing should make a bid high or low right away when Lead calls for the Shackle so Lead knows right away which way Wing is going. Both aircraft turn at the same time with Lead making approximately 45 degrees of heading change and Wing aiming to cross directly over/under Lead. Both aircraft will reverse the turn when crossing flight paths to resume the original heading in Tactical Formation. If there is any doubt in the formation about which way Wing is going, Wing will broadcast intentions "Two is going low." Lead should concentrate on holding altitude to give Wing a predictable platform.

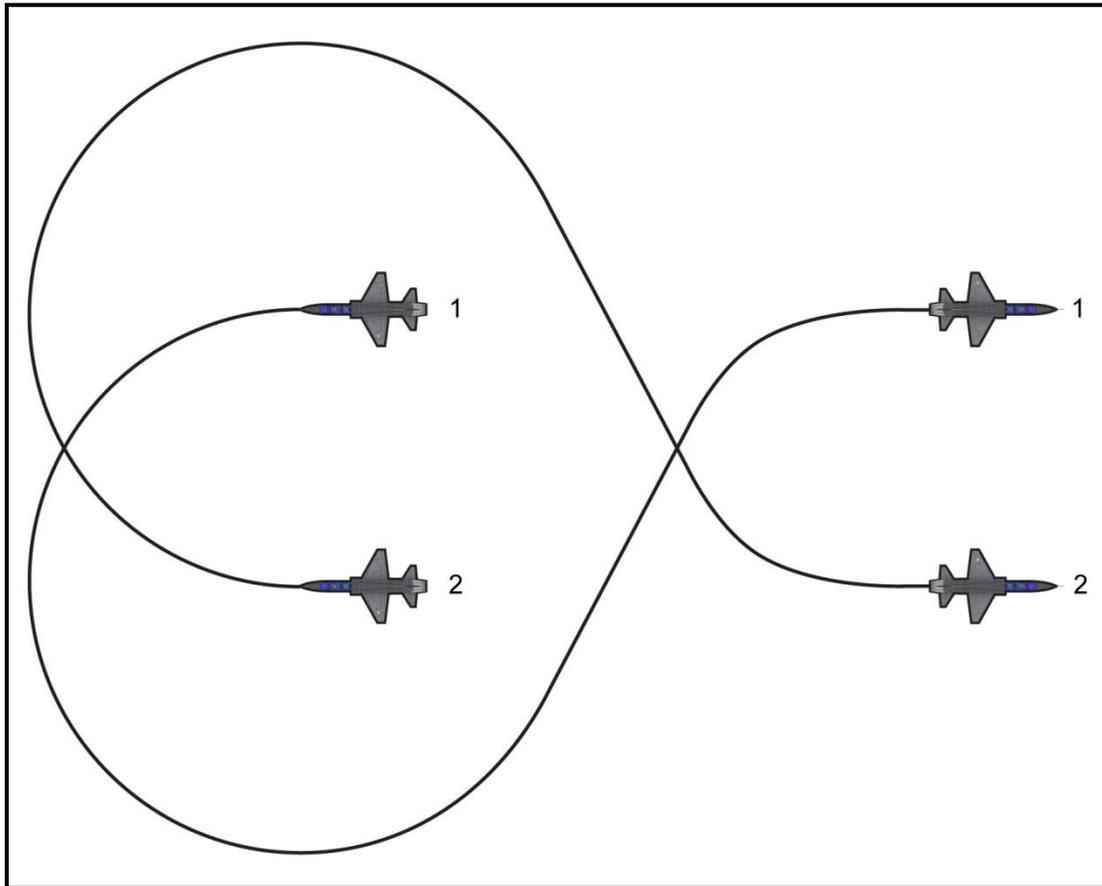
### The Cross Turn

The Cross Turn (Figure 6-9) provides a 180-degree reversal option while resetting formation spacing. Flight path deconfliction is key in the Cross Turn and is the Wingman's primary responsibility. Wing will cross high unless Lead directs otherwise e.g. "TALON, Cross Turn, Two go Low."



**Figure 6-9 The Cross Turn**

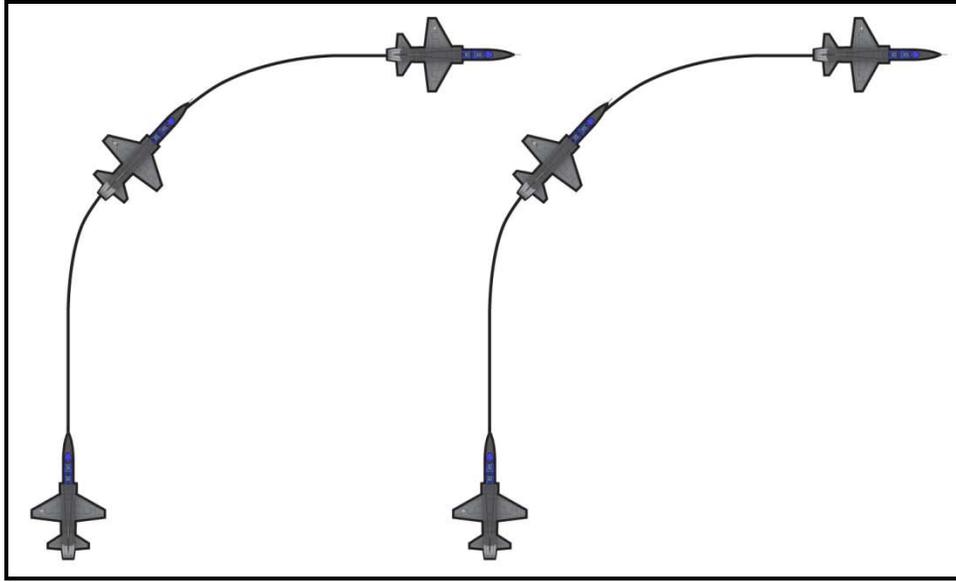
Once the Cross Turn is commanded by Lead, unless otherwise directed, Wing maintains relative positioning above Lead's turn plane. Both aircraft will execute a 180 degree contract turn. Wing will keep sight of Lead and is responsible for flight path deconfliction, Lead is responsible for heading. Wing will pick up Tactical Formation on the appropriate side once the formation rolls out in the opposite direction. Due to turn radius the later separation at rollout may be wide if the original spacing was correct. Lead may direct a Shackle to correct spacing as shown in Figure 6-10.



**Figure 6-10 Cross Turn with Shackle**

### **In-Place 90**

The In-Place 90 (Figure 6-11) Turn is commonly used to get the formation lined up behind each other for entry into a landing pattern, for example. The Lead aircraft is responsible for heading, the trail aircraft is responsible for picking up behind Lead. Also, the In-Place 90 can be used to enter Extended Trail.



**Figure 6-11 In-Place 90° Turn**

The aircraft being turned into will do a contract turn to the desired heading, the aircraft being turned away from will do a contract turn to roll out behind the other aircraft. The In-Place 90 should look like the first part of the Hook Turn.

### **Other Tactical Variations**

For turns greater than  $\sim 60^\circ$ , Lead will generally direct a delayed  $90^\circ$  turn. For turns between  $\sim 30^\circ$  and  $\sim 60^\circ$ , Lead will generally direct a delayed  $45^\circ$  turn. For turns  $\sim 30^\circ$  or less, Lead will call a check turn and turn to the desired heading. In all cases, the Wingman's responsibility is to maintain/regain position.

### **Tactical to Fingertip**

When directed by Lead, collapse to Fingertip on the side you are on by using controlled horizontal closure rates and power as required. If Lead directs the reform while turning, rejoin to the inside of the turn just like a turning rejoin. If other than Line Abreast (i.e. Trail), execute a rejoin as directed by Lead.

## CHAPTER SEVEN T-38C FORMATION NORMAL OPERATING PROCEDURES

### 700. INTRODUCTION

The effectiveness of a formation mission is highly dependent on solid flight discipline, which begins with mission preparation and continues through briefing, ground operations, flight, and debrief. Mission effectiveness requires an in-depth knowledge of flight rules, unit standards, and procedures. When Lead establishes the precedent, those orders must be followed. However, the Wingman must speak up rather than allow the flight to enter an unsafe or unauthorized situation. If directed tasks are beyond a Wingman's ability, the Wingman must immediately inform Lead. Uncompromising flight discipline is absolutely essential for successful mission execution.

This Chapter covers the normal operating procedures for the AFORM syllabus at NAS Whiting. Reference the VT-3 standards and the communications appendices for further guidelines.

### 701. GROUND OPERATIONS

Ground procedures in AFORM will be similar to the ground procedures in Primary Formation. The attitude of aggressiveness starts on the ground. Flight members must do everything they can to look good and sound good on the ground. Set the tone of the flight early.

**Chocks.** Engine start and check-in procedures will be IAW unit standards or as briefed. If delays occur, inform Lead as soon as possible but not later than the briefed check-in time. If visual, pass a thumbs-up to Lead when ready. If not visual, turn the radios on and get on the proper frequencies as soon as possible. This allows Lead to know the status of flight members (MX delays, spares, etc.) *See the communication appendix for example radio comms and standards for check-in sequence.*

**Taxi.** Lead should taxi at a speed that allows Wingmen to attain proper spacing. Taxiing out to the run-up will be the same as Primary. Wingmen will match Lead's configuration, inspect each other for proper configuration and abnormalities prior to takeoff, and continue inspecting throughout the sortie. Taxi to the approach end of the active runway for a full length formation takeoff. When taxiing to the approach end, offset to one side of the taxiway so that 2 can offset opposite. Once at the approach end hold short line and all flight members are ready, call for takeoff. *See the communication appendix for example radio comms and standards for the taxi and run-up sequence.*

**Runway Lineup.** Runway lineup is normally determined by wind direction and other factors such as direction of traffic and weather turn out. Lead will ensure Wingmen have sufficient room to maneuver into position. If winds are calm or straight down the runway, position the Wingman on the inside of the first turn out of the pattern. If IMC conditions are expected during the turn out of the pattern, it may be desirable to place your Wingman on the outside of the turn (if winds are not a factor). **Minimum wingtip spacing is 10 feet wingtip clearance**, but may be wider as desired or required. **On the runway, a head nod is used for visual signals instead of a thumbs-up.** Each aircraft will usually take the center of its half of the runway. Wing will line

up the Leading edge of his wing with the trailing edge of Lead's horizontal stabilizer. **Once in position and takeoff checklist is completed, the Wingman will give Lead a head nod to signal ready for engine run up. DO NOT DELAY TIME ON THE RUNWAY.**

**Engine Runup.** Once all aircraft have signaled "ready," Lead will direct run-up primarily with the visual signal. Wing will acknowledge with a head nod. Run-up the engine to 500 ft/lb and make appropriate checks. **During the engine run up, continue to primarily focus your attention outside the aircraft with only short glances inside the cockpit. Signal a good run-up with another head nod.**

## 702. FORMATION TAKEOFF

1. **Description.** Simultaneous take off where Wing maintains 10' minimum wingtip spacing and initial line-up references until gear is retracted. The initial line-up references consist of the Leading edge of the #2's wing on Lead's trailing edge of horizontal tail.
2. **General.** Formation Takeoffs are used to launch multiple aircraft quickly without the necessity for a Rejoin after takeoff. Flight members fly formation from brake release throughout rotation and into the airborne phase. Lead uses a reduced power setting to give the Wingman an advantage to maintain position during the takeoff roll. The Wingman will be required to make small power corrections to avoid overrunning Lead or falling behind.
3. **Procedures.** Formation Takeoffs will always be done using the entire runway length available (5000 ft minimum). They are never to be done from mid-field. Formation Takeoffs are prohibited when the crosswind component (including gust factor) exceeds 10 knots, the runway width is less than 100 feet, or the ceiling is below circling approach minimums for the runway in use.
  - a. **Lead Procedures.** The brake release signal by Lead is crucial to the Formation Takeoff. A helmet tap is the preparatory command for brake release and selecting MIL (1015' lbs) power. The execution command is a head nod. As your chin hits your chest, simultaneously release brakes and smoothly advance power to MIL then set 950 ft-lbs. As Lead, maintain a straight track down the center of your side of the runway. At approximately 70 KIAS begin a slow rotation to the takeoff attitude and maintain it (cowl seam slightly below the horizon). Allow the aircraft to fly itself off the ground. Once both aircraft are safely airborne, check the fuel caps, give the gear up execution signal, and retract the gear. No preparatory signal is required. Execute a "reverse head not" to signal gear up. Lower your head (chin toward chest) and place your hand on the gear handle. Verify airspeed below 120 KIAS. Raise your head back to the upright position (exaggerated motion) and retract the gear. Maintain pitch/back pressure to hold airspeed below 120 kts until both aircraft are gear-up. After takeoff and gear retraction, look over to the Wingman and verify that his gear appears up and locked. Maintain below 120 kts and notify the Wingman, via a radio call on VHF, of any abnormalities. Begin a smooth power reduction to 850 ft/lbs when safely airborne. Start your level off at around 500 feet MSL to comply with the 700-800 feet MSL altitude restriction on course rules.

## NOTES

1. Depending on the wind conditions at takeoff, your Wingman may be in either a left or right Fingertip position. If you want your Wingman on a specific side, you may reposition him with a cross under once established on the departure and above 300 feet AGL.
  2. If the crosswind component exceeds 10 knots, a 5-second interval takeoff will be made. The interval takeoff is done when weather/winds or runway conditions prevent a Formation Takeoff. It is done the same as in Primary. Lead will give the same run up signals as the Formation Takeoff, but there will be no tapping of the helmet or brake release signal. Lead will commence takeoff roll after a good run-up is acknowledged. Wing will take five seconds spacing and will execute his/her own takeoff. Lead will comply with course rules and stay below any weather until join up.
- b. Wingman Procedures. Monitor Lead for the preparatory and execution signals. The Wingman will use power as required to maintain position throughout the takeoff roll. Upon brake release, immediately select MIL power to spool the engine. You want to get a “jump” on Lead, so make sure you release brakes and select MIL power right as Lead’s chin hits his chest. Tap brakes as required to maintain position initially. Do not drag the brakes in an attempt to stay behind the Lead aircraft.

Rotate with Lead’s aircraft and concentrate on maintaining a proper position. Normally, the first indication of Lead’s rotation will be the extension of the nose gear strut. Duplicate Lead’s pitch attitude for lift-off.

When both aircraft are airborne, maintain a stacked-level position until retracting the gear and flaps. Confirm the gear is retracted then move into Fingertip. After takeoff, if ahead of Lead, check slightly away from Lead, while continuing to fly off Lead, if possible. Lead may pass the lead to Wing if conditions warrant.

- c. If a substantial power advantage or disadvantage is apparent, Wing can request one increase or decrease in power (for example, “TALON 1, give me one/push it up.”). Wing makes the “push it up” call if overrunning Lead and the Wingman feels a further power reduction is unsafe. Unless aborting the takeoff, at the “push it up” call Lead advances power to 1015 ft-lbs and monitors the Wingman’s position. If the Wingman continues to overrun, perform a Lead change over the radio (“TALON 2, you have the Lead on the right/left”) and maintain safe spacing until a rejoin and subsequent Lead change can be accomplished airborne. At the “give me one” call, Lead may reduce the power to minimum of 900 ft-lbs. Limit maneuvering until the Wingman is in position. If, after making this radio call, the Wing is unable to regain position, check proper engine operation, ensure MIL power, maintain the respective side of the runway and make a separate takeoff. If Wing cannot remain in position (either overrunning Lead or falling behind) with power set between 900 ft-lbs and

1015 ft-lbs, Wing should check PCL in MAX, maintain separation from Lead, and perform a separate takeoff.

#### 4. Common Errors

- a. Both students forgetting to accomplish last three items of Takeoff Checklist.
- b. Lead putting Wing on the wrong side of the runway.
- c. Wing forgets head nod to indicate readiness to proceed with takeoff sequence.
- d. Lead forgetting run-up signal.
- e. Creeping forward during run up.
- f. Lead forgets preparatory helmet tap prior to brake release signal.
- g. Lead forgetting brake release signal.
- h. Lead releases brakes and/or advances power before chin hits chest.
- i. Wing allowing aircraft to fall too far aft.

### 703. FORMATION TAKEOFF ABORTS

1. **Description.** One or more flight members unable to continue takeoff and executes the abort procedures.
2. **General.** A situation may arise when one or more aircraft may have to abort during a formation takeoff. Each aircraft will apply the abort procedures as required. If Lead sees the need for the flight to abort, he will command the flight to abort over the radio.
3. **Procedures.** After brake release, if either aircraft aborts the takeoff, all steps shall be executed IAW the NATOPS. The good aircraft will set MIL power, maintain lateral control of the aircraft, not cross the centerline of the runway, and execute a separate takeoff. The bad aircraft shall follow abort procedures, and transmit status over the radio as applicable after the good aircraft is airborne. For this reason, Wing must maintain ample wingtip clearance when lining up on the runway and throughout the takeoff.

Should a safety issue require both aircraft to abort after brake release, Lead will direct the abort over the radio using the word "ABORT" three times ("*TALON Flight, ABORT, ABORT, ABORT*"). Each aircraft will execute NATOPS abort procedures while maintaining their respective side of the runway. Wing will select full Beta immediately. Depending on the reason for the abort, Lead may delay full Beta to allow Wing to acquire nose/tail separation. All necessary means shall be taken to avoid collision.

#### 704. FORMATION DEPARTURE

1. **Description.** Not applicable.
2. **General.** In AFORM, all formation departures will be from a formation takeoff or a 5 seconds interval takeoff. If IMC is expected and a 5 second interval is used, the flight will rejoin prior to IMC.
3. **Procedures.** Formation departures will adhere to all ATC instructions. There is a simulated Departure Procedure in Appendix D to proceed to Duke Field for the instrument approach or the Rosehill MOA. All departures should abide by local Course Rules if training permits.

#### 705. REJOIN

1. **Description.** The Rejoin is used to bring the formation back together should it be separated for any reason (pitchout, breakout, extended trail maneuvering, Lost Wingman, etc.).
2. **General.** Rejoins can be done either straight ahead or turning. Rejoins in T-38C FORM are different from Primary in that Wing can use whatever tools are necessary to effect a Rejoin on the Lead, - pursuit curves (radius of turn), power, or altitude; likewise, Lead can direct a Rejoin in either direction when turning or at any airspeed, as long as Lead's parameters are made known to the Wingman in non-standard. The standard airspeeds for Rejoins are 150 knots for Turning Rejoins, and 120 knots for Straight Ahead Rejoins. Signal for a Rejoin visually (Appendix A) or via radio call. After directing the Rejoin, Lead may either continue straight ahead, or roll into a 30 degree bank turn in either direction, depending on area orientation.

#### 706. STRAIGHT AHEAD REJOIN

Straight Ahead Rejoins are commonly used after an interval takeoff or when going to or returning from the MOA. Wing will always rejoin to the left side of Lead unless directed otherwise. Note that wing rocks to tighten up the formation to Fingertip from Route or Tactical are not commands for a Straight Ahead Rejoin, rather the Wingman should simply close up the formation on the side he is on unless Lead directs otherwise. When Lead directs a Straight Ahead Rejoin, he will give distinct wing rocks or will make a call over the radio directing Wing to rejoin.

After directing the Rejoin, Lead will smoothly pull the power back sufficiently to gradually slow to 120 knots, climbing if appropriate to convert excess airspeed to altitude for energy. Make a gradual climb to provide the Wingman a predictable platform. The Wingman will bid (move) to Lead's six o'clock position, by setting MIL power and immediately turning to place the Lead at 12 o'clock slightly above the horizon. Use caution to avoid Lead's prop wash. The Wingman should monitor airspeed as he closes on Lead. Approximately three ship-lengths behind Lead, start pointing the aircraft to the predicted Route position on the Rejoin side and monitor your closure, about 10 knots for every ship length, 30 knots of closure – three ship lengths back, 20 knots – two ship lengths back and 10 knots – one ship length back. As you get closer to Lead

maintain a vector away in case you have to overshoot. Do not hesitate to use idle power or overshoot procedures if it looks like you have excessive closure. If you are slow, dip your nose slightly down to gain energy by exchanging altitude to build closure airspeed. Remember, Lead is at 120 knots, closure may build quickly. You will not be able to assess closure very well behind Lead, so you have to reference your airspeed indicator often. As you get closer and move to the side, you will see the aspect increase on Lead and you will be able to assess the rate you are moving to the Route position. As you approach the Route position, monitor your closure. Stabilize in the Route position; once stabilized, move smoothly into Fingertip.

## 1. Procedure

### a. Lead

- i. Command a rejoin by rocking the wings or direct the Rejoin on the radio *“TALON, Rejoin Straight Ahead”*.
- ii. Rollout wings level, pull power smoothly reducing airspeed to 120 knots. Exchange airspeed for altitude as required early.
- iii. Monitor Wing while clearing for the formation.

### b. Wing

- i. Once you see Lead command a rejoin with the wing rock, add MIL power and bid to the 6 o'clock.
- ii. Use pure pursuit (pointing at Lead) to maneuver to approximately 100-300 feet behind Lead. Make sure you do not bleed all your energy in this maneuver. Place Lead slightly above the horizon.
- iii. Monitor your airspeed as you get closer to Lead. Remember he is at 120 knots.
- iv. Approximately three ship lengths behind Lead, point the aircraft to the predicted Route position on the side you want to rejoin to. Wing rejoins to the left side.
- v. Approaching Route, control your closure. Once established in Route, smoothly move into Fingertip position.

## 2. Common Errors

- a. Lead forgetting to slow to 120 knots and not informing Wing. Lead slowing to less than 120 knots and not informing Wing.
- b. Wing depleting his energy in the turn to Lead's six and rolling out in trail at 120 knots.

**707. OVERSHOOT FROM STRAIGHT AHEAD REJOIN**

An Overshoot from a Straight Ahead Rejoin is executed similar to the Straight Ahead Under Run in Primary; lower the nose, reduce PCL to idle, then establish a vector away from Lead. Try to control your closure early. Watch your airspeed as you get closer to Lead and reduce the airspeed incrementally. Always reference Lead's airspeed compared to yours. If there is any doubt about your ability to stabilize in Route without passing in front of Lead, then execute an Overshoot. In any case, never pass in front of Lead or under him. If you cannot prevent passing in front of Lead (i.e. Lead's 3/9 line (directly abeam)), then you must execute a breakout.

**Procedure**

- a. Wing recognizes excessive closure approaching Route.
- b. Wingman turns aggressively away from Lead to establish a vector away and to arrest forward line of sight.
- c. Wingman simultaneously selects PCL idle, while lowering the nose.
- d. Once overtake is under control, with zero/negative line of sight, the Wingman smoothly moves into the Fingertip position.

**708. TURNING REJOIN**

In Primary, you used radius of turn (geometry) to effect a co-air speed rejoin. In T-38C FORM you will use pursuit curves, geometry (radius of turn), power and altitude to rejoin. The Turning Rejoin in T-38C FORM is intended to get Wing in the Fingertip position quickly and safely. Lead will signal a Turning Rejoin with large wing rocks so Wing can see the signal. The magnitude of Lead's wing rocks should be commensurate with Wing's distance from Lead. If Wing is 200 feet away, Lead does not have to use 90-degree angle of bank wing rocks; likewise, if Wing is more than 500 feet away, then exaggerated wing rocks will be appropriate so Wing can see them. Generally, Lead will initiate the first wing rock in the direction of the intended turn; however, Wing will join to the inside of the turn irrespective of the first wing rock.

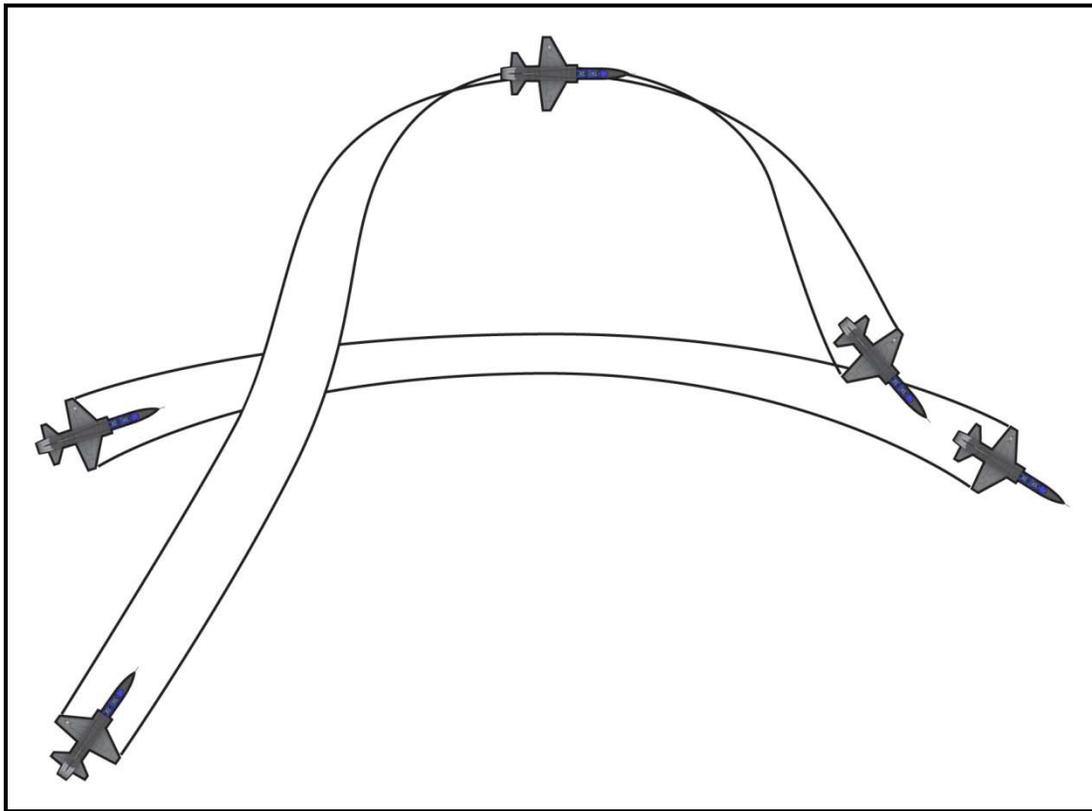
**1. Procedure**

- a. **Lead**
  - i. Command a Rejoin by rocking the wings. The first wing rock should be in the direction of the Turning Rejoin. The magnitude of the wing rock should be in accordance with how far Wing is away from Lead.
  - ii. Maintain 30 degrees of bank, on altitude, 150 knots. You can be off any of these parameters, but do so for a reason. For example, you can command a Turning Rejoin while in a slight climb; let Wing know if your airspeed is non-standard.

- iii. Clear and monitor the airspace and rejoin.
- b. **Wing**
  - i. Observe the Rejoin signal and aircraft geometry to determine type of rejoin. Pick an appropriate pursuit curve to get on the rejoin line; High/Low Yo-Yo as appropriate.
  - ii. Maintain Lead slightly above the horizon (a fist width) and maintain the rejoin line (45-60 aspect). Use power, altitude, and pursuit curves to control angle-off. The visual reference should be Lead's vertical stabilizer bisecting the opposite wing (45 degree) or on the wingtip (60 degree). Plan Angle-Off (line up fuselages) to be near zero as you get close to the Route position on the inside of Lead's turn.
  - iii. Make an expeditious, controlled Rejoin on Lead, controlling closure as you approach the Route position.
  - iv. From Route position, ease into Fingertip.
- 2. **Common Errors**
  - a. **Lead**
    - i. Commanding a Rejoin in one direction, but rolling into bank the opposite direction.
    - ii. Sloppy basic aircraft control in altitude, airspeed, etc., changing parameters without a reason, and not notifying Wing of non-standard parameters.
    - iii. Setting a direction for the Turning Rejoin that takes the formation out of the area.
    - iv. Not recognizing an opportunity to climb or descend during the Rejoin phase. Not planning ahead for the formation while Wing works the Rejoin.
  - b. **Wing**
    - i. Immediately committing to a High Yo-Yo when Lead rocks his wings and Lead is actually commanding a Straight Ahead Rejoin.
    - ii. Being confused about the Rejoin direction and not clarifying with Lead on the radio.

- iii. Pulling inappropriate Lead, too much or not enough.
- iv. Not maintaining Lead slightly above the horizon, which results in a low-to-high geometry or not being slightly below Lead's turning plane.
- v. Letting Aspect and Angle-Off increase for no reason and not recognizing a dangerous closure situation developing.
- vi. Not controlling closure approaching Route before rejoining to Fingertip. Rejoining with a lot of closure and aspect and forcing an overshoot situation (underrun).

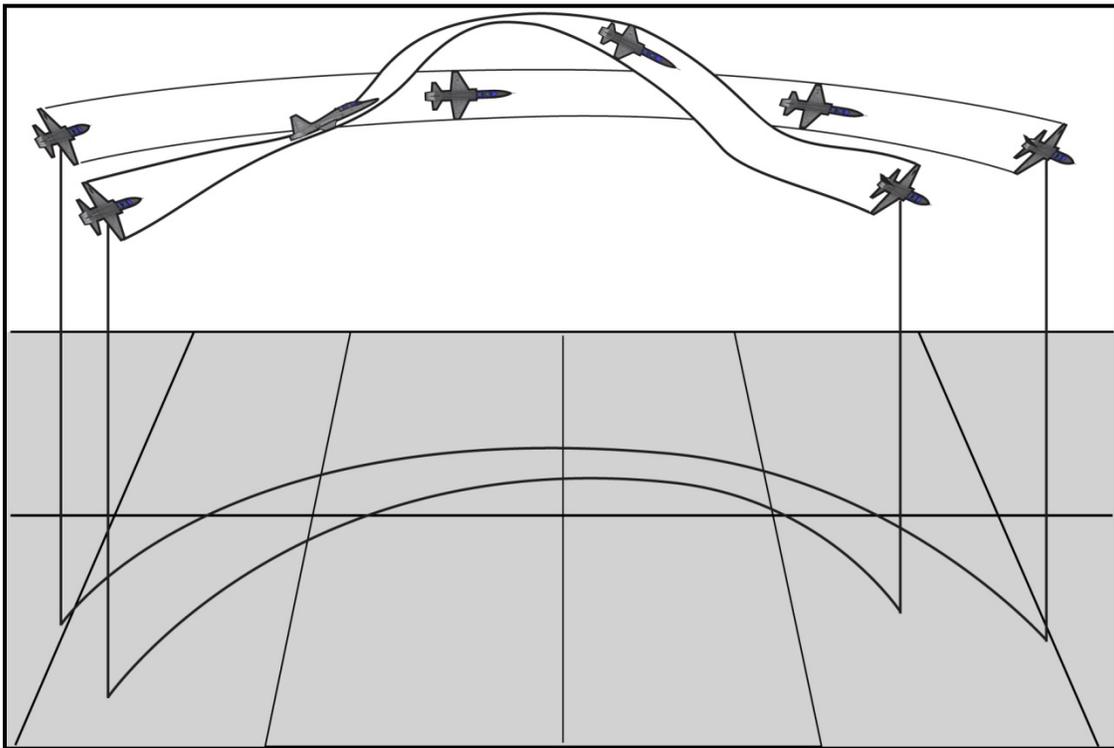
### 709. HIGH YO-YO/LAG REPOSITION



**Figure 7-1 High Yo-Yo**

High Yo-Yo is an out-of-plane maneuver performed to control closure, decrease Aspect Angle and/or prevent an overshoot by building vertical separation (turning room) on another aircraft. A High Yo-Yo can be a small reposition or a larger maneuver called a “quarterplane.” The difference consists of how nose high the repositioning aircraft has to go. An extremely high reposition in the vertical is termed a “quarterplane.” High Yo-Yo’s allow Wing to use the vertical as a tool to deal with the aspect and heading crossing angle problem posed with a Turning Rejoin and medium to high aspect.

Another, more current, term for the High Yo-Yo is the Lag Reposition. The Lag Reposition, as the High Yo-Yo, is used to generate turning room to solve excessive closure and angle-off problems. Position your lift vector up and out of the training aircraft's POM (The out-of-plane angle required will vary). Add backstick pressure as required to generate turning room. Once sufficient turning room has been achieved, crisply roll back to place the lift vector on or below the training aircraft and pull to attempt to align fuselages. Use the radial G and out-of-plane turning room made available by the Lag Reposition to help establish Lead pursuit.



**Figure 7-2 Lag Reposition**

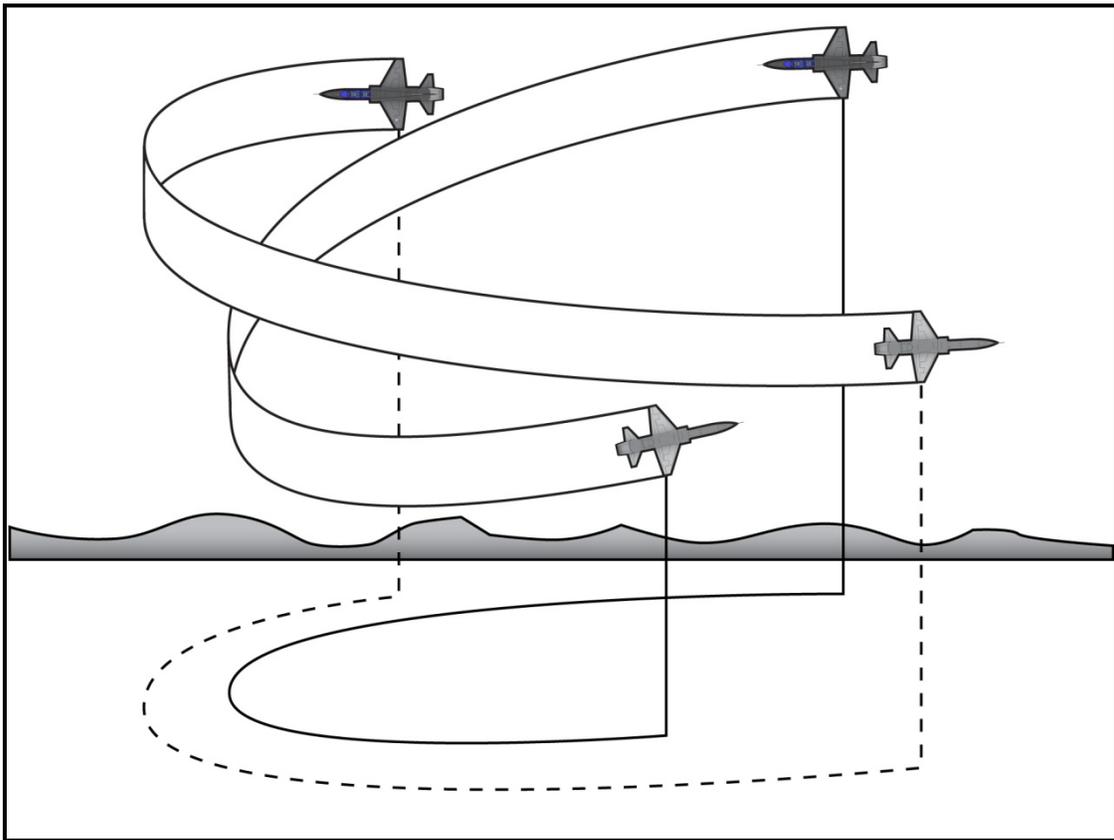
### Procedure

- a. **Lead**
  - i. Command a Turning Rejoin
  - ii. Clear and monitor the airspace and rejoin
- b. **Wing**
  - i. Observe Lead's wing rock and turn geometry to determine it is a Turning Into Rejoin.
  - ii. Make a pull to establish separation above Lead's turning plane.
  - iii. Select MIL power and turn aggressively toward lag pursuit until behind the

Rejoin line.

- iv. Monitor Lead's line of sight as he crosses under you. Make wing dips to monitor Lead. **DO NOT LOSE SIGHT OF LEAD!** Do not climb out the top of the area!
- v. As the Lead crosses underneath you, ensure that you are deconflicted, and then descend while maneuvering to the rejoin line on the inside of the turn and execute a Turning Rejoin.

### 710. LOW YO-YO/LEAD REPOSITION

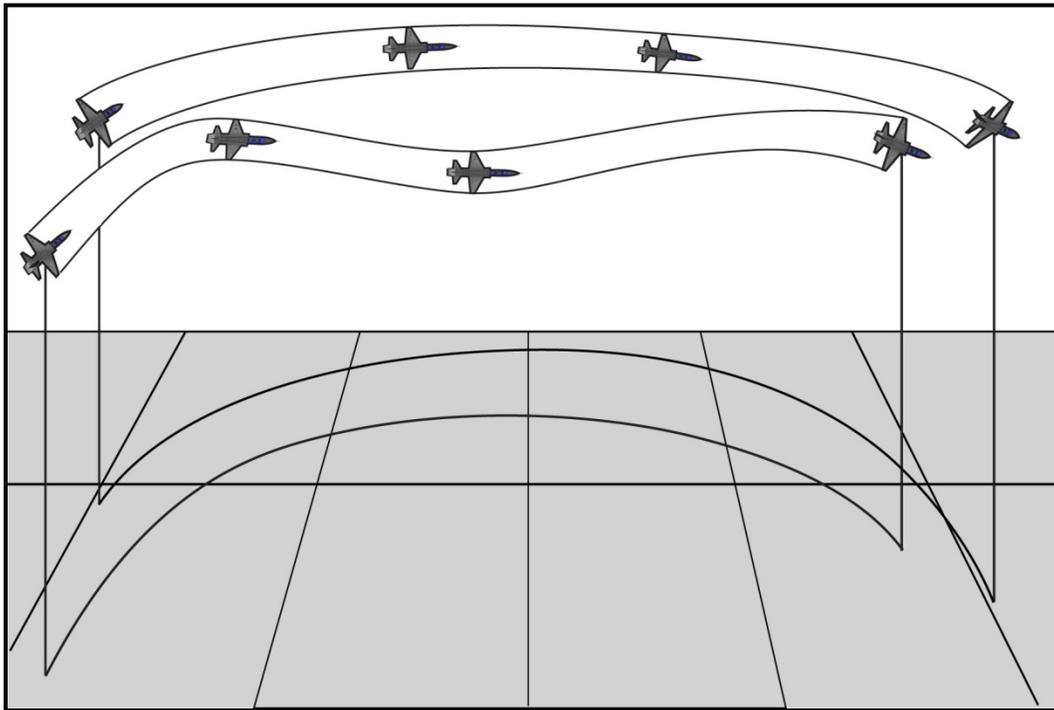


**Figure 7-3 Low Yo-Yo**

Unlike the High Yo-Yo, which is designed to slow closure and decrease aspect, the Low Yo-Yo is used to create closure by momentarily increasing aspect (Lead pursuit) and diving in the vertical to gain airspeed. A Low Yo-Yo situation typically occurs when the formation is separated, such as at the end of extended trail maneuvering, after a Breakout/Lost Wingman exercise and Lead commands a turning rejoin away from Wing, or after a High Yo-Yo maneuver.

Another term for the Low Yo-Yo is the Lead Reposition. Place the nose and lift vector such that

you pull Lead pursuit in a plane of maneuvering (POM) below the training aircraft. (How much Lead and (or) descent will vary with range, closure, the training aircraft's LOS, and your energy state.) This out-of-plane maneuver uses turning room below Lead. Analysis of the training aircraft's LOS will tell you whether you need more or less Lead pursuit. When desired range or closure is reached, a lag maneuver or reposition may be required to preserve turning room for realigning fuselages.



**Figure 7-4 Lead Reposition**

### Procedure

- a. **Lead**
  - i. Command a Turning Rejoin.
  - ii. Clear and monitor the airspace and rejoin.
- b. **Wing**
  - i. Observe Lead's wing rock and turn geometry to determine it is a turning away rejoin. Add MIL power while turning toward Lead.
  - ii. Establish Lead pursuit by maneuvering your aircraft to point ahead of Lead. Your choice of Lead pursuit angle should be commensurate with your range from Lead. Pull no farther than a 9 aspect. If you need to pull more Lead later, roll out to drive to less than a 9 aspect then pull Lead again.

- iii. With sufficient Lead pursuit roll out and lower the nose to gain airspeed. You are essentially cutting across the circle of Lead's turn.
- iv. As you approach the 45-60 degree aspect line, align your fuselage, climb to establish proper vertical alignment, and use power as required to control airspeed. Avoid getting low while on the inside of the turn.

### 711. OVERSHOOT FROM A TURNING REJOIN

The Overshoot (Figure 7-5) is a maneuver to ensure separation of aircraft should the Wingman fail to recognize an unsafe Rejoin or a Rejoin with excessive closure. As in Primary Formation, recognize the overshoot situation early enough so that you can either correct or overshoot gently to the outside of the turn. Unlike Primary, however, you will not rejoin on the outside of the turn. Once line of sight is under control (forward) and the overshoot is stable, maneuver below Lead to the rejoin line on the inside of the turn and restart the Rejoin. The decision to overshoot should be made early so the Wingman crosses Lead's low 6 o'clock with a minimum of approximately two ship lengths spacing. ***In all cases, ensure nose-tail separation can be maintained.*** Select idle and wings level. Once you have crossed to the outside of the turn, increase bank to stabilize the separation, but do not pull into Lead or pull higher than the Echelon Turn position. If Wing sees that he will pass under or in front of Lead, or that he cannot control his closure with an overshoot, then Wing will break out of formation.

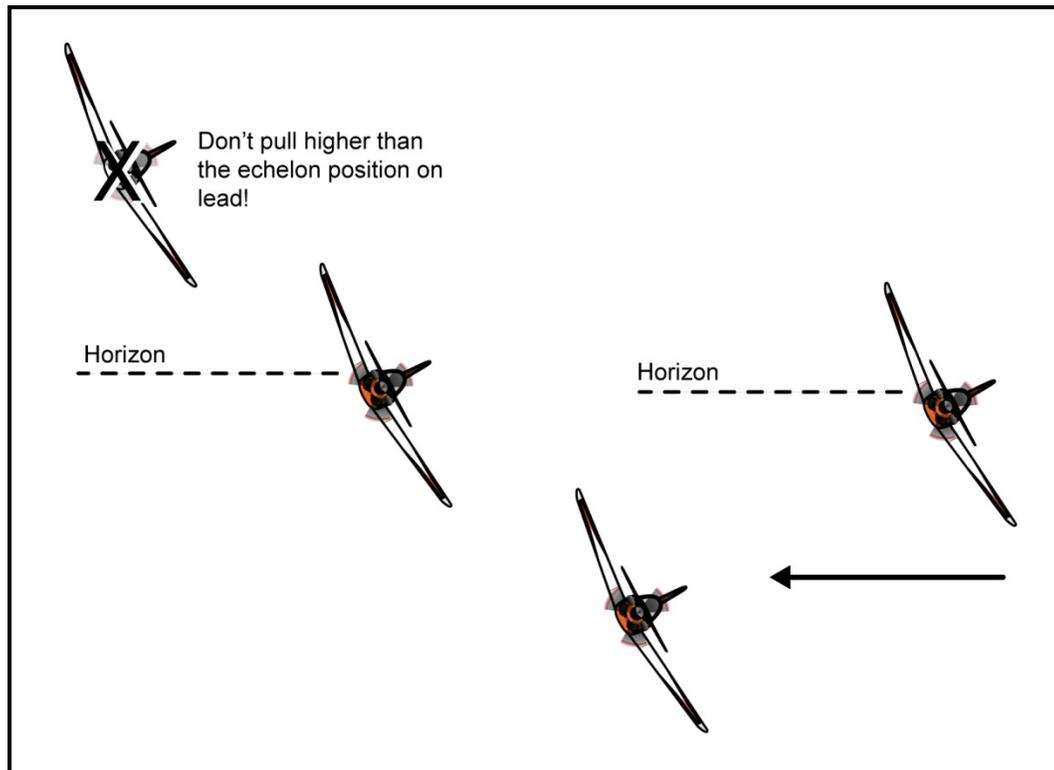


Figure 7-5 The Overshoot

**1. Procedure****a. Lead**

- i. Clear and monitor the airspace and rejoin.
- ii. If a collision appears imminent, take positive action to prevent a midair collision.

**b. Wing**

- i. Recognize an overshoot situation developing; if unable to correct, then execute an Overshoot; if there is any doubt as to whether to overshoot – there is no doubt – overshoot!
- ii. Plan your Overshoot to pass two ship lengths behind Lead and beneath his plane of motion.
- iii. Reduce power to idle, lower your nose and decrease bank to lag pursuit on Lead.
- iv. Increase bank to stabilize outside the turn. Do not pull into Lead or pull any higher than the Echelon position.
- v. Once stabilized (zero/forward line of sight), move below and behind Lead back out to the rejoin line approximately three ship widths (100 feet) and restart the Rejoin.

**2. Common Errors**

- a. Wing does not recognize an unsafe situation and does not overshoot.
- b. Wing attempts to save the Rejoin by banking away from Lead and bleeds off too much energy with Gs, loses sight, or drops low to maintain sight.
- c. Wing passes under or in front of Lead in the overshoot and does not break out.
- d. Wing banks up after the overshoot and either pulls into Lead or pulls above the Echelon position prior to zero/forward line of sight on Lead.
- e. Wing sets up a poor rejoin after the overshoot and overshoots again.

**712. CROSSUNDER**

**Procedure.** Execute the crossunder whenever signaled by Lead. The visual signal is a wing dip

in the direction of the appropriate side.

### 713. PITCHOUT

1. **Description.** The pitchout is similar to the “breakup and rendezvous” taught in primary. The pitchout is used to obtain spacing for practice Rejoins, initiate a G-exercise, or to take spacing for the overhead pattern.

2. **General.** Pitchouts can be accomplished in either direction, but are always away from the Wingman. When not accomplished as part of a G-exercise or pattern the pitchout is usually a steep banked level turn of 180 degrees or more followed by a Rejoin to Fingertip. A pitchout is an effective technique to quickly reverse direction when pressing area boundaries. The pitchout maneuver is always initiated with the Wingman in Fingertip.

#### 3. Procedures

##### a. Lead

- i. If the Wingman is in Route, direct him to Fingertip with small wing rocks.
- ii. Give the pitchout signal. (Circling finger similar to “breakup and rendezvous” signal [see Appendix A]. Wing will not acknowledge the signal. There is no USAF equivalent to the “kiss off” signal.)
- iii. Clear in the direction of turn then aggressively bank away from the Wingman using 60 or more degrees of bank while adding power to 1015 torque and maintaining altitude. Continue turn for approximately 180 degrees of heading change.
- iv. After rolling out on heading and sufficient time has elapsed for the Wingman to complete the turn and roll out in trail (typically 5 seconds) initiate a Rejoin with three large wing rocks. Follow appropriate Rejoin procedures.

##### b. Wing

- i. Observe Lead’s pitchout signal.
- ii. Wait 5 seconds after Lead turns away then turn aggressively to follow, matching Lead’s bank angle and pull. Add power to 1015 torque and maintain altitude throughout the turn. Plan to roll out at Lead’s six o’clock position.
- iii. Roll out directly in trail behind Lead with the Lead aircraft approximately one “fist width” above the horizon.
- iv. Follow appropriate Rejoin procedures when you observe Lead rock wings.

#### 4. Common Errors

- a. Lead delays Rejoin signal while attempting to establish position in area. Plan ahead; use a Crossunder to put the Wingman opposite the direction you want to pitch, and plan the pitchout so that the subsequent Rejoin is accomplished in the direction you want the formation to go.
- b. Wing loses sight of Lead monitoring airspeed, altitude, and G meter.

#### 714. FORMATION G-EXERCISE

1. **Description.** The G-Exercise will be performed for formation sorties that will require more than 4 Gs during maneuvering.
2. **General.** The G-Exercise is described in Chapter 4. Reference Chapter 4 for further information. The formation G-Exercise can be performed from Fingertip or Tactical. The standard will be from Fingertip.
3. **Procedures (Pitchout)**
  - a. Enter the working area at 9500 MSL (weather and ATC dependent) with 850 ft-lbs. Fence in and have Wing in Fingertip on the appropriate side.
  - b. Lead: *"TALON, PUSH IT UP, PUSH IT OVER, STANDBY G-WARMUP"*  
Wing: *"TWO"*  
Smoothly push over for a shallow descent (no more than 5-7 degrees), increase torque to 950 ft/lbs, and allow the airspeed to build to approximately 190 to 200 knots.
  - c. When on parameters and ready:  
Lead: *"TALON 1 ready"*  
Wing: *"TALON 2 ready"* – do not call ready unless you are  
  
Check airspeed, altitude, and clear in direction of turn. Give the pitchout signal. No acknowledgement required from Wing.
  - d. With airspeed, quickly roll with rudder and aileron and set the lift vector slightly below the horizon, set 1015 ft/lbs, begin your AGSM and pull smoothly to 3 – 3.5 Gs and maintain. The aircraft will need to be in a slight descent during the turn to maintain 190-200 KIAS. You want to sustain 3-3.5 Gs and 190-200 knots for the entire 180 degrees. (ROLL-POWER-STRAIN-PULL)  
  
Wing delays 5 seconds before turning.
  - e. Rollout with rudder and aileron on heading. Check Gs and engine instruments. Delay 5 seconds before initiating a rejoin.
  - f. Once Wing has rejoined, rollout as required and proceed with the G-Awareness turn.

- g. Lead: *"TALON, PUSH IT UP, PUSH IT OVER, STANDBY G-AWARENESS"*  
Wing: *"TWO"*  
Same push-over as before. 190-210 KIAS.

- h. When on parameters and ready:  
Lead: *"TALON 1 ready"*  
Wing: *"TALON 2 ready"* – do not call ready unless you are

Check airspeed, altitude, and clear in direction of turn. Give the pitchout signal. No acknowledgement required from Wing.

- i. With airspeed, quickly roll with rudder and aileron and set the lift vector slightly below the horizon, set 1015 ft/lbs, begin your AGSM and pull smoothly to 3.5-4 Gs and maintain. Wing delays 5 seconds before turning.

- j. Rollout. Check Gs and engine instruments. Delay 5 seconds and initiate rejoin (straight ahead recommended to regain energy). Make the radio call:

Lead: *"TALON 1's good, 4 Gs"*  
Wing: *"TALON 2's good, 4 Gs"*

The "good" call signals the aircraft is performing and you are personally ready for any required Gs during the sortie. If you do not feel capable of Gs, consider changing the sortie profile or RTB. Report maximum Gs attained during the entire G-Exercise.

- k. Once Wing has rejoined, proceed with profile.

#### 4. Procedures (Tactical Line)

- a. Enter the working area at 9500 MSL (weather and ATC dependent) with 850 ft-lbs, 170 KIAS. Fence in and have Wing in Tactical line abreast, strive for 1800' separation.

- b. Lead: *"TALON, PUSH IT UP, PUSH IT OVER, STANDBY G-EXERCISE"*  
Wing: *"TWO"*  
Smoothly push over for a shallow descent (about 5-7 degrees), increase torque to 1015 ft/lbs, and allow the airspeed to build to approximately 190 to 200 knots.

- c. When on parameters and ready:  
Lead: *"TALON 1 ready"*  
Wing: *"TALON 2 ready"* – do not call ready unless you are  
Check airspeed, altitude, and clear in direction of turn.

Lead: *"TALON, G-Warmup, hook left/right"*

- Wing: No verbal acknowledgement – turning the aircraft is acknowledgment.  
Lead should consider turning into Wing to monitor the initial pull.
- d. With airspeed, quickly roll with rudder and aileron and set the lift vector slightly below the horizon, check 1015 ft/lbs, begin your AGSM and pull smoothly to 3-3.5 Gs and maintain. The aircraft will need to be in a descent during the turn to maintain 190-200 KIAS. You want to sustain 3-3.5 Gs and 190-200 knots for the entire 180 degrees. (ROLL-POWER-STRAIN-PULL)
- e. Rollout with rudder and aileron on heading. Keep airspeed between 190-210 by descending as required. Wing should immediately gain visual on Lead and vice versa. Do not attempt to correct back to LINE formation if out of position. Keep energy and prepare for next turn.
- f. When on parameters and ready:  
Lead: “*TALON 1 ready*”  
Wing: “*TALON 2 ready*” – do not call ready unless you are  
Check airspeed, altitude, and clear in direction of turn.  
  
Lead: “*TALON, G-Awareness, hook left/right*”  
Wing: No verbal acknowledgment – turning the aircraft is acknowledgment.  
Lead should consider turning into wing to monitor the initial pull if area allows.
- g. With airspeed, quickly roll with rudder and aileron and set the lift vector below the horizon, check 1015 ft/lbs, begin your AGSM and pull smoothly to 3.5-4 Gs and maintain.
- h. Rollout. Check Gs and engine instruments. Initiate a climb for energy. Make the radio call:  
  
Lead: “*TALON 1’s good, 4 Gs*”  
Wing: “*TALON 2’s good, 4.2 Gs*”

The “good” call signals the aircraft is performing and you are personally ready for any required Gs during the sortie. If you do not feel capable of Gs, consider changing the sortie profile or RTB. Report maximum Gs attained during the entire G-Exercise.

#### NOTE

Due to the tight turn radius of the T-34 and the need to descend during the turns to maintain energy, there is a possibility of a blind situation. If both aircraft are blind, cease tactical maneuvering and establish deconfliction immediately. Facilitate a rejoin and proceed with the profile as appropriate.

- i. Lead initiates a rejoin, either a turning or straight ahead.

## 5. Common Errors

- a. Over-G the aircraft or yourself. Do not try to manhandle the airplane into 4 Gs; the T-34 has a lot of elevator authority and will over-G in a second. Roll, set the lift vector and pull smoothly to 4 Gs and maintain. The idea is not to over-G yourself and have the IP save you; remember, this is a single seat world.
- b. Failing to start the AGSM before onset of Gs. The AGSM must begin before application of Gs in order to prepare your body for the effects of high G maneuvering.
- c. Not keeping the nose down after the first turn. Having to delay the ready call while waiting to regain energy.

## 715. ECHELON TURNS

1. **Description.** Echelon Turns are turns away similar to Primary turns away, but Lead uses up to 60 degrees of bank. The difference between Echelon Turns and Primary turns away is that Wing is level with Lead and the horizon bisects Lead's aircraft.

2. **General.** Echelon Turns will be flown only in VMC and are used when signaled by Lead when in Fingertip or when in Route. An exception to this is that Echelon Turns will be the default for turns away in the VFR traffic pattern when the formation is in Fingertip. As Lead, increase angle of bank, slightly increase backstick pressure to compensate for loss of vertical lift vector. Add power to maintain altitude and airspeed. Maintain altitude throughout the turn. When you roll out of the turn, start decreasing angle of bank slowly with an increasing roll rate until level. The Wingman will anticipate Lead's roll and G application in order to maintain position.

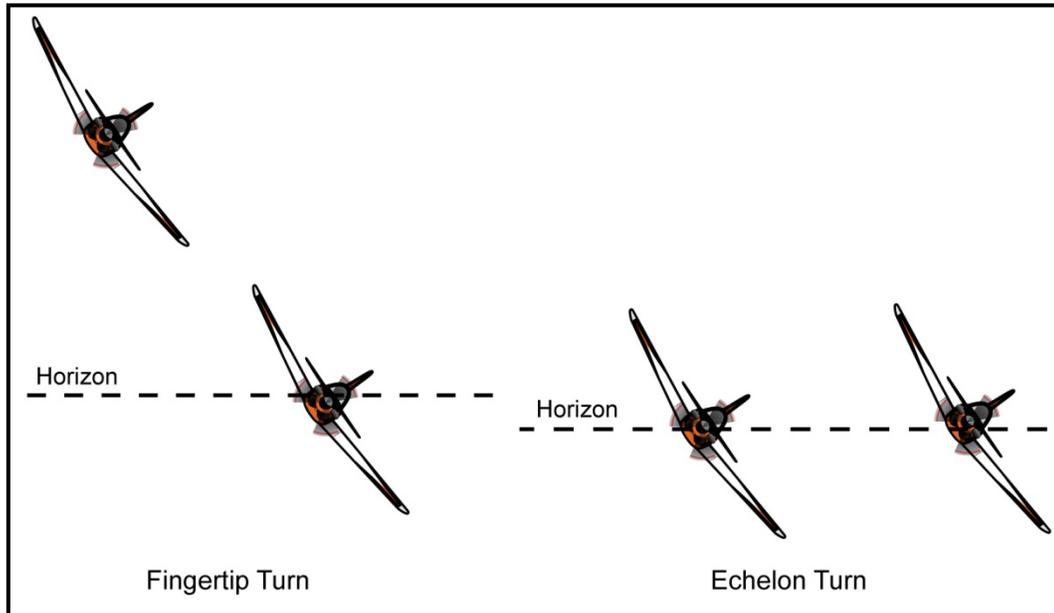
### 3. Procedures

- a. Lead signals Echelon Turn (Appendix A). No acknowledgement required.
- b. Minimum 180 degrees of turn. Wing rolls about his own longitudinal axis in Route or Fingertip position.

### 4. Common Errors

- a. Wing rolling on Lead's longitudinal axis as opposed to his own.
- b. Wing failing to add power and falling behind.
- c. Lead fails to pull sufficient G and allows rate of descent to become excessive, then makes rapid correction back to altitude.
- d. Lead rolling too fast.

- e. Lead climbing and using less G instead of angle of bank to level off or reset a lower pitch angle.



**Figure 7-6 Options for Turns Away From Wing in Fingertip**

## 716. PRACTICE LOST WINGMAN

1. **Description.** Practice Lost Wingman is a maneuver simulating Lost Wingman using Lost Wingman procedures.
2. **General.** Practice Lost Wingman exercise will be conducted VMC. Lost Wingman procedures will be used. Minimum of two different procedures will be used (straight ahead, turning into, or turning away). See Chapter 5 for actual Lost Wingman Procedures.
3. **Procedures.** The procedures below are for 2-SHIP practice Lost Wingman.

**Remember: Lost Wingman** – Simultaneously **TRANSITION TO INSTRUMENTS, NOTIFY LEAD, EXECUTE PROCEDURES.**

- a. **Straight and Level:**  
Lead initiates maneuver with a radio call:  
Lead: *“TALON 2, go practice Lost Wingman”*

Wing: *"TALON 2's, practice Lost Wingman"*

Wing simultaneously transitions to instruments, notifies Lead, and executes procedure.

Turn away 15 degrees for 15 seconds

Lead: *"TALON 1 is heading 270, 8500 ft"*

Wing: *"TALON 2 is heading 300, 8500 ft"*

After 15 seconds, Wing will resume Lead's heading and call:

Wing: *"TALON 2 visual"*

Lead will direct a rejoin. Lead: *"TALON 2 rejoin"* or visual rejoin signal.

**b. Turns into the Wingman**

Lead initiates maneuver with a radio call:

Lead: *"TALON 2, go practice Lost Wingman"*

Wing: *"TALON 2's, practice Lost Wingman, Lead roll-out"*

Wing simultaneously transitions to instruments, notifies Lead, and executes procedure. Momentarily reduce power to ensure nose-tail separation and inform the 'Lead to roll out. Maintain angle of bank until lateral separation ensured. Lead rolls-out and does not resume turn until separation assured.

Lead: *"TALON 1 is heading 270, 8500 ft"*

Wing: *"TALON 2 is heading 300, 8500 ft"*

After lateral separation assured, Wing will roll-out and call:

Wing: *"TALON 2 visual"*

Lead will direct a rejoin. Lead: *"TALON 2 rejoin"* or visual rejoin signal.

**c. Turns away from the Wingman**

Lead initiates maneuver with a radio call:

Lead: *"TALON 2, go practice Lost Wingman"*

Wing: *"TALON 2's, practice Lost Wingman"*

Wing simultaneously transition to instruments, notifies Lead, and executes procedure. Reverse the direction of turn 15 degrees for 15 seconds. Ensure separation prior to resuming the turn. Lead continues the turn.

Lead: *"TALON 1 is heading 270, 8500 ft"*

Wing: *"TALON 2 is heading 330, 8500 ft"*

After 15 seconds, Wing will roll out and call:

Wing: *"TALON 2 visual"*

Lead will direct a rejoin. Lead: *"TALON 2 rejoin"* or visual rejoin signal.

**4. Common Errors**

- a. Wing fails to acknowledge call to go practice Lost Wingman.
- b. Lead or Wing fails to call out heading and altitude.
- c. Wing loses excessive altitude in maneuver or is not smooth with maneuver.
- d. Wing does not tell Lead to rollout during turns into Lost Wingman.
- e. Wing turns for longer than 15 seconds.
- f. Wing fails to reduce power during turns into.
- g. Wing slow to transition to instruments.

### 717. WINGWORK

Wingwork is a series of Lazy 8s (wingovers) in Fingertip Formation. Lead uses no more than 90 degrees of bank, no more than 200 knots at the bottom, and no less than 100 knots at the top of any leaf. Wing maintains Fingertip throughout the entire sequence. The Lazy 8s Lead will execute are similar to Primary PA wingovers and emphasize Lead parameters for airspeeds, bank angles, and area maintenance. Wing's job is simply to maintain position. Keys to success in wingwork are for Lead to telegraph when wingwork begins by rolling and slowly letting the nose fall to accelerate to 190 to 200 knots. Lead should be smooth with pulls in the vertical, and then use slow and smooth roll rates. Keys to success for Wing are to be aggressive about maintaining position and using power and vertical maneuvering appropriately to maintain or re-attain position.

Before initiating wingwork, Lead should attain a suitable energy level so that Wing can be trimmed and ready for maneuvering at the entry airspeed. Lead will normally set 700-750 ft-lbs. If you wish to build energy during wingwork, use a higher torque setting. If you wish to lose energy, set torque at a lower level. However, if more than 750 ft-lbs is used, it may be impossible for Wing to stay in position during turns away at steep bank angles.

The best thing Lead can do is fly solid wingover parameters. Monitoring your Wingman while executing solid single-ship parameters is key. Be smooth on the controls.

#### 1. Procedures

- a. **Lead**
  - i. Start wingwork in the middle of the area, with a good energy state. 7500' MSL, 700-750 ft/lbs, and 150-170 KIAS is a good starting point. Begin a descent into Wing, allowing the nose to accelerate to 190-200 knots.
  - ii. Raising the nose smoothly wings level, Lead should pull up to about 15-20 degrees nose high (exhaust stack on the horizon) and start his roll. Lead should

make his first turn into Wing as a warm up. Do not use 90 degrees on the first leaf, 60 to 70 degrees is a good warm up.

- iii. Lead will not slow below 100 KIAS in order to ensure that Wing will have sufficient control effectiveness to maintain position. Additionally, airspeeds in excess of 200 KIAS will rapidly deplete energy and should be avoided. Always maneuver in a smooth and predictable manner to provide a stable platform for the Wingman.
- iv. Execute four wingover turns per side. Direct a Crossunder at the beginning of the last turn away, then four on the opposite side.
- v. Lead should maintain airspeed between 100 and 200 KIAS. Do not exceed 90 degrees of bank or 2 Gs.

### NOTES

1. For turns away, Lead should begin the turn slightly earlier than the turn into, and then roll smoothly to 90 degrees of bank. One technique is to increase back-stick pressure to pull the nose across the apex until approaching 100 knots, then letting the nose fall to the horizon slowly to allow the aircraft to accelerate. Make the stick inputs slowly so they are imperceptible to the Wingman. Do not unload and cause the Wingman to go high!

2. Normally, cross the Wingman from the high wing to the low wing. Due to limited energy, it may not be possible for the Wingman to cross from the low wing to the high wing at high angles of bank.

#### b. **Wing**

- i. The Wingman will use power as required to maintain the Fingertip position. Anticipate the power requirements needed for turns into and away and use smooth controlled inputs. **KEEP THE VENTRAL FIN ON THE CUTOUT AND EXHAUST STACK COVERED BY THE WING.**
- ii. As Wing, the challenge is to stay in position at higher angles of bank using the normal Fingertip references. Wingwork is a matter of aggressive positional maintenance using power and stick inputs and knowing when to use gravity to help you and when gravity can hurt you. Turns into should be no problem, since you are on the inside of the turn, although at the higher angles of bank, the tendency to get “acute” or ahead of the bearing line is more pronounced. There is also a tendency to want to ride high and lose sight of the ventral point and then let Lead turn into you. Do not let this happen, maintain the **VENTRAL POINT ON THE CUTOUT!** Turns away are more challenging, because the T-34 is so power limited. Wing must be very proactive with power on the pull-

up for turns away. Add power early and at a rate that is equal to or slightly more than the power required to maintain position. Any power reductions you make on the pull-up show up fast, so if you reduce power, you are going to have to add it back very quickly. If you find yourself getting acute or ahead of the bearing line at the apex of the turn, roll out of the bank just a little bit, let Lead get some forward line of sight on the canopy, and then get back into position. If you find yourself getting behind on the turn away, there is not much you can do. Your only recourse is to set maximum power and just accept what you have. Use the vertical (down) on the descent side of the wingover to gain energy and get back into position. Be aggressive about getting the nose down on the acceleration phase, because you want to time it so that you are in position before Lead starts the next pull. Do not come barreling into Lead as he starts his pull; his next turn may be into you and this could cause a breakout situation. Lead has the option to do turns away or turns into at his discretion for area orientation or weather avoidance. On the descent, power corrections show up fast; gravity will assist you instead of working against you.

## 2. Common Errors

### a. Lead

- i. Not telegraphing to Wing that the formation is accelerating for wingwork, just going right into maneuvers.
- ii. Ratcheting turns (rough air work).
- iii. Failure to maintain airspeed between 100 and 200 KIAS.
- iv. Failure to maintain at least one G (unloading).
- v. Exceeding 90 degrees of bank.

### b. Wing

- i. Late to add power on the pull-up for turns away, failure to pull power on the downside as Lead accelerates.
- ii. Dropping low on turns away.
- iii. Failing to match Lead's angle of bank.
- iv. Failing to maintain the ventral fin point on the cutout.

## 718. WINGWORK CROSSUNDER

Crossunders during wingwork are the same as straight and level except that the formation will be

at higher angles of bank. The key for Lead is to be smooth and predictable. The key for Wing is to STABILIZE FIRST, then fly a “square corner” Crossunder just like in Primary, then pick up Fingertip on the opposite side.

## 1. Procedure

### a. Lead

- i. Give the Crossunder command beginning the pull-up for the turn away, it should be a small crisp wing dip in the direction of Crossunder.
- ii. Fly a smooth, stable platform for Wing.

### b. Wing

- i. STABILIZE FIRST, drop “down” (relative to Lead’s wing line and angle of bank) and fly a normal, Primary Form Crossunder to the inside wing with nose-tail separation.
- ii. Pick up Fingertip on the inside wing.

## 2. Common Errors

### a. Lead

- i. Gives too big a wing dip so that it is a hazard.
- ii. Does not fly a smooth aircraft for Wing.

### b. Wing

- i. Does not stabilize first and rushes the Crossunder so that it is hazardous.
- ii. Does not get the step-down required, and gets sucked up into Lead, not ensuring proper nose-tail separation.
- iii. Gets acute on the inside of the turn.

## 719. FORMATION BREAKOUT

The Formation Breakout is a procedure where the Wingman immediately departs the formation due to a potentially hazardous situation. Breakouts are generally done for safety reasons when the formation aircraft need to quickly obtain separation.

When in close proximity to another aircraft, break out when

1. **directed by Lead**
2. **unable to maintain sight of Lead**
3. **unable to rejoin or remain in formation without crossing under or in front of Lead**
4. **any time your presence constitutes a hazard to the formation.**

For breakouts, predictability is critical for all players. Lead should continue maneuver with the current power setting, if possible; however, if the Wingman is in sight, maneuvering to obtain, increase, or guarantee separation may be appropriate or necessary. In all cases, Lead should try to stay visual and be directive with the Wingman as appropriate (for example, “*TALON 2 rollout, visual is your right 2 o’clock high,*” “*rejoin – left turning,*” etc.).

Wingmen should clear in the direction of the breakout, maneuver to ensure safe separation from other aircraft, and notify Lead, if required, when conditions permit. Once safe separation is assured, the Wingman may rollout to attempt to regain the visual. After the Wingman calls visual Lead will direct him or her to the desired formation.

Control inputs can vary anywhere from maximum rate stick deflection to avoid collision to a small check turn away. If breaking out due to a lost-sight situation, the Wingman will break away from Lead’s last known position or direction of turn, using power as required.

If breaking out due to a blind situation, the Wingman breaks away from Lead’s last known position or direction of turn, or in any direction that ensures immediate separation. A power adjustment may help expedite separation. If Lead does not have Wing in sight, Lead will call “*Blind*” with his altitude (i.e. “*TALON 1’s Blind, 8500*”). Wing will immediately vacate Lead’s altitude and call out his. Lead will be directive for the join up. Once visual contact is reestablished, Lead will direct a Rejoin.

1. **Procedures.** If the breakout is initiated by the Lead aircraft, the following format will apply:

Lead: “*TALON Two, breakout*”

Wing: Immediately maneuver away from Lead’s last known position and call:

“*TALON Two, breaking out*”

Lead: Maintain sight of Wing and call for rollout when safe separation has been achieved:

“*TALON Two, roll out*”

Wing: Roll wings level, reacquire Lead and call:

“*TALON Two’s, visual*”

Lead will direct a rejoin. Lead: *“TALON Two rejoin”* or visual rejoin signal.

If the breakout is initiated by the Wingman, the following applies:

Wing: Immediately maneuver away from Lead’s last known position and call:

*“TALON Two, breaking out”*

Lead: Acknowledge the call, *“TALON One,”*

If able immediately be directive to get the formation back together.

*“TALON Two rollout, Lead is your right three o’clock, level, call your visual.”*

If blind on two or unable to be directive, call *“blind, with altitude”*

If Wing has a hard time acquiring Lead, Lead can direct Wing to fly a heading or have Wing start a turn and Lead can rejoin on Wing.

If appropriate, Wing can call visual:

*“TALON Two’s, visual”*

Lead should initiate a Rejoin that is prescribed for the profile, but in all cases, in a direction that will keep the formation in the working area.

Lead will direct a rejoin. Lead: *“TALON Two rejoin”* or visual rejoin signal.

## 2. Common Errors

- a. Wing fails to execute a breakout after encountering a situation that mandates a breakout.
- b. Wing responds to Lead’s call, but does not immediately execute the maneuver.
- c. Wingman executes an excessively aggressive maneuver or is not aggressive enough.
- d. Lead fails to be directive after the aircraft are separated and leaves Wing wondering what to do next. As soon as the formation is separated and stabilized, Lead should effect a Rejoin immediately.
- e. Both aircraft lose sight of each other and Lead does not initiate an altitude deconfliction.

## 720. EXTENDED TRAIL EXERCISE

The ET exercise is an initial building block that introduces some of the concepts and skills required in future short-range and medium-range basic fighter maneuvers (BFM). The ET exercise allows pilots to practice the use of pursuit curves and dynamic maneuvering in relation to another aircraft. The DLOs of ET are as follows: To practice recognizing and solving problems of range, closure, AA, HCA, angle-off, and turning room from a short-range and medium-range, simulated “offensive” position behind a cooperative aircraft flying a scripted training profile.

Extended Trail is probably the most challenging, yet most fun, portion of the T-38C PREP FORM syllabus. Extended Trail incorporates everything that you have learned about pursuit curves, energy management, and Aspect/Angle-Off and uses those tools in three dimensions. The name of the game in Extended Trail is for Wing to stay in the cone behind Lead. A good set of Extended Trail depends on good teamwork. Lead has to do his job to help out Wing, and Wing has to stay in position. Extended Trail is generally the last item each flight member will do before the Lead change or departing the area. Typically, Extended Trail consists of four maneuvers with at least one leaf of a Cloverleaf. The approved maneuvers in Extended Trail are: Wingover, Barrel Roll, Cloverleaf, and Half Cuban Eight.

The Extended Trail cone is the same as Fighting Wing covered in Chapter 5, 30-45° aspect angle from Lead, 300-500 feet aft. Wing evaluates position in the ET cone using visual references and stadiametric range estimation. You can enter the ET exercise from any basic formation position.

The goal of Extended Trail is to teach the student three-dimensional maneuvering in relation to another aircraft. Wing uses several “tools” to maintain the cone during Extended Trail.

1. Aspect Angle and Angle-Off (See Figures 6-2 and 6-3.)

Refer to the Turning Rejoin section about Aspect/Angle-Off definitions. Wing is going to have to manage Aspect relative to Lead. In other words, Wing wants to continually work towards that 3-4 aspect; if you start seeing a 9 aspect or greater, then you are out of the cone.

2. Pursuit Curves

Specific pursuit curves (Lead, lag, and pure) control Aspect Angle and Angle-Off. Wing must select the proper pursuit curves during Extended Trail to maintain the cone, i.e., increase/decrease Range and control Aspect. Generally, the rule of thumb is to lag pursuit at the bottom of any over-the-top maneuvers (so Wing can accelerate to over-the-top as well) and to Lead pursuit at the top (while maintaining visual).

3. G-Load

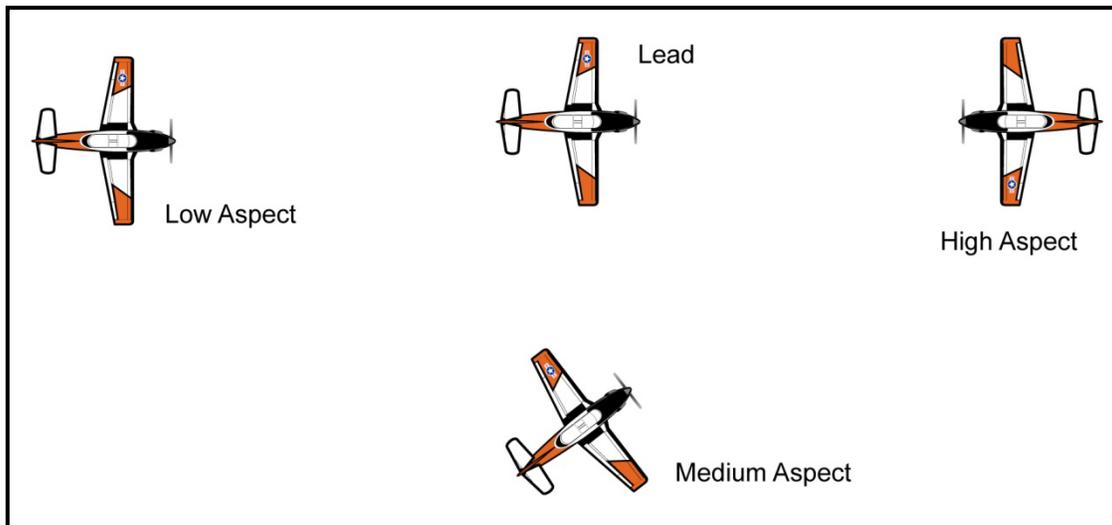
Wing uses G to max perform his aircraft to maintain position or proper energy level. Use G to maneuver aircraft to lose energy, or to accelerate (positive or negative G).

4. Aircraft Performance

Use your knowledge of the T-34's performance to maintain the cone; in other words, you know a T-34 needs about 190-200 knots to go over the top.

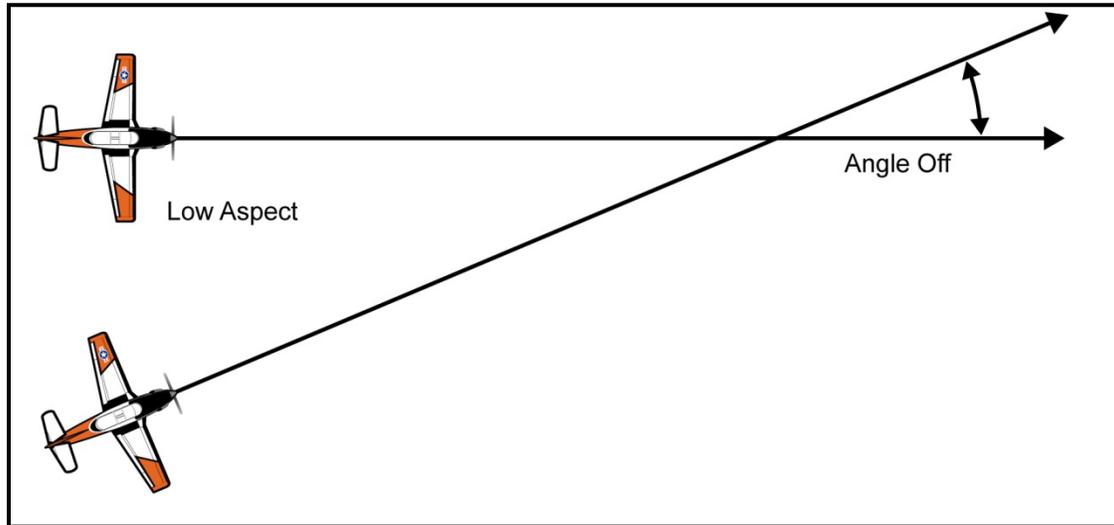
**Extended Trail will not be accomplished below 5000 feet AGL. If either aircraft descends below 5000 feet AGL, execute a Knock-It-Off.**

Wing may use the entire 30 to 45-degree cone to maneuver; however, avoid staying at Lead's six to help him keep you in sight and to avoid Lead's prop wash. Use Lead pursuit to develop closure. Use lag as necessary to maneuver outside Lead's turn to maintain position. Limit your use of lag pursuit to avoid excessive Angle-Off which may result in too much spacing. Lead/lag pursuit can also occur in the vertical plane during maneuvers like a loop. As a rule of thumb, if you can see the top of Lead's wing you are inside Lead's turn and have Lead pursuit. If you see the bottom of Lead's wing you are outside Lead's turn and have lag pursuit. Maneuver above or below Lead's flight path when transiting six to avoid Lead's prop wash and wake turbulence. Pure pursuit will tend to draw the aircraft toward Lead's six and should seldom be used.



**Figure 7-7 Aspect Angle**

5. Angle-Off (also known as heading crossing angle) is the heading difference between the two aircraft. As Angle-Off decreases, the fuselages of the two aircraft become more aligned.



**Figure 7-8 Angle-Off**

Lead initiates the entry with a radio call and Wing acknowledges. Lead maneuvers by pulling away from Wing with military power and a moderate G turn. Wing maneuvers as required to attain the ET (Fighting Wing) position. Lead aircraft will be in a constant turn and Wing will maneuver to stay in the cone. Once Wing calls in, Lead begins the maneuvering phase.

### 721. EXTENDED TRAIL ENTRY

1. **Description.** Extended Trail entry is the first phase of a set of Extended Trail.
2. **General.** Before entering Extended Trail, Lead will ensure a sufficient energy level. In the T-34C, approximately 7500 feet and 170 KIAS is a good energy level to begin.
3. **Procedures**
  - a. **Lead**
    - i. Direct the flight to begin with the radio call  
Lead: *"TALON Two, go Extended Trail"*  
  
Wing: *"Two"*
    - ii. After the Wingman acknowledges the call, begin a level, 2 G/60 degree angle of bank turn away from the Wingman and reset power to 1015 ft-lbs torque.
    - iii. Continue the turn until Wingman calls  
  
*"TALON Two's in"*

Begin the Extended Trail maneuvering. Do not maneuver until the Wingman calls in.

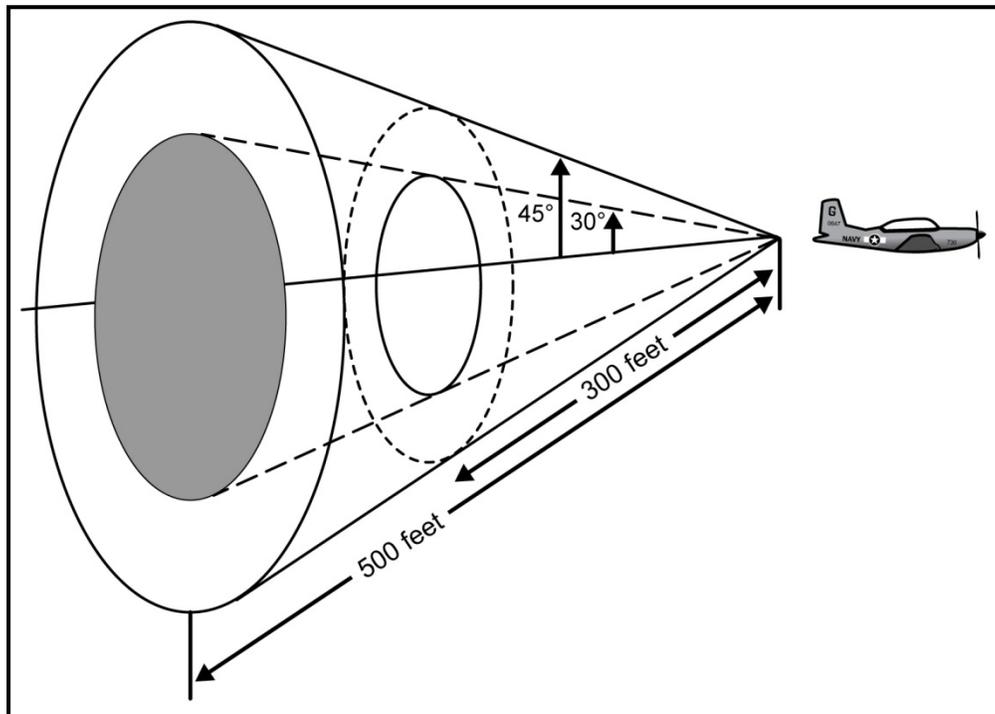
b. **Wing**

- i. Immediately acknowledge Lead's call to "go Extended Trail" "Two"
- ii. If doing a ranging exercise: Delay 5 seconds, set 1015 ft-lbs and turn to follow Lead. Initially, you should find yourself in a position with 500 – 1000 feet of spacing. Use Lead pursuit to attain 300-500 feet of spacing (Fighting Wing/Extended Trail Cone).

If not doing a ranging exercise: When Lead turns away, delay as required to enter the Fighting Wing/Extended Trail entry position.

- iii. Once in position and ready to maneuver call

*"TALON Two's in"*



**Figure 7-9 The Fighting Wing/Extended Trail Cone**

## 722. RANGING EXERCISE

1. **Description.** Use stadiametric ranging as Wing drives from the initial separation at extended trail entry to the Fighting Wing cone.

2. **General.** While closing range with Lead pursuit, Wing will build visual cues to determine proper ranging of 300-500'. Clearly reading the side number approximates 500 feet; the ability to discern detail on Lead's helmet will indicate range inside of 300 feet. The ranging exercise should be accomplished on the first Extended Trail exercise demo then afterwards as deemed necessary.

3. **Procedures.** After Lead maneuvers away, Wing will be in a position with 500-1000 feet of spacing. Use Lead pursuit to attain 300-500 feet of spacing. As range decreases, use stadiametric ranging to determine distance from the Lead aircraft. 500' is the outer range of route position. Call "in" when stabilized in the Fighting Wing cone.

### 723. ET LAZY 8

The Extended Trail Lazy 8 is different from the wingover that you flew in Primary. The Extended Trail Lazy 8 does not specifically reference the ground; instead, reference the area and energy level. The Extended Trail Lazy 8 is used not only as a maneuver in Extended Trail, but also as an administrative maneuver to set up for the next maneuver in Extended Trail, gain energy/lose energy, work towards the center of the area, or avoid clouds.

#### 1. Procedure

- a. Roll into bank and let the nose drop to gain 190-200 knots, roll wings level and pull through the horizon to about 30-45 degrees nose high (about heels on the horizon).
- b. Start a relatively aggressive roll to about 120 degrees of bank and aggressively pull down to about 30-45 degrees nose low. If you have started low in the block, use only 80-90 degrees of bank in order to regain some energy.
- c. As you regain airspeed to 190-200, roll to maintain the turn and give Wing some angles to work with.

#### 2. Common Errors

##### a. Lead

- i. Overbanking in the pull down.
- ii. Not using the maneuver to build/lose energy as appropriate.

##### b. Wing

- i. Overbidding to lag when turned into.
- ii. Not getting nose down through horizon early enough and falling out of the cone.

### 724. ET BARREL ROLL

The Barrel Roll is very similar to the PA Barrel Roll in execution. The Barrel Roll is useful as a backup maneuver if your Cloverleaf does not go well; namely, you are too fast to pull through the Loop portion of the Cloverleaf. The key to the Barrel Roll is a good energy exchange between 200 knots to no slower than 100 knots at the top. Keep the nose tracking throughout the maneuver. Once the maneuver is complete, resume the turn to give Wing some angles to work with.

### 1. Procedure

- a. Keep turning until you are ready for the pull in the vertical. Allow the nose to drop to attain 190-200 knots.
- b. Execute the barrel roll procedures from primary. Flying your best single-ship parameters will provide the best platform and training for Wing.
- c. Slow or accelerate the roll so that you reach your target of 100 knots inverted and 90 degrees off, hold positive G throughout the maneuver, keep the nose tracking through the maneuver.
- d. On the backside of the maneuver, allow aircraft to accelerate to 190-200 knots, resume the turn to give Wing some angles to work with.
- e. The ET exercise can continue with more maneuvers or be terminated. Lead can initiate the terminate call or Wing can request it. Lead directs a rejoin.

### 2. Common Errors

- a. **Lead**
  - i. Not getting nose high enough and only 30-60 degrees off heading when inverted.
  - ii. Too slow or too fast when inverted.
  - iii. A quick roll from inverted back to upright. Not arriving on back on starting altitude and not giving Wing angles to maneuver.
- b. **Wing**
  - i. Overbidding to lag when turned into.
  - ii. Not getting nose down through horizon before Lead and falling out of the cone.
  - iii. Excessive separation from Lead on the backside due to poor use of Lead pursuit.

- iv. Not using angles and getting spit out in front, crossing Lead's 3/9.

## 725. ET CLOVERLEAF

The first part of the Cloverleaf is just like the Barrel Roll, a wings-level pull, then a roll to the 90-degree reference striving for wings level, inverted. Pull through the back half of the loop portion no faster than 115-120 knots. If you find yourself faster than 115-120 knots, then just continue with a Barrel Roll and set up for a better Cloverleaf on the next pull. The last part of the Cloverleaf is a Split-S just like you did in Primary, except you are at 1015 ft-lbs, not idle, so you must max perform the airplane through the vertical, pull to approximately rudder shakers and then back off slightly.

### 1. Procedure

- a. Attain 190-200 knots, roll out wings level when ready to make the pull into the vertical.
- b. Execute the first half of the Extended Trail Barrel roll to wings level inverted approximately 100 knots, no more than 120 knots.
- c. At no more than 120 knots, execute a Split-S by pulling to approximately rudder shakers and then back off a little to max perform the aircraft through the vertical.
- d. Once past vertical, allow the aircraft to accelerate to approximately 190-200 knots, then resume a turn to give Wing some angles to work with.

### 2. Common Errors

- a. **Lead**
  - i. Not getting nose high enough and only 30-60 degrees off heading when inverted.
  - ii. Too slow or too fast when inverted.
  - iii. Not max performing aircraft through the split-S resulting in excessive airspeed build-up.
- b. **Wing**
  - i. Not getting nose down through horizon before Lead and falling out of the cone.
  - ii. Excessive separation from Lead on the backside due to poor use of Lead pursuit.
  - iii. Not monitoring airspeed – pulsing stick – over G.

## 726. ET HALF CUBAN EIGHT

The Extended Trail Half Cuban Eight is exactly like the Half Cuban Eight in Primary PA except that the entry airspeed is a little faster and the minimum airspeed at the top is going to be higher. Attain approximately 210 knots on the descent and get no slower than 90 knots at the top. In the Half Cuban Eight, you want to ensure that the nose moves at a nearly constant rate throughout the maneuver. At the end of the maneuver, resume the bank so that Wing has angles to work with.

### 1. Procedure

- a. Attain 200-210 knots, roll wings level and make at least a 3.5 G straight pull into the vertical.
- b. Concentrate on the nose continually tracking, visually acquire the opposite horizon and pull to it; get not slower than 90 knots inverted.
- c. Continue to pull to approximately 30-40 degrees nose low inverted (approximately heels on the horizon inverted). Roll with rudder and aileron to the upright position, wings level.
- d. Once rolled upright, go right back into the turn to give Wing some angles to work with. Let aircraft accelerate to 190-200 knots.

### 2. Common Errors

- a. **Lead**
  - i. Not getting 200-210 KIAS resulting in slow over the top.
  - ii. No SA on Wing's position.
  - iii. Not giving Wing angles to work with after rolling upright.
- b. **Wing**
  - Not delaying pull-up and pulling up with Lead initially, resulting in Lead pursuit in the vertical and getting acute/blind.

## 727. ET TECHNIQUES

Lead is responsible for maneuvering the formation in Extended Trail within the working area and at an energy level that is conducive to over-the-top maneuvering. There are a couple of things Lead can do to ensure success for a good set of Extended Trail:

**1. Drive to the middle of the area with good energy and work your set of Extended Trail there.**

Extended Trail requires a lot of vertical maneuvering. It is difficult to work radial/DME when you are upside down. Pick a reference on the ground and work over that reference. Continually work towards the reference and pay attention to your altitude.

**2. Strive for 4 Gs, aim for 100 knots at the top of an over-the-top, and 200 knots when accelerating for an over-the-top (over-the-top is anything that involves inverted flight).** Lead must always assume Wing will pull more G, get slower, or get faster in order to stay in position so Lead must plan accordingly. Lead must anticipate that Wing is one step behind Lead so if Lead must make a last minute save to not go below the floor of the area, for example, he knows that Wing will definitely go through the floor. Plan accordingly!

**3. Lead should always be in a turn to give Wing some angles to work with.**

The T-34C is very underpowered, so any time Lead just races off straight away, accelerating, Wing will never get back into position if out. Lead should only roll wings level for the pull into the vertical for a PA maneuver; other than that, he should be in some degree of turn.

**4. Lead should maneuver to help Wing maintain position, but not sacrifice area orientation or maneuver flow to do so.**

Monitor Wing but do not sacrifice your maneuvers to do so. For example, if Wing is out of the back end of the cone, accelerating for an over-the-top maneuver is not going to help him at all; do a wingover and “reel Wingback in” before going for the next maneuver. Extended Trail usually consists of four maneuvers, but Lead has prerogative to do administrative wingovers to help Wing out or deal with weather/low energy, etc.

**5. The typical flow for Extended Trail is a Wingover, to a Barrel Roll, to a leaf of a Cloverleaf, to a Half Cuban Eight.**

This is just technique; you can do any sequence of the four you want, but this sequence works pretty well.

**6. Wing Extended Trail Techniques**

Wing’s job in Extended Trail, simply stated, is to maintain the cone behind Lead. The Wingman uses all the tools discussed thus far to maintain the cone. Flying Extended Trail as the Wingman is very challenging and requires an aggressive crosscheck of both aircraft. Even though Wing must maintain the cone, he is still responsible for flying a safe aircraft, i.e., do not over-G, do not go OCF, keep track of fuel/engines, etc.

You will need to understand the cone you must maintain. You must manage three things to maintain position; the first two, Aspect and Range, are ingredients you reference from Lead's aircraft. The Aspect is approximately 30-45 degrees and range is 300-500 feet behind Lead. As a technique, most pilots fly in the aft portion of the cone, 400-500 feet, so that you have time to react to Lead's maneuvering. The third item you need to stay in the cone is a little more subtle; it is energy. Since the goal of Extended Trail for Wing is to maintain the cone, then Wing must emulate Lead's energy state to a certain extent. If Lead is going over-the-top (cloverleaf, Half Cuban Eight, etc.), then Wing must ensure he has sufficient airspeed to do the same. Splitting the outboard wing with the vertical stabilizer (ventral fin point on "cutout") will define 45 degree angle-off; Lead's nose on the canopy bow approximates 30 degree angle-off. Distance behind Lead can be estimated by noting the amount of detail on Lead's aircraft. Clearly reading the side number approximates 500 feet; the ability to discern detail on Lead's helmet will indicate range inside of 300 feet. One area to avoid, but is still in the cone, however, is Lead's high six. Avoid this area, since it is easy to lose sight of Lead under the nose.

## 728. LEAD CHANGE

1. **Description.** The Lead change transfers responsibility for conduct and in-flight planning of the flight from one aircraft to another. Lead changes can be accomplished from various formations, except Fingertip, and are typically done with the Wingman in Route.
2. **General.** It is important to understand that a Lead change is exactly that: The new Leader is now entirely responsible for Leading and safely conducting the mission requirements as briefed. This includes picking up the squawk, making all radio calls, flight planning decisions, and clearing for the formation. The Lead change must be crisp and instantaneous, since no one is clearing for the formation at the instant of Lead change. A Lead change may be initiated with the Wingman on either side.
3. **Procedures.**
  - a. **Lead:**
    - i. If the Wingman is in Fingertip, direct the Wingman to Route.
    - ii. Signal for the Lead change.
    - iii. Monitor the Wingman and clear for the formation. Crack power slightly to initiate LOS.
    - iv. When the Wingman is line abreast, look for a head nod; the Wingman now has the Lead.
    - v. As the new Wing, maintain Route until new Lead directs otherwise. In other words, the Lead change was in Route, do not come into Fingertip unless told to do so.

- vi. Place the transponder to STANDBY.
- b. **Wing:**
  - i. Move to the Route position when signaled; do not second-guess Lead! Move no further forward than abeam position. When Lead directs the Lead change, set 1015 ft/lb to establish forward line of sight.
  - ii. When ready to accept the Lead and abeam (looking at Lead down the Leading edge of his/your wing) moving forward, (after receiving Lead's lead change signal) acknowledge your acceptance of the Lead with an exaggerated head nod. At this point, the Lead has been passed. Squawk altitude.
  - iii. Rock wings to signal Wing to the Fingertip position (if desired).
  - iv. Conduct an Ops Check.

**Lead Change over the Radio.** Lead changes may also be accomplished on the radio using the following format:

Lead: *"TALON Two, you have the Lead on the left/right"*

Wing: *"TALON Two has the Lead on the left/right"*

New Lead: *"TALON check"*

New Wing: *"Two"*

The new Lead will then pick up the squawk and the former Lead will squawk standby.

#### 4. **Common Errors**

- a. Wingman accepts Lead early, aft of abeam.
- b. Wing does not establish forward line of sight and takes too long to move abeam.
- c. New Lead forgets to reduce power once in the Lead.
- d. New Lead forgets to squawk "Altitude" with the proper code.
- e. Lead does not clear for the formation when Wing is maneuvering abeam. Do not stop clearing until the Lead is passed! Make momentary glances to monitor his position.
- f. New Wingman forgets to squawk "STANDBY".

**729. BATTLE DAMAGE CHECK**

1. **Description.** All members of the flight will check over each other's aircraft for any abnormalities (leaking fluid, loose panels, etc) after maneuvering during the RTB.
2. **General.** During the BD check, the aircraft fulfilling appropriate Lead responsibilities must navigate and clear for the formation (NAV Lead) while the Wingman maintains deconfliction within the formation. The BD should be accomplished after fencing out and on the RTB.
3. **Procedure**
  - a. The signal is either a radio call or a visual "checkmark" signal.
  - b. To perform the check, make a slight check turn away from Lead (if in Fingertip), and climb only as necessary to visually inspect the top of the near side of the aircraft.
  - c. Continue the inspection by dropping down to inspect the lower side of the aircraft; perform a cross under; and inspect the lower and upper side of the opposite side of the aircraft.
  - d. Upon completion, remain on that side and assume the proper formation position (Fingertip or route).
  - e. Use the intraflight radio to pass discrepancies; otherwise, pass a thumbs-up.
  - f. The Lead aircraft then passes the Lead to the Wingman and performs a BD check on him.
  - g. After the BD check and a thumbs up, the Wingman passes the Lead back to Lead (as required).

**730. FORMATION APPROACH AND LANDING**

The Formation Approach is used to expedite the recovery of aircraft by recovering aircraft two at a time. It can also be used as a recovery method for certain emergencies. The Wingman will fly the Fingertip position until past the final approach fix and below actual or simulated weather. Wing will then fly a forward and stacked level position with the Leading edge of his wing lined up with the trailing edge of Lead's elevator (exactly the same as the takeoff picture) to either a missed approach, low approach, or a landing. Full stop landings will be accomplished using full runway length. If flying a missed or low approach, the Wingman will maintain the forward/stacked level position throughout the maneuver until the landing gear and flaps are raised using Formation Takeoff procedures, then the Wingman will automatically move to Fingertip. The key to a good Formation Approach is smooth aircraft control as Lead and aggressive position maintenance by Wing. Lead must fly a good approach! Lead cannot let Wingman consideration influence the instrument approach. Fly your best approach as Lead, but

be smooth. Make required corrections earlier than when you are flying single ship approaches.

### 731. FORMATION LANDING RESTRICTIONS

1. Full runway length available.
2. Total crosswind component must be less than 10 knots.
3. Dry runway.
4. Minimum runway width is 100 feet.
5. Weather must be above circling minimums to fly a formation approach or 1000/3 if circling minimum do not apply.

#### 6. Procedures

- a. Lead will intercept the final approach course, check airspeed and command the gear down signal for the formation approximately two to three miles from the final approach fix.
  - i. Lead checks airspeed, calls gear clear, gives the preparatory gear signal (Appendix B) and receives an acknowledgment from the Wingman.
  - ii. The signal to move the gear handle will be three taps on the helmet followed by a single exaggerated head nod forward. Both pilots will then perform the Landing Checklist.
  - iii. After completing the Landing Checklist, both flight members will check each other's gear and pass a thumbs up if everything appears normal. Report abnormalities over the radio.
- b. If Whiting is landing runway 5 or 32, Lead will automatically coordinate with Tower for South Field penetration. If Tower does not approve the penetration, then do not execute a Formation Landing. Fly the formation approach and take spacing during the circling maneuver.
- c. Lead will follow ATC clearances/instructions and fly his best, smoothest approach. The Wingman will maintain Fingertip position. Lead will query Tower for the current winds if not given at the final approach fix call. A Crossunder will be performed at Lead's discretion if the Wingman is not positioned upwind for the landing. Crossunder no lower than 300 feet AGL. If a Crossunder is necessary below 300 feet AGL, Lead will let Wing land while Lead executes a go-around.
- d. If the formation must circle to land, then Lead will maneuver to at least a one to two mile final. Maneuver the formation as required when within 3 NM. If, for any reason the formation approach must be discontinued, request maneuvering to initial for the break, or execute a discontinued entry to set up another formation approach.

- e. Lead will line up on the center of his side of the runway. Wing will crosscheck runway line up. A technique for Lead is to line up on the centerline of the runway until about a 1 nm final then check to the centerline of his half. This avoids having to check into Wing on short final if crosswinds are a factor.
- f. Lead should fly a normal to slightly shallow power-on approach at 120 KIAS. Lead should reduce power to slow to 110 KIAS on short final, no slower than 100 KIAS crossing the runway threshold.
- g. Under normal conditions, about 10 feet above the runway, Lead should start one smooth power reduction so that he is slightly above idle on touchdown. Lead should ensure that he is not carrying so much energy into the flare that the formation floats in ground effect. A slightly firm touchdown for Lead is a good thing.
- h. Wing assumes the forward/stacked level position after the FAF, with the runway in sight, normally no later than 1.5 miles from the runway. If actual IMC, Wingman will stack level when breaking out into VMC conditions. The forward/stacked level position is defined as:
  - i. Leading edge of the Wingman's wing aligned with the trailing edge of Lead's horizontal stabilizer (fore/aft position).
  - ii. Allow ten feet of wingtip clearance minimum (left/right position).
  - iii. The Leader's helmet on the horizon (up/down).
- i. Lead is the primary reference for the Wing landing. Cross-check the runway on short final to ensure proper alignment and then fly the proper position off Lead throughout the flare and touchdown. Wing should strive to touchdown at the same time as Lead. Once on the runway, maintain lateral spacing, use normal braking techniques, and in no case allow your aircraft to drift across the runway centerline. As Wing, land on your side of the runway.
- j. Once both aircraft are on the runway, Wing will go to the full Beta and use brakes as required (to establish safe separation from Lead) and call "Beta" on the radio. Lead uses mid-range Beta and tests his brakes. Once both aircraft are under control, they will come to a complete stop or taxi off the runway. If Lead has to cross in front of Wing to clear the runway, Wing will call "cleared cold" once his aircraft is under control and slow enough to avoid an immediate turn by Lead. Lead will monitor Wing while crossing in front due to the potential of an untimely brake failure.

Wing: *"TALON Two's Beta, One cleared cold"*

## 7. Common Student Errors

- a. **Lead:**

- i. Not flying a smooth approach and flare.
  - ii. Too rapid of a throttle reduction in the flare. Going full IDLE.
  - iii. Not placing the Wingman on the upwind side.
  - iv. Not maintaining own side of the runway.
  - v. Too rapid use of BETA.
  - vi. Late to align on final (angling to or crabbing on).
  - vii. Not configuring prior to FAF.
- b. **Wingman:**
- i. Not moving to the stacked forward/level position.
  - ii. Not flying formation through touchdown.
  - iii. Not matching Lead's power reduction.
  - iv. Slow to engage BETA.
  - v. Not calling "BETA" on the runway.
  - vi. Not maintaining own side of the runway.
  - vii. Late/not calling "Cleared Cold".
- c. **Techniques**
- i. Do not fly a steep approach; this tends to cause a rapid power reduction and quick flare (swap ends), which the Wingman will not be able to match. The Wingman will then either land short or hard.
  - ii. Fly a normal to slightly shallow glide path (2-3 degrees), as this permits a power-on approach, and slower power reduction.
  - iii. Lead should monitor the Wingman throughout the approach. This means checking on his position intermittently. Do not sacrifice flying a stable platform to a good approach and landing.
  - iv. Determine landing winds early and put the Wingman on the upwind side for landing. Configure early if necessary.
  - v. On final, Lead should line up on his half of the runway to give the Wingman the

larger amount of runway. This helps the Wingman feel more comfortable during the landing and eliminates his concerns about landing off of the runway edge.

- vi. The Wingman should check the runway alignment intermittently during the approach; however, Wing's job is to fly formation and trust Lead to land the flight on the runway.

### 732. FORMATION LOW APPROACH/GO AROUND

1. **Description.** Flown for any reason when the formation cannot land together.
2. **General.** If Lead cannot continue to a formation landing, a formation low approach can be executed. If not restricted by tower, a form low approach can go as low as touchdown. Can be flown to achieve multiple form approaches without having to land.
3. **Procedure.**
  - a. Lead smoothly adds power as required to execute low approach.
  - b. Raise the nose and begin climbing away from the ground. When a positive rate of climb is established and below 120 KIAS, signal to Wing for raising gear (same as after formation takeoff).
  - c. With gear up and locked, smoothly advance power as required and coordinate with tower for multiple formation patterns, inside downwind, or back to radar.
  - d. Request sequential closed if intending to make separate landings. Pull closed with clearance as required.
  - e. Wing maintains position and does as directed by Lead.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **CHAPTER EIGHT**

### **T-38C INSTRUMENT NAVIGATION**

#### **800. INTRODUCTION**

Your T-38C INAV procedures will be incorporated into all AFORM flights as applicable. You will be flying real instrument approaches to airfields other than the ones you are used to at Whiting. Also, the T-38C INAV is also intended to prepare you for operating on an IFR clearance in a single seat aircraft. You will have to come up with a good information flow in the cockpit so that you manage your resources effectively as the single crewmember and Flight Leader. T-38C INAV will introduce you to Air Force Flying regulations. Remember, your T-6 peers in your class are already going to be able to quote chapter and verse on Air Force flying publications, so you are already behind the curve (and guess who they are going to call on in standup for questions?).

#### **801. PLANNING YOUR T-38C INSTRUMENT FLIGHTS**

It is important to plan ahead for the applicable approaches. On every flight you will fly at least one instrument approach. You will be expected to fly the approach and still execute responsibilities as Flight Lead.

#### **802. SINGLE SEAT CRM**

The mentality on your T-38C INAVs is to fly the flight plan single seat. The challenge here is to be able to execute the flight plan by yourself. Crew Resource Management (CRM) is typically discussed in the crew format, but it does apply to the single seat world. Single seat IFR flying has at least two pillars: a good information flow plan in the cockpit and proper task prioritization. Remember, your cockpit is your office and you can set it up any way you want. Keep in mind that you want to set it up so that it is standardized. Everything should be in the same place every time, i.e., approach plates, checklists, kneeboard, pencils/pens, etc., so that you know where things are in a time critical situation. When flying in the single seat world, you want to always keep busy brainstorming on how to be prepared for not just what is going on at the time, but how you can make life easier later on in the flight. An example might be droning along on the airway; “What can I do to help myself out? Can I get the ATIS this far out?” Maybe you can brief the first approach. Maybe you could call a Pilot-to-Metro service or Flight Service to get the weather at the destination if convective activity is a factor. Techniques abound on how to keep busy in the cockpit, but one over-riding thing must be kept in mind: You are the only pilot in the aircraft and you must be able to run everything by yourself.

### 803. TECHNIQUES

While en route always keep all **your NAVAIDs “gainfully employed”**. If you are flying GPS aircraft, then use the VOR/TACAN for cross radial references to keep up with divers. If you are coming into the terminal area, then back the NAVAIDs up with each other; is the Localizer lined up with the PAR? Are there cross radials to help you out with where you are on the approach?

How can I use the radios in order to make my life easier? Flying into a terminal area, you can fly UHF the whole way and put the Tower and Ground freqs in the VHF so that when you are told to switch to Tower at the FAF all you have to do is toggle VHF/UHF. Similarly, departing from a cross-country airfield, put Tower and Ground in the VHF and the Departure freq in the UHF, so when you are told to switch to Departure you can just flip the UHF/VHF select switch during this critical phase of flight.

There are plenty of other techniques to streamline your “office” during single seat IFR. Talk to your IPs and feel free to come up with some on your own as well.

### 804. FLYING INTO AN AIR FORCE BASE

Flying into an Air Force Base is no different from flying into any other military base, but there will be some terms and procedures that are unique to the Air Force.

#### Instrument Approaches

Flying an instrument approach into an Air Force Base is no different from flying into any other military base, but some terminology might catch you off guard.

“Active Runway” – not the “Duty Runway”

“Fix to Fix” – not “Point to Point”

“Initial” – coming up the center of the runway for a crosswind break

“Overhead” – a pattern consisting of coming in for the break

“Two-ship” formation – not a “section”

“Approach end arresting gear” – approach end cables that you want to land past (normally at fighter bases the cables are up)

#### VFR Pattern

“Maneuver to initial for the overhead to a full stop” is how you will describe it. Usually you will tell Tower that you want to maneuver to a “two-mile initial,” which means that you will set up the aircraft rolled out wings level, two miles from the approach end of the active runway and will call out “two-mile initial.” From there, Tower will usually clear you to break.

## On the Ground

When flying into any military base, they close out your flight plan automatically, but it is a good idea to check. All you have to do is ask the Base Ops personnel to check if your flight plan is closed out in the computer. “Transient Alert” is usually going to park you; sometimes they will greet you during taxi with a “follow me” truck, which you will follow to parking. Keep the airfield diagram in the instrument approach procedure book open to use as a “road map” for finding your way around the airfield. If there is no “follow me” available, request “progressive taxi instructions” from ground to help you get to the parking ramp. Base Operations is where you go to file and get your weather. If you want to get something to eat you can call the “base taxi” and they will give you a ride anywhere on base. If you are going to be there overnight, you can call the base motor pool to get an Air Force van or truck so that you can at least have a way to get around on base.

### 805. CONDUCT OF THE FLIGHT

The conduct of the T-38C INAV flights will be in accordance with what you are taught in INAV flight procedures, but there are some memory aids that will be mentioned in Air Force training that you should be familiar with because they are still being taught today. Memory aids in IFR flying are numerous and it seems that every IP has their own that they were taught at an early age. Here are a few you may adopt in the Air Force world.

Before stepping out to the aircraft to go fly, make sure you have done the “WANTS” check:

- W** – Check the weather. Note cloud tops/ceilings; ensure circling mins or higher for formation ops; think about your weather game plan.
- A** – Activate the flight plan.
- N** – Check all applicable NOTAMS.
- T** – Compute TOLD, (TOLD is takeoff and landing data, something you will become very familiar with in the T-38C, e.g., Decision Speed, Takeoff Speed, Single Engine Takeoff Speed, etc.) Check takeoff procedures (trouble T).
- S** – (SID) Is there an applicable Departure Procedure (DP) from this field that I should look at, since I am probably going to have to fly it anyway, even if I did not file it?

Before taking off, do your “NEWS” check:

- N** – NAVAIDs set up for the departure.
- E** – Emergency return; what if I had to immediately recover due to an EP after takeoff?
- W** – Do I have the weather to take off/shoot an approach back to this field?  
Winds. Check crosswind limits; plan formation lineup.
- S** – SID, review the Departure Procedure one last time before takeoff.

Flying en route to your first destination, about 100 miles out, you want to do the “**WHOLDS**” check:

- W** – Check the weather, PMSV, FSS, ATIS.
- H** – Is there any applicable holding? Are we planning to do any holding? How will I enter?
- O** – Obtain a clearance when I talk to the destination Approach Controller; how will I tell him what I want?
- L** – Letdown plate review, brief up the first approach into the terminal area (NMAILMAN check).
- D** – Descent check, if applicable.
- S** – Compute Speed and Configuration, (in T-34, this will always be BAC.)

When briefing an approach always do the “**NMAILMAN**” check:

- N** – Check for applicable NAVAIDs; are my NAVAIDs compatible with the entire approach from IAF to missed approach procedure?
- M** – Check for all minimums; minimum weather to fly the approach, Minimum Sector Altitude, Emergency Safe, at or above altitudes, as well as MDA/DH for the approach you are flying.
- A** – Altimeter – check the altimeter setting. Did you reset to local altimeter after descending below FL 180 (where the altimeter setting is always 29.92)?
- I** – What is the inbound course? Can I dial it in right now if I am getting radar vectors or I am on the arc?
- L** – Letdown review/Lost Comm. Again review the flow of the approach plate, altitudes, FAF, MAP, etc. How will the runway look when I break out of the weather? Is this a backup to a GCA? What will I do if communications are lost?
- M** – Review Missed Approach Procedure do I have to coordinate for alternate Missed Approach Procedure if I do not have compatible NAVAIDs?
- A** – Recheck the altimeter setting; your life depends on it.
- N** – Next approach, am I doing one? Do I have to coordinate with approach control for “climb out instructions” for the next approach I want? (Climb out is different from missed approach; missed approach is flown when you fly an approach with the intent to land and did not break out of the weather; climb out is meant to sequence you back into the radar pattern for more approach work and starts at departure end vice the Missed Approach Point (MAP).

When executing a Localizer Approach, do a “**LIDS**” check:

- L** – Dial in the localizer frequency, make sure you are toggled to VOR on the toggle switch.
- I** – Inbound course, dial it in.
- D** – DME. Is it a separate channel for this localizer? (Like South Field, usually these are Y channels.)
- S** – Speed and configuration (this will always be BAC in the T-34).

Refer to AFM 11-217 Instrument Flight Procedures and other Air Force IPs for more memory aids and techniques commonly used in the Air Force.

**CHAPTER NINE  
T-38C LOW LEVEL NAVIGATION**

**900. INTRODUCTION**

Low altitude navigation is a tactic used to penetrate enemy defenses and avoid detection. As enemy defensive capability grows and the technology to engage aircraft with surface-to-air missile (SAM) systems proliferates, the ability to survive may depend on one's ability to fly low.

Unfortunately, flying low also has some disadvantages. While terrain masking and flying below enemy radar line of sight offer safety from some enemy defenses, it is also hazardous because of the close proximity to the ground. Things that were "out of sight and out of mind" at medium to high altitude now require mission planning to avoid. Towers, buildings, mountainous terrain, trees, and wires are very unforgiving to any aircraft that tangles with them. We can minimize the danger of low altitude flying through proper mission planning and safe flying skills.

Here at Whiting, we cannot teach fighter tactics at 300 feet, but we will teach good low-level flying fundamentals and skills, both single-ship and two-ship. In your follow-on training, the skills you learn here will provide the basic building blocks and foundation for advanced tactics. By learning all you can now in the T-34 at 1000 feet, you will be better prepared to fly lower and faster in the T-38C track at Vance!

**901. LOW ALTITUDE ENVIRONMENT**

Do not worry, this is not going to be a review of your high school or college physics class. We are simply going to use physics to analyze how much time we have before the aircraft could hit the ground during a low level. Flying an airplane at low altitude requires a great deal of attention, and carelessness or complacency must be avoided. Analyzing the time to impact for aircraft in the following situation stresses the importance of being vigilant during low level operations. The chart below shows time to impact at typical fighter speeds when the aircraft is allowed to descend at 5 degrees or when the aircraft is overbanked by 10 degrees in a turn. As you can see in each scenario, the pilot has less than six seconds to react before hitting the ground.

<b>ALTITUDE</b>	<b>STRAIGHT AND LEVEL FLIGHT (-5 DEG DEVIATIONS)</b>	<b>LEVEL TURN (+10 DEG OVERBANK)</b>
100 feet AGL	1.4 sec	2.6 sec
300 feet AGL	3.2 sec	4.5 sec
500 feet AGL	6.0 sec	5.8 sec

**902. LOW ALTITUDE TASK MANAGEMENT**

Low level flying requires the pilot to accomplish numerous tasks. Some of the tasks include navigation, route timing, defensive maneuvering, weapons employment, visual lookout, system updates, etc. The workload associated with low level flying can easily overload the pilot so it is important to prioritize these tasks. By effectively managing the low altitude workload, you can maximize an aircraft's offensive capability.

Low altitude tasks can be divided into two groups.

1. **Terrain Clearance Tasks (TCT)** – any task, mental or physical, which is required to maintain obstacle clearance and avoid impact with the ground.
2. **Mission Tasks (MT)** – any task required for mission accomplishment. These include items such as navigation, communication, maintaining formation, and weapons system management.

*So here is a typical scan pattern or crosscheck used to manage low altitude tasks:*

1. LOOK OUTSIDE AT NEAR ROCKS (TCT)
2. LOOK OUTSIDE AT FAR ROCKS (TCT)
3. FORMATION (MT)
4. LOOK AT THE MAP (MT)
5. LOOK OUTSIDE AT NEAR NEAR ROCKS (TCT)
6. FORMATION (MT)
7. CHECK ENGINES (MT)
8. LOOK OUTSIDE AT NEAR NEAR ROCKS (TCT)
9. LOOK OUTSIDE AT NEAR FAR ROCKS (TCT)
10. FORMATION (MT)
11. CHECK TIMING TO THE NEXT POINT (MT)

And so on...

The goal is to manage all cockpit tasks with the priority of NOT HITTING THE GROUND. No mission task can ever override terrain clearance. If a task conflict arises, you must ensure that terrain clearance or flying the aircraft overrides all other mission tasks. Your life depends on it.

**9-2 T-38C LOW LEVEL NAVIGATION**

### 903. MISSION PLANNING

The mission plan is the most important thing to success in Low Level flying. A bad plan, no matter how well executed, will not be a success and in the worst case can result in death of the pilot and loss of the aircraft. On the other hand, a good, well executed low level plan can be a fun and rewarding thing.

Low level mission planning starts like any other mission planning - checking the weather and determining where you would like to go and what training you need to do to complete the mission. Mission planning for the low level is similar to cross-country planning: You need a Jet Log with your points and a DD-175. You will use the fuel and timing from the Jet Log to put on your map with two additions, Bingo fuel and Continuation fuel (called Joker fuel on other than a low level route).

“Bingo” fuel is the minimum fuel required to return to your base or destination by the most direct means plus required fuel reserves. You must calculate this fuel for every mission. Calculate the fuel for the most direct route at the highest VFR altitude you can fly for the weather the day of the flight. Usually this fuel is calculated using maximum range airspeed. In the T-34, this would be fuel flow based on 580 lbs of torque. The Bingo fuel is then written on the chart in red at the furthest point on your route. Applied in flight this means that if I reach Bingo fuel before reaching my furthest turn point, I must abort the mission and fly my calculated abort profile.

Continuation or “Joker” fuel is the minimum fuel at a given checkpoint required to complete the remainder of the low level mission with required fuel reserves. Calculate this fuel by beginning with the minimum fuel you will land with at your destination (again plus any required reserve) and work backward to each point along the route. For example, let us say I have to be on deck with 240 lbs of fuel. I start with 240 lbs of fuel and then add the fuel used from my last turn point on my route to the destination. Then I do the same for each turn point back to the beginning, let us say this “leg” fuel was 75 lbs per turn point, my continuation fuel for my last route turn point would be 315 lbs. Applied in flight, continuation fuel means if I arrive at this turn point with less than continuation fuel, I must abort the mission and return home using a normal profile or cut off legs of the route until I can make Continuation fuel at a turn point.

Once you figure that out, it is time to get a map and start drawing. But wait, which map do I use? The GNC, JNC, ONC, or TPC? What is the difference between them?

Maps, or charts, as they are correctly termed, come in a variety of scales. These charts are optimized for the type of navigation you will be doing. Large aircraft going long distances use small-scale maps that cover long distance, but have little detail. Tactical aircraft that fly close to the ground and need detailed topographic information use large-scale maps. These large-scale maps have the detail necessary to fly shorter legs at low altitude and high speeds.

Some types of charts and scales:

GNC (Global Navigation Chart), 1:5,000,000 (small scale)

JNC (Jet Navigation Chart), 1:2,000,000

ONC (Operational Navigation Chart), 1:1,000,000

TPC (Tactical Pilotage Chart), 1:500,000 (large scale)

Other charts are available in even larger scale and are used for target area charts, such as the 1:25,000 Air Target Chart. So, what scale is best for us? Simply put, the 1:500,000 is the best all-around low-level chart for us. At Vance, you will use the TPC, a 1:500,000 scale chart. Here at Whiting, we use a sectional chart, which is also 1:500,000 scale.

#### 904. UPDATING CHARTS FOR TOWERS AND OBSTRUCTIONS

The National Imagery and Mapping Agency (NIMA) produces new edition charts every five years. Unfortunately, details on these areas change much more frequently. So, what is a pilot to do to find out if a new 1700-foot tower has been built along their planned flight route? NIMA has thought about this and produces a manual called the CHUM, or Chart Updating Manual. This publication is published on a semi-annual basis with supplements being produced each month.

A CHUM update in the manual will look something like this:

Change:	Tower 265-607 to multi towers	31 05 58N	88 13 51W
Add:	Tower, 310-391	31 14 46N	87 44 03W

Find the coordinates on your chart and update them with the new information. Now you are ready to start plotting your course! But wait, where can I fly this route? Let us look at some defined, preplanned low level corridors.

#### 905. AP/IP, IR/VR ROUTES

Military training routes are found in the AP/1B. These are predetermined corridors for low level military training and come in three flavors: IR, VR, and SR routes. The AP/1B provides textual and graphic descriptions, and operating instructions for all military training routes, both low level and air refueling. Information provided includes type of route, length of route, direction of flight on the route, entry/exit points, and of course definition of the three main types of routes.

## IR ROUTES

IR routes, or instrument rules routes, must be flown on an IFR flight plan regardless of weather conditions. Your flight plan must include the entry fix/radial/distance, the route designator, and the exit fix/radial/distance. You must enter/exit the route via published entry/exit point or published alternate entry/exit points. You must also have a specific ATC clearance prior to entering the route. When on the route, you must remain within the confines of the route corridors, both width and altitude. When practical you should avoid flight within three NM and 1500 feet AGL of airports. IR routes are designed so that specially equipped aircraft may fly them in IMC/night conditions.

## VR ROUTES

VR routes, or visual rules routes, are much less restrictive. You should be on a VFR flight plan, but are required to only have the fix/radial/distance of your entry point, not the exit point (unless you intend to get an IFR clearance at the end of your low level). You must still avoid airports by three NM and 1500 feet AGL and maintain VFR weather minimums.

## SR ROUTES

SR routes, or slow speed routes, are flown at or below 1500 feet AGL at speeds of 250 knots or less. AP/1B prohibits high speed aircraft from flying slow speed routes. For slow speed routes, VFR is required and the entry point fix/radial/distance is required for the entry point only.

Now these AP/1B routes are just one way of flying a low level. You could fly VFR virtually anywhere if you desired. You could fly in unrestricted airspace, a MOA, or a restricted area if you coordinated clearance to enter. Either way, the TPC is the map of choice. So, go get your map and start plotting.

## 906. DRAWING YOUR ROUTE

The AP/1B will list corridor centerline points and width. Note that the corridor centerline is not necessarily the intended route of flight; when used with the route width it defines the boundary you must stay within when selecting turn/check points. In the Tactical community, we use felt tip markers to draw the route using black for the route line and information “doghouses.” Plot your turn/checkpoints on the map and connect them from the starting point to the end point. Use the symbology in the appendix example chart. Put timing tick marks on the course line at one-minute intervals. A good technique is to number every other minute mark on opposite sides of the route of flight (this reduces clutter) continuously through to the target (eliminating the need to re-start the clock at each point). Leg time between points is used for ease of fuel calculations and is placed in the “doghouse” near the turn point. Next, draw the “doghouses” on the map next to the turn point and pointing towards the next turn point. Fill in the information in the doghouses as shown in Figure 4-2 in P-359 “T-34C Visual Navigation”.

A couple of other things that need to be done that may not be on your Jet Log are Route Abort Altitude (RAA), Bingo fuel and Joker fuel. We already talked about Bingo and Joker fuels; just put them on the map. Bingo fuel should be prominent and in red and written next to the furthest turn point on the route. Continuation fuel for each point should be put under the bottom of the doghouse in black. So much for fuels; how about RAA?

Route Abort Altitude is calculated to give you a safe “hip pocket” altitude you could climb to if you inadvertently enter IMC. In the tactical community, RAA is also used if a threat reaction has taken you off the “black line” and you are trying to get your SA back. Calculate RAA by finding the highest obstacle along your route line of flight. Round this altitude **up** to the nearest 100 feet and then add 500 feet. This is your RAA. Write it in large red letters on your map.

### 907. FLYING THE LOW LEVEL

Now that you have completed the planning, it is time to fly the plan. Low level navigation is a step-by-step process using dead reckoning and pilotage to fly from a known position to an unknown position. Proper pilotage requires a **CLOCK TO MAP TO GROUND** sequence: Note the time elapsed, find a feature on the map that is at your time elapsed or slightly in front of the aircraft, and then find that feature on the ground. This sequence allows you to progress from one know point to another. Do not be tempted to find a feature on the ground and try to match it to the map! This technique will cause you to spend too much time with your cranium in the cockpit looking at the map instead of watching out for the ground. Once on the low level, you will probably need to apply course and timing corrections to hit the target on time.

Let us start with course corrections. The following techniques in order of priority should be used to correct course deviations:

1. Aim for a feature in the distance that is on course.
2. Use funneling features between 10 and 2 o'clock to steer back to course. Funneling features may include roads, power lines, natural terrain, etc.
3. If you cannot find a feature between 10 and 2 o'clock, you can use the Standard Closing Angle (SCA), which is based on the 60-to-1 rule. For the T-34 at 150 knots groundspeed, for every nautical mile you are off course, apply a 20-degree heading correction for one minute. When back on track, analyze why you got off course and apply a correction to your heading if required.

For timing corrections, you can cut off or extend segments of the low level by turning early or late at a turn point. However, a better technique is to apply groundspeed corrections. Like course corrections, timing corrections are also based on the 60-to-1 rule. Let us look at a T-34 traveling at 180 knots groundspeed, or 3.0 nautical miles per minute. For every 10 seconds off of timing, change the groundspeed by 10 knots for 3 minutes. So, if you are 10 sec behind, increase the groundspeed to 160 knots for 2.5 minutes. When back on time, analyze why you got off time and apply corrections to your groundspeed as required.

## 9-6 T-38C LOW LEVEL NAVIGATION

**908. FORMATION LOW LEVEL**

The two-ship is the basic fighting element for low level flying. During a two-ship low level, the number one priority for both aircraft is to avoid hitting the ground or anything attached to the ground! After that, the Lead aircraft is primarily responsible for navigation and timing, or in other words, getting the formation to the target on time. The Wingman is primarily responsible for station keeping and providing mutual support.

The basic To-Ship Formation is Tactical. Low-level Tactical is flown the same as medium altitude Tactical with a couple of important exceptions. First, the Wingman never stacks low or flies below the Lead aircraft. As a visual reference, the Wingman should look out and see the Lead aircraft on the horizon or slightly below the horizon. If the Wingman sees the Lead aircraft above the horizon (can see sky between the ground and the Lead aircraft), the Wingman is flying below Lead's altitude and should climb immediately. The second major difference with low altitude Tactical Formation involves turns. During tactical turns, the Wingman should climb slightly to deconflict from the Lead aircraft. In other words, if the two aircraft in the formation are approaching each other in a turn, the Wingman is responsible for climbing to provide vertical separation.

**909. LOW LEVEL EMERGENCIES**

Not every mission goes as planned. There are many factors beyond our control that can rapidly change the mission. In this section, we will look at the following low level emergencies: Aircraft malfunctions, bird strikes, weather, and lost aircraft.

The first step when encountering any type of aircraft malfunction at low altitude is to maintain aircraft control by climbing the aircraft away from the ground. Once the aircraft is safely away from the ground, we can devote our attention to analyzing the situation and taking the appropriate action. The most serious aircraft malfunction we may experience is an engine failure. In this situation, the aircraft should be zoomed to trade excess airspeed for altitude while executing your low altitude power loss procedures.

Another major danger during low level operations is bird strikes. In the event of a bird strike, the first step is to climb the aircraft away from the ground. If the bird penetrates the canopy, both crewmembers should come on the controls and climb the aircraft away from the ground. Once the aircraft is safely away from the ground, the next step is to analyze the damage to the aircraft and the pilots. If one of the pilots is injured, the uninjured pilot should fly the aircraft to the nearest suitable field and land. If aircraft damage is suspected, a controllability check should be performed above 5000 feet AGL prior to landing. For any bird strike, the low level should be terminated and the aircraft returned to either the home base or to the nearest suitable field if the aircraft is damaged.

During the low level, we are required to maintain VMC. If the aircraft cannot maintain VMC or inadvertently enters IMC, immediately execute a route abort by applying full power, transition to instruments, and climb to your Route Abort Altitude. Do not attempt to re-enter the route once the route abort is initiated. When able, squawk emergency and coordinate with the appropriate controlling agency for an IFR clearance to the destination airfield.

If you become lost or disoriented, the first step is to **climb** to a safe VFR altitude and slow the aircraft down to **conserve** fuel. From there, look for prominent land features or use nearby TACAN stations to update your position. If unable to determine your location, contact a nearby controlling agency and **confess** your status and request radar vectors to your destination airfield.

Bottom line, with any type of abnormal situation at low level; climb the aircraft away from the ground first and then handle the problem. It is much easier to deal with emergencies once you have achieved terrain and obstacle clearance.

## SUMMARY

Low-level flying is an integral part of fighter and bomber operations in peacetime and wartime. The low altitude environment is not only one of the most challenging areas to fly and employ weapons; it is also one of the most dangerous. When flying low, it is imperative to develop solid habit patterns to manage the multiple tasks within the cockpit and keep the aircraft safely away from the ground. Once these skills are mastered, you can effectively take the fight down into the enemy's back yard and put iron on target.

## WHITING T-34 LOW LEVEL ROUTES

The Appendix provides some guidance for local T-34C low levels. Included are instructions on how to prep are the maps, sample AP/1B coordinates for three simulated VR routes, and an example map. On local two-ship sorties, students should plan a lateral departure from Whiting to enter the low levels. Prior to the first entry point, Lead will fence-in the flight and send Wing to Tactical. As Lead passes over the first point, he will initiate both aircraft's clocks by transmitting "*TALON, READY READY HACK!*"

Here are several techniques for the two-ship low level:

1. The first point should be visually significant so Lead can accurately start the timing.
2. As the formation approaches the first point, they should be flying the initial heading. This will prevent Lead from having to do a turn directly over the first point.
3. After rolling out on heading for each leg, check engine instruments, present fuel, and continuation fuel. Consider setting the next heading in the CDI as a reminder. That way, when you arrive at the next point, you can reference the CDI instead of looking down at the map.
4. Trust your timing and headings until proven otherwise.

## 9-8 T-38C LOW LEVEL NAVIGATION

5. As part of your mission planning, study the map and not visually significant points along the route to update your timing.
6. Land-Water contrast such as large rivers, lakes, the shoreline, bays, etc. are excellent turn points.

**THIS PAGE INTENTIONALLY LEFT BLANK**

**APPENDIX A**  
**GLOSSARY OF TERMS USED IN THIS SYLLABUS**

**Angle-Off (AO):** The angular difference between the longitudinal axes of two aircraft.

**Aspect Angle (AA):** The angle measured from the tail of Lead's aircraft to the position of the Wingman; can be expressed in degrees or clock position. The tail of Lead's aircraft is an aspect of 0, the nose is 18 (180 degrees). Any perpendicular position of the Lead is a nine aspect (left wingtip, right wingtip, top of canopy, center of wings underneath).

**Blind:** No visual contact with friendly aircraft (aircraft in our formation); opposite of term "visual."

**"Bingo" Fuel:** Prebriefed fuel state which allows aircraft to return to base or alternate, if required, using preplanned recovery parameters and arriving with normal recovery fuel.

**Closed:** Successive takeoffs and landings/low approaches, where the aircraft does not exit the landing pattern.

**Closure (Positive or Negative):** Relative velocity of one aircraft in relation to another. Also known as  $V_c$  (pronounced V sub C).

**Corner Velocity:** The minimum speed at which an aircraft can attain maximum allowable G. In the T-34C this is approximately 135 KIAS for positive G. This is the speed where you can attain maximum turn rate and minimum turn radius on the aircraft.

**FCIF:** Flight Crew Information File is a file of cards containing each squadron pilot's name. Every pilot has their own FCIF card; signing off the last entry in the FCIF book acknowledges you have read the latest entry. This is similar to the student read file except a little different in that you cannot fly or perform Runway Supervisory Unit (RSU) duties [USAF Wheels-Watch] until the card is up to date; if you have not signed off the last FCIF, you will not get an airplane. Variations include the SARF (Safety Aircrew Read File) and the ARF (Aircrew Read File) or PRF (Pilot Read File).

**Formal Release:** You and your classmates will spend all day at the flightline (about 10-12 hours per day); you will all brief in a mass brief in the morning and you will all release at the end of the day together; the end of the day is called "formal release."

**FTU:** Flying Training Unit – this is where you will transition to your weapon system after pilot training.

Dyess AFB – B-1

Luke AFB – F-16

Tyndall AFB – F-15/F-22

Davis Monthan AFB – A-10

Barksdale AFB – B-52

**Heading Crossing Angle (HCA):** Same as AO.

**High Six:** A position above and behind Lead.

**High Yo-Yo:** An out-of-plane maneuver to control overtake, decrease AA, or prevent an overshoot by increasing vertical turning room on the Lead aircraft using a lag maneuver.

**“Joker” Fuel:** Prebriefed fuel state at which an event is terminated and the transition to the next phase of flight begins, e.g. stop area work and proceed to landing pattern, Lead change for training, etc.

**Lag Pursuit:** Lag pursuit (nose behind the Lead) can build turning room, increase range, and control overtake. Although there can still be some closure, Angle-Off will increase and Aspect Angle will decrease up to the Lead’s flight path. Lag pursuit will appear like you are going to pass behind Lead.

**Lead Pursuit:** Lead pursuit (nose in front of Lead) decreases range towards Lead. Aspect Angle and closure increase, Angle-Off decreases. Lead pursuit will appear like you are going to pass in front of Lead.

**Lift Vector:** A line through the center of the fuselage perpendicular to the wings.

**Line of Sight (LOS) Rate:** Speed of apparent movement of another aircraft in relation to your aircraft.

**Low Yo-Yo:** An out-of-plane maneuver to create closure using Lead and acceleration techniques.

**No Joy:** No visual contact with unfriendly aircraft (aircraft not in our formation); opposite of term “tally.”

**Pure Pursuit:** Pure pursuit (nose on Lead) increases closure (but at a more moderate rate than Lead pursuit). Pure pursuit will cause you to be on a collision course with Lead.

**Plane of Motion:** An imaginary plane defined by the aircraft’s flight path.

**Radial G:** The vector sum of the aircraft’s lift vector and gravity.

**Sequential Closed:** Formation breakup to closed pattern with Formation Wingmen taking appropriate spacing behind Lead prior to closed pull-up.

**SOF (Supervisor of Flying):** The SOF is an Instructor Pilot who sits in the tower and monitors flying; he/she is a senior pilot who is there mainly for emergencies and weather recalls. If you have any problem airborne, he/she is the person to call to first notify them of your problem, tell them what your course of action is, and then enlist their help to do such things as find out the weather at certain divert airfields, have crash crew waiting for your arrival, etc.

**Tally:** Visual contact with unfriendly aircraft (aircraft not in our formation); opposite of term “no joy.”

**Turn Circle:** The flight path described by an aircraft in a turn.

**Turn Radius:** The distance between an aircraft’s flight path and the center of the turn circle.

**Turn Rate:** The degrees per second at which an aircraft is turning.

**Turning Room:** The space available to turn your aircraft in relation to another.

**Visual:** Visual contact with friendly aircraft (aircraft in our formation); opposite of term “blind.”

**THIS PAGE INTENTIONALLY LEFT BLANK**

**APPENDIX B  
USAF AIRCRAFT FORMATION FLIGHT SIGNALS**

See AFI 11-205 Attachments 1 and 2 (excerpted below) for standard USAF formation visual and distress signals.

**Attachment 1**

**STANDARD FORMATION SIGNALS FOR DAYTIME COMMUNICATION**

**Table B.1.1. Standard Formation Signals for Daytime Communication (See Notes).**

<b>Action</b>	<b>Preparation</b>	<b>Execution</b>
Afterburner in or out: <i>Note: Not required during formation itself</i>	Move clenched fist inboard or outboard as appropriate	Nod head.
Attention in the air:		Execute rapid shallow rocking of wings.
Battle Damage Assessment (BDA) Check		Hold clenched fist with index finger and thumb extended, back of hand towards canopy.  Wingman responds by executing prebriefed BDA check.
Change Lead:	Make several forward pointing motions, then hold up number of fingers to indicate present position of the point which is to assume the Lead	Pilot of aircraft assuming the Lead nods head.
Echelon to the Right or Left		Dip wing to the right or left, whichever is appropriate.
Echelon Turn:		Extend clenched fist with forefinger and little finger extended upward for each echelon turn performed.
Flaps Up or Down <i>Note: During a formation takeoff, preparatory or execution signals are not required for raising flaps.</i>  Initial gear movement on the Lead's aircraft may be used as the Wingman's signal for gear and flap retraction.	Over the shoulder – Hand flat, fingers backward, downward motion of hand from wrist to lower flaps – reverse motion to raise flaps.	Nod head.

Fuel check:		Close fist with the thumb extended and perform drinking motion with thumb touching the oxygen mask.
Fuel Remaining for like type aircraft.	In response to Fuel Check.	Extend one finger for each 1000 lbs of fuel board. Extend finger(s) vertically for 1000 to 5000 lbs, horizontally for 6000 to 9000 lbs. After signaling 1000 lbs. increments, pull hand out of sight then signal 100 lbs. increments in the same manner. Signal zero with closed fist. For example: To signal 6300 lbs, extend one finger horizontally (indicating 6000 lbs); pull hand out of sight (indicating a change from thousands to hundreds); and extend three fingers vertically (indicating 300 lbs).
Fuel Remaining for dissimilar aircraft	In response to Fuel Check	<p>a. Less than 10 minutes remaining.</p> <p>Use the “Land Immediately” signal in Attachment 2.</p> <p>b. For more than 10 minutes use up to five fingers to indicate each 10 minute increment of fuel as follows:</p> <p>1 finger = 10 – 19 minutes                  2 fingers = 20 – 29 minutes                  3 fingers = 30 – 39 minutes                  4 fingers = 40 – 49 minutes                  5 fingers = more than 50 minutes</p>
Gear Down.	Over the shoulder – Downward motion with a closed fist, thumb extended downward.	Nod head.

<p>Gear up.</p> <p><i>Note: During a formation takeoff, preparatory hand signals are not required for raising the gear.</i></p>	<p>Upward motion with closed fist, thumb extended upward.</p>	<p>Nod head.</p>
<p>Jettison Stores:</p>	<p>Hold fist at top of canopy and make several pumping motions.</p>	<p>Nod head.</p>
<p>Lanyard Check</p>		<p>Show hooked index finger.</p>
<p>Loosen Formation:</p>		<p>Fishtail the aircraft.</p>
<p>Oxygen Check</p> <p><i>Note: If the response is not an OK, use the radios or appropriate HEFOE signal.</i></p>		<p>Cup hand over oxygen mask, followed by query in the form of an OK sign (circle formed by touching ends of thumb and forefinger, other fingers extended).</p>
<p>Pitchout:</p>	<p>Make a circular motion with vertically extended index finger.</p>	
<p>Radio Frequency Change:</p>	<p>Tap helmet near ear with fingers extended.</p>	<p>Extend finger(s) vertically for digits 1 through 5, horizontally for digits 6 through 9, pulling hand down out of sight between digits. Signal zero with a clenched fist. Ensure signals are made against a visible background. For example:</p> <ul style="list-style-type: none"> <li>a. Present channel change – tap helmet, extend appropriate number of fingers for channel desired, pulling hand down out of sight between digits.</li> <li>b. Prebriefed manual frequency – tap helmet, hold up clenched fist next to helmet.</li> <li>c. Manual frequency not prebriefed – tap helmet, hold up clenched fist next to the helmet, extend appropriate number of fingers for frequency desired pulling hand down out of sight between digits.</li> </ul>

Ready for Takeoff:	After run up, the Leader looks at the Wingman.	Wingman nods head yes or no.
Reform or Tighten Formation:		Rock wings slowly
Runup Engine for Takeoff		Make a circular motion with vertically extended index finger.
Speed Brake(s) in or out:	Biting motion with hand; fingers and thumb opening and closing.	Nod head.
Start Engines:		Extend arm over head and make a circular motion with the hand.
Start Takeoff Roll:	Lead places head back toward headrest.	Lead nods head for brake release. For aircraft equipped with afterburner, after the aircraft are rolling straight down the runway, a second head nod is a signal to light afterburner (unless afterburner light up is initiated simultaneously with brake release).
Tactical Formation		Make a series of porpoising maneuvers, spacing as briefed.

**NOTES:**

1. Pilots in formation will relay visual signals; the Leader must allow enough time for the relay of each signal after it is given.
2. The head nod is the signal to acknowledge understanding of preparatory signals.

## Attachment 2

## IN-FLIGHT DISTRESS SIGNALS

Table B.2.1. In-Flight Distress Signals.

Intention/Problem	Signal
Approach End Cable Engagement	<p>a. Escorted: Extend tail hook. Escorting aircraft will relay intent.</p> <p>b. Unescorted: Fly parallel to the active runway at 1000 feet above the field elevation with tail hook extended. Rock wings until reaching the departure end of the runway, turn to downwind and check tower or mobile control for light signals. If a straight-in cable engagement must be flown, flash landing light on final.</p>
*Bailing Out or Ejection	One or both clenched fists pulled downward across the face to simulate pulling an ejection face curtain.
Descend to Lower Altitude	Hold hand at top of canopy, palm down, fingers extended and joined, move hand forward and down.
*Desire to Land	Movement of the hand, flat, with palm down, forward and downward, finishing the movement in a simulated roundout. As an alternate signal, lower the landing gear.
Electrical Failure Landing (No Assist Aircraft Available)	Distressed aircraft will fly 500 feet over the tower or mobile control, then continue to the far end of the runway and pull up into a wide downward leg. Proceed with a landing and pattern approach for the type of aircraft being flown while watching the tower or mobile for signals. The control tower will clear the area of the aircraft and will call emergency crash equipment to the scene.
I Must Land Immediately	Close fist and hold it to top of canopy with thumb extended downward, then move arm up and down rapidly. (Do not confuse with "GEAR DOWN" signal, which is generally not used with altitude.)

I Must Land on Your Wing	Pat shoulder, palm down. To prevent confusion with other signals, use right hand and left shoulder or vice versa. To acknowledge, other pilot must give the OK signal; the basic signal indicates a jet approach speed of 130 knots. If the distress aircraft desires a higher approach speed, the pilot must raise one finger for each 10 knot increase desired. The distressed aircraft lands and the escort executes a go around.
Intercepting Signals	The intercepting aircraft positions itself in front of and usually to the left of the intercepted aircraft and rocks its wings. This is a signal that the interceptor wishes the other aircraft to follow it. A responding irregular flashing of all available lights in this case indicates distress.
Radio Failure	Tap microphone or earphone of helmet and signal as appropriate: <ul style="list-style-type: none"> <li>a. Receive Failure: With palm of hand over the ear position, move hand forward and backward.</li> <li>b. Transmitter Failure: With palm of hand toward and in front of the face, move hand up and down.</li> </ul>
Radio Inoperative Landing (No Assist Aircraft Available)	Fly aircraft along the side of the landing runway, 1000 feet above the field elevation, rocking wings until reaching end of the runway. Turn to downwind and check the tower or mobile control for green light on base leg and final approach for landing clearance.

Systems Failures (HEFOE System)	<p>Clench fist and hold it at top of canopy, then hold up the required number of fingers to denote which system is involved (see a through e below). If the clenched fist signal is seen, but no finger signal is seen or the intercepting pilot is unable to understand the signal given, the pilot will assume the aircraft in distress has one or more systems inoperable and should proceed with caution.</p> <p>The receiving pilot acknowledges the signal by repeating it:</p> <ul style="list-style-type: none"> <li>a. Hydraulic – one finger</li> <li>b. Electrical – two fingers</li> <li>c. Fuel – three fingers</li> <li>d. Oxygen – four fingers</li> <li>e. Engine – five finger</li> </ul> <p><i>Note: For multi-engine aircraft, point to the side, left or right, that corresponds with the engine failure.</i></p>
---------------------------------	---

**NOTES:**

1. For use only when radio is inoperative or not available.
2. Day visual signals.

**THIS PAGE INTENTIONALLY LEFT BLANK**

**APPENDIX C  
GENERAL BRIEFING GUIDE**

<b>MISSION PREPARATION</b>	<b>ALTERNATE MISSION</b>
1. Time Hack	1. Type Mission/Objectives
2. Stand-Up EP	
3. Mission Objectives/DLOs	<b>ABNORMAL PROCEDURES</b>
4. Mission Overview	1. Divert/Emergency Fields
5. Mission Data Card	2. Minimum/Emergency Fuel
a. Mission CC/Designated Flight Lead	3. EPs
b. Joker/Bingo	
c. Working Area(s)	<b>SPECIAL BRIEF ITEMS</b>
6. Environmental Conditions	1. Instructor Responsibilities
a. Weather	2. Transfer of aircraft controls
b. SIGMETS	3. Chase Procedures
c. Alternate	4. IFF/Squawk
7. NOTAMS	5. Visual Search/MACA/Flight Path/ Deconfliction
8. Personal Equipment	6. Terrain Avoidance
9. R&I/Pubs/Maps/Fuel Packets	7. Bird Strike
	8. Human Factors
<b>GROUND OPS</b>	a. Channelized Attention
1. Preflight	b. Task Saturation
a. Fuel/Oxygen requirements	c. Complacency
b. Securing rear cockpit (as required)	9. G-Awareness
2. Check-In	10. Spatial D
3. Taxi/Run-up	11. Lost Wingman
4. Spare procedures/MX delays	12. Radio/ICS Failure
	13. SARCAP
<b>TAKEOFF</b>	14. Recall Procedures
1. Runway Lineup	15. Training Time Out
2. Formation Takeoff/Interval Takeoff	16. Last event in stage?
3. EPs	
a. Aborts	<b>SPECIAL INTEREST ITEMS</b>
b. Land Immediately after takeoff	
	<b>TRAINING RULES</b>
<b>DEPARTURE</b>	1. 5000' AGL for aerobatics
1. Routing	2. WX limitations
2. Join-Up/Formation	
3. Ops Check	<b>DISCUSSION ITEMS</b>
<b>RECOVERY/LANDING</b>	
1. Rejoin	
2. Battle Damage Check	
3. Type Recovery	
4. Pattern and Landing	
5. After Landing	

**THIS PAGE INTENTIONALLY LEFT BLANK**

**APPENDIX D**  
**T-38C FORMATION COMMUNICATIONS GUIDE**

**GROUND OPS**

**Check-in**

Lead: (on VHF): *TALON check Victor.*

Wing: (on VHF): *“2”, or” 2 needs 1 Minute, (Reason)”*

Lead: (on UHF): *TALON check.*

Wing: (on UHF): *“2”*

**Clearance**

FWOP standard – Wingman responds as required: clearance, squawk, or altimeter (see Standards)

**Taxi**

Lead: *North Ground, RED KNIGHT XXX, flight of two, <parking spots>, taxi with information <current ATIS> to the approach end of Runway XX.*

Tower: *RED KNIGHT XXX flight taxi runway XX.*

Lead: *RED KNIGHT XXX flight taxi runway XX.*

**Runup**

Switch flight to Sandbag using clenched fist (prebriefed frequency) and call outbound. Switch flight back to channel 1.

**At the Approach end of the runway**

Lead: *North Tower, RED KNIGHT XXX flight of two, holding short approach end, Rwy XX for section takeoff*

Tower: *RED KNIGHT XXX flight, winds are XX at XX, cleared for takeoff*

Tower may not say “full-length available.” Clearance for takeoff at the approach end implies full runway length. If there is any doubt confirm full-length is available with the tower. If cleared “on to hold” request winds from tower if not previously given.

**TAKEOFF**

FWOP standard

**DEPARTURE**

(After flight check-in)

Lead: *Pensacola departure, RED KNIGHT XXX flight of two passing XXXX feet.*

If WX dictates a specific altitude to remain VFR then request that altitude.

On Departure, call for an Ops Check.

(VHF)

Lead: *TALON, standby Ops Check*

Wing: *Two*

Lead: *TALON Ops Check, TALON One is 7.1*

Wing: *TALON Two is 7.5*

**Clear of Class Charlie airspace (passing 4200 feet)**

Lead: *Pensacola departure, RED KNIGHT XXX, clear of class C cancel radar advisories*

After canceling advisories, push flight to RI common and ask if “Anybody is working Whiting.”  
Once clear of the arc, push flight to Eglin.

**Instrument Approach Entry to Duke Field**

Lead: *Eglin Approach, RED KNIGHT XXX flight of two T-34s XX miles to the North/West of CEW, request.*

Eglin Approach: *RED KNIGHT XXX, Squawk XXXX, go ahead with request.*

Lead: *Eglin Approach, RED KNIGHT XXX, Request winds, runway and vectors TACAN 18 Duke, followed by VFR with tower.*

**NOTE**

This call will vary depending on your intentions and the weather. If the weather conditions permit and you can clearly see Duke, do not request weather. For Instrument approaches to Duke, you will almost always accomplish the TACAN 18 (or ILS 18) to Runway 18 (or circle to Runway 36) to enter Duke Field. If the weather is in doubt, then ask for additional information.

**VFR Entry to Duke Field**

Lead: *Eglin Approach, RED KNIGHT XXX flight of two T-34s XX miles to the North/West, request.*

Eglin Approach: *RED KNIGHT XXX, Squawk XXXX, go ahead with request.*

Lead: *RED KNIGHT XXX, Request winds, landing runway at Duke Field and VFR to Initial (or 3 Mile straight-in) via Point Rocks*

Eglin Approach: *Duke Field is Landing Runway 18(36), winds are XXX@X, Altimeter XXXX, cleared to Point Rocks, contact Duke Tower.*

Lead: *RED KNIGHT XXX, altimeter XXX, Cleared to Point Rocks, TALON Push XXX.XX.*

**Once on final**

Lead: *Duke Tower, RED KNIGHT XXX and flight, 3 mile final runway XX, gear down for Two.*

Duke Tower: *RED KNIGHT XXX cleared option.*

Lead: *RED KNIGHT XXX cleared for the option.*

**For break up into single ship overheads after formation approaches:**

Lead: *Duke Tower, RED KNIGHT XXX request sequential closed.*

Duke Tower: *RED KNIGHT XXX, sequential closed approved, report right base.*

Lead acknowledges tower, gives pitchout signal (after Crossunder if appropriate), then pulls closed. Wingman follows five seconds later. Once on downwind Lead will pass the side numbers for each aircraft to tower.

**For single ship closed pattern**

Climbing out with aircraft clean: *XXX, request closed/present position closed.*

Duke Tower: *XXX, closed/present position closed approved, report right base runway XX.*

At the perch: *XXX, base, gear, option.*

Duke Tower: *XXX, cleared the option.*

Lead/Wing: *XXX, cleared option.*

**Call to Eglin Mission control if going to R2915 (IP only)**

Lead: *Eglin Mission Navy RED KNIGHT XXX, flight of two T-34s with you west of Crestview XX miles at XXXX altitude for R2915, mission number XXXX*

**Call to Cairnes approach for Rosehill MOA (IP only)**

Lead: *Cairnes approach, RED KNIGHT XXX, flight of two T-34s 10 SW of Florala to work the southwest corner of the Rosehill MOA (or whichever sector you want to work) from 5 to 10,000 feet.*

Cairnes Approach: *RED KNIGHT XXX roger, squawk XXXX.*

Wing: *Two.*

**Once established in any working area**

Lead: *TALON Fence-in, Standby Ops check.*

Wing: *Two.*

**After sufficient time for Wing to do Ops check**

Lead: *TALON Ops check, TALON One is 6.5*

Wing: *TALON Two is 6.2* (Wing responds in format that Lead used).

**If any “Knock-it-Off” or “Terminate” is called**

Knock-it-Off is called for safety, area border, traffic, etc.

(Any flight member): *TALON Knock-it-Off.*

Lead: *TALON One knock-it-off.*

Wing: *TALON Two knock-it-off.*

*TALON Two, traffic 11 O’Clock 2 miles level (for example).*

Keep repeating the sequence until it is done right. If DLOs are met, use “Terminate.”

**Going extended trail**

Lead: *TALON Two, go extended trail.*

Wing: *Two*

Wing: (in position): *TALON Two’s in.*

**Before departing any area**

Lead: *TALON Fence-out, Standby Ops check.*

Wing: *Two.*

**After sufficient time for Wing to do Ops check**

Lead: *TALON Ops check, TALON One Bingo plus 1.0* (for example).

Wing: *TALON Two Bingo plus 1.3* (Wing repeats in format that Lead used).

**Leaving the Rosehill MOA (IP only)**

Lead: *Cairnes Approach, RED KNIGHT XXX departing Rosehill, cancel radar advisories.*

Cairnes Approach: *Roger, RED KNIGHT XXX, Squawk VFR, frequency change approved.*

**If RTB to NSE from Rosehill (approximately 25-30 DME from NSE):**

Lead: *TALON sweep ATIS, push channel 5 (this means get current NSE ATIS and meet on Channel 5).*

**If going to Florala from Rosehill:**

Lead: *TALON push XXX.*

Lead: *TALON check.*

Wing: *Two.*

Lead: *TALON push 123.0*

Lead: *TALON check Victor.*

Wing: *Two.*

**Florala Call (IP only)**

Lead: *Florala Unicom, RED KNIGHT XXX flight of two T-34s 5 miles to the East/West inbound for landing, request traffic advisories, Florala.*

Lead: *Florala traffic, RED KNIGHT XXX flight of two, left/right base for runway 04/22.*

Wing: *Make the same traffic advisory calls using your side number.*

**Leaving 2915A**

Call Eglin Range Control 5 minutes prior to departure. Do not leave R2915A until cleared by Eglin to leave.

Lead: *Eglin Mission, RED KNIGHT XXX in 2915A, ready to depart airspace, request present position direct to Duke Tower/Hurlburt/Crestview VORTAC.*

Eglin Mission: *RED KNIGHT XXX, you are cleared to depart R2915A, descend and maintain XXXX feet.*

**Returning to NSE**

Lead: *TALON sweep ATIS (if not previously accomplished), push channel 5.*

Lead: *(on Ch5). TALON Check.*

Wing: *Two with <ATIS>*

Lead: *Pensacola Approach, RED KNIGHT XXX flight of two XX miles northeast of Whiting with information <current ATIS>, request.*

Pensacola Approach: *RED KNIGHT XXX squawk XXXX, say your request.*

Lead: *RED KNIGHT XXX request vectors TACAN final runway XX, circle to runway XX (if 05/32 in use), formation full stop.*

**Tower call approaching FAF for NSE formation approach**

Lead: *North Tower, RED KNIGHT XXX flight of two, XX DME TACAN final, gear down for two, require full-length request South field penetration (if circling to runway 05/32 only).*

North Tower: *RED KNIGHT XXX report three DME.*

Lead: *RED KNIGHT XXX wilco, say winds (perform Crossunder prior to FAF if required after tower confirms wind direction).*

Lead (approaching DME): *North Tower, RED KNIGHT XXX three DME.*

North Tower: *RED KNIGHT XXX winds are XX at XX, report right/left base for runway XX (if circling) cleared to land, full-length available.*

*Clearance to land does not imply full-length is available. Confirm South Field penetration and full-length is available with the tower.*

## **APPENDIX E**

### **VT-3 AFORM FORMATION STANDARDS**

#### **E100. INTRODUCTION**

Squadron Standards are designed to shorten briefing times and provide a common reference for IPs and students. Every pilot flying in the VT-3 will be familiar with these standards. These standards do not replace any applicable guidance in any FTI, NATOPS, OPNAV, or related documents.

Students will consider these standards directive guidance on all sorties unless specifically briefed otherwise.

#### **E101. MISSION PREPARATION**

1. All pilots will be in the squadron a minimum of 15 minutes prior to brief time and be in position for the brief NLT 5 minutes prior. Students will have line up cards prepared for the planned mission and alternate missions prior to the beginning of the brief.
2. Time Hack will be obtained from the Naval Observatory (DSN 762-1069/1401.)
3. Prior to the brief, ensure R&Is/Ops notes are signed off with the FDO.
4. All students should be prepared to discuss the EP of the day (not Stand-Up EP) in less than one minute, covering essential details and highlight special considerations applicable to the sortie. This will augment, not replace EP on the student's gradesheet.
5. Students will be prepared with the current and forecast weather, airfield status, and applicable NOTAMs.

2-ships: #1 student briefs the EP, #2 student briefs WX/NOTAMs.

#### **E102. FLIGHT BRIEFINGS**

1. Brief time will be 1+00 hours prior to takeoff for formation sorties or as designated by the Flight Lead IP. Flight members will not eat in the brief without IP/Flight Lead permission. Drinks are acceptable.
2. Students are responsible for briefing preparation to include: room and boards neat and clean, chairs as required, current gradesheet called up/printed (as required), sticks and working pens available. Students should consult with the Flight Lead for additional specific briefing requirements. All stand-ups will be conducted IAW Air Force standards.
3. Students will clean the briefing room/area after the brief. Boards shall be erased and cleaned.

4. The Flight Lead is the instructor briefing the mission.
5. Step time from the FDO desk will be takeoff – 45 minutes. Check-in time is takeoff -20. All flight members will step together.

### E103. GENERAL ADMIN

1. Use discrete VHF frequency for intra-flight communications when not on an area working/discreet UHF frequency. When in the MOA, VHF will be the primary intra-flight frequency.
2. Tactical maneuvering in the airspace will normally be at 150 KCAS. “Contract” tactical turns use 1015°/lbs trq and G as required to hold airspeed and altitude.
3. Once below Joker fuel, call fuel state in relation to Bingo (i.e. “Bingo + 2”). On the RTB, fuel should be referenced in lbs, not Joker/Bingo.

Ops checks will reference fuel in 100s and 10s until reaching Joker and after the RTB has started. (ex. “TALON, Ops check, “TALON1 is 7.2” for 720 lbs total fuel. If #2’s fuel is within .2 of #1, #2 can respond “TALON 2 Same”)

4. Knock It Off (KIO) – Upon hearing a “*Knock it off*” or observing a wing rock, all aircraft will clear their flight path, cease tactical maneuvering and acknowledge with call sign or wing rock and climb/descend to the briefed safe altitude (1000’ AGL min) as required. KIOs are reserved for safety of flight. After a KIO call, whichever aircraft called the KIO will briefly state the reason, i.e. Bingo, Floor, Bubble, Over-G, Emergency, etc. If a directive call (Ex. *Pull Up*) is necessary prior to the radio drill, make one.
5. “Terminate” calls will be used when DLOs have been met or will not be met within reasonable time.
6. Channel changes and check-ins will apply to the UHF radio unless prefaced by “Victor”. Use full call signs when talking on the UHF radio. This is not required on VHF discrete.
7. If a flight member gets lost during a frequency change, they will return to the last frequency, monitor guard, and await directions. Flight Leads should use UHF, VHF discrete, visual signals, and Guard to get flight members on frequency.
8. The visual signal of tapping the helmet then holding up a clenched fist directs the flight to go to Sandbag (342.8). To direct a VHF channel change, tap the helmet, pass the frequency/channel and then pointing your thumb in a rearward motion (making a hitchhiker signal).
9. Lead may use a visual “pushing” of the hand signal in lieu of a rudder kick to send Wingmen to route.

### E-2 VT-3 AFORM FORMATION STANDARDS

10. Lost sight:
  - a. If #1 is blind, they will call blind. #2 will then talk #1's eyes on using a wing flash as required.
  - b. If #2 loses sight, call "blind" with altitude. #1 will ensure a 1000' (500' min) altitude deconfliction and transmit a reference heading. All aircraft are responsible for maintaining area orientation until rejoined. If not visual by Joker, #1 will coordinate for separate recoveries.
11. Wingman will acknowledge all clearances, squawks, and altimeters with a "2" call after Lead acknowledges it to ATC.
12. Check-in with ATIS is standard. Do not report "with ATIS". Report only "Negative ATIS" if appropriate. If Wing reports negative ATIS, Lead will pass the current ATIS information on interflight.

#### **E104. GROUND OPERATIONS**

1. Aircraft forms will initially be reviewed by the student but always checked by a rated pilot, unless student is solo.
2. All aircrew will keep their hands clear of all aircraft controls when crew chiefs are under the jet.
3. The student will wear the mask with cold mic selected, students can go ground ops with mask down. Students can drop mask during flight to get drinks of water, but must put it back up when done. Have mask up for all radio calls. **HOT MIC WILL BE SELECTED FOR THE G EXERCISE.**
4. Obtain ATIS prior to check-in. Upon completion of the Pre-Taxi Checklist and with "thumbs-up" from all Wingmen or at check-in time (whichever occurs first), Lead will check the flight in on VHF discrete then UHF 342.8 (Sandbag). If not ready to taxi at check-in, notify Flight Lead at that time with reason and estimated time on VHF. Use GPS time for check-in when GPS is available. GPS time can be found on the SETUP 2 (SETUP page 2) menu on the left side (outer ring to get to SETUP, inner ring to get to page 2).
5. Wing will acknowledge the clearance/squawk by saying "Two" after Lead reads it back to ground or clearance delivery and it is acknowledged as correct.
6. Spares – pass new tail numbers to Sandbag on UHF 342.8 to relay to flight members. If prior to check-in, notify Flight Lead of status and new tail/spot # as applicable. Flight Lead has discretion to delay in chocks or rejoin in the ground run-up area.
7. For off-station formation sorties, or formations sorties departing NSE, all flight members will acknowledge the initial ATC clearance after the Flight Lead reads it back ("2").

8. At NSE, request taxi to the approach end of the active runway for a formation takeoff. For RWY 23/32, taxi will be normal through the run-up. For RWY 14, request taxi to approach end and execute run-up there. For RWY 05, run-up will be in the alternate run-up area. No formation takeoffs will be done from midfield.
9. Avionics Setup:
  - a. Radios (after start) UHF (Manual – Sandbag, Preset – 11), VHF (Form = Flt discrete)
  - b. GPS Area/Route of Flight as required
  - c. NACWS Enroute 20NM
  - d. IFF Flight Lead-assigned/planned; Wingmen – same, stby.
10. Mimic Lead to include radio calls and matching configuration.
11. In the run up, Wing will pass Lead a thumbs-up when ready for frequency change. Change to Sandbag and call outbound.
12. When taxiing to the approach end of the runway, the frequency change to Tower will be done with hand signals if practical (use radios as a backup).

#### **E105. TAKE-OFF**

Remain on Tower frequency until safely airborne. If aborting, advise Tower when able. For IFR departures, tower will clear formation to contact departure taking the runway. Remain on TWR freq until clear of the pattern if NSE is VFR. If the field is IFR, switch prior to takeoff.

2-Ship lineup – each pilot takes the center of his/her half of the runway, #2 aligns horizontal stabilizers with Leading edge of wings.

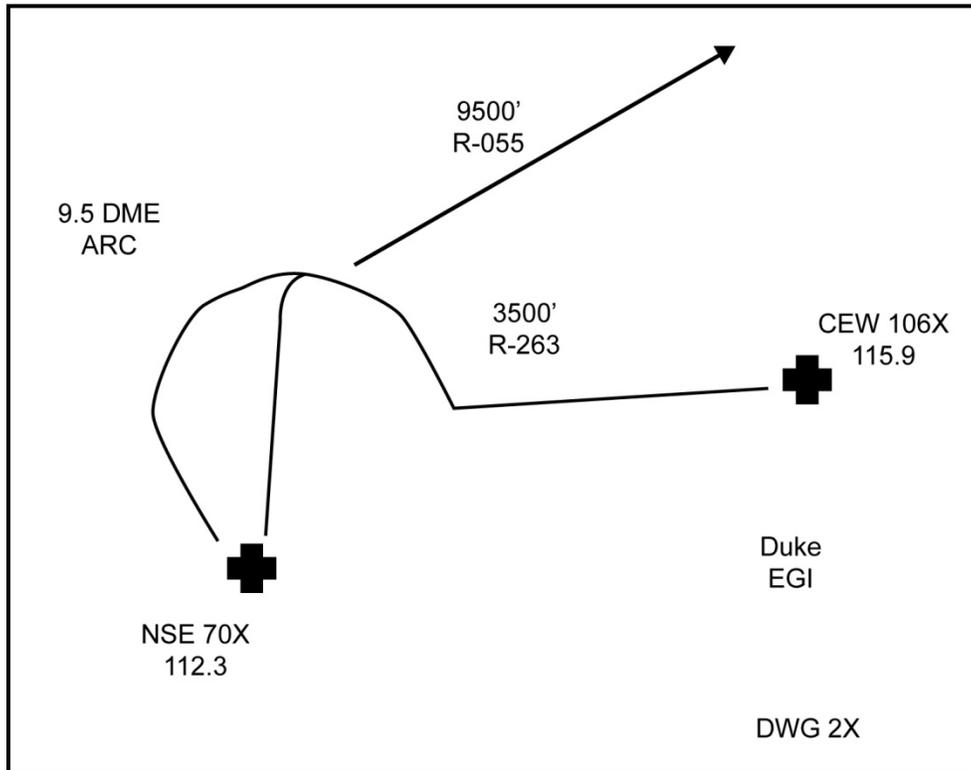
Formation takeoffs Flight Leads will set MIL power the reset to 950 ft-lbs. Wingman gets 1 “Push it up/pull it back” call on VHF.

Interval takeoffs rejoin to Fingertip unless otherwise briefed.

#### **E106. DEPARTURE**

1. Simulated departure procedure will be used to enter Duke Field or proceed to the Rosehill MOA. All other operating areas will abide by ATC/Course Rules/FWOP instructions. Lead will fly the DP to CEW or as directed by the instructor.
2. Lead will give a visual radio change to Departure frequency (as appropriate).

3. If going to Duke level off at 5500' and keep Wingmen in route. If going directly to Rosehill level off at 9500' and intercept the NSE R-055 outbound.
4. Send Wingman to Tactical after intercepting the R-055 towards Rosehill (as appropriate).
5. IPs will make all radio calls to work entries into R2915/Rosehill MOA.



**Figure E-1 Simulated Departure Procedure for Duke/Rosehill MOA**

**E107. AIRSPACE ENTRY**

1. At Lead's direction, Wingman will acknowledge and accomplish the following FENCE CHECK:

F	Fuel	Check quantity and balance
E	Engine Instruments	Check proper operation, AUTO-IGN ON
N	NAVAIDS/NACWS	Correct NAVAIDS and 20 nm range on NACWS
C	Comm	Proper UHF/VHF freqs and volume adjustment
E	Equipment	Harness and Control Lock Locked, Bilges Clear

2. G-Exercise: 1<sup>st</sup> turn at 190-200 KIAS and 3-3.5 Gs. 2<sup>nd</sup> turn will be at 190-210 KIAS and 3.5-4 Gs. Formations use two 180° hook turns if in Tactical.

**E108. AREA**

1. For Breakouts initiated by the Wingman, the “roll out” call is generally not required from the Flight Lead.
2. Turning rejoins will be at 150 KIAS, 30° bank. Straight ahead rejoins at 120 KIAS. All rejoins will be to the current position being flown unless briefed otherwise.
3. Extended Trail Exercise – set 1015 ft-lbs for maneuvering. The Wingman may modulate power as a last resort.
4. DLOs are achieved when the student gets established in the extended trail cone and uses a combination of pursuit curves and power modulations to stay in the cone.
5. When entering the Rosehill MOA, after Cairns Approach begins flight following and clears the flight into the MOA, the Lead student will call “TALON fence in, standby ops check” “2”
6. Ops checks will be accomplished, “fencing” into the area, after Lead change by the new Lead, after “fencing out,” and as required.
7. The standard Rosehill floor is 5500’ MSL and the top 10,000’ MSL.
8. Extended Trail will include at least four maneuvers with at least one leaf of a Cloverleaf.
9. Fence-out before leaving area.

**E109. RECOVERY**

1. After the FENCE OUT, tactical maneuvering and rejoins will be at 150 KIAS unless stated otherwise.
2. When a flight breakup is accomplished the Wingman will not acknowledge any instructions from a controller until #1 has confirmed good NAVAIDS via an Alpha Check, and cleared the Wingman off.
3. The BD check may be accomplished from route or Fingertip. all pilots will return to the last directed formation position before rendering the “thumbs up” and at the conclusion of the BD check. Flight Lead will automatically continue the check after the Wingman has taken the Lead. While in front, #2 has the ‘Nav’ Lead only. The BD check can be signaled by the first wing dip after the rejoin.

4. All recoveries will be planned to a formation instrument approach. The student will accomplish all the communications. Configure no later than three miles prior to the FAF. Ask North Tower for latest wind reading approaching FAF. Direct Wing to cross under no later than FAF if necessary. Advise tower you require “full-length,” and get acknowledgement of full-length available.
5. Coordinate for South field penetration if NSE is landing runway 5 or 32 (TAC 14 or 23 Circle 5/32). If South field penetration is disapproved then do not attempt a formation landing – execute discontinued entry, come up initial, or continue formation approach and take spacing one circling.
6. Tower should ensure the runway is clear for you when the formation reaches three miles; be ready to low approach if they allow aircraft to initiate a mid-field takeoff, or roll off the 180 when the formation is within three miles. Cancel IFR as appropriate.

### **E110. PATTERN OPS**

USAF Pattern work will be conducted at USAF tower-controlled airfields. Choctaw and other OLFs can be used for formation approaches and landings but should not be used to conduct single-ship pattern operations (closed pull-up, inside/outside downwind, et) if other aircraft are there. Use discretion.

#### **Duke**

1. Contact Eglin Approach prior to CEW or Duke Tower prior to Point Rock.
2. Plan formation approaches to “stop and go.” Lead will prebrief Shackle/Lead changes on the runway to reset the Wingman upwind before takeoff.
3. When splitting up for single-ship work, either pull sequential closed, or enter initial to split the flight in the break. If a Crossunder is required, ensure the formation is above 300 feet AGL.
4. Do not extend the base position for traffic. Ask for a re-entry to initial.

#### **Floral**

1. Do not come up Initial or do any USAF pattern work at Floral.
2. Departure will be interval takeoff only. On the interval takeoff, Wing should wait for Lead to rotate before starting the takeoff roll due to the narrow runway. If back taxi is required for runway 04 departure Wing will Lead the flight to the approach end on the downwind side. Lead will initiate the cross-turn to align the flight for takeoff.

3. If Florala is landing runway 22, Lead will taxi all the way to the end of the runway after landing to ensure sufficient room for Wing to land behind him. Wing will call Lead to tell him that he is clear to turn around, e.g., "TALON One Cleared to Turn." Lead will make the traffic advisory call on UNICOM that the flight is clear of the active.

### **Choctaw**

1. Entry Choctaw via a straight-in to RWY 18 or an outside downwind for RWY 36.
2. Formation "stop-n-gos" are permitted. USAF single-ship type pattern ops are not when other aircraft present (self-imposed rule). IPs should exercise sound judgment.
3. Depart on the downwind IAW FWOP.

### **E111. FORMATION LANDINGS**

Following a formation landing, get nose/tail separation and move to the "cold" side of the runway when speed is under control. If #2 lands on the cold side, once under control, #2 will turn the landing light off to clear #1 cold or clear cold on the radio.

### **E112. AFTER LANDING/TAXI BACK**

1. After landing together and clearing the runway, automatically change to UHF 1 (Ground) at NSE. #1 will check the flight in on the UHF 1 and call return. #1 will clear #2 off to call Sandbag and report return.
2. Ensure a thorough post flight is accomplished. Report any abnormalities (bird strikes, missing rivets, etc.) to MX and/or safety as required.

### **E113. ABNORMAL PROCEDURES (SINGLE SHIP)**

1. Pilot Coordination – The pilot flying is responsible for all initial actions including initiating any BOLDFACE for in-flight malfunctions.
2. If the intercom is lost, both pilots will check their Leads and switches. If all check good and critical information needs to be passed, an attempt to communicate should be made on the VHF radio.
3. Engine malfunction with the Aircraft Commander (AC) in the rear cockpit and loss of inter-cockpit communication:

Landing gear alternate extension: The AC in the rear cockpit will signal the front seat pilot to use the alternate gear extension by lowering the gear handle. If correct gear down indications are not achieved, the front seat pilot will perform the alternate gear extension checklist.

4. Emergency ground egress will be initiated by the AC using the term “*EGRESS, EGRESS, EGRESS.*”
5. Bird strike – If either the front or back seat pilot have a bird penetrate the canopy, both pilots should ensure the aircraft is moving away from the ground. The AC will then shake a stick if he can fly.

#### **E114. ABNORMAL PROCEDURES (FORMATION)**

1. Takeoff Aborts/Emergencies – For formation aborts, both aircraft will maintain their side of the runway. Aircraft will take action as necessary to avoid crossing centerline and/or hitting other aircraft.
2. On a formation takeoff, there will be no sympathetic aborts after brake release, unless safety of flight dictates. If the formation needs to abort, call “TALON FLIGHT ABORT, ABORT, ABORT.”
3. The primary method of recovery for IFEs will be a straight-in.
4. With good radios, the aircraft with a malfunction may request the lead at any time. If the aircraft is NORDO, the lead will be offered in the area, on recovery with field in sight, and on final with clearance to land. Once the emergency aircraft (NORDO or with good radios) has the lead, the good aircraft is automatically cleared to a chase position. If the emergency aircraft declines the lead on all opportunities, the good aircraft will lead the IFR aircraft back to the field; drop the IFE off in the flare and then go-around. NORDO aircraft on wing will give a head nod to inform Lead they are ready for and want to lower gear.
5. For simple NORDO, the aircraft with a good radio will Lead back IAW the FWOP. Clearance to land is implied when Lead rolls into the break. If on a formation approach, pass the Lead with clearance to land.
6. HEFOE signals will be between the respective aircraft commanders.
7. If blind and NORDO in the area, clear and climb/descend to your sanctuary altitude. Hold at the area center point in a continuous right 360° turn at 150 KCAS and 30° of bank monitoring drift. Flight members will rejoin on the inside of the turn no closer than 300’. If no rejoin has occurred by Joker fuel, recover IAW FWOP lost comm. procedures.
8. Sanctuary altitudes are #1 (Base altitude): 7500 MSL, #2: base  $\pm$  500’. These apply to the position you are currently flying. Avoid crossing the base altitude. #1 will audible a new base altitude if weather prevents using 7500’.
9. Physiological – aircraft with the problem will Lead back.

10. SARCAP – Reference FWOP for further guidance.
  - a. The on-scene commander will be the Flight Lead followed by #2.
  - b. Do not underfly chutes, follow a chute through weather, overfly Bingo, or pass any names over the radio.
  - c. Get a GPS mark point or NAVAID cut.
  - d. Squawk Emergency; make a Guard call, then call the controlling agency and the FDO; pass the coordinates.
  - e. Fly at max endurance and coordinate for a replacement.
  - f. If contact is made on guard with the downed pilot(s), direct a switch to 282.8.

### **E115. SPECIAL SUBJECTS/PILOT COORDINATION**

1. Transfer of aircraft control (with/without intercom) IAW FWOP. Both pilots must know at all times who has control of the aircraft. Transfer of aircraft control will be made with the statement “You have the aircraft.” The pilot receiving control of the aircraft will acknowledge “I have the aircraft.” Once assuming control of the aircraft, the pilot will maintain control until relinquishing it as stated above. If ICS has failed, pilots will transfer aircraft control by shaking the stick. Pass control by pushing rudder pedals. Shake to take, push to pass.
2. The AC may take control of only the radios by stating “I have the radios, you are still flying.” The pilot flying will continue to fly.
3. Call out all traffic that is a potential conflict for the flight. All calls for traffic/ground obstructions will be directive then descriptive using the bearing (clock position), range, altitude (BRA) format. If time does not allow communication, take the aircraft and maneuver it as required.
4. Midair Collision Avoidance/Flight Path Deconfliction – Wingmen own deconfliction until they call blind or normal formation maneuvering places them in a blind situation where Lead assumes the deconfliction responsibility. If unable to maintain assigned formation position, inform Lead. For possible flight path conflicts, state your aircraft’s intentions. By default, nose high, goes high and for high aspect passes, alter course to the right without crossing flight paths.
5. Lost sight:
  - a. If #1 is blind, he/she will initially use the term “posit.” For example, “TALON 2, posit.” #2 will then talk #1’s eyes on. A wing flash can be used if required.
  - b. If #2 is blind, he/she will use the term “blind.” For example, “TALON 2, blind.” If #1 is visual he will talk #2’s eyes on to him using a wing flash as required.

- c. If both aircraft are blind, #1 will ensure a minimum 500' altitude deconfliction and attempt to rejoin the flight through georefs, radial/DME cuts, and finally controller assistance. Both aircraft are responsible for maintaining area orientation until rejoined. If not visual by Joker, #1 will coordinate for separate recoveries.

#### **E116. DEBRIEF**

1. Prior to starting the debrief, fill out return NAVFLIRS to MX. Write up any MAFs for the aircraft. Fill out safety paperwork for all EPs and unsafe situations, etc. as appropriate.
2. Debriefs will start as soon as possible after landing at the time set by the Flight Lead and will be attended by all flight members. Flight members will not eat during debrief without Flight Lead permission. Drinks are acceptable.
3. Students will ensure they have sticks, working pens, the mission objectives displayed for the debrief, leaving room for flight reconstruction.
4. Ensure debrief area is clean, boards erased, and computers logged off when the debrief is over.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **APPENDIX F STAND-UP EMERGENCY PROCEDURES GUIDE**

### **F100. INTRODUCTION**

This section will help you get up to speed before going to Air Force follow-on training. The whole idea, of course, is to give the student exposure to the most realistic scenario possible, not merely asking what the critical action procedures are. Knowing the procedures verbatim does not imply an ability to apply them in a critical situation or effectively reason out a safe approach to an EP with other factors such as weather.

All situational EPs start when you notice something amiss with the aircraft or notice a caution light. This is the moment that the student is given the aircraft to solve the EP. This usually happens in the flight brief before flying, but can also be given in the debrief or during a routine/checkride ground evaluation. In Air force JSUPT, the student will get this situational EP during the morning mass brief before the flying schedule starts (at a minimum) and it will start after the USEM\* gives a scenario and then calls on a student to solve the EP. The student then stands up in front of all his peers and IPs and solves the EP. He remains standing until the EP has been brought to a successful conclusion or is “sat down” by the USEM for failing to come up with a viable solution. It is then handed to another student to “stand-up” and start from where the previous student left off. The new student has the chance to correct or change anything the previous student had done, and then continue from that point until final solution, generally defined as the point you have exited the aircraft and are on the ground (to include by parachute!).

These are a few common traits that all EPs have: you have got to come up with a solution, execute it, and hopefully walk away to fly another day. To help us accomplish this, the NATOPS (or “DASH-1” in the Air Force) manual gives us a format to logically bring an EP to a conclusion. This format is located on the first page of section 5, the EP section of the T-34C NATOPS, and is as follows:

1. **Aircraft Control – Maintain**
2. **Precise Nature of the problem – Determine**
3. **Applicable Emergency procedures – Execute**
4. **Appropriate Landing Criteria – Determine and Execute**

\*USEM: Unit Stan/Eval Manager, the one who gives you the EP

The Air Force version is similar:

1. **Maintain aircraft control**
2. **Analyze the situation**
3. **Take appropriate action**
4. **Land as soon as conditions permit**

You can see this is a common framework for solving all situational EPs. We will call this the “Mantra” of EPs. When called on to solve an EP, this should be the first thing out of the student’s mouth, so the student must memorize it. After you spit it out, you must then apply it.

### **F101. HOW TO HANDLE A “STAND-UP” EP SCENARIO**

Do not begin an emergency situation until you are absolutely sure you know the entire set up. If there is anything that you are unsure of – ask. Some things that you might think about asking are the weather conditions (nearest VFR), whether you are solo, the runway that day, what attitude your aircraft is in, or what the alternate is if the weather requires it. Only after you have a handle on the setup should you say, “Roger, I have the controls.” (“Aircraft” in the Air Force)

### **F102. MAINTAIN AIRCRAFT CONTROL**

This is the most important step in handling any situation. Be specific. Think about what attitude your aircraft is in and make appropriate control inputs to correct to wings level. Sometimes maintaining aircraft control may mean just continuing the current attitude until the EP is analyzed. Do not get too far ahead of the aircraft, only talk about how you are going to maintain aircraft control in the next 6-9 seconds.

### **F103. ANALYZE THE SITUATION AND TAKE PROPER ACTION**

At this point, the airplane stops in space and you can take your time to completely analyze the problem. Use your combined knowledge of systems, emergency procedures, and the Master Caution/Warning system to help you analyze the situation.

1. To analyze the situation:
  - a. Check your engine instruments
  - b. Punch off the Master Caution light.
  - c. Check the Master Caution Warning panel. Do not base your decisions solely on what the panel says.
  - d. Refer back to the engine instruments and confirm what the panel is telling you.

- e. Use your senses (sight, feel, sound, smell) and Wingman to analyze everything else inside and outside the cockpit.
  - f. Determine what the problem is.
2. Take proper action:
    - a. Accomplish any critical action procedures, called **BOLDFACE** in the Air Force, by first stating the **BOLDFACE**, then describe how you are going to apply the **BOLDFACE** procedures to the situation, and finally open the checklist to the proper page. Accomplish any non-critical action by first referring to the proper page in your checklist.
    - b. Finish all the checklist items. Use the guide at the end of your checklist to see what other checklists apply. Finally, do not forget to look through the “blue brains” (in-flight guide) to see if anything applies.
    - c. Do not forget your normal checks.

#### **F104. LAND AS SOON AS CONDITIONS PERMIT**

It is important to note that “as soon as conditions permit” does not mean immediately. Some situations will require you to return straight back to land. Realize that checklists can be run on the way back to the field. Do not continue to fly away from a suitable field or maintain your area as you work the problem. An overall plan can and should be stated early on in the EP while checklists are being referenced.

1. Get headed towards an appropriate landing site.
2. Decide which runway to land on.
3. Call the FDO (Supervisor of Flying (SOF) in the Air force). Notice where this step is. When the EP is under control and you have accomplished all your checklists, call him up and tell him what your indications were, what you did, and what your game plan is.
4. Land. The EP is not finished until you take the situation to a logical conclusion.

#### **F105. ONCE ON THE GROUND**

The EP is not over until the aircraft is shut down. You should think about the following when finally on the ground:

1. Did you declare an emergency? If you opened up the EP Checklist pages to handle the problem, you probably should have. If you did declare an emergency, remember that the fire chief is the only one that can terminate the emergency. Decide whether you can clear the runway or need to stop straight ahead. Relay this to the fire chief through the tower.

2. Is it critical to get out right away? If the A/C is on fire, if you have a fuel leak, etc., you should consider emergency ground egress. However, do not complicate a benign situation by rushing out of the aircraft for something like a gear malfunction.
3. Rule of thumb to decide whether you can clear the runway:
  - a. Good engine.
  - b. Good brakes/tires.
  - c. Gear handle down (no red light indications).
  - d. Three good gear indications (down and locked).

If you can answer yes to all of the above and do not have a situation requiring an emergency ground egress, you may taxi clear.

So there you have it in a nutshell. While it is not “fun” to do stand-ups, they are an integral part of preparing to handle an emergency while airborne. Attached is a memory guide you can use here at Whiting while doing a “stand-up” in the USAF formation program. Good luck!

#### **F106. STAND-UP EP CHECKLIST**

##### **Scenario/Initial Conditions:**

#1 Callsign/Tail #:                      #2 Callsign/Tail #:  
Area WX:  
Homefield WX:  
Altn:  
Altn WX:  
NAVAID/Radial/DME:  
Heading/Altitude/Attitude:  
Location of Wingman:

**“Sir, I’m going to maintain aircraft control, analyze the situation, take the appropriate action, and land as soon as conditions permit.”**

##### **Stop and Clean Up Any Missing Information Not Provided By The Instructor:**

- Where am I exactly?
- What is the aircraft’s attitude?
- Where are the nearest VFR conditions?
- Where is the nearest VFR airfield?
- What is the active runway there?
- Etc.

**Maintain Aircraft Control**

- “Knock-it-Off” or “terminate.”
- Be specific, what control inputs are necessary to roll wings level w/flying airspeed.
- Request the Lead if applicable; give transponder to Wing.

**Analyze the situation**

- In general use all your sense: Eyes (external and internal; Wingman visual check), Ears (sounds), Smell (odors), Feel (vibrations; unusual control inputs required).
- Check Instruments.

Engine Instruments: N1                      ITT                      Prop                      Torque  
    Oil Temp/Press                      Volt/Amp                      Fuel Qty  
    Fuel Flow  
    Any off flags?    ALT    RMI  
    Circuit breakers popped?

- Punch off the master caution
- Check annunciator panel. Do not base decisions solely on the panel
- Test lights if bulb failure is suspected
- Refer back to the instruments and confirm the panel
- FEVER check? (Fluctuating fuel flow, high EGT, Visual indications, Erratic engine, Roughness/vibrations)
- Use eyes, ears, nose, feeling; what is the aircraft telling you? What does the Wingman see?
- Identify the proper checklists

**Take the appropriate action**

- State the Boldface, then APPLY EACH STEP, then open up to the checklists.
- Do all non-critical items, and REFER TO CHECKLIST.
- Have Wing read you the checklists.
- Check engine instruments/caution lights/off flags/fire lights/circuit breakers.  
   Any off flags?    ALT    RMI    Circuit Breakers    N1    ITT    Prop    Oil    Torque    Fuel Flow  
   Volt/Amp    Fuel L+R
- Do not forget normal checks (Landing Checklist, NMAILMAN, etc.)

**Land as soon as conditions permit**

- Come up with a “game plan” (Where do you want to go; how will you get there? Nearest field? Instrument approach? Lead or Wing there? What are you going to do once you get there? Basically a “Big Picture” of what you intend to do then run it by Wing for a “common sense” check.

**Game Plan:**

Where do you want to go?  
   Nearest  
 Can you go there (WX)?  
   IAP?

How are you going to get there?

Lead? WX?

Wing Leads through WX

What are you going to do once you get there?

Crash trucks on runway

EP A/C land first; Wing fly low app

- Get headed toward field you will land at.
- Declare EMERGENCY?
- Request a block of altitude for maneuvering
- Request a single frequency approach (try to use single freq. approach w/any EP)
- Decide what runway to land on
- Inform the SOF (after all checklist are complete and the situation is under control). Get another "common sense" check from the SOF/FDO once the situation is under control and your game plan is formed.
- Pass/request Lead if appropriate
  - Pass Lead if descending through weather if electrical problem
- Do not forget normal checklists!
- Land

### **On the Ground**

- Did I declare an emergency (if so only the fire chief can terminate it)?
- Is it critical to get out right away (emergency egress)?
  - Has the jet had any kind of fire?
  - Is there a fire danger (fuel leak/hydraulic leak)?
- Should I clear the runway?
  - Good engine
  - Good gear downlocks/tires

## **APPENDIX G**

### **INSTRUCTIONS FOR PREPARING LOW-LEVEL MAPS**

Attached you will find three simulated VR routes which are similar to the types of military training routes you will fly in the T-38C. You will be expected to prepare a jet log (plan for 180 knots ground speed) and a map for the sortie. Follow FTI guidance and the instructions below.

1. Determine the route you want to fly based on weather or food preference (Tallahassee and Tuscaloosa have good barbeque, New Orleans has good food at Hammond).
2. Get the appropriate sectional charts from the mission planning room or the NATOPS office.
3. Plot, in pencil, the corridor point (A, B, C, etc) using the latitude and longitude coordinates provided. These are not your turn points; they only define the corridor of the low level
4. Draw the route corridor using the route width with a dark marker. Once the route is drawn on the map, you can label the corridor points (A, B, C, etc) outside of the actual corridor (see example).
5. Select turn points within the route corridor. The first point should be visually significant so that you can start your timing. The last point should be the target you want to destroy. The point prior to the target will be the initial point or IP. Turn points are labeled with a circle, the IP is labeled with a square, and the target is labeled with a triangle (see example).
6. Connect the turn points with a line.
7. Prepare a jet log for the route based on 180 knots of ground speed. You can use estimated winds from the weather shop to calculate your indicated airspeeds.
8. Your route will be based on total time. In other words, if your route takes 1+10 (or 1 hour and 10 minutes), you should arrive at your target 1 hour and 10 minutes after hitting the first point. Put total timing tick marks on the map every 1 minute starting from the first point (see example).
9. Compute the continuation fuel; the minimum fuel required at each point to continue the low level and arrive at your destination with the appropriate reserves (100 lbs per tank or 200 lbs total).
10. Add dog houses to the route with heading, indicated airspeed, leg time, and continuation fuel.
11. Determine the route abort altitude (RAA) based on the highest obstacle or terrain within 5 NM of your route of flight. Write the RAA on the chart and put a red square around the highest obstacle/terrain that the RAA is based on. Also, circle in red any other obstacles along your route of flight that may be a factor.

12. Determine a Bingo fuel to an appropriate divert field and write it on the map and line up card. Your Joker fuel is the continuation fuel.
13. Make copies of your map and jet log for all members of the formation (black and white copies are acceptable for the IPs).
14. Arrive at the brief with copies of the map, line up cards, NOTAMS, Weather, and a fuel packet.

**VR-3434 (New Orleans)**

**ORIGINATING ACTIVITY:** VT-3, NAS Whiting Field Pensacola, FL, DSN 868-7688, C850-623-7688

**SCHEDULING ACTIVITY:** Same as Originating Activity

**HOURS OF OPERATION:** Continuous During Daylight Hours Only

**ROUTE DESCRIPTION:**

<b>Altitude Data</b>	<b>PT</b>	<b>Fac/Rad/Dist</b>	<b>Lat/Long</b>
10 AGL B 20 AGL	A	BFM 055/44	N31° 00' 00.00" W87° 20'00.00"
10 AGL B 20 AGL	B	BFM 045/20	N30° 50; 00.00" W87° 45; 00.00"
10 AGL B 20 AGL	C	GCV 075/8	N31° 08' 00.00" W88° 40' 00.00"
10 AGL B 20 AGL	D	SJI 270/13	N30° 45' 00.00" W88° 35' 00.00"
10 AGL B 20 AGL	E	GPT 005/25	N30° 48' 00.00" W89° 00' 00.00"
10 AGL B 20 AGL	F	MCB 135/19	N31° 05' 00.00" W90° 00' 00.00"
10 AGL B 20 AGL	G	RQR 005/40	N30° 43' 00.00" W90° 30' 00.00"

**ROUTE WIDTH** – Five NM either side of centerline from A to D; 4 NM either side of centerline from D to E; 5 NM either side of centerline from E to G.

**Special Operating Procedures:**

1. Alternate Entry Points: B
2. Alternate Exit Points: Points E and F
3. Do not fly within 10 NM of KMOB
4. Do not fly within 15 NM of GPT
5. Do not fly within 15 NM of KMSY

**FSSs within 100 NM Radius:**

Greenwood and Anniston

**VR-6934 (Tuscaloosa)**

**ORIGINATING ACTIVITY:** VT-3, NAS Whiting Field Pensacola FL, DSN 868-7688, C850-623-7688

**SCHEDULING ACTIVITY:** Same as Originating Activity

**HOURS OF OPERATION:** Continuous During Daylight Hours Only

**ROUTE DESCRIPTION:**

<b>Altitude Data</b>	<b>PT</b>	<b>Fac/Rad/Dist</b>	<b>Lat/Long</b>
10 AGL B 20 AGL	A	MVC 155/14	N31° 15' 00.00" W87° 15' 00.00"
10 AGL B 20 AGL	B	MVC 040/19	N31° 42' 00.00" W87° 08' 00.00"
10 AGL B 20 AGL	C	MGM 230/22	N32° 00' 00.00" W86° 40' 00.00"
10 AGL B 20 AGL	D	MGM 315/38	N32° 40' 00.00" W86° 50' 00.00"
10 AGL B 20 AGL	E	TCL 105/33	N33° 05' 00.00" W86° 55' 00.00"
10 AGL B 20 AGL	F	TCL 035/24	N33° 35' 00.00" W87° 15' 00.00"

**ROUTE WIDTH** – 4 NM either side of centerline from A to B; 5 NM either side of centerline from B to C; 4 NM either side of centerline from C to D; 5 NM either side of centerline from D to F.

**Special Operating Procedures:**

1. Alternate Entry Points: None
2. Alternate Exit Points: Points C and D
3. Do not fly within 10 NM of TLH
4. Do not fly within 5 SM of KTCL
5. Do not fly within 10 NM of KBHM

**FSSs within 100 NM Radius**

Anniston, Andalusia

**VR-6969 (Tallahassee)**

**ORIGINATING ACTIVITY:** VT-3, NAS Whiting Field Pensacola FL, DSN 868-7688, C850-623-7688

**SCHEDULING ACTIVITY:** Same as Originating Activity

**HOURS OF OPERATION:** Continuous During Daylight Hours Only

**ROUTE DESCRIPTION:**

<b>Altitude Data</b>	<b>PT</b>	<b>Fac/Rad/Dist</b>	<b>Lat/Long</b>
10 AGL B 20 AGL	A	UIA 140/32	N30° 55' 00.00" W86° 00' 00.00"
10 AGL B 20 AGL	B	MAI 340/19	N31° 05' 00.00" W85° 15' 00.00"
10 AGL B 20 AGL	C	MAI 100/15	N30° 45' 00.00" W84° 50' 00.00"
10 AGL B 20 AGL	D	GEF 300/13	N30° 40' 00.00" W84° 00' 00.00"
10 AGL B 20 AGL	E	GEF 205/26	N30° 10' 00.00" W84° 00' 00.00"

**ROUTE WIDTH** – 5 NM either side of centerline from A to C; 4 NM either side of centerline from C to D; 5 NM either side of centerline from D to E.

**Special Operating Procedures:**

1. Alternate Entry Points: None
2. Alternate Exit Points: Points C and D
3. Do not fly within 10 NM of TLH

**FSSs within 100 NM Radius:**

Gainesville, Anniston, Andalusia

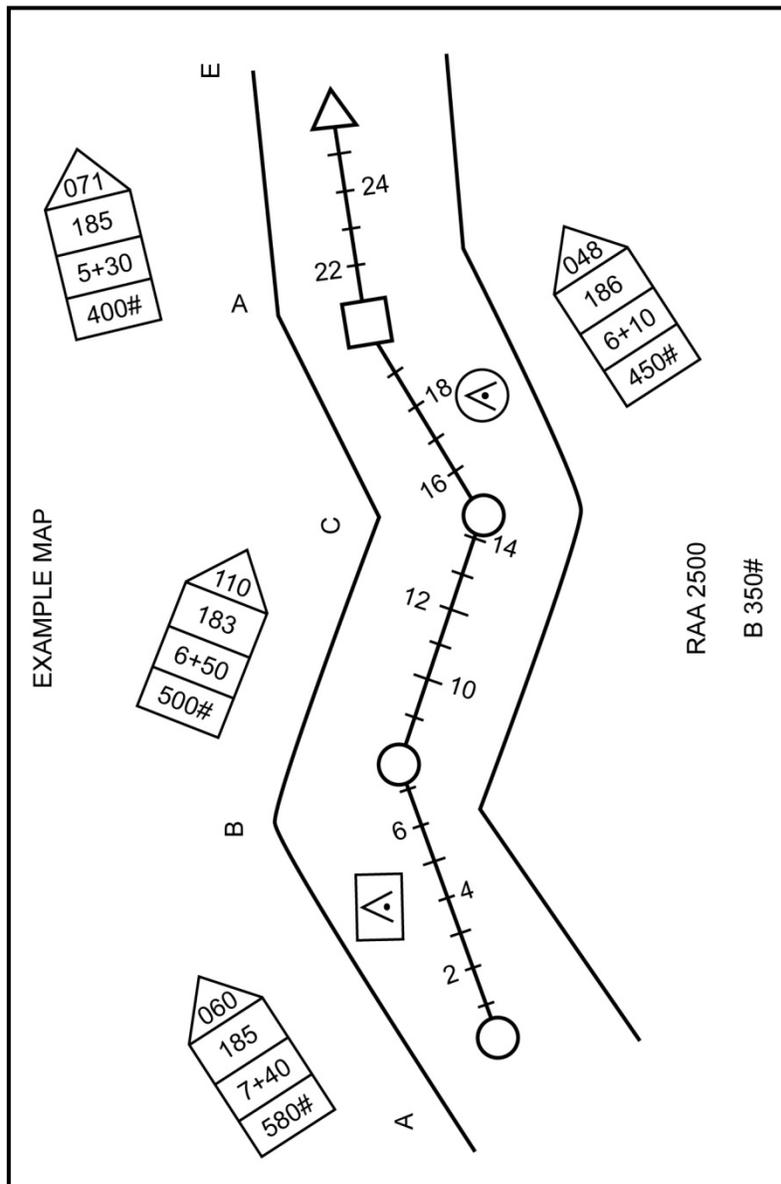


Figure G-1 Example Map

**THIS PAGE INTENTIONALLY LEFT BLANK**

## **APPENDIX H ADDITIONAL INFORMATION**

Area work in the MOA is the "meat" of the mission. The flow of your flights will always be the same: takeoff, fly a DP to the MOA, execute the mission, and RTB either to an instrument approach, or to initial. The work in the area is the crux of the mission; everything else is just "going and coming." Later, in your operational unit, "Admin" will be understood – only rookies make mistakes in Admin! Area work in T-38C FORM is intended to expand your formation flying to higher levels of performance. T-38C FORM in the MOA is going to tie in all that you have learned up to this point both in Primary PA, Primary Form, and Cruise Form...and then some. The flow for our T-38C FORM sorties is usually the same:

1. Fly DP to the MOA (or to a USAF airfield for pattern work)
  - a. Enter the MOA at the top of the block, 9500 feet MSL (weather permitting).
    - i. Entering MOA, have the flight FENCE in and accomplish an Ops check.
    - ii. Accomplish two G-awareness turns with two rejoins (turning or straight ahead).
  - b. Enter the pattern either from a formation instrument approach, VFR straight-in or to an outside DW, or initial.
    - i. Execute formation approaches, landings, and USAF pattern
    - ii. Depart to MOA
  
2. After the two G-turns, Lead will execute the briefed profile. Lead has the prerogative to execute the mission requirements as he sees fit to maintain the area or avoid weather. Here is a recommended profile:
  - a. Two Lost Wingman exercises to Rejoins (turning or straight ahead).
  - b. Echelon Turn
  - c. Wingwork with a breakout at the end, Rejoin.  
  
Four pulls then a crossunder (high to low) on the last pull away. Four turns on the new side.
  - d. Extended Trail; four maneuvers with at least one being one leaf of the Cloverleaf.  
  
Terminate Extended Trail, Rejoin, Lead change.
  
3. Rejoin, Battle Damage Check, RTB for a formation instrument approach and landing at NSE (or out & in airfield).

4. For these flights, the student who leads to the MOA will normally wing back so there is only one planned Lead change in the sortie. The student who takes the Lead will execute the same mission requirements. After the Lead Change, the new Leader will command an Ops check. (Ops checks are performed checking into the area, at Lead changes, and checking out of the area, plus periodically so the Lead has SA on the formation's fuel state.)
5. The responsibilities of each flight member are the same as Primary Form, but it is incumbent on Lead to keep the profile moving and not leave any doubt in Wing's mind what is going on in the formation. As Lead, do not just drone and leave Wing hanging out there for you to command a rejoin of some sort, have the sortie sufficiently planned so that area work "flows". Droning is acceptable if you have to work back to the center of the area to resume the profile, but barring any unforeseen circumstances, all maneuvers should be one right after the other.