

NAVAL AIR TRAINING COMMAND

NAS CORPUS CHRISTI, TEXAS

CNATRA P-870 (Rev. 8-12)



FLIGHT TRAINING INSTRUCTION



INTERMEDIATE SNFO FORMATION T-6A

2012



DEPARTMENT OF THE NAVY

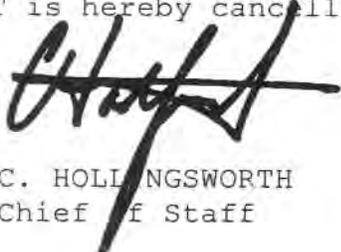
CHIEF OF NAVAL AIR TRAINING
250 LEXINGTON BLVD SUITE 102
CORPUS CHRISTI TX 78419-5041

CNATRA P-870
N712
29 AUG 12

CNATRA P-870 (REV 8-12)

Subj: FLIGHT TRAINING INSTRUCTION, INTERMEDIATE SNFO
FORMATION (T-6A)

1. CNATRA P-870 (Rev. 8-12) PAT, "Intermediate SNFO Formation T-6A" is issued for information, standardization of instruction, and guidance of all flight instructors and student aviators within the Naval Air Training Command.
2. This publication shall be used as an explanatory aid to the Intermediate Multi-Service Naval Flight Officer Training System flight 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 CNATRA P-870 (Rev. 06-07) PAT is hereby cancelled and superseded.


C. HOLLINGSWORTH
Chief of Staff

Distribution:
CNATRA Website

FLIGHT TRAINING INSTRUCTION
FOR
INTERMEDIATE SNFO FORMATION
T-6A
Q-2A-0010



LIST OF EFFECTIVE PAGES

Dates of issue for original and changed pages are:

Original...0...May 05 (this will be the date issued)

Revision...1...30 Jun 07

Change Transmittal...1...21 Dec 07

Revision...2...29 Aug 12

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 92 CONSISTING OF THE FOLLOWING:

Page No.	Change No.	Page No.	Change No.
COVER	0	6-1 – 6-6	0
LETTER	0	7-1 – 7-8	0
iii – ix	0	8-1 – 8-5	0
x (blank)	0	8-6 (blank)	0
1-1 – 1-8	0	9-1 – 9-4	0
2-1 – 2-3	0	A-1 – A-3	0
2-4 (blank)	0	A-4 (blank)	0
3-1 – 3-8	0	B-1 – B-2	0
4-1 – 4-16	0	C-1 – C-3	0
5-1 – 5-12	0	C-4 (blank)	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 practiced on the flightline.

TERMINAL OBJECTIVE

Upon completion of this course, the Student Naval Flight Officer (SNFO) shall be able to direct, with instructor assistance, specified two-plane formation maneuvers in the T-6A aircraft.

ENABLING OBJECTIVES

Coordinate section formation maneuvers, with instructor assistance, recognize relative motion, and make recommendations to correct for deviations within the parameters of this Flight Training Instruction (FTI).

Given an oral examination and aircraft models/training aids, the Student NFO shall be able to describe standard formation maneuvers without error.

INSTRUCTIONAL PROCEDURES

1. This is a flight training course and will be conducted in the aircraft.
2. The student will demonstrate a functional knowledge of the material presented through successful completion of the flight maneuvers.

INSTRUCTIONAL REFERENCES

1. T-6A NATOPS Flight Manual
2. Local Standard Operating Procedures (SOP) Instruction

TABLE OF CONTENTS

LIST OF EFFECTIVE PAGES.....	iv
INTERIM CHANGE SUMMARY.....	v
SAFETY/HAZARD AWARENESS NOTICE.....	vi
TABLE OF CONTENTS.....	vii
TABLE OF FIGURES.....	ix
CHAPTER ONE - INTRODUCTION TO FORMATION.....	1-1
100. INTRODUCTION.....	1-1
101. FORMATION DEFINED.....	1-1
102. RELATIVE MOTION.....	1-1
103. RADIUS OF TURN.....	1-3
104. FLIGHT DISCIPLINE.....	1-3
105. FORMATION COMMUNICATIONS / RADIO FREQUENCY CHANGES.....	1-5
CHAPTER TWO - GROUND PROCEDURES.....	2-1
200. INTRODUCTION.....	2-1
CHAPTER THREE - SECTION DEPARTURES.....	3-1
300. INTRODUCTION.....	3-1
301. SECTION TAKEOFF.....	3-1
302. INTERVAL TAKEOFF.....	3-4
303. RENDEZVOUS.....	3-5
304. CLIMB AND LEVEL-OFF.....	3-6
305. SNFO RESPONSIBILITES.....	3-6
306. OPERATIONS CHECK.....	3-7
307. INDIVIDUAL CLEARANCES.....	3-7
308. MOA ENTRY / FENCE-IN.....	3-8
CHAPTER FOUR - SECTION PARADE.....	4-1
400. INTRODUCTION.....	4-1
401. PARADE POSITION.....	4-1
402. PARADE TURNS.....	4-3
403. CROSSUNDER.....	4-3
404. LOST SIGHT EXERCISE.....	4-5
405. G-WARM.....	4-5
406. 180° BREAKUP AND RENDEZVOUS.....	4-6
407. CRUISE POSITION.....	4-10
408. TAIL-CHASE EXERCISE.....	4-11
409. LEAD CHANGE.....	4-12
410. FUEL AWARENESS.....	4-13
411. FENCE-OUT / REJOIN.....	4-15
412. F5001 PARADE SEQUENCE.....	4-15

CHAPTER FIVE - SECTION TACTICAL FORMATION.....	5-1
500. INTRODUCTION	5-1
501. TAC TURNS	5-4
502. 45° TURNS.....	5-5
503. CHECK TURNS.....	5-8
504. SHACKLE	5-8
505. IN-PLACE TURNS	5-9
506. CROSS TURNS.....	5-11
507. EVENT F5002 TACFORM SEQUENCE.....	5-11
CHAPTER SIX - SECTION RECOVERY	6-1
600. INTRODUCTION	6-1
601. RECOVERY OVERVIEW.....	6-1
602. MOA CHECK-OUT PROCEDURES	6-2
603. THE BREAK	6-3
604. SECTION APPROACHES.....	6-4
605. LANDING	6-6
CHAPTER SEVEN - FORMATION EMERGENCIES.....	7-1
700. INTRODUCTION	7-1
701. ABORTS.....	7-1
702. MID-AIR COLLISION	7-2
703. RADIO FAILURE.....	7-2
704. DOWN AIRCRAFT PROCEDURES	7-2
705. LOST SIGHT.....	7-3
706. BLIND	7-7
707. TERMINATE AND KNOCK-IT-OFF PROCEDURES.....	7-7
CHAPTER EIGHT - FORMATION VISUAL SIGNALS.....	8-1
800. INTRODUCTION	8-1
801. AIRCREW VISUAL SIGNALS.....	8-1
802. AIRCRAFT VISUAL SIGNALS	8-5
CHAPTER NINE - SECTION NAVIGATION PROCEDURES.....	9-1
900. INTRODUCTION	9-1
901. FLIGHT PREPARATION.....	9-1
902. LOW LEVEL ENTRY PROCEDURES	9-2
903. LOW LEVEL FLIGHT OPERATIONS.....	9-3
904. ROUTE EXIT PROCEDURES	9-3
905. ROUTE ABORT.....	9-4
APPENDIX A - GLOSSARY.....	A-1
APPENDIX B - BRIEFING BOARD.....	B-1
APPENDIX C - ACRONYMS	C-1

TABLE OF FIGURES

Figure 1-1	Lateral Movement.....	1-2
Figure 1-2	Vertical Movement.....	1-2
Figure 1-3	Radius of Turn	1-3
Figure 3-1	Runway Positioning for Takeoff.....	3-2
Figure 4-1	Parade Checkpoints	4-1
Figure 4-2	Excessive Stepdown	4-2
Figure 4-3	Insufficient Stepdown	4-2
Figure 4-4	Crossunder Signal.....	4-4
Figure 4-5	Breakup and Rendezvous.....	4-7
Figure 4-6	Kiss Off Signal.....	4-7
Figure 4-7	Rendezvous	4-8
Figure 4-8	Sucked	4-9
Figure 4-9	Acute.....	4-9
Figure 4-10	Cruise Position	4-11
Figure 4-11	Fuel Check Signal	4-14
Figure 5-1	NFO Lookout Responsibilities	5-1
Figure 5-2	Tactical Turns into the Wingman	5-4
Figure 5-3	Tac Turns Away from the Wingman	5-5
Figure 5-4	45° Turn Into the Wingman	5-6
Figure 5-5	45° Turn Away from the Wingman.....	5-7
Figure 5-6	Shackle	5-9
Figure 5-7	In-Place Turn	5-10
Figure 5-8	Cross Turns	5-11

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER ONE INTRODUCTION TO FORMATION

100. INTRODUCTION

For centuries, military strategists have been aware of the tactical value achieved via the concentration of forces. By flying in formation, aviation squadrons not only achieve concentration of force, but also gain the advantage of mutual support and improved command and control. Military aviators of all types are routinely called upon to demonstrate basic formation flying skills.

101. FORMATION DEFINED

A formation consists of two or more aircraft flying in close proximity whose movements are both coordinated and conducted in unison. The smallest formation unit is a section. It consists of two aircraft: a Lead and a Wingman. Increasing in size, the next unit is a division. It consists of two sections. From this point a formation becomes larger by simply adding a section and/or division(s); however, it is important to remember that the basic unit of a formation no matter how large, remains the section. For the purpose of this FTI, all further discussions will deal with sections unless otherwise noted.

102. RELATIVE MOTION

Formation flying is simply a function of controlling relative motion. To maneuver safely in relation to another aircraft, both the direction and rate of motion must be controlled; likewise, to maintain a proper fixed position in relation to another aircraft, the relative motion between the two must be stopped. In a section, the Lead is considered to be fixed and any movement between aircraft is considered as movement of and controlled by the Wingman. In the Contact stage, the horizon was used as the aircraft's attitude reference, while in the Instrument stage, an artificial horizon (attitude gyro) was used; however, when flying formation, Lead's aircraft becomes the primary reference.

Relative motion can occur about any one or a combination of all three axes. Figure 1-1 depicts lateral movement relative to the Lead. Lateral movement can be controlled using power to move fore/aft or by using aileron to move left/right relative to the Lead. Figure 1-2 depicts vertical movement relative to the Lead. Vertical movement is primarily controlled by elevator inputs to climb/descend relative to the Lead.

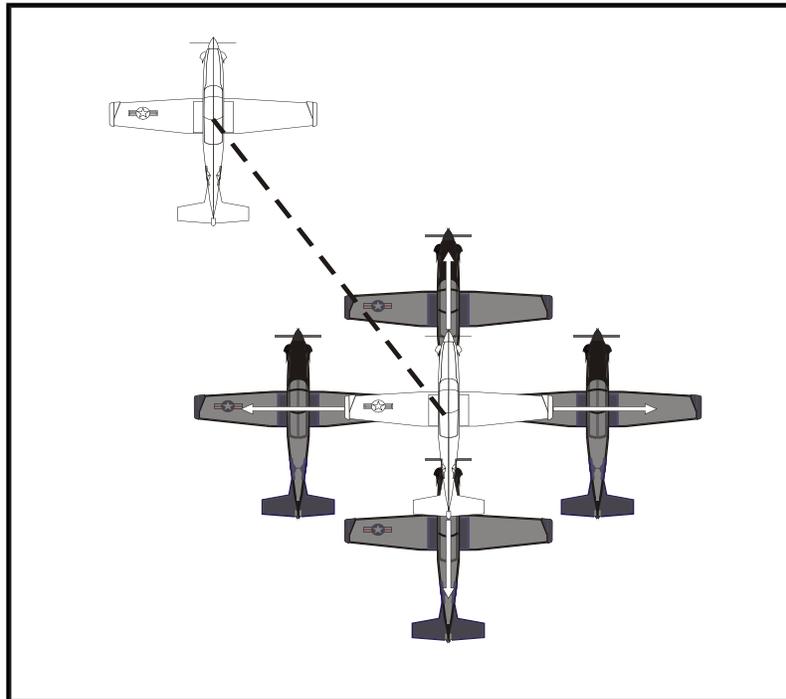


Figure 1-1 Lateral Movement

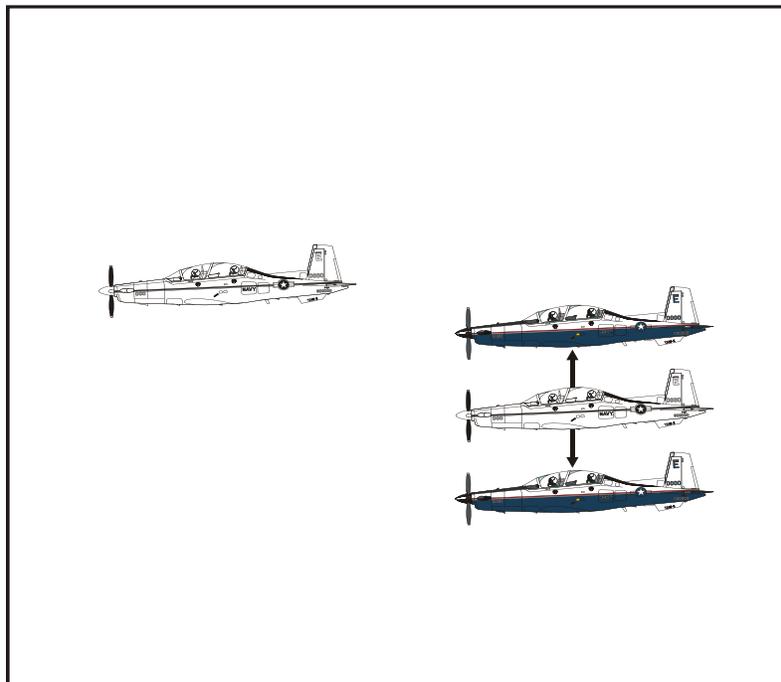


Figure 1-2 Vertical Movement

103. RADIUS OF TURN

It is also necessary to understand the concept of radius of turn and how it relates to controlling relative position during formation flight. As mentioned earlier, the lead aircraft is the positional reference point of the flight; therefore, the Wing needs to anticipate any positional corrections in relation to the Lead's radius of turn. For example, if the Wing is in the parade position and the Lead turns into the Wing, the wing aircraft will require less power to complete the turn because they will have to fly a smaller radius of turn. Vice versa, when Lead turns away from Wing's position, the wing aircraft will require more power because they will be flying a larger turn radius. Radius of turn becomes a major consideration when executing parade turns, during the breakup and rendezvous exercises, and during the tail-chase exercise. Figure 1-3 shows a constant airspeed, level turn of varying Angle of Bank (AOB) (varying G-load).

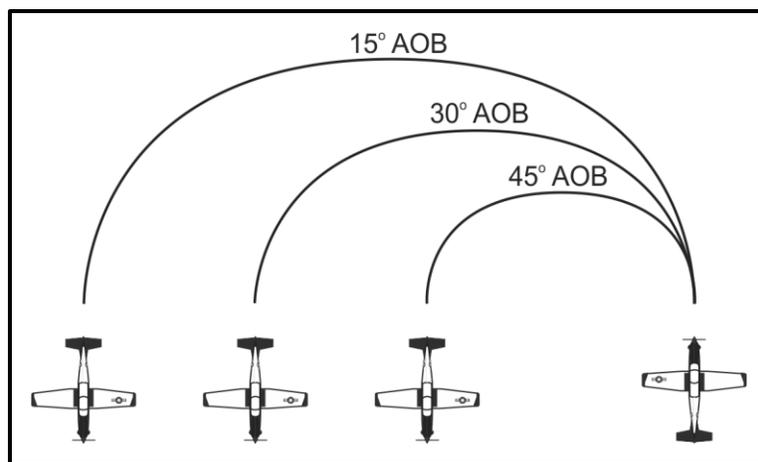


Figure 1-3 Radius of Turn

104. FLIGHT DISCIPLINE

Flight discipline, as applied to formation flying, refers to the conduct of all flight members both as individuals and as part of a team. As a member of a team where individual errors will negatively affect the overall performance of the flight, each member of the flight must do their utmost to ensure the flight functions properly.

1. The Lead. The lead aircraft is primarily responsible for conducting the prescribed sequence of maneuvers in a safe and orderly manner. It is incumbent upon the Lead to:
 - a. Keep the flight clear of other aircraft.
 - b. Keep the flight clear of clouds unless under an Instrument Flight Rules (IFR) clearance.

- c. Keep the flight within the proper operating areas while complying with local course rules and Air Traffic Control (ATC) instructions.
- d. Be predictable. Maintain smooth, precise airwork.
- e. Always be aware of your Wingman's position.

Conducting the flight within the confines of the designated formation area presents problems which must be considered both before and during the flight. Maintaining the flight within a given area requires an understanding of the area boundaries combined with an awareness of how specific maneuvers cause the flight to track over the ground. ***SNFOs should be able to visualize how different combinations of turns can be used to maintain the flight within the area. During flight, the Lead SNFO must not only be aware of the flight's position within the operating area, but also the sequence of maneuvers in order to determine a correct rollout heading to properly set up for the next maneuver.*** Additional factors to take into account are wind direction, which will affect the track of the flight, and the position of the sun, which can preclude the Wingman from seeing the lead aircraft.

NOTE

The Lead should conduct all maneuvers that minimize the Wingman's need to look into the sun.

2. The Wingman. The wing aircraft is primarily responsible for maintaining flight integrity. It is incumbent upon the Wing to:
 - a. Keep the Lead in sight and maintain proper position with respect to the Lead at all times.
 - b. Comply with all signals given by the Lead and, when required, be prepared to give a timely response.
 - c. Back up the Lead (e.g., navigation, transponder, Situational Awareness (SA), etc.).
 - d. Be prepared to assume the lead at all times.
3. Crew Coordination. In any discussion dealing with flight discipline, it is essential to address Lead/Wing student responsibilities during the various phases of flight. To avoid unnecessary duplication of effort and optimize crew efficiency while accomplishing the tasks listed in Sections 104(1) and 104(2) above, follow a few general guidelines. The lead instructor's primary focus is cockpit scan and visual lookout; thus, the lead student's greatest contribution to good Crew Resource Management (CRM) may be monitoring the Wing's status/position. The Wing's pilot will have an excellent awareness of Lead's relative position. This awareness will likely occur at the expense of cockpit scan; therefore, the Wing's student might assist with the scan. Just as in instrument flying, one's scan should never fixate on any single item. Keep your scan moving, but use CRM to prioritize your areas of focus. To further

illustrate this point, let's examine what might occur during a section takeoff. During takeoff roll the lead instructor will be concentrating on providing a smooth predictable platform for the Wingman to reference; meanwhile, lead's student will have the best perspective with respect to the Wingman's position/status. The wing instructor will be concentrating their efforts on the Lead in order to achieve and maintain the proper takeoff position. The wing student should back up the instructor by monitoring engine instruments and calling out the appropriate airspeeds.

4. The Flight Leader. Sections/divisions shall be under the command of a flight Lead; although the flight Lead may not be the actual formation Lead, the flight Lead has total responsibility for all matters pertaining to the safe and orderly conduct of their flight.

105. FORMATION COMMUNICATIONS / RADIO FREQUENCY CHANGES

The flight will use two call signs. One is the official callsign. This callsign is depicted on the flight schedule (i.e., KATT 621) and is used to communicate with outside agencies (i.e., ATC, Base, etc.). The other is a tactical callsign, which is selected by the flight and is used solely for intra-flight communications. Students are encouraged to have a two-number tactical callsign selected for the flight prior to the brief (i.e., Lead = RAIDER 11, Wing = RAIDER 12).

Standard terminology will include referring to the Ultra High Frequency (UHF) radio as "PRI" (primary) and the Very High Frequency (VHF) radio as "AUX" (auxiliary). Students will select a PRI tactical frequency and an AUX tactical frequency along with suitable back-ups for each. They will also deconflict these frequencies with any other formation flights scheduled to fly at the same time. As a technique, it is recommended that AUX be used for flight tactical frequency whenever possible.

NOTE

In the event of a lead change, each aircraft will keep its original tactical callsign number. For example, after the parade sequence, there is a lead change and RAIDER 12 is now Lead while RAIDER 11 is now Wing. Any subsequent communications should reflect this change. It is recommended that another lead change takes place after the 2nd parade sequence (event F5001) and the 2nd uncalled TacForm sequence (event F5002) and before checking out of the area. This ensures RAIDER 11 (in our example) leads the departure and the recovery phases of flight, taking ownership of the admin portions of the flight.

Flight flexibility and integrity dictate that flight members accomplish necessary frequency changes, simultaneously. The flight will always switch frequencies when directed by either ATC or the flight Lead (called a positive push). When pre-briefed, frequency changes at specific points in the flight can be accomplished automatically. The method used for check-in on the new frequency is determined by the type of frequency to which the flight is switching:

1. Switching to an ATC frequency:

The flight will receive clearance to switch frequencies from ATC. The Lead SNFO will respond normally, reading back the new frequency to ATC. Both aircraft in the flight will then switch to the new frequency. After a brief pause to allow the Wingman to make the switch, the Lead SNFO will check-in normally with ATC as “KATT 6XX, flight of two” while simultaneously looking back at the Wing SNFO. When the Wing SNFO sees the Lead SNFO look back, the Wing SNFO will pass a thumbs-up signifying that Wing heard the Lead SNFO’s transmission and both aircraft are on the same frequency. Upon initial checking-in with a new controlling agency, Lead will always use the flight’s official callsign followed by “flight of two.” This phrase enhances the new controller’s SA. Subsequent calls made by Lead to the same controller do not need to include the phrase “flight of two” *unless* Lead suspects that the controller has forgotten that the flight is a formation. The following example involves a standard frequency change:

Pensacola Approach: “KATT 621, switch Tower, button 4.”

Lead SNFO: “KATT 621, switch Tower, button 4.”

Once established on button 4:

Lead SNFO (while looking back at the Wing): “Sherman Tower, KATT 621, flight of two, approaching Pickens Gate for the break.”

Wing SNFO: (Signal thumbs-up when Lead’s transmission is heard on button 4)

Sherman Tower: “KATT 621, Sherman Tower, roger. Report the numbers Runway 25L.”

Ultimately it is the Wing’s responsibility to follow along with the Lead; therefore, in the case that a thumbs-up signal is either not seen or not given, Lead will continue on normally and Wing will administratively verify the current ATC frequency over tactical frequency *only as necessary*.

2. Switching to a tactical or safety-of-flight frequency (PRI tac, AUX tac, Common Traffic Advisory Frequency [CTAF], area common, etc.):

In the case where the flight is switching to a tactical or safety-of-flight frequency on which there will be no controller response (i.e., button 16 for the GATOR Military Operating Area (MOA) frequency or a CTAF frequency), a *positive check-in is required* by Wing on the new frequency. Lead will either read back the new frequency to ATC (if applicable) or execute a positive push from the current tactical frequency (if necessary), followed by a positive check-in on the safety-of-flight frequency. The following examples highlight these scenarios:

Example 1:

Switching to a non-ATC frequency:

On PRI button 6:

Pensacola Departure: “KATT 621, maintain 11,000. Cleared for 1A Hi/Lo, 2A Hi/Lo, frequency change approved.”

Lead: “KATT 621, maintain 11,000, cleared for 1A Hi/Lo, 2A Hi/Lo, switching.”

Lead gives enough time for both aircraft to switch to PRI button 16.

On AUX tac:

Lead: “RAIDER check PRI.”

On PRI button 16:

Lead: “RAIDER 11.”

Wing: “RAIDER 12.”

Example 2:

Positive push from current tactical frequency:

Lead desires to switch the flight to Monroe County CTAF in AUX.

On PRI tac:

Lead: “RAIDER switch AUX 123.0.”

Wing: “RAIDER 12.”

Lead gives enough time for both aircraft to switch to AUX 123.0.

Lead: “RAIDER check AUX.”

On AUX 123.0:

Lead: “RAIDER 11.”

Wing: “RAIDER 12.”

Lead (at the appropriate time/distance): “Monroe County traffic, KATT 621, flight of two, 15 miles southwest of Monroe County, setting up for a left over-head RWY 3, Monroe County traffic.”

Example 3:

Switching both radios at the same time:

Normally, the flight will only change one frequency at a time, but the need may arise to switch both radios concurrently. In this example, the flight is using PRI for ATC and AUX for tac. ATC then switches the flight to 121.0.

On PRI:

Lead: “KATT 621, switching 121.0.”

At this point, Wing must recognize the need for a new tactical frequency on PRI. Input the new ATC frequency first, then the new tactical frequency. Lead gives adequate time for both aircraft to switch to AUX 121.0 and PRI tac. When able, Lead will check in Wing on PRI tac.

On AUX:

Lead (while looking back at Wing): “Mobile Approach, KATT 621, flight of two, 5,000.”

Wing SNFO: Gives a thumbs-up signifying he heard the transmission and has made both frequency changes.

On PRI (when able):

Lead: “RAIDER, check PRI, RAIDER 11.”

Wing: “RAIDER 12.”

The goal of the above procedures is communication brevity while maintaining control of frequency switches. This will alleviate congestion on busy/populated ATC or safety-of-flight frequencies for other users. ***Significant emphasis will be placed on communication procedures during your formation flights in the T-6A. Examples of proper communications for specific procedures and maneuvers are included throughout this FTL. Good frequency switches should occur effortlessly. Plan and practice flight communications thoroughly while studying for your formation events.***

CHAPTER TWO GROUND PROCEDURES

200. INTRODUCTION

The following ground procedures will be common to all formation flights:

1. Aircraft issue and preflight will be conducted in the same manner as previous syllabus flights; however, students should note the position of their Wingman's aircraft on the flight line. To the maximum extent possible, the aircraft will be spotted next to each other, enabling the aircrew to observe if an aircraft in the flight is having difficulties prior to check-in. Regardless of where the flight is parked, always remain apprised of your playmate's progress.

2. Once the formation aircraft have been located in relation to each other, all checklists will be completed through the Taxi Checklist (holding on Turn and Slip Indicators) along with the plane captain final checks; additionally, both aircraft will copy Automatic Terminal Information Service (ATIS). Only the Lead will contact Clearance Delivery and request/copy the clearance. The flight will then accomplish a check-in on PRI tac and AUX tac as follows. The instructors will check-in on PRI tac, followed by the students on AUX tac, to ensure all radios are loud and clear. At this point, the Lead SNFO will initiate an "Alpha Check" to a pre-briefed waypoint off of the Global Positioning System (GPS), pass the clearance to Wing, and switch the flight to Ground frequency. If Wing is ready to proceed, the Wing SNFO will respond with their tactical callsign and switch immediately to Ground; however, should the Wing require more time before proceeding, he/she will inform the Lead (i.e. "RAIDER 12 needs two minutes"). Once both aircraft are ready to proceed, Lead will push Wing to Ground, then switch to Base and call "taxi outbound" for both aircraft before joining Wing on Ground frequency (no positive check-in required). The following example demonstrates the communications check-in procedures:

On PRI tac (instructors):

Lead: "RAIDER check PRI...RAIDER 11."

Wing: "RAIDER 12."

On AUX tac (students):

Lead: "RAIDER check AUX...RAIDER 11."

Wing: "RAIDER 12."

Lead: "RAIDER, Alpha Check TRADR 266 at 36.9."

Wing: (if within 3 radials and 0.5 Nautical Miles (NM) of Lead) "RAIDER 12, same."

Lead: “RAIDER, cleared to Bay Minette via the NPA-647, 1 DME past the TACAN turn left heading 220, climb and maintain 3,000. Expect 10,000, 10 minutes after departure, departure frequency 270.8, squawk 4252...no questions button 3.”

Wing: “RAIDER 12.” (If Wing is not ready to proceed inform Lead here)

Once both aircraft are ready to proceed, Wing switches to Ground and Lead switches to Base and calls “taxi outbound” for the flight. Wing will monitor Lead and follow in trail for taxi. A positive check-in on Ground is not required since it was pre-briefed.

3. The request for clearance to taxi will be made to Ground control per standard local area operations. All aircraft in the flight will copy clearances and dial in the appropriate transponder code and altimeter setting.

4. While taxiing to the hold-short area, Lead will choose the downwind side of the longest taxiway in use and comply with the taxi instructions. Each subsequent member of the flight will taxi an equal distance but on the opposite side of the centerline from the aircraft directly in front of them for Foreign Object Damage (FOD) considerations. The visual cue for proper taxi position is having the tip of the near elevator aligned over the yellow Canopy Fracturing System (CFS) door; however, under no circumstance should the aircraft be closer than 1 plane length (33 feet). Each aircraft in the flight will automatically switch to Tower frequency when passing the last taxiway prior to the hold-short area. For example, when taxiing to RWY 25L on TWY A at Sherman Field, both aircraft will switch to Tower when passing the TWY A5 intersection. No positive check-in on Tower is required due to this being a standard procedure. The lead aircraft will position themselves in the run-up area leaving sufficient room for the Wingman. At this point, each aircraft will individually complete the Over-Speed Governor and Before Takeoff Checklists plus give their Departure Brief. After completing all the hold-short requirements, Wing will conduct an integrity check on Lead, then pass a “thumbs-up” signal. This signifies that the Wingman is on Tower frequency, has completed all checklists satisfactorily, and that the lead aircraft appears ready for takeoff with the following integrity checks (**EPPPFANN**):

- a. Engine cowlings secure
- b. All Panels secure
- c. Proper extension of struts
- d. Proper tire inflation
- e. Flaps at TO
- f. All Antennas secure
- g. No visible leaks
- h. Navigation and anti-collision lights on

5. The Lead will then call Tower for takeoff for the flight of two.
6. If, while issuing the takeoff clearance, Tower clears the flight to "change to Departure frequency," the flight will switch as directed. No positive check-out from Tower or check-in on Departure is required.
7. The entire flight will comply with Tower's instructions. All aircraft will complete the Lineup Checklist when appropriate. Lead will squawk "altitude" and all other aircraft will squawk "standby."

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER THREE SECTION DEPARTURES

300. INTRODUCTION

The departure phase of flight consists of the following:

1. Takeoff (Section/ Interval/ Individual)
2. Rendezvous/ Join-up
3. Climb and Level-off
4. Operations Checklist
5. Transit to working area

In order to execute a takeoff involving more than one aircraft operating under the same clearance (i.e. a formation takeoff), the flight must have circling minimums for the runway in use or 1000-3 basic Visual Flight Rules (VFR) in the event a circling is not authorized (OPNAV 3710.7U).

301. SECTION TAKEOFF

The section takeoff has many practical advantages in tactical aviation. The section takeoff is frequently employed by sections of aircraft in order to expedite departures; additionally, it eliminates the need for a rendezvous, which can be particularly advantageous in marginal weather conditions.

1. The Lead will call for and receive clearance for takeoff for the entire flight using the procedures outlined in Chapter 2 and local SOP. Lead should make a mental note of the winds provided by Tower in the takeoff clearance. When cleared, Lead should taxi onto the active runway and position themselves according to the following criteria (Figure 3-1):
 - a. If there is a crosswind, the Lead will position on the downwind side of the active runway. This will allow the wind to blow his prop wash off the runway, resulting in no adverse effects on Wing's takeoff roll.

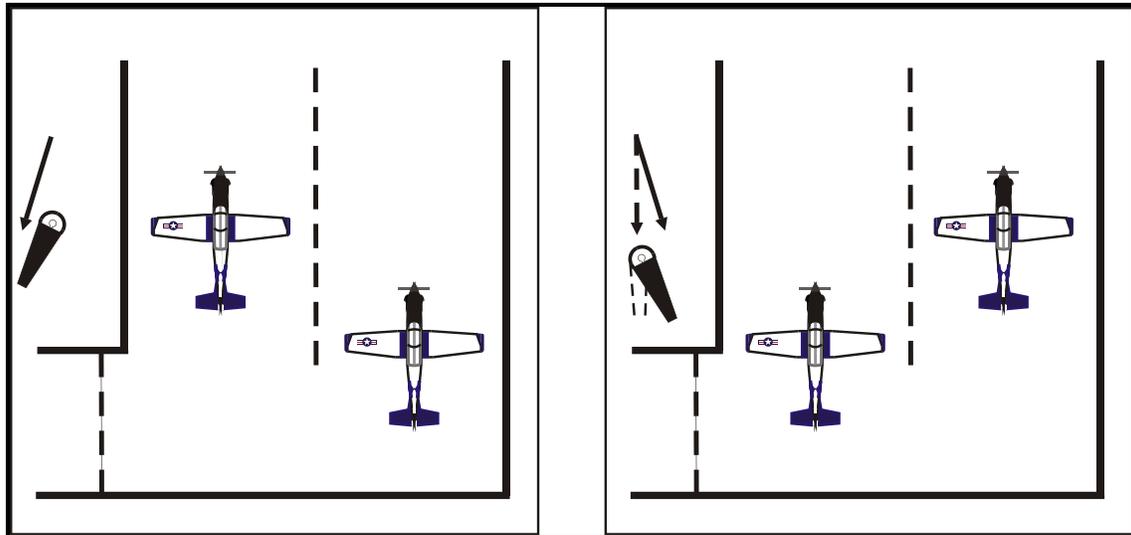


Figure 3-1 Runway Positioning for Takeoff

- b. If the wind is calm or straight down the runway, the Lead will position on the outboard side of the runway.
2. The Wing will follow the Lead and position the aircraft in the center of the remaining half of the runway. The Wing will move forward until the leading edge of their aircraft's wing is in line with the trailing edge of the Lead's horizontal stabilizer. Both aircraft should work expeditiously to complete the lineup checklist, switch to appropriate Departure frequency, and get properly positioned. As soon as Wing is ready for run-up, Wing will pass a thumbs-up signal to the Lead.
3. When positioned on the duty runway, Lead will look for Wing's thumbs-up signal. Upon receipt, Lead will give the run-up signal (2 fingers extended and rotate wrist forward and aft). The lead aircraft will set 30% torque and check his/her aircraft gauges for normal indications. Wing will likewise do the same. When ready for takeoff, Wing will again pass a thumbs-up to Lead.
4. Lead: When the run-up checks are complete and a thumbs-up is received from the Wingman (signifying Wing is ready for takeoff), the lead pilot will raise his/her arm vertically. After a slight pause, the lead pilot will drop their arm smoothly in a karate chop motion. When the lead pilot's arm stops moving (normally when their hand hits the glare shield), Lead will release the brakes and set 90% torque.
5. Wing: At the completion of the lead pilot's karate chop motion, the wing pilot will release his/her brakes. During the takeoff roll, the Wing pilot will maintain runway line-up and proper position utilizing Power Control Lever (PCL) adjustments and minimal differential braking, (brakes being used only until rudder becomes effective).

3-2 SECTION DEPARTURES

6. During the takeoff roll, the lead SNFO will monitor the Wingman's position and progress while the lead pilot calls the standard takeoff dialogue on the Internal Communication System (ICS). In the Wing aircraft, the SNFO will call the standard takeoff dialogue on ICS while the pilot maintains proper position.
7. Approaching 85 KIAS, the lead pilot will smoothly rotate to the takeoff attitude. The Wingman should attempt to match the Lead's attitude. As both aircraft reach flying speed, they should become airborne at the same time, both having approximately the same attitude, weight, and airspeed.
8. After becoming airborne, the Wingman will continue to maintain proper position on Lead. Reaching a safe altitude, the lead SNFO will survey the Wingman ensuring they are safely climbing away from the ground and are in position to see the gear retraction signal. Passing 110 KIAS, the lead SNFO will report "above 110 knots, Wingman in position" over the ICS. The lead pilot will then give a head nod to raise the landing gear and flaps. At the execution, both pilots will raise their gear and flaps simultaneously. Wing will pass a "thumbs-up" signal to inform Lead that Wing's landing gear and flaps *are* up and locked and that Lead's gear and flaps *appear to be* up and locked. The lead SNFO will then notify the lead pilot on ICS the flight is clean by saying "Flight's clean at ____ knots." Throughout this phase both students will continue to monitor position and instruments, paying particular attention to airspeed.

Steps for the Section Takeoff are:

- a. Lead receives clearance for takeoff and the flight switches to Departure.
- b. While taxiing onto the runway both aircraft run through their Line-up checklists.
- c. Wingman lines up utilizing visual cues off Lead and gives a thumbs-up when on Departure frequency, in position and ready for run-up.
- d. Lead gives the run-up signal, sets 30% torque, checks engine instruments and then monitors the Wingman for a thumbs-up.
- e. Wing sets 30% torque, checks engine instruments and gives Lead a thumbs-up when ready for takeoff.
- f. The Lead pilot will give the section go "karate chop" signal and set power to 90%.
- g. Once airborne with Wing in position and above 110 KIAS, the lead SNFO will report "Above 110 knots, Wingman in position" over ICS. The lead pilot will then give the raise gear and flaps "head nod" and both aircraft will raise the gear and flaps simultaneously.
- h. When Wing's gear and flaps are up they will give a "thumbs-up" to Lead and the lead SNFO will announce "Flight's clean at ____ knots" over the ICS.

- i. Based on weather, the Lead may then send Wing to cruise.

The following conditions must be met in order to accomplish a Section Takeoff vice an Interval Takeoff:

- a. The maximum crosswind component is 10 knots for a dry runway and 5 knots for a wet runway.
- b. No standing water on the runway.
- c. Minimum runway width is 150 ft.

302. INTERVAL TAKEOFF

The other type of formation takeoff is the Interval Takeoff, which is commonly known as the “10-second go.” The Interval Takeoff is a rendezvous where all aircraft in a flight takeoff in order and accomplish their join-up while the Lead is departing. Each aircraft must comply with prescribed course rules and/or departure procedures. If done properly, it is accomplished safely, expeditiously, and with maximum fuel economy.

1. When cleared on to the runway, the flight will position as previously discussed in Section 301, taking wind into account. After receiving takeoff clearance and a thumbs-up from the Wingman, Lead will give the run-up signal. The lead aircraft will set 30% torque and check his/her aircraft gauges for normal indications. Wing will likewise do the same. When ready for takeoff, Wing will again pass a thumbs-up to Lead.
2. Lead: Upon receipt of Wing’s thumbs-up, Lead will give the kiss off signal (see section 801) to Wing and then execute a normal takeoff maintaining the proper half of the runway. When safely airborne, Lead will clean up, reduce power to 90%, and maintain 160 KIAS to facilitate the initial join-up. The Lead will also comply with appropriate departure procedures. Any required turns will be made utilizing 30° AOB or less. If level-off should be necessary prior to rejoin, Lead will maintain 160 KIAS. Lead will contact Departure once Wing has called “RAIDER 12 airborne” on the tactical frequency. If a cloud layer is encountered during the climb that might cause Wing to lose sight, Lead will level off below the cloud layer. Once Wing is aboard and stable in the parade position or the flight path above is clear of clouds, Lead will continue the climb to the assigned altitude.
3. Wing: As Lead kisses off Wing and starts his takeoff roll, Wing will check the clock. After ten seconds have passed, Wing will release brakes and conduct a normal takeoff on the appropriate half of the runway. This delay will result in approximately 1000 ft of separation, thus mitigating the risk of a dual high-speed abort.

WARNING

Wake turbulence or lead aircraft propeller wash may result in severe degradation of trailing aircraft controllability during takeoff.

Once the Wing SNFO has confirmed gear and flaps retracted, he will advise Lead on tactical frequency by stating "RAIDER 12 airborne." Using AOB, Wing will establish himself on the inside of Lead's anticipated radius of turn.

303. RENDEZVOUS

A rendezvous joins a flight together after takeoff. The briefed departure rendezvous can be a CV (circling) rendezvous, a running rendezvous, or based off of a navigational fix, commonly referred to as a TACAN rendezvous. This will be covered in Section 307.

1. CV Rendezvous. The CV Rendezvous is used to join a flight in a turn.

After takeoff, Lead begins a 30° AOB climbing turn at a briefed airspeed. When safely airborne and cleaned up, the wingman executes a turn inside the Lead's radius of turn to intercept the 45° bearing line. Wing must maneuver to place Lead slightly above the horizon, while maintaining rendezvous bearing and control of proper closure rate (section 406). The Wingman should monitor airspeed until close enough to visually discern relative motion. When the Wing is on the bearing line and within three wingspans, he will begin the join-up by increasing step down and maintaining nose-to-tail separation. While controlling the relative motion, Wing slides outside of Lead's turn and up into the parade turn away position (section 402). If performing a level rendezvous, Lead will maintain constant airspeed, altitude, and AOB until the Wingman is in the parade turn away position.

2. Running Rendezvous. The running rendezvous is used to join a flight while proceeding on course. It is normally the initial procedure following an interval takeoff. Lead will climb at a reduced power setting (90%) in order to allow the Wingman to close sufficiently. Once sufficient closing airspeed has been attained, Wing should place Lead on the horizon and exploit any turns made by Lead by converting to a CV rendezvous as required.

The most important aspect in a running rendezvous for the Wingman will be setting the distance abeam the Lead. This distance is critical because visual closure cueing is derived from the Lead's aircraft tracking aft on the Wingman's canopy. If too wide, the Wingman will arrive on bearing line with a large distance to traverse in order to join. If too narrow, the Wingman may not recognize closure early enough when approaching the bearing line; also, closure on any aircraft is most difficult to perceive when approaching from directly behind and could result in a flight hazard due to an excessive closure rate. Approaching 500 ft from Lead, Wing will offset laterally approximately 200 ft (six wingspans). Once this distance is attained, the Wingman should concentrate on flying the aircraft on a straight line that projects forward to a point abeam the Lead. Airspeed should be monitored to keep closure under control until relative motion can be visually discerned. Wing should control airspeed to arrive on bearing line with no more than 10 knots of closure. Once stabilized on bearing line with closure under control, the Wingman will affect the join by traversing toward the Lead into a parade position.

304. CLIMB AND LEVEL-OFF

1. If Instrument Meteorological Conditions (IMC) will not be encountered after the flight is joined up, the Wingman should be given the signal to take the cruise position (hitchhiking motion over each shoulder) while transiting to the working area. If IFR, comply with all ATC departure instructions. If VFR, then things such as remaining in Visual Meteorological Conditions (VMC), airspace restrictions, and traffic avoidance must all be considered when selecting the flight's base heading and altitude. In either case, the Lead will establish a base airspeed of 200 KIAS upon leveling off. This will remain the base airspeed for the flight unless otherwise briefed.

2. If IMC is encountered, Wing should close to and maintain the parade position in order to keep sight of the Lead. Lead should pat Wing aboard prior to entering any clouds. In IMC, the Wing SNFO will continue to clear the airspace and backup the pilot on the instruments, as the pilot's main focus will be on the lead aircraft.

305. SNFO RESPONSIBILITIES

1. Lead SNFO responsibilities:

- a. Monitor Wingman's position.
- b. Monitor the gear retraction signal (below 150 KIAS).
- c. Confirm the Wingman's landing gear and flaps appear up and locked.
- d. Call Departure when both aircraft are safely airborne and in the clean configuration.
- e. Direct and monitor the departure procedures.
- f. Keep Wingman in sight and lead pilot apprised of Wingman's progress during the rendezvous.
- g. Continue clearing the area for the flight.
- h. Call for and accomplish the Climb Checklist when appropriate.

2. Wing SNFO responsibilities:

- a. Monitor aircraft operation and make standard ICS calls on takeoff roll.
- b. Keep Lead in sight.
- c. Monitor internal instruments, as pilot will keep scan primarily on Lead, and anticipate the gear retraction signal (call out airspeed to the wing pilot when this signal is given by Lead).

3-6 SECTION DEPARTURES

- d. Direct the passing of "thumbs-up" to Lead when landing gear and flaps are up.
- e. Back up Lead and monitor departure procedures.
- f. Continue clearing the area for the flight.
- g. Call for and accomplish the Climb Checklist.

306. OPERATIONS CHECK

During the departure phase and after the Lead signals to the Wing to take the cruise position, each aircraft will individually initiate/accomplish their first operations check. Subsequent operations checks should be individually accomplished after each fuel check following a lead change but at least every 20-25 minutes.

307. INDIVIDUAL CLEARANCES

When weather conditions preclude accomplishing a formation takeoff, but the forecast indicates that formation flight is possible above the weather, the flight may brief and coordinate separate takeoff clearances and execute a join-up above the weather in the working area. Lead will check-in to the area, set up a 200 KIAS orbit over either a geographic reference (GEO REF) point or a navigation fix and wait for the Wingman to join up. Before the Wingman switches to area common, he/she will check-in with Lead on the tactical frequency to determine the working area in which Lead is established and the specifications for the rendezvous (i.e. location, altitude, airspeed, and turn direction). Continual coordination with ATC will be required throughout the process of working area assignment. Wing will maintain 500' of stepdown until both Lead and Wing establish visual contact with each other.

A TACAN/ GEO REF/ NAV Point rendezvous is a visual circular rendezvous employed to join a flight above the weather after takeoff or during the mission, if the flight is separated. The rendezvous is normally executed in a left-hand turn tangent to the briefed fix (radial/DME) at a specified airspeed, altitude, and direction (inbound or outbound from the NAVAID). Points around the rendezvous circle are numbered one to four, with point one located at the fix and remaining points located at 90° intervals around the circle.

Upon reaching the rendezvous fix, Lead simultaneously calls his "Call Sign, point one" and commences a 30° AOB turn in the briefed direction. Passing each 90° position, the Lead transmits its position number until the Wingman acquires a visual. The Lead must adjust the rendezvous turn to compensate for wind, ensuring that point one is always at the briefed fix. The Wingman will fly toward point one fix, 500' below the briefed rendezvous altitude and will remain 500' below until the Lead is in sight. The Wingman will transmit his position and initiate a turn in the briefed direction using AOB as necessary. From position reports, the wingman establishes an idea of the lead's relative position, narrowing his visual search for Lead. When the Wingman sees Lead, Wing will call "visual" and fly to the rendezvous bearing line, climb to Lead's altitude and proceed with a standard CV rendezvous. If Lead's aircraft is behind the Wing's wing line when a visual sighting is attained, the Wing should proceed to the center of the circle and maneuver the

aircraft using lead/lag principles. The lead/lag concept should be used to initiate a position from which the bearing line can be attained. If Lead is cross-circle from Wing's position, Wing should maneuver to put his nose just in front of lead's nose and then roll wings level in order to close the distance on Lead. Once Lead has moved approximately 30° beyond wing's nose, Wing will maneuver again to put his nose just in front of Lead's nose to continue closing. Once Wing has closed to a suitable distance, Wing should maneuver to attain fuselage alignment and complete the remainder of the rendezvous on the bearing line.

308. MOA ENTRY / FENCE-IN

In the fleet, "fenced-in" calls are made to ensure that each aircraft in the flight has completed their applicable weapons systems' checks and are ready for combat operation. In the T-6A, both SNFOs will "fence-in" by accomplishing the Pre-stall/Spin/Aerobatic Checklist upon entering the working area. For example, if the flight has been assigned GATOR 1A High and Low / 2A High and Low, Lead will direct the flight to "fence-in" once crossing the boundary into GATOR 1A High and Low / 2A High and Low. The following example illustrates the calls that will be made on tactical frequency when fencing in:

Lead: "RAIDER, fence-in."

Wing: "RAIDER 12."

Both aircraft will then complete the Pre-stall/Spin/Aerobatic Checklist to fence-in.

CHAPTER FOUR SECTION PARADE

400. INTRODUCTION

Parade formation is used in various flight regimes to include initial/overhead patterns, instrument penetrations, demonstrations, and exhibition flights to name a few. Advantages are: it offers the Wingman the best opportunity to maintain visual contact on Lead in poor weather conditions; facilitates good visual communications between aircraft in the flight; is easily and positively controlled by the Lead; and presents a neat military appearance. The disadvantages of parade are a lack of maneuverability and it hinders proper lookout doctrine by the Wingman.

401. PARADE POSITION



Figure 4-1 Parade Checkpoints

The parade position is a fixed position on Lead's 45° bearing line that results in 3 feet of wingtip clearance and 5 feet of stepdown.

1. Visual Reference Points. Parade is maintained through the use of two visual reference points: aligning Lead's prop arc with its inboard pitot tube and placing Lead's UHF antenna over their opposite wing's inboard aileron cutout. Proper stepdown is visually confirmed when a triangle of air forms between the UHF antenna, fuselage, and wing. If too much stepdown exists, there will be a large gap between the fuselage and opposite wing; additionally, the Wing will likely see the bottom portion of the lead aircraft's opposite wing (Figure 4-2).



Figure 4-2 Excessive Stepdown

2. If there is insufficient stepdown, the normal parade checkpoints will not be visible as the lead aircraft's fuselage will cover the opposite wing's reference points (Figure 4-3).

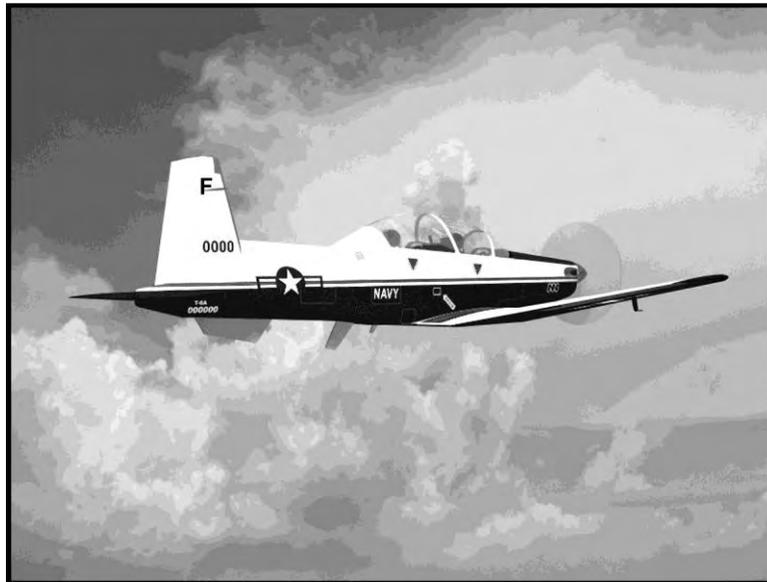


Figure 4-3 Insufficient Stepdown

3. **Maintaining Position.** While in the Parade position, it is Wing's responsibility to maintain proper stepdown and bearing line and to keep any relative motion smooth and slow. Wing accomplishes this through use of AOB and/or power while cross-checking the two visual cues in order to achieve and maintain the precise parade position relative to Lead's aircraft. Wing should ensure that all relative motion between the two aircraft occurs along the 45° bearing line

and not purely forward or horizontal. Due to the close proximity of the two aircraft, the vast majority of the wing pilot's scan is devoted to maintaining position.

4. Safety. While in the Parade position it is Wing's responsibility to:
 - a. Maintain the proper stepdown and bearing line.
 - b. Keep any relative motion smooth and slow.

402. PARADE TURNS

Parade turns are usually performed using 30° AOB, but in no circumstance will the flight exceed 45° AOB. Once the flight is fenced-in on F5001, Lead will take the Wingman through a series of parade turns. The turns will result in a heading change between 90 - 180 degrees. The amount of heading change may be adjusted due to area constraints or environmental factors (e.g., sun angle, clouds, etc.).

Turns away from the Wingman are conducted in two different ways depending whether or not the flight is IMC or VMC. If the flight is IMC, the Wingman rolls about the Lead's longitudinal axis in order to maintain the proper parade visual cues. It should be noted that in this case, the Wingman's aircraft will be slightly higher than the Lead during the turn. In the case of VMC, the Wingman will roll about their own longitudinal axis, thereby remaining co-altitude with the Lead (visually placing Lead's fuselage belly on the horizon).

Parade turns into the Wingman are similar to parade turns away from the Wingman in IMC. The Wingman will match the Lead's rate of roll and AOB to maintain the same parade checkpoints as in straight-and-level flight.

Student Duties:

1. Lead. Prior to commencing a parade turn, the Lead will clear the area and ensure the Wingman is in position. The Lead SNFO will be expected to direct parade turns as well as subsequent rollouts and/or reversals. Remember, flight leadership involves planning ahead with consideration given to any subsequent maneuvers and area boundaries.
2. Wing. The Wingman will maintain flight integrity throughout the parade sequence; additionally, the Wingman will continue to clear the area for the flight, maintain SA on area orientation, and monitor internal cockpit instruments.

403. CROSSUNDER

A formation must be flexible to achieve maximum maneuverability; therefore, the Lead must be able to change the position of the Wingman within the formation. The crossunder is a maneuver where the Wingman moves laterally from a parade position on one side of the Lead to the corresponding parade position on the opposite side of the Lead, while maintaining stepdown and nose-to-tail clearance.

1. The Lead. The Lead student will clear the area and ensure the Wingman is in position. Once again consideration shall be given to keeping the formation clear of obstructions and within the area limits. The Lead will then give the crossunder signal (Figure 4-4), maintaining a steady platform while the Wingman is crossing under.



Figure 4-4 Crossunder Signal

2. The Wingman. The Wingman will reduce power to slide down and back to the extent that they have adequate nose-to-tail separation AND enough step down to see the Lead's exhaust stacks. At this point, the Wing will cross Lead's 6 o'clock position, while increasing power. Once the Wing is safely established on the proper side with the correct wing tip separation, he/she will push up and forward into the proper parade position (as confirmed by visual cues).

3. Safety.

- a. The Lead will maintain a stable platform.
- b. Wing will avoid any rapid lateral motion.
- c. Wing will maintain the proper stepdown and keep Lead's exhaust stacks in sight. This position will keep Wing clear of any prop wash that may be encountered while executing the crossunder.

404. LOST SIGHT EXERCISE

The Lost Sight Exercise (simulating lost sight under an IFR clearance) may be accomplished at anytime during the parade turn sequence. The formation Lead SNFO will initiate exercise as follows:

Lead: "RAIDER 12, standby lost sight exercise."

Wing: "RAIDER 12."

Lead: "RAIDER 12, go simulated lost sight."

Wing: "RAIDER 12."

Wing will then initiate lost sight procedures. The wing SNFO will make the appropriate lost sight call over the tactical frequency (reference section 705 for example communications).

Each aircraft executes the appropriate procedures for the current flight regime. Because of the distance travelled during this exercise, the Lead will normally end the exercise after 10-15 seconds and initiate the G-warm. A terminate call is not required at the end of the Lost Sight Exercise.

NOTE

This exercise shall only be accomplished in VMC conditions. The Instructor pilots will remain vigilant during the separation maneuver while the SNFOs direct the appropriate aircraft maneuvers. The SNFOs are expected to know and be able to brief all the procedures outlined in Chapter 7.

405. G-WARM

A G-warm exercise is required anytime the aircrew plans to pull more than 3 Gs. Typically this maneuver will be accomplished in combat spread. The G-warm will consist of a minimum of two 90-degree turns. The first turn will be a 3 G turn followed by a second 4 G turn. The below example illustrates the proper communication and execution of the G-warm:

With the flight established in combat spread at 200 KIAS, the following calls will be made on tactical frequency:

Lead: "RAIDER, accel G-warm, reference 270." (270 being the example heading in this case)

Wing: "RAIDER 12."

Both aircraft will then apply power and accelerate to 220 KIAS. Once stable at 220 KIAS the Lead *pilot* will call the turns:

Lead pilot: “RAIDER, 90 (Left or Right), Go.”

Both aircraft simultaneously execute a 3 G turn at max power in the called direction for 90 degrees of heading change.

Lead pilot: “RAIDER, 90 (Left or Right), Go.”

Both aircraft simultaneously execute a 4 G turn at max power in the called direction for 90 degrees of heading change.

After the second G-warm turn, the SNFOs will reference the appropriate instrumentation and accomplish the following required “fenced-in” communication on tactical frequency:

Lead: “RAIDER 11, fenced-in, 860 lbs, good G.”

Wing: “RAIDER 12, fenced-in, 840 lbs, good G.”

After the fence-in, Lead will clear the Wingman back into parade position over tactical frequency.

406. 180° BREAKUP AND RENDEZVOUS

The breakup and rendezvous is used to practice a co-altitude, co-airspeed rejoin. The breakup establishes the required interval for the rendezvous. This maneuver provides practice in using radius of turn to affect a rendezvous when an airspeed advantage is not present.

1. The Lead. Prior to initiating the maneuver, the Lead must ensure that the 180° breakup and rendezvous can be accomplished from the present heading. It is important to understand the ground track that this maneuver will take the formation through. For instance, if the breakup turn is commenced from a northerly heading, the track of the formation will be in either an easterly or westerly direction, depending on area constraints. The 180° breakup and rendezvous may be executed from either the right or left parade position. The Lead SNFO will:

- a. Check to ensure the Wingman is in position.
- b. Check the area is clear.
- c. Give the breakup and rendezvous signal (Figure 4-5).
- d. Ensure the Wingman acknowledges the signal.
- e. Once again check the area is clear.
- f. Kiss off the Wingman and break away (Figure 4-6).

4-6 SECTION PARADE



Figure 4-5 Breakup and Rendezvous



Figure 4-6 Kiss Off Signal

After giving the kiss off signal, Lead will break away from the Wingman and execute a level 180° turn utilizing maximum power and available Gs to maintain airspeed and roll out at the base airspeed (200 KIAS). Once Wing is in trail, they will give the Lead two "mic" clicks on tactical frequency. The Lead will then roll to 45° AOB in the desired direction of the rendezvous to give the Wingman an initial "wing flash" before establishing a 30° AOB turn, on altitude and airspeed. Throughout the maneuver, the lead SNFO will continue to monitor lead pilot's airwork, while observing the Wingman for a safe rendezvous, informing the Lead pilot of relevant deviations in any condition.

2. The Wingman. After a 3-second interval, the Wingman will break, matching Lead's AOB and pull. When established straight and level and in trail of the Lead, the Wing will give two "mic" clicks. When the Lead "flashes" and moves left or right of centerline (Figure 4-7), Wing will roll in the designated direction and proceed until they are established on Lead's 45-degree bearing line. The Wingman is in the proper position when Lead's vertical stabilizer aligns with Lead's outboard wing. If Wing observes Lead's vertical stabilizer moving forward and inboard along the wing, then Wing is behind the 45° bearing line and said to be *sucked* (Figure 4-8). On the other hand, should Wing observe Lead's vertical stabilizer moving aft and eventually sky appearing between the vertical stabilizer and the wing, then Wing is ahead of the 45° bearing line and is said to be *acute* (Figure 4-9). When correctly positioned on the 45° bearing line, Wing will adjust his/her AOB to maintain this bearing line and close in to the parade position. At this point, Wing will cross under and behind Lead and join in the VMC Turn Away position. The Wing SNFO is responsible for monitoring the progress of the rendezvous, reporting airspeed and altitude. Aircrew coordination and safety are paramount throughout the maneuver.

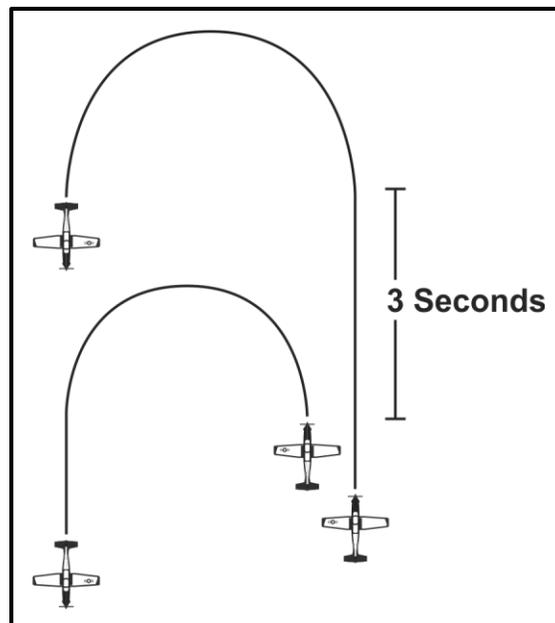


Figure 4-7 Rendezvous



Figure 4-8 Sucked



Figure 4-9 Acute

One technique that may be employed by the Wing to quickly and accurately assess a rendezvous is to check the "ABCs." "A" stands for *Altitude*. The Lead should be slightly above the horizon. "B" stands for *Bearing*. The Wingman should evaluate the visual cues discussed above. "C" stands for *Closure*. From a long distance it is very difficult to judge relative closure but, as the rendezvous progresses, excessive closure will quickly become evident. The rendezvous should be co-air-speed, so 200 KIAS +/- 10 will work fine as closure is created by the geometry.

3. Underrun Procedure. In the event Wing's aircraft becomes *excessively acute*, *acute in close*, or Wing experiences an *excessive closure rate* and is unable to execute a safe join-up, Wing shall discontinue the rendezvous and call for the underrun procedure. When the need to underrun is recognized by any crewmember in the flight, that individual shall direct/announce, "Tactical Callsign, underrun" over the radio. The Wing SNFO in the underrunning aircraft shall then be directive and talk his/her pilot through the underrun maneuver by stating, "LOWER, LEVEL, IDLE, BOARDS" over the ICS. The Wing pilot will fly the underrun by:

- a. Lowering the aircraft's nose to achieve 20 ft. of stepdown.
- b. Leveling their wings.
- c. Reducing their power to idle in order to pass behind Lead. Speedbrakes may be used as required.

As Wing passes below and behind, the Wing SNFO will report "RAIDER 12 underrun," pass below and behind Lead and then fly to the "perch" position located four plane widths abeam lead and stepped up.

Lead will visually acquire Wing and reply with: "RAIDER 11 copies. RAIDER 12 cleared back inside when stable."

Wingman will reply: "RAIDER 12."

This clearance back to the inside of the rendezvous turn is necessary due to the fact that there may be more than one aircraft joining on Lead in later flights. Lead will not normally clear Wing back inside the formation until all other rendezvousing aircraft are joined up. Wingman must ensure adequate stepdown and nose-to-tail clearance of all aircraft in the formation as they move to the inside of the turn circle to complete the rendezvous.

4. Wing Safety Considerations.

- a. Never lose sight of the Lead.
- b. Recognize the need and call for the underrun procedure when applicable.

5. Planned Underrun. After completing at least one successful rendezvous, the flight will execute a planned underrun. With the Wing in trail, the Lead will execute a normal "wing flash" and then immediately slow to 180 KIAS to begin the rendezvous. The Wing will maintain 200 KIAS. The resulting airspeed differential will force excessive closure by the Wingman during the join-up and necessitate an underrun.

407. CRUISE POSITION

When compared to parade, section cruise provides the formation with increased maneuverability and an enhanced lookout doctrine. While in cruise, the Lead is not restricted to 45° AOB. When properly positioned in cruise, Wing will be on Lead's 60° bearing line, 3-6 plane widths from

4-10 SECTION PARADE

Lead with approximately 20 feet of stepdown (Figure 4-10). The 60° bearing line can be maintained by aligning the tip of Lead's near horizontal stabilizer above the tip of the white star. During straight and level flight, the wingman should be able to receive visual signals and may fly on either side of Lead unless otherwise directed.

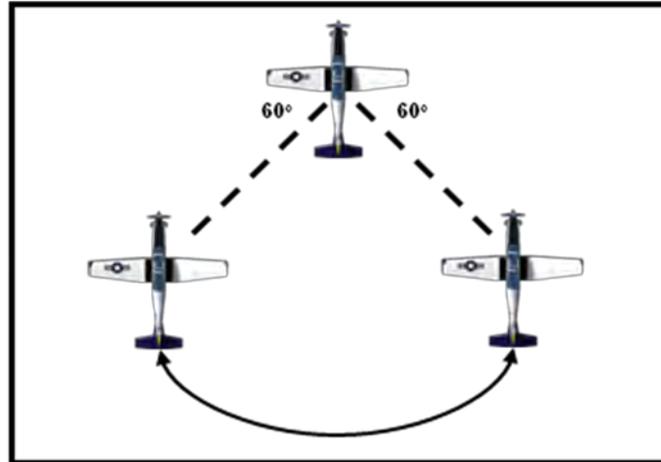


Figure 4-10 Cruise Position

The basic principal of cruise is that all flight members are free to maneuver in the 60° cone behind Lead and will maintain position by sliding to the inside of Lead's radius of turn in order to minimize PCL movements. When maneuvering, Wing may change their position to either side of Lead to maintain cruise position on the inside of Lead's turn. Nose-to-tail separation is of primary concern and can be maintained by utilizing radius of turn. At no time should the wingman be stepped up on the Lead.

408. TAIL-CHASE EXERCISE

1. Tail-Chase Exercise. The Lead will pass the tail-chase signal which is similar to the crossunder signal except that the forefinger and thumb are extended into a "cocked pistol." The formation will then execute a breakup (section 406) with the Wingman delaying 2 seconds. This will place the Wing in an extended cruise position, 500-1000 feet from the Lead. Once established in this position the Wingman will give two "mic" clicks. At this point both aircraft should set max power (unless otherwise briefed) and the Lead will begin maneuvering. The students will learn, through the instructors' demonstration of *lead*, *lag* and *pure pursuit*, the basics of how flight paths relate to each other during dynamic maneuvering; additionally, the students will also gain an appreciation for how proper body positioning will aid them in keeping the other aircraft in sight. These techniques will have a direct application in the more advanced stages of training.

2. Tail-Chase Maneuvers. In the tail-chase portion of the parade sequence, the Lead will start maneuvering with a series of steep turns and reversals. The series should include at least one fairly level turn to allow the Wingman to demonstrate lead, lag, and pure pursuit in a relatively benign flight regime. This will be followed by some wingovers and barrel rolls designed to

increase Situational Awareness (SA) in a dynamic flight regime; eventually, the flight will progress through some of the over-the-top maneuvers introduced in the Contact syllabus (i.e., loop, 1/2 Cuban eight). These maneuvers should be conducted at airspeeds in excess of 120 KIAS and between plus 1 and plus 5 Gs. As a technique, Lead will avoid exceeding 4 Gs, thereby allowing Wing an extra G with which to affect closure if necessary. The following are some specific responsibilities for the SNFOs in this stage:

3. The lead SNFO will:
 - a. Keep their pilot informed of any significant changes in the Wingman's position, calling out Wingman's clock position as necessary. While keeping the Wingman in sight, the SNFO will learn how to effectively position their body for "high G" flight.
 - b. Continue to maintain a proper lookout doctrine.
 - c. Make altitude calls at 500-foot intervals anytime the lead aircraft is within 1500 feet of a vertical boundary.
 - d. Report approaching minimum or maximum Gs and/or 120 KIAS.
4. The wing SNFO will:
 - a. Continue to maintain a proper lookout doctrine while keeping the Lead in sight.
 - b. Make altitude calls at 500-foot intervals anytime the Wing aircraft is within 1500 feet of a vertical boundary.
 - c. Report approaching minimum or maximum Gs and/or 120 KIAS.

The tail-chase exercise will end using the appropriate "terminate" calls on the radio (covered later in this instruction). Lead will then maintain 200 KIAS and will clear the Wingman to parade position to facilitate a subsequent lead change.

409. LEAD CHANGE

The lead change is a maneuver designed to affect a change of the formation lead while minimizing the effect on flight integrity. Prior to signaling for a lead change, the Lead aircrew will ensure that the flight will remain clear of other aircraft and weather while remaining in the working area (if established in a MOA). Lead changes may be done visually or over the radio and from any position with the correct coordination.

It is recommended that a second lead change take place after the second parade sequence (F5001) and the second TacForm sequence (F5002). The intent of this second lead change is to ensure the aircraft that led the flight during the departure phase also leads during the arrival phase. This will retain mission admin lead for the extent of the flight.

For a visual lead change, Lead will first pass the “push it up” signal (used only in the T-6). In response, the Wing will step out on the bearing line, establish ample wingtip separation, remain stepped down and finally increase power to smoothly begin pulling acute on the lead aircraft. When Lead sees that Wing has begun pulling acute, the *lead pilot* will pat his helmet three times and point to the Wingman as if saying “You have the lead.” The *wing pilot* will accept the lead without delay by patting his helmet three times and pointing forward as if saying “I have the lead.” The lead change has taken place once the Wing pilot returns the Lead’s hand signal. At this point, the new Wing will maintain visual contact on the new Lead and take a cut away. The new Wing will then slide down and aft, and once established on the Lead’s 45° bearing line slide into the proper parade position (all on the same side of the formation).

If after receiving the visual lead change signal, the Wing pilot is not prepared to assume the lead, he/she will reply immediately with a “negative” signal by shaking his/her head. The Lead will then clear the area and give the Wingman a chance to stabilize before attempting to pass the lead again.

For a lead change over the radio, the lead aircraft will simply make the following radio call on tactical frequency:

Old Lead: "RAIDER 12, you have the lead on the left/right."

New Lead: "RAIDER 12 has the lead on the left/right."

Once the new Wing is in the proper position, the new Lead will place their aircraft’s transponder to “Altitude” and Traffic Avoidance System (TAS) to “Norm.” Simultaneously, the new Wingman will place their transponder to "Standby" and TAS to “Standby” (as a technique, wait to hear a TAS hit from Lead prior to squawking "Standby" and placing TAS to "Standby"). The new Lead should begin a good VFR scan pattern, set 200 KIAS, maintain a solid platform, and orient themselves in the area. The new Lead should not attempt to make any corrections for altitude or heading until the new Wing has arrived in the parade position.

NOTE

For obvious safety reasons, there can be no confusion as to who the new Lead is and when, exactly, they assumed the lead. With visual lead changes, the lead changes at the exact moment the new Lead pilot points forward. During radio lead changes, the lead changes at the exact moment the new Lead verbally accepts the lead. *Anytime there is doubt as to who has the lead, quickly and accurately use the radio to resolve the situation.*

410. FUEL AWARENESS

A fuel check shall be conducted after the conclusion of each lead change and at a minimum of every 20-25 minutes. The proper hand signal required to initiate a fuel check (drinking motion with fist and thumb) is illustrated in Figure 4-11.



Figure 4-11 Fuel Check Signal

Knowing the fuel state of both aircraft at all times is paramount; as such, a couple of terms concerning fuel state need to be discussed. *Joker* fuel is a predetermined fuel state (above bingo fuel) informing the formation that one of the flight members is at a fuel state where the present maneuver needs to be terminated to ensure the flight can accomplish the remainder of the planned profile plus land with minimum fuel requirements at the planned destination. *Bingo* is a predetermined fuel state informing the formation that one of the flight members is at a fuel state where they need to proceed to the planned destination immediately in order to land with the prescribed minimum fuel requirements. For example, if the plan is to go to the MOA and do the parade sequence for both aircraft, the joker fuel would be halfway between MOA entry fuel and the fuel needed to Return To Base (RTB) based on the planned recovery. This would allow an even fuel split for each aircraft to have the lead.

EXAMPLE (all numbers are hypothetical):

Planned MOA entry fuel = 900 lbs.

Fuel needed to leave the MOA, shoot one approach to a full stop with 200 lbs on deck = 300 lbs.

Joker fuel would be $(900 \text{ lbs} - 300 \text{ lbs}) / 2 = 300 \text{ lbs}$, that 300 lbs + the 300 lbs needed to land = 600 lbs.

When either aircraft reaches 600 lbs the lead change needs to happen, if it has not already been done. This will ensure the other aircraft has an adequate amount of fuel to use as the lead. Bingo fuel in the above scenario would be 300 lbs. When either aircraft reaches 300 lbs they need to terminate maneuvering using a call similar to “RAIDER 12 bingo, terminate” and RTB immediately in order to land with at least 200 lbs. Bingo in this context is a fuel state, rather

than the flight profile where the flight plans to recover using the emergency divert chart and arrive at the destination below min fuel.

411. FENCE-OUT / REJOIN

At the end of the entire parade/TacForm sequence (to include the second Lead change) during events F5001 and F5002, the Lead will direct the flight to fence-out. Each aircraft will comply by individually completing an Operations check. The following example illustrates the communication sequence that will take place on tactical frequency after the second lead change and before MOA exit procedures:

Lead: "RAIDER fence-out."

Wing: "RAIDER 12."

412. F5001 PARADE SEQUENCE

Formation Sequence. Once established in the working area the formation sequence may be commenced. Both the Lead and the Wingman are responsible for completing the following maneuvers during the event.

1. Fuel check
2. Parade turns (both into and away)
3. Crossunder
4. Parade turns (into and away)
5. Lost sight exercise
6. G-warm (minimum of 2 x 90° turns from combat spread). This maneuver need only be conducted once per flight. Following the G-warm the flight will rejoin.
7. Breakup and rendezvous (plan on doing at least one normal breakup and rendezvous)
8. One breakup and rendezvous to a planned underrun (Lead at 180 KIAS)
9. Tail-chase
10. Lead change
11. Repeat sequence (minus the G-warm and lost sight exercise)
12. Lead change

- 13. Fence-out
- 14. Recovery

CHAPTER FIVE SECTION TACTICAL FORMATION

500. INTRODUCTION

In this chapter, students will be taught the basics of maneuvering tactical formations. SNFOs will learn how to establish and maintain combat spread (the basic formation positioning of tactical formation), remain within the working area, tactically turn a section 45°, 90°, and 180°, and develop and practice positive lookout doctrine.

1. **Combat Spread Position.** The traditional Wingman combat spread position is 1-2 nautical miles abeam the lead with 1000 to 3000 feet of altitude difference. Due to the T-6A's smaller size and turn radius, its combat spread position is reduced to an abeam distance of 1/2 NM with 200 feet of step-up. Wing is in proper position when he is directly abeam Lead, with the aircraft just outside the edge of the wing, visible to both crewmembers, and roughly the same length as the flash guard (the vertical card that sticks up from the wingtip and blocks the strobe light). Aircrew should be able to discern that there is a white spot on the side of the aircraft (but not a star) and there are two people in the cockpit. If there is more detail than this, Wing is too tight; not enough detail and Wing is too wide.

2. **Lookout Doctrine.** Success in air-to-air combat begins with early detection of the enemy. Each crewmember must develop an effective scan pattern in coordination with the other aircraft. Figure 5-1 delineates pilot and student lookout areas of responsibility for each aircraft. Notice the lack of a section blind area. Primary attention must be in the direction of the suspected threat (threat axis) and the Wingman's six o'clock position.

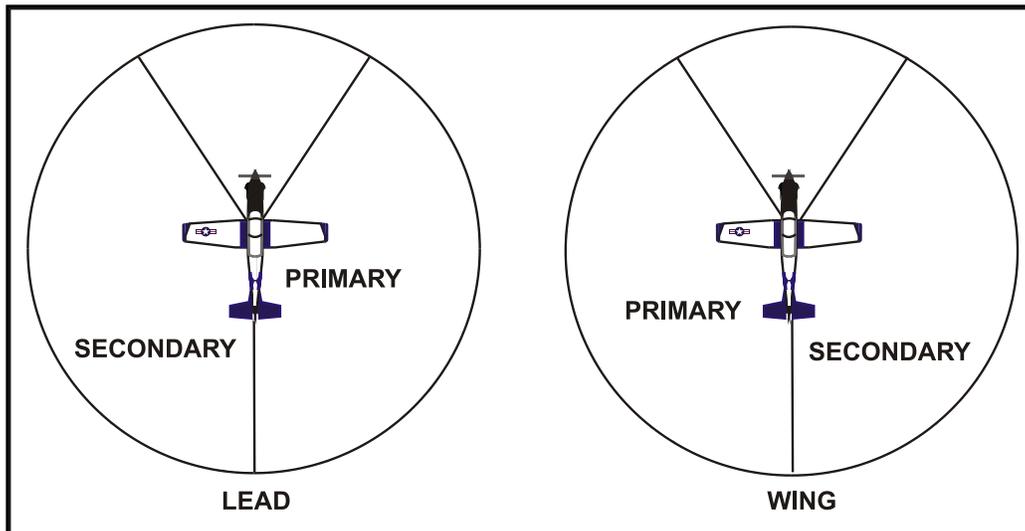


Figure 5-1 Lookout Responsibilities: Pilot-Primary and NFO-Secondary

3. Combat Spread Procedures.
 - a. Priorities. The first priority when flying combat spread is for the Wingman to maintain proper bearing (abeam or 0° bearing line). If the Wingman becomes sucked or acute, the lookout doctrine suffers; additionally, a sucked aircraft becomes more vulnerable to the enemy. The second priority is maintaining the 1/2 NM abeam distance. Should the Wingman become too wide, an enemy aircraft may be able to engage a Wingman undetected. If too close, the scanned area is reduced, it's easier for the enemy to gain sight of both aircraft and he may be able to engage both simultaneously. The third priority is altitude. Altitude can easily be traded for airspeed and thus used to maintain bearing.
 - b. Taking Combat Spread From the Parade or Cruise position. When the flight is cleared to maneuver, the flight Lead will pass the take combat spread signal (palm out, push away). Wing should reference base heading, altitude, and airspeed prior to repositioning to combat spread. The Wingman then selects maximum allowable power and aggressively drives the aircraft to the proper tactical combat spread position.
 - c. Maintaining Combat Spread. Once in combat spread the Wingman will return to the referenced base heading. In order to correctly determine the abeam position, the Wingman should look straight out over his/her shoulder directly at the Lead. The tendency is to become sucked since it is easier to look forward at the Lead. To maintain a good combat spread requires a good scan both inside and outside the cockpit. The outside scan must encompass the Lead's relative position as well as the Wingman's lookout area of responsibility. The inside scan compares reference airspeed, heading, and altitude in order to recognize early deviations and make the necessary adjustments.
 - d. If the Wingman becomes sucked, they will immediately correct by lowering their nose and adding power to accelerate to the abeam bearing. The Wingman may dissipate as much altitude as required to regain the proper bearing line expeditiously. Approaching the bearing line, the wing aircraft will raise their nose to arrive on bearing at 200 KIAS. When stable, reset power to referenced settings.
 - e. If the Wingman becomes acute, the aircraft will execute an aggressive nose-up pull to dissipate forward velocity and regain the bearing line. Approaching the abeam position, the Wing's nose should be lowered to arrive on bearing with 200 KIAS. If the Wingman is acute and close or very acute, the Wing should either execute an S-turn or extend their speedbrake to regain position. The S-turn is accomplished by using power as required while smartly turning at least 30° away from Lead followed by an immediate return to base heading. The Wingman should use caution since a sucked position may develop if the correction is too aggressive.
 - f. If bearing line and abeam distances are correct but the altitude is off, power is adjusted in order to climb or descend. Remember, maintaining proper altitude is the last priority.

- g. The amount of any correction is directly proportional to the amount of positional error. Small errors require minor corrections to finesse the aircraft into proper combat spread while gross errors will require more aggressive maneuvering.

4. Combat Spread Voice Calls. All called turns (except the Cross Turn) will be completed as follows:

Lead: "RAIDER, (type turn)."

Wing: "RAIDER 12."

The preparatory command occurs when Lead calls for the type of turn. The response, "RAIDER 12," is the command of execution and indicates the Wingman understands and will comply. The response is given by the wing *pilot*. This ensures the pilot flying is ready to execute the maneuver. If there is no response to the preparatory command, the Lead will repeat the call. The first aircraft to turn will check *old six* and the last aircraft to turn will check *new six*. In the case of 180° turns, each aircraft will check *old six* and *new six*.

NOTE

If Lead's tactical callsign is RAIDER 11, he/she will keep their tactical callsign throughout the entire flight, even if they are the Wingman. In this situation, "RAIDER 11" would be used as the command of execution.

5. TacForm Assumptions. Various turns can be utilized from combat spread that will maintain tactical integrity while changing course. For proper turn geometry, safety of flight, and coordination reasons, each aircraft must comply with a few basic assumptions while maneuvering in tactical formation:

- a. All turns are max power, energy-sustaining turns that vary AOB and Gs to maintain airspeed
- b. All uncalled turns are initially assumed to be tac turns
- c. Lead will make all turns level
- d. Wingman is responsible for deconfliction

6. SNFO Responsibilities:

Lead SNFO:

- a. Initiating each turn
- b. Area management

- c. Monitoring aircraft parameters (altitude, airspeed, heading, fuel, etc.)
- d. Visual lookout-traffic and weather avoidance

Wing SNFO:

- a. Directing the pilot to turn or roll out as appropriate during TacForm
- b. Monitoring aircraft parameters, proper position, and ensuring deconfliction
- c. Visual lookout
- d. Maintaining situational awareness in order to take the lead at any time

501. TAC TURNS

Tac turns are the most basic turns and are used to turn the formation 60-120°. These turns may be either into or away from the Wingman and may be called or uncalled.

1. Tac Turns Into the Wingman

- a. Called Turns Into the Wingman (Figure 5-2). The maneuver will begin with the Lead calling "RAIDER, Tac (Left/Right)." When the Wing responds with their tactical callsign, the Lead will turn into the Wingman with a standard tactical turn. The wing aircraft will delay until Lead is on the 45° bearing line (visual cue is looking down the lead aircraft's intake) before starting their tactical turn.

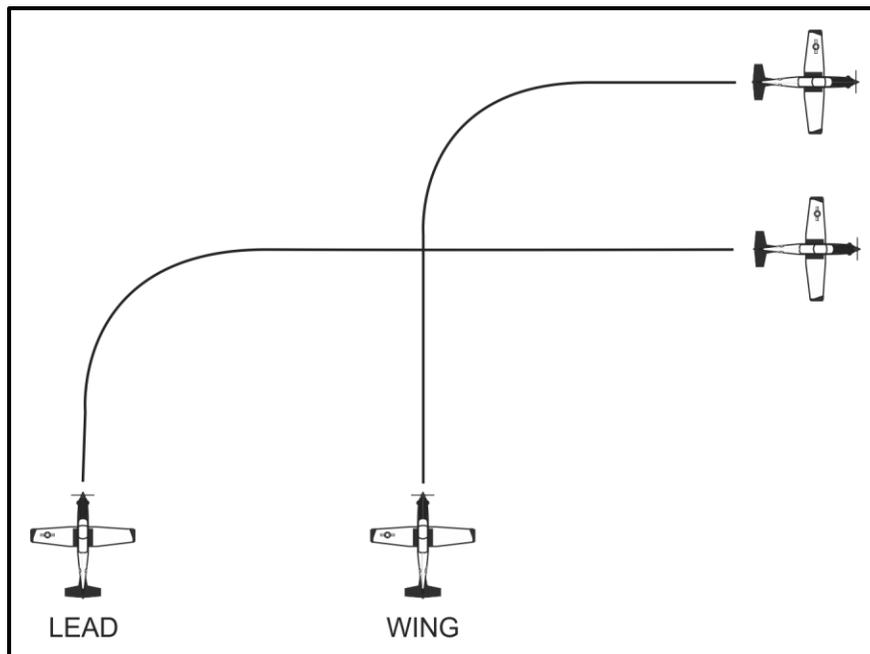


Figure 5-2 Tactical Turns Into the Wingman

- b. Uncalled turns into the Wingman are performed exactly the same as called turns except there are no radio calls. Lead will simply turn into the Wingman when desired. The Wingman delays until the Lead approaches the 45° bearing line (visual cue as previously described) before commencing their tac turn.
2. Tac Turns Away From the Wingman
- a. Called Turns Away From the Wingman (Figure 5-3). This maneuver begins with the Lead calling, "RAIDER, Tac (Left/Right)." Upon responding with their tactical callsign, the Wingman will immediately execute a standard tac turn into the Lead. The Lead will delay their tac turn until the wing aircraft reaches the 45° bearing line (visual cue is looking down the wing aircraft's intake) at which point Lead will execute a standard tac turn.

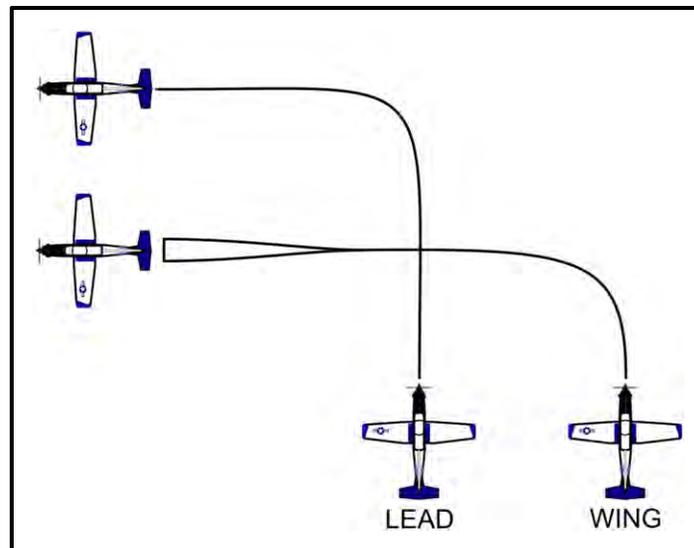


Figure 5-3 Tac Turns Away from the Wingman

- b. Uncalled turns away from the Wingman are performed exactly the same as called turns except there are no radio calls. The lead aircraft will initiate a wing flash in the direction of turn. Wingman will then commence a standard tactical turn into the Lead. Lead delays until the Wing approaches the 45° bearing line (visual cue as previously described) before commencing their tac turn.

502. 45° TURNS

Forty-five degree (45°) turns are used anytime the formation requires a turn between 31-60° of heading change. These turns may be either into or away from the Wingman and may be called or uncalled.

1. 45° Turns Into the Wingman.
 - a. Called Turns Into the Wingman (Figure 5-4). This maneuver begins with the Lead calling, "RAIDER, 45 (Left/Right)." When the Wingman responds with his/her tactical callsign, Lead will turn into the Wingman with a standard tactical turn rolling out on the desired new heading. Wing will drive forward until crossing Lead's flight path, and then execute their 45° turn. Wing will then adjust for proper combat spread.

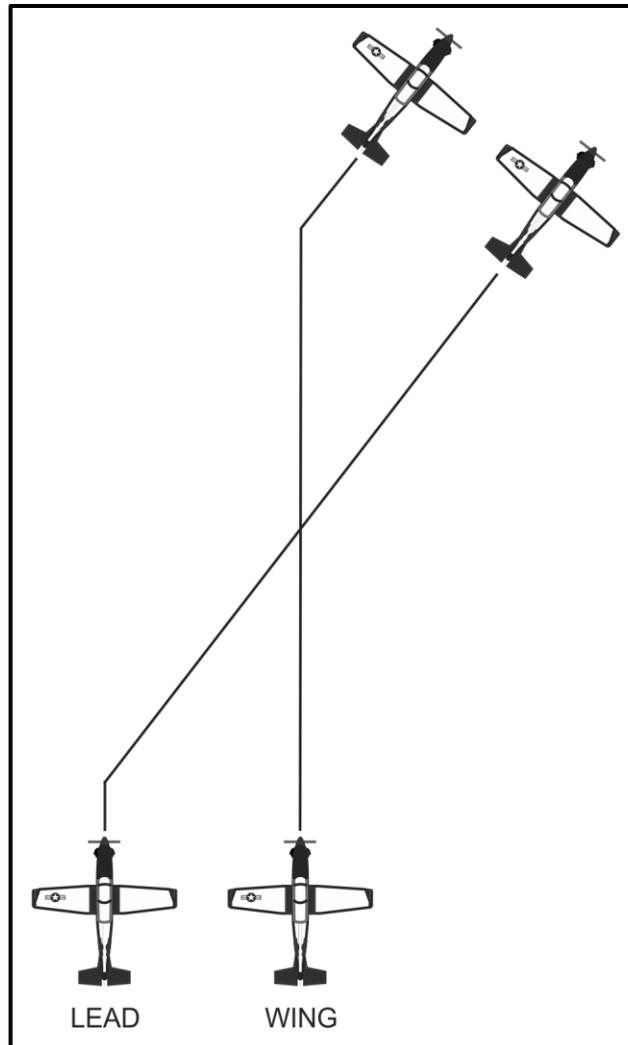


Figure 5-4 45° Turn Into the Wingman

- b. Uncalled turns into the Wingman are performed exactly the same way as called turns except there are no radio calls. The lead aircraft simply turns into the Wing and rolls out on the desired heading for the formation. The Wingman, initially assuming it is a tac turn, knows this is a 45° turn when Lead rolls out prior to seeing "intakes on." Lead may momentarily roll out of the turn after 20-30 degrees before continuing.

The intent of this momentary roll out is to inform the Wingman that the maneuver is an uncalled 45° turn and not a 90° tac turn. The Wing will drive forward until crossing Lead's flight path and then executes their 45° turn. Wing will then adjust for combat spread.

2. 45° Turns Away From the Wingman.

- a. Called Turns Away From the Wingman (Figure 5-5). The maneuver begins with the Lead calling, "RAIDER, 45 (Left/Right)." Upon responding with their tactical callsign, the Wing will immediately execute a standard tactical turn into the Lead for 45°. Lead will fly below and across Wingman's flight path and turn to the desired new heading. Wingman will adjust to the combat spread position on the opposite side.

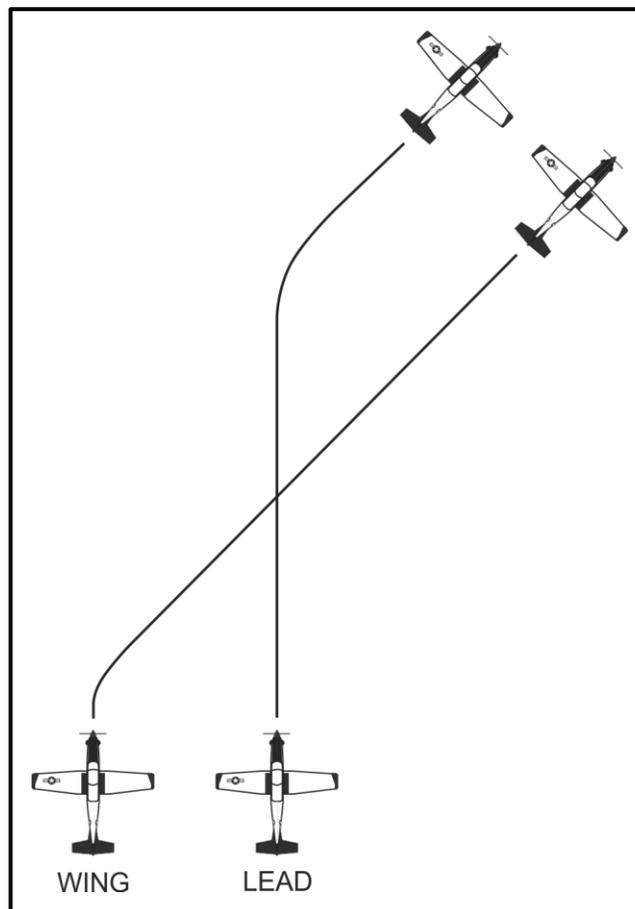


Figure 5-5 45° Turn Away from the Wingman

- b. Uncalled turns away from the Wingman are performed similar to called turns except that the Lead uses wing flashes to signal Wing. The lead aircraft initiates the turn with a wing flash in the direction of turn. The Wing will immediately commence his energy-sustaining turn into Lead, initially assuming it is a tac turn. When the Wing aircraft reaches the desired heading for the formation, Lead will give a wing flash into Wing. At this point, Wing immediately rolls wings level. Lead's aircraft should

track below and in front of Wing's aircraft. Upon crossing Wing's flight path, Lead conducts his turn to the desired heading. Wing will adjust for proper combat spread.

503. CHECK TURNS

Check turns are used to alter the formation heading 30° or less. The Lead initiates a called check turn by calling "RAIDER, Check 30 (Left/Right)." The Wingman will respond with his/her tactical callsign. At this point, Lead will change course to the new heading. Wing remains on the same side of the Lead and will adjust as required to maintain the proper bearing line.

Uncalled check turns are accomplished by the lead aircraft simply turning to the desired heading (no wing flash). It is the Wing's responsibility to make adjustments as required to maintain the proper formation position.

504. SHACKLE

The Shackle is a maneuver used to cross the Wingman from one side of the tactical formation to the other. A Shackle can also be used to "dress" the formation should Wingman's position be deemed unsatisfactory.

1. Called shackles are initiated by Lead calling, "RAIDER, Shackle." Once Wingman responds with their tactical callsign, both aircraft immediately execute a 45° turn into each other. When their flight paths cross, both aircraft reverse their turns back to the original heading (Figure 5-6).

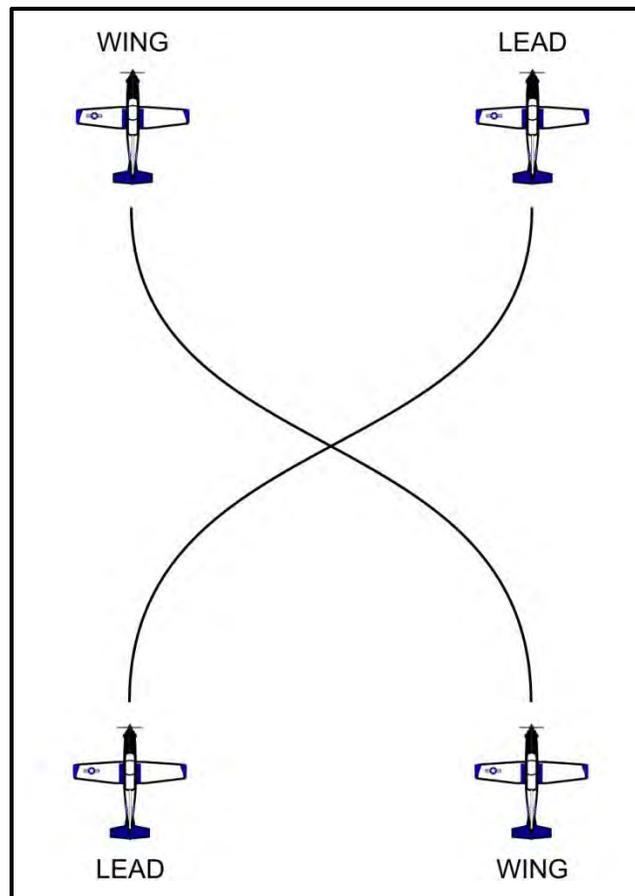


Figure 5-6 Shackle

2. When a shackle is called with Wingman out of the proper abeam position, the aircraft that is farthest downrange must turn greater than 45° , while the trailing aircraft turns less than 45° . It is a cooperative effort between aircraft to cross vertically with roughly 90° between the two flight paths. Upon crossing, the aircraft that turned greater than 45° must turn first to the original heading, followed shortly thereafter by the second aircraft's turn. As always, Wing will adjust to a proper position off of Lead. When performed successfully, Wing will immediately roll out in combat spread.

3. Uncalled shackles have exactly the same geometry as the called shackle. Uncalled shackles are initiated by Lead giving a wingflash into Wingman. As the Wing starts his turn, Lead will start a turn into the Wingman, thus signaling a shackle.

505. IN-PLACE TURNS

In-place turns (Figure 5-7) are used for 120° - 240° of heading change where both aircraft turn in the same direction; Typically, 180° is the initial assumption unless pre-briefed or until wing

recognizes otherwise. These turns may be called into or away from the Wingman and only away from the Wingman when uncalled.

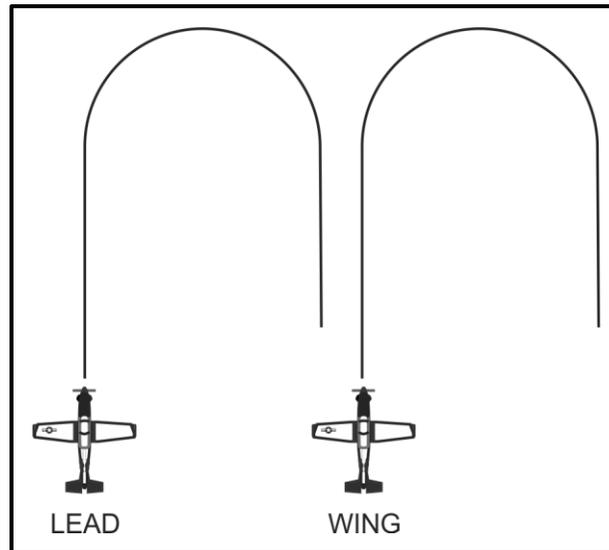


Figure 5-7 In-Place Turn

1. Called in-place turns are initiated by the Lead calling "RAIDER, In-place (Left/Right)." When the Wingman responds with his/her tactical callsign, both aircraft will immediately execute a standard tactical turn in the called direction for 180° of heading change. It should be noted that during turns into the Wingman, the Wing will momentarily lose sight of Lead. At that point Lead assumes separation responsibility until visual contact is regained by the Wingman. Since this loss of visual contact is expected *and* briefed, a "blind call" is not required unless the Wing does not reacquire Lead when expected (i.e., rolling out of the turn).
2. Uncalled in-place turns can only be performed away from the Wingman. Uncalled in-place turns are initiated by the Lead giving a wing flash away from the Wingman. As wing starts his turn into Lead, the Lead will immediately turn away from the Wingman, thus signaling the in-place turn. Both aircraft will continue their energy-sustaining turn for 180°. Wingman will reacquire sight of Lead and adjust for combat spread.

506. CROSS TURNS

Cross turns (Figure 5-8) are 180° turns where the Lead and the Wing turn toward each other. These turns are always *called*.

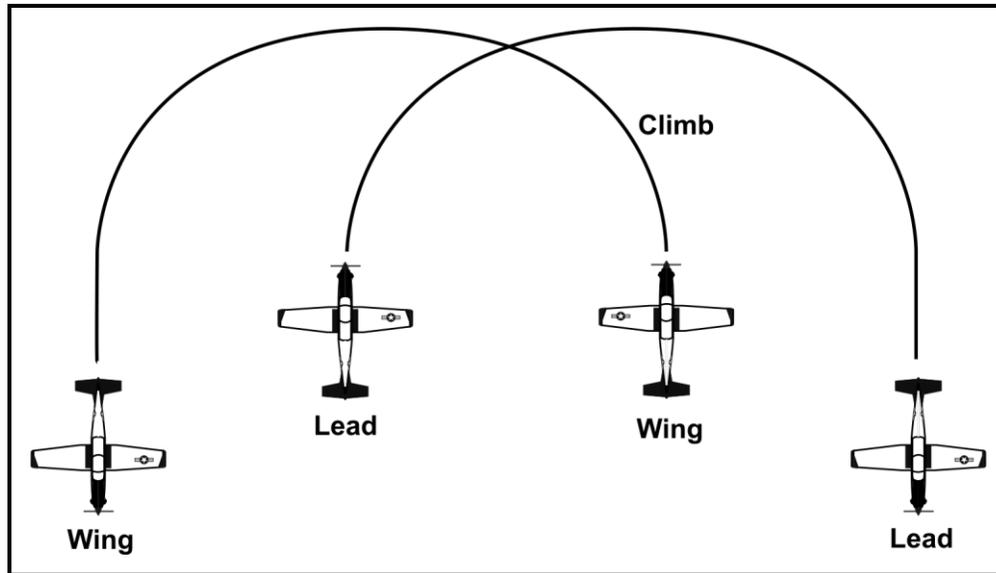


Figure 5-8 Cross Turns

Cross turns are initiated by the Lead calling "RAIDER, Cross Turn, Lead LOW." When the Wingman responds "RAIDER 12, Wing HIGH," Lead will initiate a 180° standard tactical turn into the Wingman; simultaneously, the Wingman will execute a level turn into lead, ensuring at least 200 feet of vertical separation IAW the CTW-6 T-6 Tail-Chase Training Rules. As a reminder, each aircraft in the flight will always use their original tactical callsign, regardless of their respective flight position (Lead or Wing).

507. EVENT F5002 TACFORM SEQUENCE**NOTE**

The lead SNFO will announce whether the following set of turns will be called or uncalled over tactical frequency prior to starting the sequence. Uncalled turns will be directed to the lead pilot over the ICS.

1. Fuel check
2. G-warm
3. Called tactical turns (Lead SNFO decides order of turns)

- a. Tac turns
- b. 45° turns
- c. In-place turns
- d. Cross turn
- e. Shackle

Uncalled tactical turns

- a. Tac turns
 - b. 45° turns
 - c. In-place turns
 - d. Shackle
- 4. Lead change
 - 5. Repeat sequence (minus G-warm)
 - 6. Lead change
 - 7. Fence-out
 - 8. Recovery

CHAPTER SIX

SECTION RECOVERY

600. INTRODUCTION

The recovery phase will commence once all work in the area is complete. Although instructor pilots may tailor the flow of training as desired, it is recommended that SNFOs plan for and brief at least one section approach on each flight. This may be followed by a departure and re-entry for the break if desired (no lead change required). Since the formation flight will normally be flown as "out-and-ins," SNFOs must be prepared to lead the flight to the airfield noted on the flight schedule. Typically, this airfield will be Mobile Downtown, Bay Minette, Jack Edwards, or Monroeville. In order to be familiar with airfield operations, SNFOs should review applicable publications (VFR/IFR Supplement, General Planning (GP), Read and Initial (R&Is), Fixed Wing Operating Procedures (FWOP), etc.).

If entering any of these fields for the break/overhead, there are a number of ways to proceed from the area to the airfield (depending on traffic, weather, etc.). These include: own VFR navigation, VFR flight following, and vectors to the break/overhead. Regardless of the VFR recovery technique used, the SNFO will want to keep the formation in the cruise position (to maximize lookout and maneuverability) until approximately 3 NM from the initial. At 3 NM, the Wing will still have enough time to get into the parade position on the proper side of the Lead, receive the appropriate visual break signal (3-second or fan), and stabilize their aircraft prior to executing the break.

Each aircraft will get an opportunity to lead an approach. SNFOs should plan and brief their flights so that they execute one section approach on each flight, to include at least one to a section drag/full stop. SNFOs should also plan and brief so that they see at least one 3-second break and one fan break during the T-6A formation syllabus.

601. RECOVERY OVERVIEW

Upon completion of the second parade sequence, the flight will be ready to initiate the recovery phase. This phase will consist of the following:

1. MOA check-out procedures (if applicable)
2. Radio channel changes to include ATIS
3. Descent
4. Request to ATC for appropriate entry
5. Required checklist(s) and briefs (e.g. descent checks, field brief, approach brief)
6. Break/Instrument approaches

602. MOA CHECK-OUT PROCEDURES

It is imperative that SNFOs develop a suitable gameplan for the radios in order to smoothly exit the MOA and execute the recovery. Things to consider when the flight is preparing to leave the MOA for the destination airfield are the need to get ATIS, check-out/cancel IFR with Approach Control, while continually monitoring the MOA frequency and maintaining the ability to communicate with each other. If the Lead SNFO does not have a good plan for the radios it will quickly become apparent. The SNFOs should realize that the formation has 4 radios between the two aircraft. For example: the formation is on PRI button 16 (GATOR MOA frequency) and AUX tac. The Lead (RAIDER 11) may send Wing (RAIDER 12) to get ATIS on AUX. After Wing passes the ATIS information, Lead alone switches to AUX button 5 (Pensacola Approach) to check-out/cancel IFR. Lead then checks the flight out of the MOA and switches back to PRI button 16. At this point, Lead switches the flight to PRI tac and then to AUX 118.5 (Mobile Approach), ensuring that the flight has a tactical frequency in use at all times. For example:

On AUX tactical:

Lead: "RAIDER 12, cleared off AUX for ATIS."

Wing: "RAIDER 12."

Once ATIS is obtained, RAIDER 12 switches back to AUX tac and passes ATIS to Lead when Lead is ready to copy:

Wing: "RAIDER 12 up with information Foxtrot."

Lead: "RAIDER 11 ready to copy."

Wing: "Winds 120 at 10, 29.92, RWY 14, better than 5000 and 5."

Lead: "RAIDER 11 copies. RAIDER 11 going off AUX to check-out."

Wing remains on AUX tac. On AUX button 5 (Lead only):

Lead: "Pensacola Approach, KATT 621, flight of two, complete in the GATOR MOA, cancel IFR."

Pensacola Approach: "KATT 621 cancellation received, squawk 1200, frequency change approved."

Lead: "KATT 621, squawking 1200, switching."

Lead switches back to AUX tac. On AUX tac:

Lead: "RAIDER 11 back up... RAIDER switch PRI tac. RAIDER check PRI."

6-2 SECTION RECOVERY

Wing: "RAIDER 12."

Lead gives adequate time for both aircraft to switch to PRI tac. On PRI tactical:

Lead: "RAIDER 11."

Wing: "RAIDER 12."

Lead: "RAIDER switch AUX 118.5."

Wing: "RAIDER 12."

Lead gives adequate time for both aircraft to switch to AUX 118.5 (Mobile Approach frequency). On AUX 118.5:

Lead: "Mobile Approach, KATT 612, Flight of two, VFR, 6,500, 10 NM east of Mobile Downtown." (Looking back at Wing for thumbs-up.)

NOTE

It is acceptable and recommended for Lead to tell the Wingman to obtain the ATIS if it suits the flow of the flight and then report the information back to Lead. In any case, the specific details will be covered in the pre-flight briefing.

603. THE BREAK

There are two methods of executing the break. Either method is authorized, but the specific break must be briefed.

1. 3-second break. Prior to the break, the Lead will pass the visual 3-second break signal (extend arm vertically with 2 fingers vertical and rotate the wrist). The Wing will respond with either a head nod or thumbs-up. At the appropriate point, Lead will kiss off the Wingman and execute a normal break just like in Contact stage. When 3 seconds have elapsed, the Wingman will then execute a normal break. Lead will call "KATT 621, 180, 3 down and locked, full stop." Tower will clear both aircraft to land by replying, "KATT 621, cleared to land RWY 25L." The Wingman is still required to call his/her gear by stating "dash-2, 3 down and locked;" however, Wing will not receive a separate landing clearance. Tower will likely reply, "dash-2, roger gear." The flight will rejoin on deck after crossing the hold-short and then taxi as a flight.
2. Fan break. Prior to the break, Lead will pass the fan break signal (arm and hand extended vertically with palm facing inboard while motioning "come with me"). At the appropriate point, Lead will execute a parade rate of roll towards 90° AOB and Wing will match Lead's roll rate. The Lead will leave their power set through 90° of turn before reducing it to IDLE and extending the speed brake. The Wingman will match Lead's roll rate but will reduce their power to IDLE and extend their speed brake at the beginning of the maneuver. This will create the separation

needed for landing rollout. From this point, the procedures and radio calls are the same as the 3-second break.

604. SECTION APPROACHES

Section approaches are practiced during flight events F5001 and F5002 plus any other formation flights where the weather conditions preclude a VFR recovery. Approaches shall be thoroughly briefed to include the appropriate signals and procedures for both the approach and missed approach.

Since we are simulating IMC during section approaches, all turns will be made using IMC parade position (i.e., keep the same checkpoints as straight-and-level parade). In IMC, it is imperative the Wingman must safely stay in visual contact in order to maintain section integrity. Prior to conducting an actual section approach, consideration should be given to the approach, missed approach, and the procedures for separating the flight on final. In the event of a missed approach the flight will execute the published procedure using normal hand signals **unless** specific instructions were given to the contrary.

1. It is important to remember that unlike instrument flights everything takes longer to accomplish in a formation; therefore, the SNFOs should plan accordingly. The following items must be completed prior to the Final Approach Fix (FAF) or glide path intercept (not necessarily in this exact order):

- a. Bring the Wingman into the proper parade position.
- b. Slow the flight down.
- c. Configure the flight.

Although these tasks may appear simple at first glance, they can quickly become task saturating when the appropriate visual signals (Section 801) are combined with the required Instrument Navigation (INAV) briefings and checklists. Studying, planning, and practicing (chair-flying) will greatly help the SNFO during this phase of a formation flight.

2. The flight will comply with all approach control instructions; generally, the flight will receive radar vectors to the final approach course. Below 150 KIAS and when ready to transition the flight to Basic Approach Configuration (BAC), the Lead SNFO will initiate the "prepare to lower gear signal." Wing SNFO will check the airspeed and call "below 150" over the ICS and give Lead a thumbs-up. The Lead pilot will then give the head nod signal to lower the gear and place flaps to T/O. Each SNFO should check for good gear and flap indications and then Lead will look to Wing for a thumbs-up, signifying that Wing has 3 down-and-locked and Lead's gear and flaps appear to be down-and-locked. Lead should transition the flight to BAC in VMC if able, but no later than 30° prior to the final approach course or 5 miles from the FAF.

3. Lead Low Approach, Wing Touch and Go. This maneuver simulates recovering a No Radio (NORDO) Wingman on an approach. Lead will fly a normal instrument approach and

6-4 SECTION RECOVERY

drop off the Wingman approximately 1-2 NM from the runway threshold, with the runway in sight. Keep in mind that the formation must have circling approach minimums or 1000-3 if no circling approach minimums are available to start the approach. Lead should give the Wingman the visual signal to land (patting the glareshield and pointing to the wingman) and then kiss him/her off. This signifies, "You are cleared to land, detach." The Lead then turns away smartly and executes a low approach, parallel to the runway at 500' AGL and 120 KIAS. Wing will visually acquire the runway and execute a touch and go. At the completion of the Wingman's touch and go, both aircraft will raise their gear and flaps. Lead will accelerate to 160 KIAS and maintain that airspeed until the Wingman has rejoined into parade. Wingman will use running rendezvous or CV rendezvous procedures as necessary. Should Lead need to begin a climb for airspace considerations, maintain 160 KIAS and no more than 90% power until the formation is rejoined.

4. Section Drag. The section drag is used to land two aircraft at the completion of a section approach. Lead will fly a normal instrument approach. Lead should fly the approach on the downwind side of the duty runway in order to minimize the risk of wake turbulence. After the flight has received clearance to land and with the runway in sight, Lead will pass the land signal (pats the glareshield without pointing to the Wingman) and kiss the Wingman off. This visual signal signifies, "The flight is cleared to land, detach." At this point the Wingman will immediately lower their flaps to LDG and slow to 100 KIAS. Initiating the drag 2.5-3 NM from the landing threshold should provide the Wingman with ample time to establish the required 1500 feet of landing separation. If Lead is unable to coordinate clearance to land and/or establish the section drag in time to ensure 1500 feet of runway separation, Lead will coordinate a section missed approach and re-attempt. If the Wingman realizes they will not have sufficient separation, they will execute a waveoff.

NOTE

OPNAVINST 3710.7 specifically prohibits the Wingman from slowing to less than normal approach speed or using "S" turns to obtain proper interval; additionally, the Section Drag may not be accomplished to a touch and go followed by a rejoin.

5. Section Missed Approach. Once the decision to execute the Missed Approach is made, Lead will smoothly increase power to establish the flight with a positive VSI. Once both aircraft are climbing away, Lead will initiate the "prepare to raise gear signal." After receiving a thumbs up from the Wingman, the Lead pilot will give the head nod to signal both aircraft to raise their gear and flaps. Wing will give Lead a thumbs up to signal that his gear and flaps are up and they are ready to proceed past 150 KIAS.

Guidelines for the planning and execution of section instrument approaches are thoroughly covered in OPNAVINST 3710.7 Section 5.1.12 and the Training Wing SIX SOP.

605. LANDING

Runway Ops. The lead aircraft will land on the center of the downwind half of the runway and the Wingman will land on the center of the upwind half of the runway. During the landing phase, the runway centerline is once again treated like a brick wall until both aircraft are safe on deck and have slowed to a safe taxi speed. With strong crosswinds or narrow runways, Lead has the option of directing both aircraft to land on centerline. In this event, Wing must ensure at least 3000 ft of separation before touching down (for T-6 aircraft IAW FAA Handbook 7110.65). If Lead is required to cross the runway centerline (in front of the Wingman) in order to exit the active runway, they will delay accomplishing this until the Wingman (whose nose will be crossed) calls "RAIDER 12, slow" on flight tactical. This call signifies the Wingman has adequate spacing and speed control to ensure it is safe for Lead to cross.

Careful planning must go into the final approach to minimize the Wingman's risk of flying into Lead's wake turbulence. Wing should waveoff if wake turbulence is encountered on short final. For Wing consideration, Lead should not rapidly apply brakes on rollout unless necessary. There is no rush to make an early turnoff from the runway, potentially compromising formation safety. If, at any time, things do not go as planned maintain aircraft control and use the radios.

Post Landing Ground Operations. Once clear of the runway, Lead will automatically switch to Ground without waiting for Wing and obtain the flight's taxi clearance. Once Wing is clear of the runway, he/she will automatically switch to Ground frequency to join Lead. Once clear of the duty, it is Wing's responsibility to establish and maintain the proper visual cues previously discussed for formation taxi. Each aircraft will individually do their own After Landing and Engine Shutdown Checklists; additionally, Wing will report either "up aircraft" or their specific downing malfunction over tactical frequency.

When returning to Sherman Field, the formation will taxi back to the chocks on PRI button 3 and Lead will call Base with the flight's ATC callsign to inform Base of the flight's return and the status of all aircraft (i.e., "in and up" or "990 down for cockpit overpressurization"). This call will be made as the lead aircraft enters the T-6 ramp area and without notifying the Wingman.

CHAPTER SEVEN FORMATION EMERGENCIES

700. INTRODUCTION

Two general points can be made pertaining to formation emergencies. First, the aircraft with the emergency informs the other aircraft (requests the lead if necessary) and handles the emergency in accordance with (IAW) NATOPS. Secondly, each aircraft within the formation stands ready to lend assistance in an emergency situation. This assistance may be in the form of checklist backup, location of nearest airfields, communication coordination, exterior aircraft inspection, and/or a stable platform for Wingman to reference. The type of assistance varies with the type of emergency however, quick and accurate communications (using Hydraulic, Electrical, Fuel, Oxygen, Engine (HEFOE) if NORDO) will greatly aid in coordination of a safe recovery.

NOTE

Avoid the tendency to assist to the point of jumping in the emergency aircraft's cockpit. A good technique is to be prepared to offer any assistance *only when requested*.

As in previous training, the T-6A NATOPS Manual and NATOPS Pocket Checklist shall be used to address any emergency; however, there are a few unique considerations pertaining to formation flying which will be covered in the following paragraphs.

701. ABORTS

Serious thought must be given by the aircrew beforehand to the proper course of action that will be taken in the event of an abort. There are two prime considerations. The first is the safe abort of the aircraft experiencing difficulty. The second is the safety of the remaining aircraft in the flight. For these reasons, the runway centerline is treated as a brick wall not to be crossed while another aircraft is in the vicinity. It is better to go off the runway than hit a playmate.

It is impossible to list all of the possible situations that might cause the flight to abort. The following are procedural guidelines that should be followed in the event of an abort. These guidelines should be tempered with sound judgment combined with decisive action by the emergency aircraft's aircrew.

For the T-6A aircraft, the following principles should be applied along with any applicable NATOPS procedures:

1. Single Aircraft Abort. While executing a Section Takeoff, if one aircraft aborts after brakes are released, the other aircraft should *continue their takeoff*. In all cases there is no substitute for sound judgment. *Do not* transmit over the radio announcing an abort until *after* your wingman is airborne (i.e., "RAIDER 11 aborting"). This will avoid confusion between the need for a single aircraft abort and a dual abort. When executing an interval takeoff, if Lead aborts prior to rotation, Wing will reduce power, stay on the brakes, and discontinue the takeoff.

2. Dual Aborts. Should a situation arise that requires a dual abort, the person identifying that need shall call on the radio, "RAIDER FLIGHT, ABORT, ABORT, ABORT." *Flight* is the key word to execute a two-plane abort. It is imperative that each aircraft maintain their own side of the runway and execute the abort procedures IAW the T-6A NATOPS. Maintaining aircraft directional control during the abort is crucial to its safety and success.

702. MID-AIR COLLISION

The first consideration after a mid-air collision is to regain control of the aircraft and determine whether or not it can be flown. If control cannot be maintained, *eject*. Immediately separate the flight while keeping the other aircraft in sight if possible. *Do not rejoin* if the mid-air collision was with the wingman.

Aircrew will follow the procedures established in Section III of the current T-6A NATOPS. In the final analysis, the pilot of the damaged aircraft must determine whether or not he/she can land safely and then proceed to the nearest suitable field.

703. RADIO FAILURE

Before assuming a radio failure, both aircraft should check all radios, switches, circuit breakers, and connections. The aircraft with a radio failure must communicate to the other aircraft, through hand signals, the exact nature of their problem. The aircraft with the operating radio will assume the Lead (if required) and lead the NORDO aircraft back to home field while advising the appropriate ATC agencies of the situation.

Recovery in VMC will be via course rules to the break. If the Lead does a touch and go, then the Wingman is cleared to land. If Lead does a low approach, the Wingman will wave off and follow Lead. Lead is expected to attempt another pattern after executing a waveoff.

In IMC conditions, Lead will request an instrument approach for the flight. Lead will execute the Lead Low Approach and Wing will execute Touch and Go procedure from Section 604. Lead will remain alert to the possibility that the NORDO Wingman may need to rejoin in the event they execute a missed approach or waveoff.

704. DOWN AIRCRAFT PROCEDURES

In the event one aircraft in the formation develops difficulties to the extent that the crew is forced to eject, the responsibility of coordinating a Search and Rescue (SAR) is left with the remaining aircraft. Should the entire formation be involved in a SAR effort, the flight Lead will coordinate a flight split up to establish high/low orbits.

Although it is important to get aid to the downed aircrew, the safe conduct of the remaining members of the flight is equally important. The aircrew who has assumed the On-Scene Commander (OSC) responsibilities, typically the senior member of the flight, will make the necessary voice reports, keep the downed aircrew and aircraft in sight, control the airspace, set a

bingo fuel and formulate a recovery plan. The OSC will also follow procedures outlined in the In-Flight Guide.

705. LOST SIGHT

Lost sight is not to be confused with Blind. Lost sight is the term used when Wing loses sight of Lead after encountering IMC, typically from the parade or cruise positions. Blind is the term used when the aircrew in one aircraft of a flight does not have visual contact with the other aircraft during dynamic maneuvering (i.e. tail-chase, TacForm, etc.).

Lost sight when flying formation in IMC can be very disorienting and potentially dangerous. The two main objectives after losing sight are *Separation* and *Communication*. Procedures and associated communications are listed below for various situations (use your tactical callsign when making these calls). Both aircraft shall conform to the procedures below to ensure separation. The general theme for all instances is that Wing should immediately call lost sight and “break the trend” of the maneuver. Once separation is achieved, Lead will coordinate either a VFR join-up or separate IFR clearances.

NOTE

If the below procedures are accomplished at a point when RAIDER 12 has the administrative flight lead, each aircraft will use their pre-assigned flight tactical callsign number, regardless of position in the flight. Tactical callsigns will not change based on position in the flight.

1. Inadvertent IMC (flight on a VFR clearance) – Straight and level

Wing - Immediately transition to an instrument scan and execute a ½ Standard Rate Turn (SRT) away from the Lead for 30° of heading change. Maintain the new heading for 30 seconds. When directed by Lead, turn another 150° away from the Lead using a ½ SRT.

Lead - Maintain straight and level flight for 30 seconds after the Wingman separates. Utilizing a ½ SRT, turn away from Wingman to the reciprocal heading and then communicate with Wingman. *After becoming established on the reciprocal heading, the formation should visually reacquire each other as they return to VMC conditions.*

Example of communications:

Wing: "RAIDER 12, lost sight." (Wing commences a ½ SRT away from Lead)

Lead: "RAIDER 11 copies, heading XXX."

Wing: "RAIDER 12."

Wing: "RAIDER 12, heading YYY, hack." (YYY is 30° past XXX)

Lead: "RAIDER 11."

After 30 seconds:

Lead: "RAIDER 12, you are cleared right/left to heading ZZZ." (ZZZ is the reciprocal heading of XXX)

Wing: "RAIDER 12."

2. IFR Clearance – Straight and level

Wing - Transition to instrument scan and execute a ½ SRT away from Lead for 30° of heading change. Maintain new heading for 30 seconds. Communicate with Lead. After 30 seconds, turn to Lead's heading.

Lead - Maintain heading and altitude and reply to Wingman using directive communications when applicable. Advise ATC of the situation and either conduct a join-up if visual contact is re-established or arrange for a separate clearance for the Wingman.

Example of communications:

Wing: "RAIDER 12, lost sight." (Wing executes a ½ SRT away from Lead)

Lead: "RAIDER 11 copies, heading XXX."

Wing: "RAIDER 12."

Wing: "RAIDER 12, heading YYY, hack."

Lead: "RAIDER 11."

After 30 seconds:

Lead: "RAIDER 12, you are cleared right/left to heading XXX."

Wing: "RAIDER 12."

3. Lead making a level turn INTO the Wingman

Wing - Transition to an instrument scan, reduce power (to affect nose-tail separation), and continue turn to new heading (30° from Lead's heading). Advise Lead and direct them to roll out.

Lead - Immediately roll wings level, notify Wingman of your heading, and communicate with ATC for a separate Wingman clearance for either a VFR join-up or separate RTBs.

Example of communications:

Wing: "RAIDER 12, lost sight, Lead roll out." (Wing continues turn and reduces power)

Lead: "RAIDER 11 copies, rolling out heading XXX."

Wing: "RAIDER 12." (Wing continues turn to heading YYY, 30° beyond Lead's heading)

Wing: "RAIDER 12, heading YYY, hack."

Lead: "RAIDER 11."

After 30 seconds:

Lead: "RAIDER 12, you are cleared to heading XXX."

4. Lead making a level turn AWAY from Wingman

Wing - Transition to an instrument scan, roll wings level immediately and communicate with Lead. After 30 seconds, turn to the cleared heading.

Lead - Continue turn to new heading (30° from Wingman's heading). Make applicable directive communications with Wingman and call ATC.

Example of communications:

Wing: "RAIDER 12, lost sight, rolling out heading YYY."

Lead: "RAIDER 11."

Upon reaching heading XXX (30° from Wing):

Lead: "RAIDER 11 rolling out heading XXX, hack."

Wing: "RAIDER 12."

After 30 seconds:

Lead: "RAIDER 12, you are cleared to heading XXX."

Wing: "RAIDER 12."

5. Climbs and Descents

Wing - Will call lost sight and level off. The previously discussed procedures for turns still apply.

Lead - Will continue to climb or descend to the cleared altitude or to an intermediate altitude providing at least 500 ft of separation from Wing. The previously discussed procedures for turns into and away from Wing still apply.

Example of communications:

Lead turning away from Wing and passing 6500 for 9000:

Wing: "RAIDER 12, lost sight, rolling out heading YYY."

Lead: "RAIDER 11 copies, passing 6500 for 9000."

Upon reaching heading XXX:

Lead: "RAIDER 11 passing 7000, heading XXX, hack."

Wing: "RAIDER 12."

After 30 seconds:

Lead: "RAIDER 12, you are cleared to heading XXX and cleared climb to 8500, RAIDER 11 is established at 9000."

Wing: "RAIDER 12."

Lead turning into Wing and passing 7500 for 5000:

Wing: "RAIDER 12, lost sight, Lead roll out."

Lead: "RAIDER 11, rolling out XXX, passing 7500 for 5000."

Upon reaching heading XXX:

Wing: "RAIDER 12, rolled out heading YYY, hack."

Lead: "RAIDER 11."

After 30 seconds:

Lead: "RAIDER 12, you are cleared to heading XXX and cleared to descend to 5500."

Wing: "RAIDER 12."

7-6 FORMATION EMERGENCIES

NOTE

Lead has a few options in the above scenario. They could have opted to level off at 7000 ft (providing 500 ft of altitude separation from Wingman) instead of going all the way to 9000 ft. In either case, it is important for Lead to take control of the situation and then advise ATC of the situation and the flight's intentions. Good headwork and procedural knowledge are important in all lost sight situations.

706. BLIND

An aircraft is blind if, during dynamic maneuvering (tail-chase, TacForm, etc.), both crewmembers expect to see the other aircraft but do not. If this happens to the Wingman, the Wingman should call "blind." It is then Lead's responsibility to direct the Wingman's eyes back onto the lead aircraft. If the Lead is also blind, Lead should immediately be directive ensuring *altitude separation*, followed by coordination to get the flight back together. In the case where Lead cannot see the Wingman, but Wingman has Lead in sight, it is Wingman's responsibility to call their position off Lead using the clock-code to help Lead reestablish visual contact. The following is an example of this flight coordination:

Wing: "RAIDER 12, blind."

If Lead is Blind:

Lead: "RAIDER 11 is blind at 9000 ft, heading 360."

Wing: (Wingman will deconflict by a minimum of 500 ft, without going through Lead's altitude) "RAIDER 12 leveling at 9500 ft."

If Lead has visual contact:

Lead: "RAIDER 11 is at your 2 o'clock slightly high, 1 mile."

Wing: (Once Lead is in sight) "RAIDER 12, visual."

707. TERMINATE AND KNOCK-IT-OFF PROCEDURES

There may be times during formation flight when a member of the flight deems it necessary to stop maneuvering. Depending on the urgency of the situation, the formation may utilize the phrases "terminate" or "knock-it-off." Typically, "terminate" is the term to use when training is complete, for a crewmember getting sick, or in any other non-safety of flight scenario. "Knock-it-off" is used when safety of flight issues arise such as when an outside aircraft finds their way into your airspace or there is an emergency within your aircraft such as a CHIP light or a crewmember has G-LOC'd due to poorly executing the Anti-G Straining Maneuver (AGSM).

When either of these calls is made, Lead will maneuver in a predictable manner to a safe flying attitude. Utilizing directive comms Lead will then make their intentions known to the flight. As with all communications in aviation, it is critical to use the proper format when making these calls. To initiate a "terminate" call, any member of the formation will state "RAIDER, terminate." To initiate a "knock-it-off" call, any member of the formation will state "RAIDER, knock-it-off." Regardless of who initiated the terminate or knock-it-off, each aircraft in the flight will respond in tactical callsign number order with a "roll call" acknowledging the initial call.

Example of a "knock-it-off" call that was initiated by the flight Lead:

Lead: "RAIDER, knock-it-off...RAIDER 11 knock-it-off."

Wing: "RAIDER 12 knock-it-off."

Example of a "terminate" call initiated by the Wingman:

Wing: "RAIDER terminate."

Lead: "RAIDER 11 terminate."

Wing: "RAIDER 12 terminate."

NOTE

The only pre-planned "terminate" calls will be following tail-chase maneuvering and any called or uncalled tactical formation sequence.

CHAPTER EIGHT FORMATION VISUAL SIGNALS

800. INTRODUCTION

Good formation discipline depends on the proper use and execution of visual signals. A well briefed and disciplined formation can conduct an entire flight with a surprisingly small amount of talking between the two aircraft. In general, there are two types of formation visual signals; those given using aircrew (e.g. a shoulder pat), and those given using the aircraft (e.g. a porpoise). These signals cover most maneuvers encountered and preclude the need for in-flight radio transmissions.

Aircrew signals are generally used anytime the Wingman is close enough to see them, such as in the parade position or cruise. Signals must be clearly visible to the other aircraft, so hand signals need to be exaggerated and given well above the canopy rail. As Lead, when initiating any signal, pass the signal first, then pull the signal down and look at the Wingman for a response (i.e. Wing returns a thumbs-up or executes the desired maneuver). This will reduce the time Lead spends looking aft and thus enhances both outside scan and basic airwork. Coordinated signal passing from the same cockpit presents a disciplined military appearance and avoids confusion. The Lead SNFO should direct the execution of the signal to the instructor over the ICS. An example cadence, “Crossunder signal, ready, ready, now.” After a second, both Lead aircrew then drop their signals, and the SNFO immediately follows with “ready, ready, look.” Always give signals with the hand nearest your playmate; typically, *aircraft signals* are reserved for when the Wingman is not close enough to see *aircrew signals*, such as when the Wingman is in combat spread. In the event that Wingman is outside the aircrew signal range and no aircraft signal exists for the desired maneuver, use the tactical frequency.

NOTE

Any signal that is timed upon actuation of controls (brake release, gear movement) will be accomplished by the *pilot* only. Also, due to the unique characteristics of the lead change, the Lead pilot will look at Wing as he/she passes this signal and gives the signal across the cockpit to ensure a safe, positive change of the lead. The lead change will involve only the pilots; students shall keep their hands below the canopy.

801. AIRCREW VISUAL SIGNALS

General Signals:

<u>MEANING</u>	<u>SIGNAL</u>
1. Affirmative (I understand, ready to go)	Thumbs-up, or head nod.
2. Negative (I do not know, not ready to go)	Thumbs-down, or head shake.

- | | | |
|----|------------------------|---|
| 3. | Wait | Fist held up with palm outward. |
| 4. | Ignore last signal | Hand waved in an erasing motion in front of face, with palm turned forward. |
| 5. | Numerals, as indicated | With forearm vertical, extend fingers to indicate desired number from one to five. With forearm horizontal, indicate number which added to five, gives desired number from six to nine. A clenched fist indicates zero. |
| 6. | I am in trouble | Arm bent across forehead, weeping (used only when NORDO). |
| 7. | Ejecting | Both clenched fists pulled downward across the face to simulate pulling the face curtain. |

Takeoff Signals:

- | <u>MEANING</u> | <u>SIGNAL</u> |
|---------------------------|---|
| 1. Run-up signal | Extend arm vertically with two fingers extended. Rotate wrist forward and aft. |
| 2. Interval Takeoff | Kiss off performed on runway. |
| 3. Section Takeoff | (Lead pilot only) Extend arm vertically. Lower in the smooth chopping motion until horizontal. Once arm motion stops, both pilots release brakes. |
| 4. Gear retraction signal | (Lead pilot only) Nods head forward, then sharply raises head and moves gear handle. |

In-Flight Signals:

<u>MEANING</u>	<u>SIGNAL</u>
1. Fuel check/Cruise check	Raise fist with thumb extended in a drinking motion on Wingman side.
2. Cruise position	Hitchhiking motion of thumb alternating over each shoulder.
3. Crossunder	Extend forearm vertically with fist clenched.
4. Breakup and rendezvous	Same as run-up signal: extend arm vertically with two fingers extended. Rotate wrist in forward and aft.
5. Kiss off/Detach	Fingers joined together on side of helmet (back of hand facing canopy), then make a splat motion toward Wingman, extending all fingers and back of hand against canopy.
6. Rejoin to parade	Pat shoulder (or aircraft porpoise).
7. Push it up	Fingers held together straight, open palm toward direction of flight. Hand moved in a forward motion repeatedly.
8. Offer lead change	Lead pilot taps the front of his helmet three times and then points to the Wingman.
9. Lead change	Wingman pilot taps the front of his helmet three times and then points forward.
10. Prepare to extend speedbrake	Open and close 4 fingers against thumb with fingertips pointing forward simulating speedbrake. Wing will extend the speedbrake upon seeing Lead's extend.
11. Take Combat Spread	Hand vertical, palm facing outboard. Hand moved in a push away motion repeatedly.

Landing Signals:

<u>MEANING</u>	<u>SIGNAL</u>
1. Fan break	Prior to the break, raise hand vertically (palm inboard), motion arm toward inside of cockpit simulating "come with me."
2. 3-second break	Same as run-up signal.
3. Prepare to lower/raise gear	Rotary movement of hand in cockpit (palm forward) as if cranking the wheels down.
4. Lower/raise gear	(Lead pilot only) Nods head forward, then sharply raises head and moves gear handle.

NOTE

In the T-6, the landing gear and flaps are lowered/raised together (to/from the "TO" position) using only the "Prepare to lower/raise gear" and command of execution. A separate raise/lower flap command is neither required nor expected.

5. Prepare to lower/raise flaps	Open and close four fingers against thumb with fingertips pointing aft simulating flaps.
6. Lower/raise flaps	Lead pilot only nods head forward then raises head sharply while moving the flaps.
7. The formation is cleared to land	Lead pats the glare shield.
8. Wingman is cleared to land	Lead pats the glare shield then points to Wingman.

Electronic Communications:

<u>MEANING</u>	<u>SIGNAL</u>
1. Change PRI radio to preset frequency	Tap ear, extend forearm vertically, and indicate by fingers the number of the preset frequency.
2. Change radio to manual frequency	Tap ear, extend forearm vertically, followed by the numbers of the manual frequency.

Equipment Malfunction (HEFOE signals, used in the event of communications failure):

<u>MEANING</u>	<u>SIGNAL</u>
1. I am having difficulty	Arm bent across forehead, weeping
2. Hydraulic trouble	One (1) finger extended upward
3. Electrical trouble	Two (2) fingers extended upward
4. Fuel trouble	Three (3) fingers extended upward
5. Oxygen trouble	Four (4) fingers extended upward
6. Engine trouble	Five (5) fingers extended upward
7. Radio receiver or transmitter inoperative	Tap microphone or ear, give thumbs-up or down, as appropriate.

802. AIRCRAFT VISUAL SIGNALS

<u>MEANING</u>	<u>SIGNAL</u>
1. Go to the parade position	Aircraft porpoise
2. NORDO or Knock-It-Off	Aircraft wing rock

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER NINE

SECTION NAVIGATION PROCEDURES

900. INTRODUCTION

The purpose of the formation navigation flight is to introduce SNFOs to the basic considerations and procedures required for maneuvering a formation in the low altitude environment. The formation navigation flights are very involved and require significant preparation, brief, and debrief. You will be introduced for the first time to the true low altitude environment by flying the VFR Military Training Route (VR)-1024. The formation procedures previously discussed in this FTI will be applicable to the section navigation flights.

The section formation flight will typically be flown as an out-and-in utilizing the VR-1024. One SNFO will lead the entire first flight (VR-1024 points A-G) and then fly as Wing on the second flight (VR-1024 points G-M). Prior coordination with your instructor on the selection of your out and in destination is required. Typical destinations are Meridian Key Field (KMEI), Hattiesburg-Laurel (KPIB), or Hammond (KHDC); however, if the VR-1024 low level is unavailable (scheduling problems, weather, etc.), then any local area Visual Navigation (VNAV) route may be flown instead (SNFOs will have their VNAV charts available).

The goal of these flights is to allow the SNFO to act as a mission commander using all of the knowledge accumulated during the previous flights. To that end, the SNFO will be expected to direct the flight, making any necessary decisions. The instructor will, to the maximum extent possible, act as a safety observer and intervene only as necessary.

901. FLIGHT PREPARATION

1. The VR-1024 low level route is described in detail in the AP-1B publication. Refer to the current AP-1B for MTR specific procedures, turnpoint coordinates, corridor widths, required altitudes, and route restrictions.
2. Your low level chart will be constructed the same as it was for VNAVs with a few additions/exceptions:
 - a. Plan for 240 KTS groundspeed instead of 180 KTS; thus, time ticks are now 4 NM apart vice 3 NM.
 - b. A route corridor will be displayed in black ink around the route centerline. Route centerline is drawn between the latitudes and longitudes listed in the AP-1B. Refer to the AP-1B for these lat-longs and the route widths.
 - c. Turn circles will be centered around the coordinates given in the AP-1B. Later on in your training, you will choose any significant feature inside the turn circle to be your actual turnpoint; however, utilize the current CNATRA Stage Manager Memorandum to identify the standard visual turnpoints to be used on this route. The route course

(different from route centerline) will connect the features used as visual turnpoints inside the turn circles.

- d. Place a copy of the AP-1B information for the VR-1024 on the back of your chart.
3. The VR-1024 is an official military training route that any other aircraft can fly. In order to ensure aircraft deconfliction, route entry times must be scheduled and strictly adhered to. You do not want to accidentally get on the route a couple minutes in front of an F-18 doing 420 KTS. Contact the Squadron Duty Officer (SDO) to ensure that your route entry times are properly entered in the Low Level Route Manager online; also reference the flight schedule and low level training rules for deconfliction procedures.
 4. Bird strikes can be very hazardous in the low altitude environment. To reduce the risk, check the bird condition online at www.usahas.com. Bring this information with you to the brief.
 5. Ensure the weather is appropriate for the low level. Per the AP-1B, the required weather to fly a VR route is a minimum of a 3000-foot ceiling and 5 miles of visibility.

NOTE

The students are responsible for having all of their previous VNAV charts with them in case weather precludes the use of the VR-1024 route.

902. LOW LEVEL ENTRY PROCEDURES

1. You must ensure that the formation takes off at the appropriate time in order to meet the flight's low level entry time. It is better to take off early and hold near the entry point than to be late. If you will not make your entry time, either coordinate with the SDO to get a new entry time or abort the mission.
2. Update weather and winds with the local FSS (Flight Service Station).
3. Fence-in and accomplish a G-warm prior to route entry.
4. A radio call is required 5 minutes prior to entering any VR low level route on FSS 255.4. The radio call should be similar to the following call:

Lead: "Any Radio, KATT 621, flight of two T-6's entering VR-1024 Point "A" at 1310, exiting Point "G" 1350, 1000 ft AGL, 240 KTS." (All times in Zulu)
5. Aircraft flying VR routes are required to squawk 4000. The flight Lead must ensure the squawk is changed to 4000 no later than the entry point. As a technique, switch the squawk at the 5 minute prior call.

9-2 SECTION NAVIGATION PROCEDURES

6. The flight Lead will usually keep the Wingman in cruise position until lined up on the first low level route heading. Once lined up, push the Wingman out to combat spread. Brief which side you want your Wingman on for route entry.
7. Both aircraft must hack the clock at route entry. Lead SNFO will call the mark-on-top at Point "A" in the form of a time-hack over AUX tac.

903. LOW LEVEL FLIGHT OPERATIONS

1. Normal VNAV turnpoint procedures will be used by both aircraft on the low level with a few exceptions/additions:
 - a. The route will be flown at 240 Knots True Air Speed (KTAS). Typically this equates to approximately 230 KIAS for normal temperatures. Airspeeds will not be changed on the route to compensate for winds; instead, Estimated Time of Arrival (ETA) to the next point will be updated as required.
 - b. Turns on the VR-1024 will be *called* over AUX tac. When the Lead SNFO calls for each turn, the flight has marked on top of the corresponding turnpoint.
 - c. Standard course corrections will be used as before except the correction is different due to the increased airspeed. Use 7° in order to provide $\frac{1}{2}$ NM of course correction for every minute flown.
 - d. The priority for the formation low level is to overfly the turnpoints; therefore, if the lead aircraft has the turnpoint in sight, they will accomplish an uncalled check turn to overfly the turnpoint. This turn will minimize the need for large course corrections while promoting formation integrity.
 - e. Both aircraft will monitor 255.4 for the entire low level route.
2. The route will be flown at or above 1000 ft Above Ground Level (AGL) (unless route restrictions dictate otherwise). SNFOs will determine the highest terrain on a route leg (+/- 5 NM from route centerline) and add 1000 feet to it in order to determine a Mean Sea Level (MSL) altitude to fly for each leg. The Wingman will fly the route with 200 feet of step-up from Lead.
3. The goal of the low level flight is to "hit" the target. To simulate a target attack, the flight may execute a called shackle to cross over the target.

904. ROUTE EXIT PROCEDURES

1. For deconfliction reasons, all aircraft will exit the low level route in a climbing turn. Once established in the climb, the flight Lead will call for the Wingman to rejoin; additionally, the Lead must change the squawk back to 1200 upon exiting the route.
2. Make the required call on FSS 255.4 when exiting the MTR.

3. Fence-out.
4. The lead aircraft will then navigate the formation to the appropriate airport using a combination of visual and instrument navigation procedures. Instrument approaches or the break will be accomplished IAW the requirements in the Multi-Service Student NFO Training System (MNTS) Curriculum Guide (CNATRINST 1542.155B).

905. ROUTE ABORT

Should the need arise to abort the route for weather, the flight shall: initially turn 180° and avoid the weather. If weather cannot be avoided, both aircraft will begin a max power climb to route abort altitude. Both aircraft should also check away from each other; lead will be directive and give headings. Minimum Safe Altitude (MSA) within 350 miles of Navy Pensacola (NPA) is 3,200 feet Mean Sea Level (MSL). Lead will climb to 3,200 feet and Wing will climb to 3,700 feet MSL.

APPENDIX A GLOSSARY

ABEAM: A position, either on the left or right side, which is 90° off the longitudinal axis of the aircraft.

ACUTE: A condition in which the Wingman is positioned forward of a designated bearing line.

BANDIT: Term used for a hostile aircraft.

BEARING LINE: An imaginary line drawn aft from the Lead's 3/9 line. The bearing line is the angular difference between the Wingman's aircraft and Lead's 3/9 line (i.e., being established on the 60° bearing line means the Wingman is offset 30° from Lead's six o'clock position).

BINGO: A predetermined fuel state informing the formation that a flight member is at a fuel state where he needs to recover to the planned destination in order to land with minimum fuel requirements.

BLIND: A term used by Wing to communicate that he has lost visual contact with the lead aircraft when VMC.

BREAKUP: A maneuver utilized to separate the formation aircraft and establish them in trail or column.

CHECK SIX: A visual lookout to check the aircraft or formation's six o'clock position for a potential adversary.

CHECKPOINT: A selected point or set of points, on the lead aircraft, which are utilized by the Wingman to determine relative position.

CLOSURE RATE: The relative rate at which the wing aircraft is approaching (or "closing on") the lead aircraft.

CROSSUNDER: A maneuver utilized to change the position of the wing aircraft from one side of the Lead to the other.

CUTOUT: A visual checkpoint on the T-6A referring to the outermost or innermost corner of that portion of the wing that has been cut out to allow installation of the aileron.

DASH TWO: A radio communication term used to refer to the Wingman in a formation.

FLIGHT INTEGRITY: The ability of the Wingman to maintain the proper relative position while the formation is performing maneuvers.

JOKER: A predetermined fuel state (above bingo fuel) informing the formation that a flight member is at a fuel state whereas the present maneuver needs to be terminated in order to

accomplish remainder of planned profile and land with minimum fuel requirements at planned recovery base.

KNOCK-IT-OFF: A radio call used by a flight member to alert the formation to cease maneuvering. This radio call should be used when safety of flight is in question and may be initiated by any flight member.

LOST SIGHT: A term used by the Wingman to communicate that he has lost visual contact with the lead aircraft when IMC.

NEW SIX: This is the formation's new six o'clock position at the conclusion of a tactical turn or maneuver. Checking this position will normally be assigned to a specific crewmember during a tactical turn, to maximize visual lookout opportunities and enhance visual lookout doctrine.

NOSE-TO-TAIL: The distance from the nose of the wing aircraft to the tail of the lead aircraft.

OLD SIX: This is the formation's current or old six o'clock at the conclusion of a tactical maneuver or turn. Checking this position will normally be assigned to a specific crewmember during a tactical turn, to maximize visual lookout opportunities and enhance visual lookout doctrine.

PARADE POSITION: A fixed position on the 45° bearing line on either the left or right side of the lead aircraft with 5 ft of stepdown and 3 ft of wingtip separation.

PLAYMATE: A term used when referencing aircraft participating in your formation.

PROP ARC: A visual checkpoint on the T-6A, referring to the outermost portion of the circle created by the tips of the propeller blades in motion.

RATE OF ROLL: A roll rate in which AOB is achieved.

RENDEZVOUS: A maneuver where the formation aircraft are maneuvered into a position where a join-up may be performed.

SHAKE OFF: A visual signal (negative head shake) given by the Wingman to indicate he is not prepared to execute the next maneuver or required action.

STACK: A visual checkpoint on the T-6A, referring to the trailing edge of the exhaust stacks.

STAGNATED ON THE BEARING: A condition during the rendezvous where the wing aircraft ceases to continue closing on the lead aircraft.

STEPDOWN: The vertical distance between the lead and wing aircraft.

SUCKED: A condition in which the Wingman is positioned aft of a designated bearing line.

TAIL CHASE: An exercise designed to demonstrate the concepts of lead, lag, and pure pursuit while dynamically maneuvering the section.

TERMINATE: A radio call (normally initiated by the flight Lead) to terminate an exercise or maneuvering. This differs from the knock-it-off call in that it is anticipated/expected (i.e., after tail chase).

TRAIL: A formation pattern where Wing is directly behind the lead aircraft.

UNDERRUN: A maneuver utilized to allow the wing aircraft to pass below, behind, and outside the lead aircraft's radius of turn in the event that the rendezvous becomes unsafe.

THIS PAGE INTENTIONALLY LEFT BLANK

**APPENDIX B
BRIEFING BOARD**

The briefing board for all formation flights will appear as follows. Included on the board will be the flight's callsign as per the flight schedule as well as the tactical callsign chosen by the students. The tactical callsign is used to differentiate various formation flights from the same squadron that may be airborne concurrently. The students should also have a lineup card containing the following information to hand out in the brief.

1. Admin

(if available)

KATT 621 Maj Hoffman/ENS Smith #969, A-10

KATT 621-2 LT Johnson/ENS Williams #972, A-11

Tactical Callsign "RAIDER 11/12" Joker: _____ Bingo: _____

Brief - 0700, Walk - 0850, Start - 0910, Taxi - 0920, T/O - 0930, Land - 1130

2. Weather and NOTAMS NPA, BFM, MVC (or any other field to be used)

3. Communications: PRI tac: 362.8 (20) AUX tac: 123.37 (.57, .67...)

(Example communications plan for mission to MVC and RTB)

To MVC: 1-2(L)-PRI tac-19(L)-3-(4)-6-16.....PRI tac.....

.....AUX tac.....5(L)-AUX tac-123.0.....

RTB: PRI tac.....6-16.....1(W)-16-6-4-(3)-(19).....

AUX tac-123.0-AUX tac.....5(L)-AUX tac.....

4. Conduct

Parade Sequence (F5001)

Marshall/Taxi

Parade Turns (into and away)

Takeoff (Sect Go/Run Rndz)

Crossunder

Departure

Parade Turns (into and away)

Parade sequence/Tac Turn Sequence

Simulated Lost Sight Exercise

Lead change

G-warm

Parade sequence/Tac Turn Sequence	Breakup and Rendezvous
Lead Change	Breakup and Rendezvous (underrun)
Recovery (Instrument Approaches/Break)	Tail Chase Exercise
5. Emergencies (list)	<u>Tac Turn Sequence (F5002)</u>
Q.O.D/E.O.D	Tac Turns (Called/Uncalled)
Aborted Takeoff	45 Turns (Called/Uncalled)
Divert Fields	In-Place Turns (Called/Uncalled)
Minimum and Emergency Fuel (Joker/Bingo)	Cross Turn (Called Only)
Wave Off Pattern	Shackle (Called/Uncalled)
Radio Failure/ICS (HEFOE)	
Lost Sight	
Damaged Aircraft/Midair	
Aircraft Emergencies and System Failures	
Ejection	
Wake Turbulence	
Low-Level Training Rules	

6. The F5101/F5102 briefing board will be similar to the F5001/F5002 except the route, typically VR-1024, will be drawn on the board. Students will draw a general description of each point as well as general hazards along the route of flight. The students will also ensure that the VR-1024 scheduled route entry and exit times are included in the event timeline (in admin portion of the briefing board). Scheduled route entry and exit times will be discussed as part of the route brief (route entry plan).

APPENDIX C ACRONYMS

AGL - Above Ground Level

AGSM - Anti-G Straining Maneuver

AOB - Angle of Bank

AP - Area Planning

ATC - Air Traffic Control

ATIS - Automated Terminal Information Service

AUX - Auxiliary Radio (VHF Radio)

BAC - Basic Approach Configuration

CFS - Canopy Fracturing System

CRM - Crew Resource Management

CTAF - Common Traffic Advisory Frequency

DME - Distance Measuring Equipment

E.O.D. - Emergency of the Day

ETA - Estimated Time of Arrival

FAF - Final Approach Fix

FOD - Foreign Object Damage

FSS – Flight Service Station

FTI - Flight Training Instruction

GP - General Planning

GPS - Global Positioning System

HEFOE - Hydraulic, Electrical, Fuel, Oxygen, and/or Engine

IAW - In Accordance With

ICS - Internal Communication System

IFR - Instrument Flight Rules

IMC - Instrument Meteorological Conditions

INAV - Instrument Navigation

KIAS - Knots Indicated Airspeed

KTAS - Knots True Airspeed

KTS - Knots

L - Lead

MNTS - Multi-Service Student NFO Training System

MOA - Military Operations Area

MSA - Minimum Safe Altitude

MSL - Mean Sea Level

NATOPS - Naval Air Training and Operating Procedures Standardization

NFO - Naval Flight Officer

NM - Nautical Miles

NORDO - No Radio

NOTAM - Notice to Airmen

NPA - Navy Pensacola

OPNAV - Office of the Chief of Naval Operations

OSC - On Scene Commander

PCL - Power Control Lever

PRI - Primary Radio (UHF Radio)

Q.O.D. - Question of the Day

RTB - Return to Base

SA - Situational Awareness

SAR - Search And Rescue

SDO - Squadron Duty Officer

SNFO - Student Naval Flight Officer

SOP - Standard Operating Procedures

SRT - Standard Rate Turn

TAC - Tactical

TAS - Traffic Avoidance System

UHF - Ultra High Frequency

VFR - Visual Flight Rules

VHF - Very High Frequency

VMC - Visual Meteorological Conditions

VNAV - Visual Navigation

VOR - VHF Omni-directional Range

VR - VFR Military Training Route

W - Wing/Wingman

THIS PAGE INTENTIONALLY LEFT BLANK