FLIGHT TRAINING INSTRUCTION

FORMATION HELICOPTER ADVANCED PHASE TH-57

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1. CNATRA P-430 (Rev 10-23) PAT, "Flight Training Instruction, Navigation Advanced Phase, TH-57" is issued for information, standardization of instruction, and guidance to all flight instructors and student military aviators within the Naval Air Training Command.

2. This publication is an explanatory aid to the Helicopter curriculum and shall be the authority for the execution of all flight procedures and maneuvers herein contained.

3. Recommendations for changes shall be submitted via the electronic Training Change Request (TCR) form located on the Chief of Naval Air Training (CNATRA) Web site.

4. CNATRA P-430 (New 10-20) PAT is hereby cancelled and superseded.

T. P. ATHERTON
By direction

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FLIGHT TRAINING INSTRUCTION

FOR

FORMATION HELICOPTER ADVANCED PHASE TH-57

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LETTER	0		
iii - viii	0		
1-1 – 1-8	0		
2-1 – 2-36	0		
3-1 – 3-4	0		
A-1 – A-2	0		
B-1 – B-2	0		
C-1 – C-4	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

INTRODUCTION

This Flight Training Instruction (FTI) provides you amplifying information covering Formation Flight and Section Low-Level Formation. You have to draw upon and apply the fundamentals you have learned from the previous modules of instruction to successfully complete this module. The concepts of formation flight is the capstone of this stage. The objective of formation flying is to employ and control multiple aircraft flying in close proximity to accomplish an assigned mission in a manner that will minimize the effectiveness of enemy opposition.

SCOPE

This publication contains maneuvers introduced in the Formation and stage of the Advanced Helicopter Multi-Service Pilot Training System (MPTS) Master Curriculum Guide (MCG) (CNATRAINST 1542.156 Series). It is your responsibility to have a thorough knowledge of its contents.

CHANGE RECOMMENDATIONS

Change recommendations to this publication may be submitted by anyone to Commander Training Air Wing FIVE and Chief of Naval Air Training (CNATRA) N7, a process which improves training curricula and its associated training publications. This includes all personnel involved at every level of flight training. A Training Change Request (TCR) form should be completed and submitted for routing to the standardization office of your respective squadron. Remember, no TCR is too small.

TABLE OF CONTENTS

TABLE OF FIGURES

CHAPTER ONE
FORMATION COMMUNICATIONS

100. INTRODUCTION

This chapter introduces the student to the basic fundamentals of communications within a formation of aircraft. The procedures contained herein are intended to provide a foundation for communication which will meet most mission requirements.

101. COMMUNICATIONS

1. Application

In any combat situation, command and control is critical. Good communications are essential to winning on the modern battlefield. The enemy will employ various methods to disrupt communications. To the aviator, this means effective use of the radios. Even when the enemy is not using jamming, they might be monitoring aviation nets for intelligence. Improper radio discipline could cost lives. Tactical situations dictate prudent use of all available communications.

Clear and concise communication is essential for effective aircraft employment. Communication brevity is used to alleviate confusion and provide a common knowledge of critical information during tactical operations. Standard brevity terms are an essential element because it reduces the time required to transfer information and enhances understanding without reducing the quality of information in the transmission. Communication cadence is also essential as it assigns each member of the flight a priority for communications depending on the phase of the mission. However, each member of the flight is allowed to talk by exception to increase the flight's overall Situational Awareness (SA). A critical point of comm brevity and comm cadence is that it not only tells aircrew when to talk, but also, and more importantly, when to listen. Standardized radio procedures will significantly reduce unneeded radio transmissions, thus denying the enemy valuable information.

Detailed communication planning is also essential. During the planning phase, do not rely on electronic communications. Anticipate the need for visual signals, brevity codes, and ground reference points to aid in communication. Plan the mission from beginning to end in detail emphasizing simplicity.

A thorough mission brief is the start of your communication plan. When little to no verbal communication is used, each aircrew member must be thoroughly familiar with the mission and its execution. This familiarity must be such that if the lead aircraft is compromised, any member of the flight may complete the mission.

Great care should be taken in the brief presentation. The bulk of the brief should be spent on the execution portion, specifically the actions in the objective area. Administrative matters should be covered but should not be the focus of the brief.

Whenever possible, the briefer should present the flight members with copies of all pertinent information in what is called a "Smartpack" (covered in Chapter Three). This will cut down drastically on time spent and mistakes made in hand copying information. Thus, the aircrew can pay full attention to the briefer.

A time for questions at the end of the brief will ensure each individual fully understands the mission and their role.

2. **External Communication Procedures**

External communications are those done with agencies or individuals outside your section. All external radio communications will utilize an external call sign, which will be your Section Lead's call sign. Initial communication with an external agency will require the external call sign followed by how large the flight is. For example: *"Approach, Eightball 123, flight of two, request."* Subsequent communication transmissions with the same external agency can replace "flight of 2" with "and flight."

3. **Internal Communication Procedures**

Internal communications are those done between the aircraft in the section. Usually in the fleet, your external call sign is your internal call sign. In the training command, each section is allowed to come up with their own internal call sign. This call sign should be two syllables and shall be professional. The Section Lead reserves the right to veto any inappropriate or unsuitable internal call sign. The internal call sign alleviates confusion over common frequencies when multiple sections may be established in the training area. If the internal call sign is "Rooster," Lead will be "Rooster 1" and Wing will be "Rooster 2." Wing position will use "Rooster 2" throughout the conduct of the flight. When either aircraft directs the section to do something, they will use their internal call sign: "Rooster flight, push button 6." When rogering up to a direction from Lead, the response is your internal call sign. The exception to this is rogering up the maneuvers in the working area or at the OLF. Follow the examples provided in Appendix C, Formation Communication Script, for those communications.

All pilots should know and practice sound communication brevity and cadence. This means listening and responding appropriately to only those transmissions affecting them. The following standard communication procedures will be utilized during the formation phase of training.

a. Radio Check-in Procedures. The Section Lead will check the flight in at the beginning of the flight or following a frequency change to ensure everyone in the flight is up on the desired frequency. This is accomplished by calling "check radio" utilizing the flight call sign. A check-in is always done at the beginning of a formation flight to ensure each radio is working properly in each aircraft, and that all aircraft are ready to continue with the briefed timeline. After a positive or automatic switch, a check-in may be required to ensure the flight is on the correct frequency.

Example:

Lead - *"Rooster flight, check Uniform/Victor"*

Wing - *"Rooster 2"*

b. **Frequency Changes.** There are two basic ways to accomplish a frequency change. These are:

i. **Positive Switch.** Under this method, the flight is directed to make a frequency change. This direction comes in the form of a radio call. This direction may come from someone within the section or an agency external to the flight (e.g., Clearance Delivery, Ground, Tower, or Approach Control).

Example:

Lead - *"Rooster flight, push ground"*

Wing - *"Rooster 2"*

(All aircraft now switch to ground)

Lead - *"South Ground, (aircraft call sign), flight of two, taxi…"*

Utilization of the positive control method ensures all aircrew hear and comply. This will also ensure no one gets lost among the frequency changes.

ii. **Automatic Switch.** Under this type of frequency change, the flight will change frequencies as specified in the brief. This could be a specific time or over a pre-designated visual check point. This method depends on each aircrew member taking detailed notes in the brief and paying very close attention during the flight. These frequency changes may or may not be accompanied by a check-in which should be covered in the brief.

Example:

Lead - *"South Ground, (aircraft call sign), flight of two, taxi…"*

Ground - *"Roger, (aircraft call sign) and flight, you're cleared to taxi…"*

Lead - *"(Aircraft call sign) and flight, Roger"*

(The flight taxis as instructed, and all aircraft automatically switch to tower frequency when Lead is 200 feet from the hold short).

Lead - *"Tower, (aircraft call sign), flight of two, number one holding short…"* The automatic switch requires more detailed planning. The switch from one frequency to the next may be accomplished in many different ways (e.g., by time, location or after pre-briefed radio calls).

c. **Negative Check-ins.** Check-ins will not be conducted on Air Traffic Control (ATC) frequencies due to not having a dedicated inter-flight frequency. However, one caveat is that no intra-flight communications be conducted over frequencies the training command does not own, (e.g., ground, tower, approach, etc.), this includes positive switches and check-ins. The exception would be in an emergency like IIMC.

4. **Brevity Code**

In any communication intense environment where an aviator may require brief transmissions, short, explicit transmissions understood by all are mandatory. The use of a standard brevity terms will prove useful to reduce the length of all transmissions.

Each individual is required to memorize all applicable brevity terms. Individuals are discouraged from using brevity codes of their own, as it will tend to confuse matters in critical situations. The following brevity terms should be used during these flights.

ABORT	Cease action/attack/event/mission.
BASE (+/- number)	Reference number used to indicate such information as headings, altitude, fuels, etc.
BINGO	Fuel state needed for recovery.
(system) BENT	System indicated is inoperative. Cancelled by **SWEET**.
BLIND	No visual contact with **FRIENDLY** aircraft/ground position. Opposite of **VISUAL**.
BUSTER	Fly at maximum continuous speed (military power).
BUTTON	Radio channel setting.
CHECK (number, LEFT/RIGHT)	Turn (number) degrees left or right and maintain new heading.
CONTACT	Acknowledges sighting of a specified reference point (either visually or via sensor).
FEET WET/DRY	Flying over water/land.
FUEL STATE (time)	A helicopter's fuel quantity, expressed in hours and minutes before having to make a controlled emergency landing.
HOLDING HANDS	Aircraft in visual formation.
HOME PLATE	Home airfield or ship.
JOKER	Fuel state above BINGO at which separation or BUGOUT or event termination should begin.
KICK (appropriate frequency)	* Change radio or data link to a specified net or frequency. Also see PUSH.
KNOCK IT OFF	Cease all air combat maneuvers/attacks/ activities/exercises (training use only).
LAME DUCK	An aircraft in a minor state of emergency.
LOOKING	Aircrew does not have the ground object, reference point, or target in sight (opposite of **CONTACT**).
ON STATION	Unit/aircraft has reached assigned station.
OPENING	Increasing in separation.
ORBIT(ING)	Hold/ (holding) on current or indicated position.
PIGEONS	Magnetic bearing and range to **HOMEPLATE**.
PLAYMATE	Cooperating aircraft.
(freq) POGO (freq)	Switch to communication channel number preceding **POGO**. If unable to establish communications, switch to channel number following **POGO**. If no channel number follows **POGO**, return to this channel.
POPEYE	Flying in clouds or area of reduced visibility.
PUSH (channel)	Switch to designated frequency; no acknowledgment required.
VISUAL	Sighting of a friendly aircraft or ground position. Opposite of **BLIND**

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Figure 1-1 Joint Brevity Term List

102. LOOKOUT COMMUNICATIONS

In the modern battlefield, survival is intrinsically linked with finding and recognizing the enemy first. The helicopter's primary defensive weapon is avoidance of the threat. It is imperative each crewmember has an assigned lookout sector and each aircraft in a flight has a primary area of responsibility.

Pilots shall assign each crewmember a sector of lookout responsibility. Within the limitations of aircraft configuration, the combination of all such sectors shall provide 360º of lookout around the aircraft. Horizontal lookout sectors shall be overlapping per Figure 1-2 and designated by a clock code with 12 o'clock oriented on the nose of the aircraft. Vertical sectors shall be designated with reference to the aircraft's perceived horizontal reference plane: HIGH is a position above the aircraft, LOW to a position below the aircraft, and LEVEL is a position level with the aircraft.

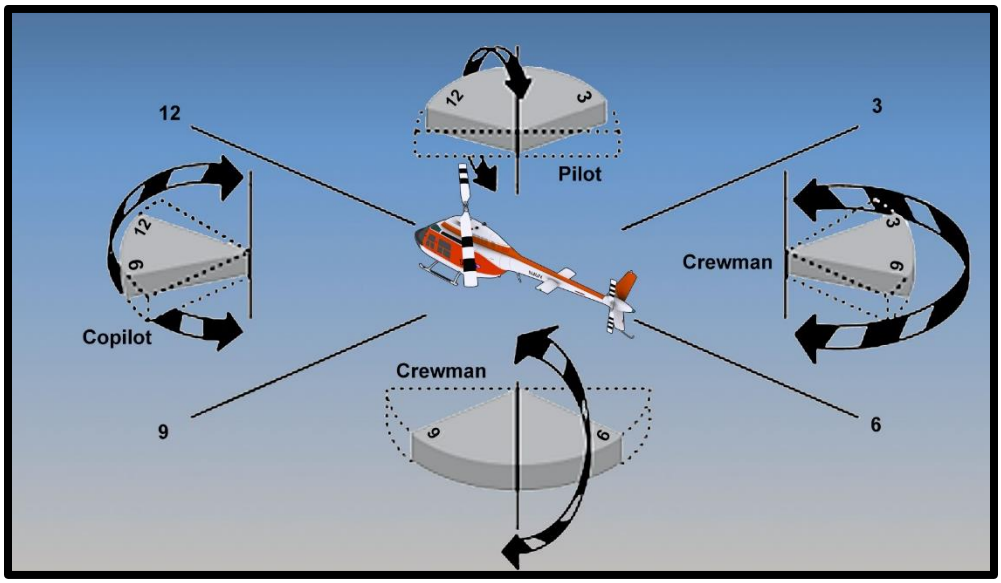

Figure 1-2 Lookout Responsibilities

Individual lookout sectors and responsibilities shall not be modified or relaxed when a helicopter is operating as a flight. Safety of the flight depends on the concept of several sets of eyes scanning the same or overlapping sectors to provide a better chance for timely attack warning than would be the case if each aircraft or aircrew were assigned a separate lookout sector. Clock code references for a flight shall be referenced from Lead's 12 o'clock position.

Any crewmember that observes another aircraft, must immediately inform the pilot of the location and type. The pilot will then alert the flight with a response from all flight members. The position of a fixed-wing aircraft shall be expressed as the relative bearing in clock code and altitude in relation to the aircraft's horizontal reference plane.

Example:

Lead - *"Rooster flight, fixed-wing, five o'clock high"*

Wing - *"Rooster 2, visual"*

a. Visual - refers to sighting of a friendly aircraft or ground position. Opposite of BLIND.

b. Blind - No visual contact with FRIENDLY aircraft/ground position. Opposite of VISUAL.

c. Contact - Acknowledges sighting of a specified reference point (either visually or via sensor)

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CHAPTER TWO
FORMATION FLIGHT

200. INTRODUCTION

This chapter introduces the student to the basic fundamentals of formation flying. The procedures and positions contained herein are intended to provide a foundation for formation flying which will meet most mission requirements.

201. FORMATION FLIGHT

1. Application

It is essential that the basic fundamentals of formation flying be practiced in preparation for combat readiness.

The number of formation aircraft required to accomplish a mission varies. A section will consist of two aircraft, a light division will consist of three, and a division will consist of four (two sections). Five or more aircraft constitute a flight. Within any formation flight, there are certain terms used to designate aircraft within the flight as well as leadership designations or "chain of command" within the flight. **The aircraft commander designated as the Flight Lead is ultimately responsible for mission accomplishment, and provides guidance for the conduct of the flight via a thorough mission brief and in-flight instructions.** The other aircraft are considered the wingmen who are responsible for maintaining flight integrity and complying with the Section Lead's directions. These designations are made prior to the mission, identified on the flight schedule, and adhered to rigidly unless Lead becomes compromised or otherwise unable to carry out the leadership responsibilities. "**Lead" is a term used to indicate the first aircraft in a formation, and the term "Wing" applies to the other aircraft in the flight**. The lead aircraft does not necessarily have to be Lead. For example, a Section Lead can be flying as a wingman in the flight. Regardless of position in the flight, the Lead is ultimately responsible for the overall success or failure of the mission. All discussions in this manual assume a section unless otherwise noted.

Two of the basic types of formations are parade and cruise. **Parade is used primarily when there is a requirement for aircraft to fly a fixed bearing position in close proximity to each other, and maximum maneuverability is not essential**. It is most frequently employed during arrival at or departure from ships or airfields, or during flight demonstrations. Power is varied to maintain position. **Cruise is used to afford Lead more freedom to maneuver the flight while minimizing wingman workload, and allowing Wing more fuel conservation.** Lead must be able to use the formation as an integral unit and still be free to turn, climb, or dive the formation with few restrictions. The cruise formations outlined herein afford that flexibility. Wing will use varied radius of turn rather than power to maintain position.

Combat Cruise formation is designed to provide maximum flexibility and individual aircraft freedom to increase maneuverability, lookout doctrine, and terrain masking for the section. It will be covered more in-depth in Chapter 3.

2. Relative Motion

Essentially, formation flying is nothing more than controlling the relative motion between aircraft. To maintain a fixed position the relative motion must be stopped. To maneuver safely in relation to another aircraft, the direction and rate of motion must be controlled. Lead is considered "fixed" and any movement between aircraft is considered as movement of Wing in relation to Lead. In formation flying, Lead becomes the primary reference, therefore, it is important for Lead to be as stable as possible.

Relative motion can be resolved into movement about any one or a combination of all three axes. Wing's position in relation to Lead will be based on step-up, bearing, and distance. Step-up is commonly used in helicopter formation flight, and is the standard vertical separation between Lead and Wing giving Wing a higher altitude than Lead. Bearing and distance have the same definitions as Primary. Step-up, bearing and distance are mainly changes in only one phase or plane. Step-up is an altitude correction and should be mostly controlled with collective. Bearing is a lateral, horizontal plane correction and should be mostly controlled with lateral cyclic. Distance is a longitudinal, horizontal plane correction and should be corrected by increasing or decreasing airspeed with fore or aft cyclic in addition to some power. Because of the interrelation of controls, it is not possible to entirely correct for undesired movement with any single control. All controls must be coordinated to fly formation properly. During formation training, practice should consist of correcting one plane at a time (set-up, bearing, distance) at first, then progressing to correcting all deviations with multiple control inputs.

3. Lead and Wing Responsibilities

a. Lead provides a stable platform.

b. Wing ensures proper separation from Lead.

c. Lead makes all applicable external radio calls for the section.

d. Lead ensures safe navigation for the flight.

e. Wing backs up Lead on all external radio communications and navigation.

f. Wingman PAC initiates all maneuvers during CNATRA formation training.

g. Lead *"rogers"* all maneuvers during CNATRA formation training.

h. Both aircraft ensure the section is clear from obstacles.

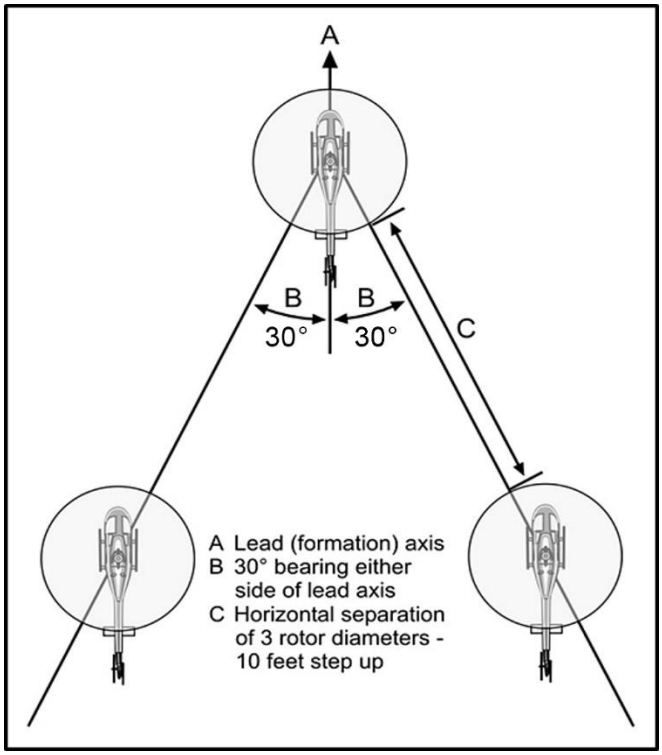

Figure 2-1 Cruise Formation

4. **Formation Positions**

a. **The Cruise Position**

Description

i. Cruise is used en route when maneuverability and navigation by all aircraft are the primary considerations. Wing maintains position through radius of turn with minimal power adjustments when Lead turns. Using radius of turn vice large power adjustments to maintain position allows Wing to approximately match Lead's fuel consumption, enabling both aircraft to arrive at the operating area with enough fuel on board to complete the assigned mission. If the radius of turn concept is not employed by Wing, Wing may have insufficient fuel to complete the mission. Cruise formation may be flown at any airspeed, but for training purposes it shall be flown at 80 KIAS when practicing maneuvers, and at 100 KIAS while transiting to and from the designated operating area.

ii. The cruise position is defined as ten feet of step-up, on the 30º bearing line, and at three rotor diameters of longitudinal separation measured from blade tip to blade tip (See Figure 2-1). Wing is free to slide to either side of Lead. Wing should stay out of the trail position.

iii. Ten feet of step-up can be maintained by placing Lead's rotor hub just below the horizon.

iv. The 30º bearing line line is measured from Lead's tail or 6 o'clock position, which is defined as the 0º bearing. The 30º bearing line is attained by lining up the near skid heel with the far skid toe on Lead.

v. Three rotor diameters in the TH-57 is approximately 100 feet of separation between rotor tips of both aircraft. One hundred feet is also the distance between spots at South Whiting. A three-rotor diameter is approximated when Wing can just read Lead's bureau number and cannot read "TH-57C" on the lower section of Lead's vertical fin. Only through practice and concentration can this position be maintained with any proficiency.

vi. A helpful ditty is "Step-up, Bearing, Buno, Ball."

b. **Common Errors and Safety Notes**

i. When flying in cruise formation, remember that all aircraft are a team. Wing is responsible for maintaining position relative to Lead.

ii. Utilize small, smooth control inputs. The purpose of cruise is to provide tactical control of several aircraft while reducing fuel consumption and pilot fatigue.

iii. Lead must be especially alert. Keep your "eyes out of the cockpit" and be aware of the formation's reduced maneuverability.

iv. Good basic air work is essential for Lead.

v. The most common error in formation operations is Lead's inability to manage more than one aircraft.

vi. Wing's PAC shall keep Lead in their scan but strive not to stare at Lead. Wing's PNAC must perform copilot duties to include an overlapping outside scan due to the primary scan focus of the PAC on Lead.

vii. Maintain balanced flight while in formation (except for takeoff and landing) and avoid the tendency to point the nose of the helicopter at Lead with the pedals.

202. FORMATION MANEUVERS

1. Section Taxi

a. **Application.** Both aircraft must taxi as a section yet are unable to taxi in parade or cruise formation. Wing needs to be in close proximity to Lead to show that they are taxiing as section, but far enough away to allow a safe interval. A safe distance is one rotor distance from Lead's tail rotor to Wing's tip path plane.

b. **Procedures**

i. Lead should make all radio transmissions to ground and tower for taxi and takeoff instructions. Lead should check-in Wing on VHF and UHF primary frequencies prior to calling for taxi. If the Automated Terminal Information Service (ATIS) is available, report the information designator when calling for taxi. An example of Lead's section taxi call should be as follows:

"South Whiting Ground, (Section Lead call-sign), flight of two, wingman's side number_____, taxi VFR to the East/West, (time), two souls each aircraft from spots _____, with information ____."

ii. Both Lead and Wing must know each other's position on the parking ramp prior to taxi. If necessary, plan to meet at a specific point (also called marshalling) prior to switching to tower frequency for takeoff clearance.

iii. Once the section is formed, continue taxiing in trail for takeoff. Wing should stay at a comfortable position behind Lead and remain out of Lead's rotor wash. Excessive power may be required due to the disturbed air caused by Lead's main rotor.

c. **Crew Resource Management**

i. Lead PAC makes all radio calls for formation. (Communication)

ii. Wing is ready with all automatic frequency changes. (Situational Awareness)

d. **Common Errors and Safety Notes**

i. Lead taxis too fast or does not wait for Wing to pick up from their spot.

ii. Wing taxis too far in trail allowing other aircraft to cut between them.

2. **Section Takeoff**

a. **Application.** Section takeoffs are frequently used during normal missions and should be practiced maintaining proficiency. Power available, wind direction and velocity, and terrain features should be considered in determining aircraft positioning for takeoff.

b. **Procedures**

i. Lead obtains clearance for takeoff from the tower, notes the winds on the windsock or as reported by the tower, and positions the aircraft on the downwind side of the runway. Wing follows Lead onto the runway and assumes the cruise position on the upwind side of the section (Figure 2-2). Each aircraft will take the center of their side of the runway.

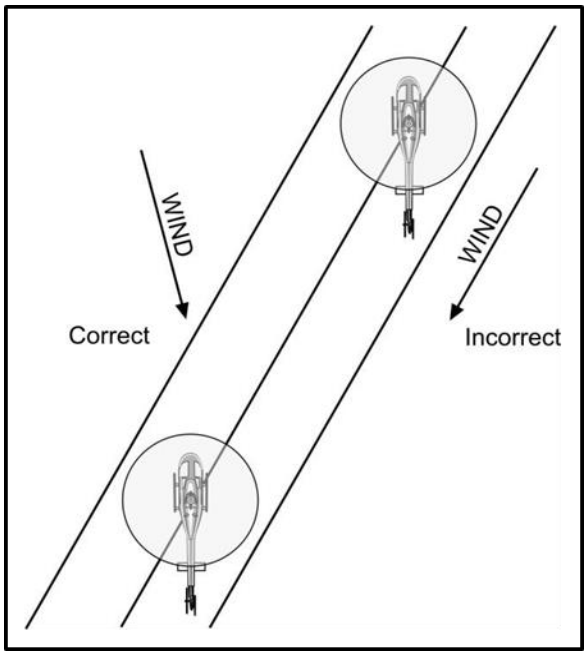

Figure 2-2 Wing's Cruise Position

ii. When both aircraft are in position, a clearing turn shall be performed. The clearing turn is accomplished by both aircraft turning 45º towards each other. The pilot on the inboard side in each aircraft shall inspect the integrity of the other aircraft and clear the section on their respective sides, behind and above, while the other pilot in each aircraft checks the instruments and caution lights. When the section has completed these steps and the section is clear, the ready signal is given. The ready signal is searchlight on or "thumbs up."

iii. When the ready signal is given, both aircraft will turn back to the appropriate takeoff heading, and Lead will commence a normal transition to forward flight. Lead should avoid gaining excessive altitude at low airspeed. Focus on normal transition to forward flight parameters allowing Wing to gain position without utilizing a high-power setting. This may require Lead to take a little power out once through translational lift. Wing should maintain the cruise position throughout the takeoff, yet be mindful of maintaining their aircraft within the safe region of the H-V diagram. Wing shall be in the cruise position prior to executing cruise-type maneuvers.

c. **Crew Resource Management**

i. Lead PAC makes all radio calls for formation. (Communication)

ii. Lead PNAC/Wingman PNAC signal when ready for takeoff by turning search light(s) on, then off and/or giving a "thumbs up." (Communication)

d. **Common Errors and Safety Notes**

i. As Wing, avoid the common tendency to be late applying power and getting in Lead's rotor wash.

ii. As Lead, avoid rapid power changes or continuous operation at maximum power. BE CONSIDERATE of your Wing. Take some power out once safely through translational lift.

iii. As Lead, avoid becoming too concerned with flying too slow or low in order to try to help Wing. This may place Wing in a position where they have to greatly reduce power to avoid inadvertently overtaking Lead, causing them to fall outside of the safe region of the H-V diagram.

iv. Upon the completion of a Lead change at an outlying field, Wing may now be on the downwind side of Lead. To preclude a potential over-torque situation during a downwind takeoff, Wing shall pedal turn 90º and taxi to the opposite side of Lead, maintaining safe lateral separation from Lead. Once in cruise position, on the upwind side of Lead, both aircraft will execute a clearing turn prior to takeoff.

v. As Wing, avoid the tendency to close laterally with Lead due to a narrow scan, which focuses solely on Lead. Use of an active scan to maintain your position and takeoff lane relative to Lead will assist in holding a more solid cruise position during takeoff.

3. **Crossover (Straight and Level Flight)**

a. **Application.** A crossover is a maneuver used to switch sides safely while in parade position. This maneuver is only used during parade formation and directed by Lead. A cruise-modified version of this maneuver is used for training purposes to teach Wing control of relative motion while safely maneuvering about Lead. Parade Crossovers are flown as a precision maneuver with four distinctive positions, whereas, Wing crosses at will in cruise. For training purposes, Wing shall announce the initial crossover to Lead. Crossovers shall be practiced at 80 KIAS.

b. **Procedures**

i. Wing shall initiate the maneuver by announcing *"Rooster flight, Crossover."* Lead shall acknowledge by saying *"Roger Rooster flight, Crossover"* prior to Wing commencing the maneuver. Lead should acknowledge if there is not enough room in the working area to commence the maneuver.

ii. Lead clears the flight and maintains constant heading, altitude, and airspeed.

iii. Wing shall increase step-up to 20 feet while maintaining bearing and distance. The 30º bearing with 20 feet of step-up is visualized when Lead's far skid toe just touches the bottom of the fuselage (scratching the belly). It is also recognized by the horizontal stabilizer in the elbow (tip in the pit).

iv. With 20 feet of step-up, start a slide to cross Lead's tail. This is accomplished by turning towards Lead only long enough to gain an angular difference from Lead's heading, and then going back to a wings level attitude. A slight increase in power and some forward cyclic will be required to maintain longitudinal separation as Wing now has a diagonal movement in relation to Lead's flight path.

v. Keep Lead in sight at all times. Lead should slide across Wing's windscreen just above the instrument panel. It is not intended to maintain three rotors while crossing. Wing will get inside three rotors with the closest position being at Lead's six o'clock. The intent is to do a sliding point-to-point to the correct bearing and distance on the other side.

vi. A visual picture of 20 feet of step-up while crossing Lead's tail is the upper anti-collision light passing through the exhaust stacks (smacks through the stacks).

vii. Once positioned on the new 30º bearing, Wing should reduce power, realign heading with Lead, and momentarily stabilize on the new bearing with 20 feet of step-up. Wing will then reduce power to drop down into the cruise position until repeated or a new maneuver is initiated.

c. **Common Errors and Safety Notes**

i. Lead must present a stable platform.

ii. Excessive step-up by Wing may result in losing sight of Lead and possible midair collision.

iii. Poor power and cyclic control by Wing will result in excessive aft drift while crossing over, thus requiring excessive power to regain position.

iv. Arcing around to the new bearing rather than flying straight across.

4. **Cruise Turns**

a. **Application.** A cruise turn is a radius of turn maneuver enabling the pilot to practice maintaining cruise position while in a turn without adjusting power.

b. **Procedures**

i. Wing initiates the maneuver by announcing, *"Rooster flight, Cruise Turns"* on the UHF radio. Lead shall acknowledge with *"Roger Rooster flight, Cruise*

Turns" prior to commencing. Lead should not acknowledge if there is not enough room in the working area to commence the maneuver.

ii. Lead must maintain a constant altitude, power setting, and angle of bank (AOB). When setting constant power, think "Check Torque" as a verbal reminder. Cruise turns should be commenced at an airspeed of approximately 80 KIAS, and a recommended minimum altitude of 1000 feet AGL. Lead's AOB should remain constant. For the purpose of training, 20º AOB will be used for this maneuver.

iii. Lead clears the flight, checks torque for 80 KIAS, and smoothly rolls 20° AOB in either direction, maintaining altitude with cyclic, and a constant power setting. The initial airspeed of 80 KIAS may dissipate during the turn to a minimum of 60 KIAS, at which point power may be added to remain above 60 KIAS.

iv. Lead will continue to turn using 20º AOB until the Wing calls for a reversal by saying, *"Rooster flight, reverse."* Lead will not respond, and will reverse the turn using 20º AOB. Lead will maintain the turn until Wing calls for the next maneuver.

v. Wing should attempt to stay in the cruise position relying on radius of turn and relatively constant power. When Lead initiates a turn, Wing shall maintain longitudinal distance from Lead by moving either to the inside or outside 30º bearing line as necessary. For Wing to increase the distance from Lead using radius of turn, Wing must move to the outside of the turn. To decrease the distance, Wing should move to the inside of the turn. The 30º bearing is still visualized by lining up the near heel with the far skid toe. On the inside of the turn, the 30º bearing line can also be seen by the horizontal stabilizer touching the "elbow" or "Tip in the pit." On the outside of the turn, 30º bearing can also be visualized with the horizontal stabilizer touching the engine oil tank casing or "Tip in the upper pit."

vi. Step-up should be maintained on Lead's rotor hub by adjusting cyclic, not power. However, over-control of the cyclic can affect aircraft airspeed and cause increased distance from Lead or excessive closure rate.

When on bearing on the inside of Lead's turn, adjust the AOB as necessary to maintain 30º bearing until approaching three rotors, then reduce the AOB to cross to the outside of Lead's turn. As Wing approaches the 30º bearing line on the outside of Lead's turn, increase AOB to stop the bearing change and stabilize on bearing, on the outside. As Wing reaches roughly 5-7 rotors on the outside of the turn, Wing should increase AOB to return to 30º bearing on the inside of Lead.

vii. Wing will need to anticipate reaching the 30º bearing on both sides and make appropriate AOB corrections to stabilize on correct bearing. Wing ***cannot*** simply match Lead's AOB and expect closure/separation to occur. Once on bearing, Wing will usually need less AOB than Lead to ride the bearing in/out to the appropriate distance. Less AOB reflects a larger radius of turn for Wing, thus resulting in closure or separation.

viii. This is a smooth maneuver with a constant power setting. There is no reason for radical or excessive cyclic inputs. The purpose of the maneuver is to practice controlling longitudinal distance between Wing and Lead utilizing radius of turn. During en route/normal flight, Wing can freely swap sides in a turn, as needed to maintain distance.

c. **Common Errors and Safety Notes**

i. Lead must present a stable platform. Altitude and airspeed should remain constant.

ii. Lead must constantly clear the flight during turns.

iii. Lead must maintain 20° AOB throughout turns.

iv. Lead should ensure turns are initiated smoothly and balanced flight is maintained. Altitude should be maintained precisely using cyclic and not collective.

v. Wing must maintain proper step-up throughout the maneuver. Excessive step-up can result in loss of visual contact with Lead and the need to terminate the maneuver early.

vi. Wing ensures radius of turn, not power, is used to increase or decrease longitudinal distance from Lead.

vii. Wing must keep the ball centered in order to get the most benefit from radius of turn.

viii. Wing must use both inside and outside 30º bearing line to ensure proper separation. If too acute on the inside, closure may become too uncomfortable. Too much distance on the inside of the turn, closure may not occur. If too acute on the outside of the turn, separation will be drastic. Too much distance on the outside of the turn, separation will not occur. At Lead's 6 o'clock position, there will be no distance change, and as Wing moves away from the 6 o'clock position, closure/separation starts to increase.

5. **Cruise Climbs and Descents**

a. **Application.** Climbing and descending as a formation is a necessary skill of both en route and landing procedures. When there is no turn required, Wing can use power to match Lead's rate of climb or descent. To maintain cruise position in a climbing or descending turn, Wing can use cruise turn principles in conjunction with power. To alleviate power required, Wing will move to the inside of a climbing turn. To reduce pilot workload, Wing will move to the outside of a descending turn.

Cruise climbs and descents enable the formation flight to practice the climb and descent together in flight.

b. **Procedures**

i. For practice purposes, Wing shall initiate the maneuver by announcing *"Rooster flight Climbs and Descents."* Lead shall acknowledge with *"Roger, Rooster flight, Climbs and Descents"* prior to commencing. Lead should not acknowledge if there is not enough room in the working area to commence the maneuver.

ii. Lead clears the flight for either a climb or descent (ensuring they are clear of any airspace above them with the verbal reminder, "Check DME"), then smoothly adjusts power for a climb or descent rate of 500 FPM and airspeed of 80 KIAS and rolls into a standard rate turn. Lead should reverse the direction of the turn at least once during the climb and at least once during descent. The climb or descent is usually done for 1000 feet of altitude change but shall be for at least 500 feet of altitude change, after which Lead will stabilize momentarily then transition to a climb or descent in order to level off at the starting altitude.

iii. Wing remains in the cruise position during the climb and descent. Wing has a lower power required when climbing on the inside of Lead. Therefore, Wing should attempt to climb on the inside of a climbing turn. For the purposes of training, Wing will climb on the inside of the turn and descend on the outside of Lead to reduce the possibility of an over-torque.

iv. Even though Wing will be using cruise turn principles, climbs and descents will be different than cruise turns due to wing's ability to use power. Wing will be able to better hold a cruise position by adjusting power and roughly holding the same AOB as Lead. Where the radius of turn comes into play is with Wing's airspeed. To hold their position with all other variable the same, Wing will be slower than Lead on the inside of the climbing turn and faster than Lead on the outside of the descending turn. In this way, Wing is matching Lead's turning radius with an airspeed difference

v. As soon as Wing recognizes a climb, they should immediately increase power and move to the inside of the turn. As soon as Wing recognizes a descent, they should decrease power and then let Lead cross in front of them as they turn, if needed.

c. **Common Errors and Safety Notes**

i. Lead must present a stable attitude and clear the formation continuously.

ii. Wing must anticipate power changes and a transition to a climb and descent. Delay in recognizing the relative motion change will result in an out of position condition for Wing requiring excessive power applications to regain the proper position.

iii. Wing has lower power requirements when climbing on the inside of Lead. Wing should attempt to climb on the inside and descend on the outside of Lead to reduce the possibility of an over-torque.

iv. Lead or Wing not recognizing position within the designated operating area prior to commencing the maneuver causing the section to climb into Whiting Class C or other airspace. This can easily be remembered by "Check DME" before Lead commences the climb.

6. **Breakup and Rendezvous**

a. **Application.** The breakup and rendezvous is practiced as two separate maneuvers. The breakup is used when the section needs to break apart to allow for separate landing clearances, particularly when conducting landings at the ship. The rendezvous enables the formation flight to join aircraft after being separated. This can be done after takeoff, when Wing loses sight of Lead, during Case 1 IIMC procedures, or when Wing is late to join the objective area. Normally, the breakup and rendezvous is practiced from the parade formation, for training purposes, it will be conducted in cruise.

The two types of rendezvous are the running rendezvous and the carrier rendezvous. The running rendezvous is performed on takeoff and is performed by Lead maintaining a briefed altitude, airspeed, and heading thus allowing Wing to use airspeed differential to join. The carrier rendezvous is performed by Lead maintaining an AOB to allow Wing to use radius of turn to affect the join-up. Only the carrier type rendezvous shall be used during formation training.

b. **Procedures**

i. Wing shall initiate the maneuver by announcing *"Rooster flight, Breakup and Rendezvous"* over the UHF frequency. Lead shall acknowledge with "*Roger Rooster flight, Breakup and Rendezvous"* prior to commencing the maneuver.

Lead should not acknowledge if there is not enough room in the working area to commence the maneuver.

ii. After clearing the formation and receiving the proper signal (Wing in position with the search light on), Lead shall break away from Wing utilizing 30º AOB. Altitude, airspeed, and 30º AOB will be maintained for 180º of turn. As soon as Lead breaks, Wing will focus on their Basic Air Work (BAW) and break in the same direction of turn after Lead passes through a 45º bearing line oriented from Wing's nose. The 45º bearing line from Wing is approximately when Lead passes through the pilot or copilot side doorframe.

iii. Both aircraft will integrate a BI scan during the 180º turn. Since the formation is broken up, there is no need for Wing to stare at Lead. Once all aircraft have completed the level 180 º turn, the formation will be in extended trail position of approximately 800 to 1000 feet of nose-to-tail separation. Wing will reacquire Lead and shall keep Lead on the horizon. This position is necessary for Wing to begin the rendezvous.

iv. When established in the extended trail position and ready to commence the rendezvous, Wing shall signal Lead by stating the flight's internal call sign and keying the UHF twice. This is the only accepted meaning of two clicks during training and any other use of this signal is discouraged.

v. Lead's turn to initiate the rendezvous may be made in either direction. Attempt to keep Wing from joining up into the sun. Lead will flash to 20º AOB momentarily, then stabilize at 10° AOB for 180º of turn while maintaining altitude and 80 KIAS.

vi. Wing immediately turns inside Lead's turn to use radius of turn to affect the join-up. Wing becomes established on Lead's 45º bearing line utilizing AOB to maintain bearing and relatively constant power to maintain at least 80 KIAS. Airspeed may be adjusted as necessary to effect timely closure. 80 KIAS is usually perfect to affect the join-up just as Lead rolls out on the proper heading. Wing shall keep Lead on the horizon. Approaching three-rotor diameters, Wing should slide back to the 30º bearing line and establish cruise position inside the turn.

vii. Due to the large separation between aircraft, the 45º bearing line may be hard to see. Wing can roughly identify this position by starting to see the black of the nose on Lead. Once on the 45º bearing line, Wing must reduce their AOB, to increase their radius of turn, allowing closure to occur. This may even require wings level or some AOB towards Lead depending on the distance. If Wing is allowed to get too acute, very large and drastic cyclic and collective inputs will be required to fall into position on the inside of the turn.

c. **Common Errors and Safety Notes**

i. Both aircraft should roll into and out of the initial break smoothly yet smartly and maintain altitude.

ii. Both aircraft should maintain 30º AOB through the initial break for 180º of turn.

iii. As Wing approaches three rotor diameters, power should be adjusted to establish the aircraft on the 30º bearing while maintaining ten feet of step-up.

iv. Ensure proper step-up is maintained on join-up to allow for a safe overrun.

v. Proper step-up is visualized by keeping Lead's rotor hub at or slightly below the horizon during rendezvous.

vi. If closure rate becomes excessive or uncomfortable, do not hesitate to execute an overrun.

7. **Overrun**

a. **Application.** The overrun maneuver enables Wing to maneuver to a safe position when a dangerous closure rate is recognized during turns or join-up. It allows Wing to clear Lead, avoiding a potential midair collision.

b. **Procedures**

i. Wing increases step-up to 20 feet by leveling the wings and adding power as required. Do not to apply aft cyclic as that can cause Wing to go blind. 20 feet of step-up is seen by the far front of the skid touching the fuselage and anti-collision light passing through the exhaust stacks (smacks through the stacks). Leveling the wings enables Wing to slide to the outside of the Lead's turn.

ii. Wing may regain the cruise position on the outside after safe separation from Lead is attained. Keep Lead in sight at all times.

iii. After Wing has completed the maneuver, Wing shall announce, *"Rooster flight, Overrun"* on UHF.

c. **Common Errors and Safety Notes**

i. As soon as closure rate becomes uncomfortable, do not hesitate to initiate an overrun.

ii. Never underrun Lead or pass directly below Lead.

iii. Do not lose sight of Lead. Losing sight will increase the possibility of a midair collision.

8. **Lead Change**

a. **Application.** The Lead change enables the formation flight to exchange Lead. Lead changes are done when there is an airspeed or radius of turn differential while in parade, cruise, or combat cruise. All Lead changes require communication between both aircraft; this is usually over the radio but can be visual hand-and-arm signals. For training purposes, all Lead changes will be conducted from the cruise position, during straight and level flight at 80 KIAS or in a taxi, and will be accomplished verbally over the radio.

b. **Procedures**

i. Wing shall initiate the maneuver by announcing on UHF *"Rooster flight, Lead change."* Lead shall acknowledge with *"Roger Rooster flight, Lead change"* prior to wing commencing. Lead should not acknowledge if there is not enough room in the working area to commence the maneuver.

ii. Both aircraft will ensure the pilot on the inboard side of the section has the controls during the Lead change. Lead shall maintain a constant airspeed and altitude. Wing shall increase lateral separation, move abeam Lead with an increase in airspeed.

iii. Once Wing is approaching the abeam position, Wing will transmit *"(Aircraft external call-sign) in position for the Lead."* When Wing is abeam Lead and Lead has a visual of Wing, Lead will transmit *"(Wing's external Aircraft call-sign) you have the lead."* The new Lead then replies, *"Roger (external Aircraft call-sign) has the lead."*

iv. From this point the new Wing shall affect a slow drift aft to the 30º bearing line while maintaining lateral separation. The new Lead must maintain a constant heading, altitude, and gradually slow to 80 KIAS while the new Wing refines their position.

v. The Lead change on deck is executed in the same way but in a taxi. Lead can either maintain a hover or remain on deck while Wing taxis forward to pull abeam Lead. Wing calls "Lead Change." Wing takes safe lateral separation and taxies abeam Lead. The pilots on the inboard side must have the controls. Wing will call "(Aircraft call-sign), in position for Lead change." Lead will respond with "(Aircraft call-sign), you have the lead." New Lead will respond with "Roger (Aircraft call-sign) has the lead." Once the new Lead taxis far enough ahead to place the new Wing on the 30º bearing line. If it is necessary for new Wing to move to the upwind side, based on wind direction, each aircraft will make an appropriate 90º pedal turn and taxi (with safe lateral separation). New Lead will need to pedal turn for 270º in order to maintain SA on Wing.

c. **Common Errors and Safety Notes**

i. Do not lose sight of the other aircraft during the Lead change.

ii. Do not rush the maneuver. Avoid rapid closure rates.

iii. New Wing must anticipate the 30º cruise bearing line in order to avoid drifting too far aft.

iv. New Lead should advance slowly on old Lead, ensuring at least a three-rotor diameter separation is maintained while moving abeam.

v. Relative motion should not stop during the maneuver. Failure to keep relative motion when abeam could cause a very dangerous situation when both pilots are staring at the other aircraft while holding an abeam position (which is not an appropriate cruise position).

vi. Wing calls in position prior to moving fully to the abeam position. Delay in making the radio calls could cause Wing to be ahead of Lead before taking the lead, a very dangerous position. Practicing radio calls while walking out the maneuver greatly enhances each pilot's ability to time the communications correctly.

9. **Section Landings**

a. **Application.** Section landings enable the formation flight to land in formation. While in the pattern, Wing must utilize cruise principles and all they've learned from cruise turns and climbs and descents to maintain position. Ideally, Wing can be on either side in the downwind and can cross as many times as they want to arrive on the upwind side for landing. For training purposes, Wing shall always be on the upwind side of Lead and cross only once to get there. Normal section landing patterns are conducted in the cruise position, at 500 feet and 70 KIAS. All approaches may terminate in a hover to a vertical landing or a no-hover landing.

b. **Procedures**

i. Once complete in the working area, Wing initiates the maneuver by announcing, *"Rooster flight, Section Landings"* on the UHF radio. Lead shall acknowledge with *"Roger, Rooster flight, Section Landings"* prior to heading to the OLF. Lead then leads the flight to the appropriate OLF via course rules.

ii. Radio calls at the OLF will stay the same except for the splitting call. The splitting call requires Lead to give wing's side number so the RDO can log it.

iii. Lead shall utilize normal approach procedures. See the Familiarization and Logistics FTIs.

iv. During the climbing crosswind turn, Lead will climb at a normal 70 KIAS. Wing will cross over once. This should be similar to the climb and descent maneuver due to Lead holding a constant airspeed. Wing will need to adjust power as soon as Lead rolls out on downwind due to radius of turn no longer being a factor.

v. Wing will be in the cruise position on the upwind side of Lead while in the downwind part of the pattern. Wing will hold that position until they see Lead start to descend.

vi. Lead should be slower with control inputs to allow sufficient straightaway and shallow enough glideslope on final so that Wing does not need to make rapid or abrupt power and nose attitude changes.

vii. As Wing, make expeditious power and attitude adjustments to maintain a cruise position until reaching short final. This will be slightly harder than the crosswind due to the changing airspeed of Lead. Wing should monitor their own instruments to stay near Normal Approach Procedures.

viii. During the descending, decelerating turn from downwind to final, Wing will use procedures learned during Climbs and Descents and Cruise Turns to maintain position on the upwind side of Lead, crossing to the opposite side only once. Wing will need to adjust their profile as soon as Lead rolls out on final due to radius of turn no longer being a factor.

ix. At approximately l00 feet AGL on short final, Wing should divide outside scan evenly between Lead and the landing lane. If an obstacle in the landing lane precludes a safe landing, execute a wave-off. At approximately 50 feet AGL, Wing should start to pick out a specific landing spot. At approximately 25 feet AGL, Wing should confirm their landing spot based off of Lead's landing spot and focus on conducting the briefed landing.

x. Lead must control the closure rate to the LZ with smooth power applications early enough to prevent Wing from overshooting Lead.

xi. In order to provide a wave-off capability on final approach, Wing should maintain step-up until short final and in a position to intercept a glideslope to a safe landing. Avoid Lead's rotor wash.

c. **Common Errors and Safety Notes**

i. Lead must avoid large attitude changes on final or large power changes in the hover transition, which may result in Wing overshooting Lead.

ii. As Wing, do not overtake Lead on landing. Keep Lead in sight at all times. Wave-off if it appears you are overtaking Lead or if visual reference is lost.

10. **Section High-Speed Approach**

a. **Application.** The section high-speed approach enables the formation flight to execute a high-speed approach in cruise formation. It allows each aircraft to practice energy management while in close proximity to another aircraft.

b. **Procedures**

i. Wing initiates the maneuver by announcing, *"Rooster flight, Section High-Speeds"* on the UHF radio. Lead shall acknowledges with *"Roger Rooster flight, Section High-Speeds"* prior to commencing. Lead will also need to complete an external radio call to OLF Traffic that their section is doing a section high-speed approach, reference Appendix B.

ii. Lead shall utilize High-Speed approach procedures, see the Familiarization and Logistics FTIs.

iii. From abeam the downwind field boundary, begin a descending turn to arrive on final with 80 KIAS and level at 50 feet AGL. The level off will be done with a combination of increased collective and forward cyclic to hold 80 KIAS and 50 feet AGL. If there is an obstacle in front of the lane, level off early with collective, then descend again with collective to 50 feet AGL.

iv. Wing will again use cruise principles to maintain position and cross once to the upwind side before final. Lead will be holding 80 KIAS, so Wing's profile can be closer to the climbs and descents: Wing holds an airspeed difference to maintain position.

v. Lead should delay two seconds to allow Wing to stabilize at 50 feet AGL before decelerating. The section shall then decelerate while maintaining 50 feet AGL until they intercept a steep approach profile and are at a speed conducive for a no-hover landing. Power will be required to hold 50 feet AGL until starting the descent due to loss of translational lift. Wing will need to slow faster than Lead in order to not get acute.

vi. Once on glideslope, Lead will level the aircraft. This provides a visual reference of when Wing can scan for a landing spot. At 25 feet, Wing will scan Lead and match their rate of descent, then focus on their own landing. Section High-Speed Approaches should terminate in a no-hover landing.

c. **Common Errors and Safety Notes**

i. Lead gets slow on final.

ii. Wing drifts out of position during the turn.

iii. Lead levels off at 50 feet AGL incorrectly by using aft cyclic vice adding power.

iv. Wing tends to drift towards Lead while decelerating vice maintaining separation.

v. Wing can easily overshoot Lead, particularly if Lead makes a large, rapid power reduction.

vi. Lead should avoid the tendency to settle while decelerating. If 50 feet AGL is not maintained, the section will have a rapid closure rate with the ground, resulting in a need for a large power input.

vii. Wing must be cognizant of torque during the transition to a hover, particularly if there is a rapid closure with the LZ because Lead is below glideslope or if settling into Lead's rotor wash.

11. **Section Wave-off**

a. **Application.** A wave-off allows either aircraft individually or both aircraft collectively to discontinue an approach and transition to a normal climb out. Any time Wing loses sight of Lead during the landing pattern or gets into an unsafe position, Wing may execute their own wave-off. The Section Wave-off is required when someone either externally or internally to the section wants the entire section to discontinue their approach.

There are three conditions under which a Wave-off may be necessary.

i. Scenario 1. When someone external to the section makes the wave-off call. Lead will make the internal call, *"Rooster Flight Wave-off*." Wing will acknowledge the internal call, *"Roger, Rooster Flight Wave-off."* Both aircraft will wave off and Lead will make the external call, *"Harold traffic, Eightball 123 and flight, waving off lane 4."*

ii. Scenario 2. Someone internal to the section may call for a section wave off. The other aircraft will acknowledge the internal call. Both aircraft will wave off and Lead will make the external call.

iii. Scenario 3. Wing waves off. Wing will make one call using their own side number. EXAMPLE: *"Eightball/Factory Hand/Lucky 110 waving off, left/right side."*

b. **Procedures**

i. The maneuver is initiated when someone (internal/external to the section) calls for the section to wave-off.

ii. Lead and wing will make the appropriate internal calls.

iii. Both PACs will execute a wave-off in accordance with the Familiarization and Logistics FTIs.

iv. Increase the collective to establish a rate of climb and maintain balanced flight.

v. Lead will make the external radio call once established on climb out.

vi. If a wave-off is called for the section, Wing will maintain cruise position relative to Lead and climb out from the field. If a wave-off is being executed as a single ship, maintain safe lateral separation from the Lead aircraft and execute climb out making separate radio calls.

c. **Common Errors and Safety Notes**

i. Using excessive power exceeding torque limitations of aircraft.

ii. Making the improper radio call causing section to wave off when intent is for a single ship wave-off.

iii. When executing a wave-off, controls should be transferred to the pilot with the best situational awareness (SA). This is critical if Wing must execute a wave-off.

203. INSTRUCTOR DEMO MANEUVERS

1. Parade Formation

a. **Application.** Parade formations are employed when there is a requirement for aircraft to fly a fixed bearing off Lead in close proximity and maneuverability is not essential. It is most frequently used during arrival or departure from ships and airfields or during flight demonstrations. Parade formation shall only be demonstrated by the instructor. The switch from cruise to parade formation or vice versa will be either briefed in the formation brief or called upon over the radio.

b. **Description**

i. Parade is flown utilizing a fixed bearing, fixed lateral distance, and fixed step-up. The parade position is the 45º bearing line, ten feet of step-up, and one rotor diameter lateral separation.

ii. The step-up sight picture doesn’t change from cruise. The 45º bearing line is achieved by visually aligning Lead's far skid toe with the near skid aft cross tube.

iii. Wing shall rotate about Lead's axis for turns into Wing. Wing shall rotate about their own axis in turns away from Wing.

2. **Parade Break**

a. **Application.** The Parade break is a procedure to transition the section from the parade position when entering an airspace to a normal approach landing in trail.

b. **Procedures**

i. Lead will request a home field break before entering the Class C.

ii. The section shall be in the parade position, 300 feet AGL and 100 KIAS prior to crossing the approach end of the duty runway. Lead shall ensure Wing is joined in a position opposite the direction of the break. The break shall commence away from tower at South Whiting Field.

iii. When cleared by tower for the break, Lead will break away from Wing over the intended point of landing, executing a level turn to arrive at the downwind position of 300 feet AGL and 70 KIAS.

iv. Wing breaks in the same direction of Lead when Lead passes through the 45º bearing line. Once Wing has completed the level 180º decelerating turn, the formation will be in an extended trail position.

v. At the abeam position, each aircraft will execute a normal approach to the intended point of landing in trail.

3. **Section Inadvertent IMC**

a. **Application.** The Section Inadvertent IMC maneuver is executed to quickly separate two aircraft after one or both have entered IMC and can no longer maintain safe visual separation from the other. There are two ways to execute this maneuver depending on the environment. Both procedures will be described below and available for use. The Blue Water Procedure works well when conducting ship operations and over open ocean. The Fan Break works well anywhere. The Fan Break works well with a briefed base heading and altitude that keep both aircraft clear of any obstacles while IMC. They are often briefed as a safe heading and altitude and can change throughout the course of the flight.

Both procedures will end in one of three cases:

i. Case 1: Both aircraft Visual Meteorological Conditions (VMC). Join up can be at the discretion of the Section Lead, but normally is conducted as a carrier rendezvous over a known geographical reference (GeoRef) per the loss of visual contact (LOVC) procedures. For VMC join-up, Wing shall maintain 200 feet above base altitude until visual contact with Lead is established.

ii. Case 2: One aircraft is VMC, one aircraft is IMC. The Section Lead will conduct a positive switch to the approach frequency with a check-in. The IMC aircraft will then coordinate with approach, and once under positive control, the section is dissolved, both aircraft will RTB separately.

iii. Case 3: Both aircraft are IMC. The Section Lead will conduct a positive switch to the approach frequency with a check-in. The Section Lead will coordinate with approach and once both aircraft are under positive control, the flight will be dissolved. Both aircraft will RTB separately.

b. **Blue Water IIMC Procedure**

i. Once Inadvertent IMC is encountered, Wing will immediately turn away from the lead aircraft calling *"Popeye, side, and direction of turn."*

ii. Upon hearing this call, Lead will call out the base heading and base altitude. Wing will climb to 200 feet above the base altitude.

iii. When Wing passes through 90º of turn relative to the base heading, Wing will call out *"passing through the 90."*

iv. Upon hearing this call the lead aircraft will then turn in the opposite direction and both aircraft will continue their turns for a total of 170º relative to the base heading or until they are VMC.

v. At the completion of the turns, a check-in will take place with aircraft status (IMC/VMC) and fuel state. The Section Lead will direct the actions of the flight per Case 1, 2, or 3.

c. **Fan Break IIMC Procedure**

i. Once Inadvertent IMC is encountered, either aircraft will call *"Popeye."*

ii. Lead will call out the base heading and altitude.

iii. Wing will turn 20ºaway from Lead's base heading and climb to 200 feet above the base altitude. Lead will then turn and climb to the base heading and altitude as needed.

iv. At the completion of the turns, a check-in will take place with aircraft status (IMC/VMC) and fuel state. The Section Lead will direct the actions of the flight per Case 1, 2, or 3.

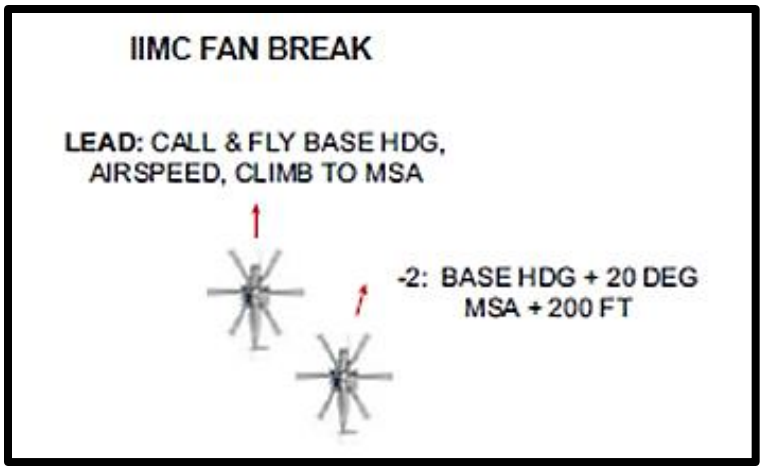

Figure 2-3 Fan Break Procedure

d. **Common Errors and Safety Notes**

i. Lead not immediately responding to the initial call with a base heading and base altitude call.

ii. Blue Water Procedures: Wing not making call as they pass through 90º relative to the base heading.

iii. Either PAC flying too aggressively while in IMC, causing vertigo.

4. **Loss of Visual Contact (LOVC)**

a. **Application.** At any time in the flight, Wing can lose sight of Lead (ex. Excess step-up). This is a very dangerous situation and Wing should immediately call "Blind." A join-up or rendezvous will be required.

b. **Procedures**

i. Wing loses sight of Lead and calls *"(Wing's external call sign) blind."* Wing will turn away from Lead's last known position and climb 200 feet above Lead's last known altitude.

ii. Lead will call out a base heading and altitude and initiate the join-up by establishing themselves in an orbit over an identifiable GeoRef. The orbit will be right-hand turns, 80 KIAS with one-minute legs. Lead will relay the position to Wing.

iii. Once there is safe lateral and vertical separation, Wing will turn towards the GeoRef. Wing will maintain 200 feet about the base altitude until Lead is in sight. Wing will use cruise turn principles to affect the join-up.

iv. Once Wing is in the appropriate position, Wing will call *"(Wing's external call sign) holding hands, right/left side"* and mission will continue.

c. **Common Errors and Safety Notes**

– Too much step-up, especially when crossing Lead's tail, is the most common cause of losing sight of Lead.

5. **Lost Communication Procedures**

a. **Application.** Complete radio failure can happen to either aircraft in flight. During the brief, it's important to change from Lead and Wing to Good Comm and Lost Comm aircraft. The Lost Comm aircraft will always tuck into the Wing position and adhere to any hand-and-arm signals from the Good Comm aircraft. Both aircraft should continue to make internal calls in the blind just in case.

b. **Procedures**

i. Upon noticing they are lost comm, the Lost Comm aircraft will switch to the Lost Comm Lighting Configuration (anti-collision light off/position lights on, flashing bright) and gain lateral separation (as needed) to get the attention of the Good Comm aircraft and signify *"I am Lost Comm."*

ii. Once recognized, the Good Comm aircraft will go to the Lost Comm Lighting Configuration signifying *"I understand you are lost comm and I have the lead."*

iii. The Lost Comm aircraft will return to the Normal Lighting Configuration to signify *"You have the lead."*

iv. The Good Comm aircraft will return to the Normal Lighting Configuration to signify *"I have the lead."*

c. **Common Errors and Safety Notes**

– It's important to maintain high SA in a Lost Comm situation. Both aircraft will need to expedite procedures to not prolong both aircraft flying abeam each other while conducting a Lead change.

204. HELICOPTER FORMATION BRIEF

1. **Application**

The following mission brief shall be conducted prior to all formation flights in the Training Command. It is designed to introduce fundamental briefing procedures for formation operations. For training standardization, this particular brief is modeled on the O-SMEAC format commonly used in the Marine Corps. SMAs can expect briefing formats in the fleet to vary by community and specific mission requirements.

This brief is divided into six distinct sections. The first is Orientation which consists of: introductions, time hack, section responsibilities, call-signs, aircraft assignments, pen and ink changes, maps required, and weather brief. The remainder of the brief follows the SMEAC format: Situation, Mission, Execution, Administration and Logistics, and Command and Signal. Each of these sections is organized into multiple subsets to cover all aspects of the planned event.

Information encapsulated by arrows (< >) is amplifying information and not required to be stated in the brief. The brief shall be conducted in the prescribed format, but specific wording is at the discretion of the student. The only topics which should be recited verbatim are emergency type procedures such as: IIMC, Lost Contact, Aborts, Wave-offs, and Lost Communication as these are emergency procedures. The verbatim material will be encapsulated with brackets [ ].

SMAs shall divide the brief into two sections. For FRM4001 profiles, the first briefer should cover Orientation through Scheme of Maneuver, the second should cover Contingencies through Command and Signal. For out and in profiles (FRM4002/FRM4003 and Capstone), the first briefer should cover Orientation through the terminal area and the second briefer should cover the terminal area through Command and Signal. It is extremely important students work together and become proficient with both portions of the brief, as they will alternate every event. Expect the student that briefs first also acts as Lead first, which will alternate with the briefing portions.

For each flight, a Smart Pack shall be provided by the student to each member of the flight. The Smart Pack shall include, at a minimum, a Coversheet, Route Card, Bingo Route Card, and a Terminal Area Diagram (in that order). Optional additions to the Smart Pack can be the weight and balance or Instructor Pilot (IP) kneeboard-sized grade card. Pages shall be numbered, individual crewmember names highlighted, and all edges aligned. Pen and ink changes are utilized to amend existing information on the Smart Card or to add new information. If information is received well before the scheduled brief time, these changes may be made by the briefer(s) on each Card and noted during the brief to ensure continuity. Otherwise the briefer may instruct flight members to make appropriate changes during the brief. The coversheet should list critical mission information such as frequencies, aircraft performance data, timeline etc. Consult Appendix A for a standard coversheet example.

Only the FTI briefing guide, with minimal notes, and the kneeboard cards may be used during the brief. Verbatim items are contingencies and therefore, like EPs in our Naval Air Training and Operating Procedures Standardization (NATOPS), require a verbatim knowledge.

2. Procedures

a. Orientation

i. Introduction

"Attention to brief. I am _____ and will conduct the first portion of the brief, _____ will conduct the second portion. Please hold all questions until the end."

ii. **Time Hack**

"At my hack the time will be _____. 1 minute...30 seconds...10 seconds...5, 4, 3, 2, 1, HACK, 1, 2, 3...at my hack the time was _____. If anyone requires a further hack, please see me after the brief."

<Obtain accurate time from Naval Observatory Master Clock: DSN 762-1401. Allow at least 1 minute before the hack.>

iii. **Aircraft Assignments**

"_____ and _____ will be in the Lead aircraft _____on spot. _____and _____ will be in the Wing aircraft _____on spot."

iv. **Section Lead & Call sign**

(a). *"The Section Lead for today's flight is _____."*

<Section Lead will be the designated IP on the flight schedule.>

(b). *"The external call sign is Eightball/Factory Hand/Lucky _____."*

<Section Lead's side number.>

(c). *"The internal call sign is _____flight."*

v. **Smart Pack Inventory**

"*Each person should have a ____ page Smart Pack. Page 1 is the Coversheet. Page 2 is… The following Pen and Ink changes have been/should be made to the coversheet.*"

<Cover all changes to or information written into smartcard made after it was printed.>

vi. **Maps/Charts Required**

"The maps and pubs required for this flight will be _____."

<Include low-level navigation charts for FRM4003 and FRM4101/4102.>

vii. **Weather**

"The current weather is _____. The forecasted weather is _____. The required weather for the flight is _____."

<Provide a brief summary of current and forecasted weather, with focus on expected conditions during the planned flight time and possible impact on the mission. Just because the RWOP min weather is 1000-3, does not mean we can get the events complete with 1000-3.>

b. **Situation**

This section will be used on the Formation Capstone event.

c. **Mission**

"Our mission is the safe completion of _____." e.g., FRM4001

d. **Execution**

– **Concept of Operations**

(a). Operating Area

Big picture - Brief using the 1:250,000 JOGAIR, Eastern Formation Area Map and low-level navigation charts as applicable. Example: *"We will depart South Whiting Field via Point Able departure to conduct training in the Eastern Formation Area, proceed to OLF Harold for pattern work, and return to South Whiting via Point Juniper arrival."*

Boundaries - Describe area boundaries using visual checkpoints and available Navigational Aids (NAVAID). If necessary, the briefer should use a pointer to reference visual aids.

(b). Obstacles

"Obstacles for today's flight include aircraft. We will mitigate the risk of other aircraft by utilizing a See and Avoid scan."

<Identify location of specific obstacles and control measures utilizing ABCTRP: Aircraft, Birds, Class C Airspace, Towers, Restricted Areas, and Power lines. Mention the obstacles to flight, and the de-confliction method or applicable mitigation controls for all obstacles listed.>

e. **Scheme of Maneuver**

For training purposes, "T times" are utilized to allow flexibility for takeoff time, or "T." In the fleet a specific time may be designated for takeoff, overhead, troop insert, etc. All other times will be calculated by working backward from that time. Example: For a 1200 takeoff, conduct preflight at 1130, turn-up 1145, check-in at 1150, and taxi at 1155. Make those times accurate and push the flight to adhere to them.

i. **Preflight**

"Preflight will be conducted at T-xx."

ii. **Turn-up**

"Turn-up will be conducted at T-xx."

iii. **Check-in**

"Check-in will be at T-xx on VHF 121.95 and UHF BTN 5/6/7. After outbound call to base/skeds we will conduct a positive switch to BTN 3 without a check-in via one turn in ATIS.

iv. **Taxi**

"Taxi for take-off at T-xx. Taxiing in trail."

v. **Take-off**

"We will execute an automatic switch to Tower without a check-in when lead is 200' prior to the hold short, then at takeoff time we will depart Spot xx in Cruise Formation."

vi. **En Route**

<Brief the execution of flight from South Whiting to Formation Area or Low-Level route as applicable. For FRM4003 and FRM4101/4102, include a detailed route brief, procedures for Lead change, then an overview of the reverse route.

At each major change point (e.g., Deaton Bridge, PT Racetrack, etc.) brief the following: Formation, Altitude and Airspeed, Lighting configuration, Communication setup (including squawk), Obstacles, Navigation (headings/GeoRef). **This is also referred to as the acronym FALCON.** If something hasn't changed since the last checkpoint, there is no need to brief it again. For example, both aircraft will take off in cruise formation with anti-collision lights on and position lights off, there is no need to cover these at each checkpoint if it doesn't change.>

Example: *"We will depart South Whiting in cruise formation, climb to 900 feet and speed up to 100 KIAS, in normal lighting configuration en route to Point Able, squawking 0100, on BTN 4 UHF/121.95 VHF."* <This will continue until in the working area.>

vii. **Objective Area**

(a). **Sequence of Events (FRM4001-4002)**

"The Sequence of Events will be Crossovers, Cruise Turns, Climbs and Descents, Breakup and Rendezvous with Overruns as required, and a Lead change. We will repeat the sequence minus the Lead change."

(b). **Sequence of Events (FRM4003 and FRM4101/4102)**

<The objective area following these routes will be the terminal environment. For training purposes this will be your Landing area. After briefing the route your Objective area will start with SWEEP checks as described below in the Landings section.>

viii. **Landings**

Brief route and course rules to OLF (FALCON). Conduct an OLF orientation brief including OLF boundaries and procedures per the RWOP and Landing Site Evaluation (NATOPS Ch. 17).

A sequence of events will be given for the LZ and shall include the types of landings to be conducted (Normal and/or High speed), where the landing is conducted (lane 4 on the diamond), and who is at the controls (IP/SMA). A Lead change will be conducted on deck and the sequence repeated.

Any time the section is conducting an approach for the first time expect the sequence to be IP/IP, IP/SMA, SMA/SMA for PAC in Lead and Wing respectively.

ix. **RTB**

Upon completion of the landing sequence, Wing will call for RTB. The flight will re-split as necessary and depart the OLF at the appropriate departure corner (be specific in your brief). Return to base will be via normal course rules. Lead will need to conduct a positive switch to base with a check-in. Lead will need to conduct a positive switch to Tower via one turn in ATIS. This is a lot to get done before the first reporting point so know it cold in the brief so that it can be just as fast in flight. If conducting the home field break (FRM4001 SSR), you must request it by KNDZ's entry points: Igor, Bell, or Cypress. This can be used to brief specific changes to formation over certain points to avoid excessive radio calls.

Example: *"At PT Juniper we will turn 245º and follow the road to PT Cypress. At PT Cypress we will automatically maneuver to Parade Formation and enter the traffic pattern for landing."* <If this is briefed, then the IPs will not need to call over VHF to enter Parade Formation, see Appendix C.>

x. **Contingencies**

(a). **Emergencies**

["Emergencies will be considered actual unless prefaced with the word "simulated." Aircraft emergencies will be handled internally, notifying the other aircraft when safe to do so. The degraded aircraft will determine who they want to be in the Lead position. The Section Lead will determine the conduct of the remainder of the flight."]

(b). **IIMC**

Either IIMC procedure can be briefed. Below is the verbatim for the Fan Break Procedure.

["If the flight encounters IIMC and Wing has sight of Lead, Wing will maintain position. If Wing loses sight of Lead, Wing will call "Rooster Flight, Popeye (side number)" and immediately turn 20º away from Lead. Lead will stabilize and call base heading and altitude. Wing will continue their turn to 20º from the base heading and commence a climb to 200 feet above base altitude. If either aircraft regains VMC, they will remain VMC. The Lead PAC will commence a check–in with status and fuel state. At this point one of three cases will exist:]

(i). **Case 1. Both aircraft VMC:** *["Aircraft will execute a join up over a known or specified GeoRef as dictated by Lead. Lead will maintain 80 KIAS, right-hand turns, 1-minute legs over reference point. Wing shall maintain 200 feet above base altitude until visual contact with Lead is established. Once the join-up is initiated Wing may descend as appropriate. Section Lead will direct the remainder of the flight."]*

(ii). **Case 2. One aircraft VMC/One aircraft IMC:** *["The Section Lead will call for a positive switch to Approach with a check–in. The IMC aircraft will contact approach, informing them of the situation and obtaining a discrete squawk. Once the IMC aircraft is under positive control, the section is dissolved, and each aircraft will RTB separately."]*

(iii). **Case 3. Both aircraft IMC:** *["The Section Lead will call for a positive switch to Approach with a check–in. The Section Lead will inform Approach of the situation and obtain two discrete squawks. Once both aircraft are under positive control, the section is dissolved, and each aircraft will RTB separately."]*

(a). **Loss of Visual Contact**

["If Wing loses sight of Lead, Wing will maneuver as necessary to gain safe separation and call 'Rooster flight, Blind.' Lead will call base heading and altitude and communicate a join-up per "Case 1" under inadvertent IMC. If Wing goes Blind in the pattern, it is a mandatory wave-off for Wing. Lead will continue to landing."

(b). **Lost Communications**

NOTE

When an aircraft in the flight goes Lost Comm, the roles in the section have changed from Lead/Wing to Good Comm/Lost Comm aircraft. Once the Lost Comm Lead change is complete, the standard roles are resumed.

["For the purposes of demonstration, palms down signifies normal lighting configuration and palms up signifies lost comm lighting configuration."

LEAD LOST COMM: "If Lead experiences a total radio failure, Lead will switch to the lost comm lighting configuration and slow to 65 KIAS to gain Wing's attention. The good comm aircraft will gain safe lateral separation and move abeam the lost comm aircraft, then switch to the lost comm lighting configuration to signify, 'I understand you are lost comm, I am in position for a Lead change.' The lost comm aircraft will return to the normal lighting configuration to signify, 'You have the lead.' The good comm aircraft will then return to the normal lighting configuration to signify, 'I have the lead.'" The lost comm aircraft will then slide back to the 45º bearing line. The flight will proceed as necessary, returning to base if possible."

WING LOST COMM: "If Wing experiences a total radio failure, Wing will switch to the lost comm lighting configuration, gain safe lateral separation and move abeam Lead to signify, 'I am lost comm.' The good comm aircraft will then switch to the lost comm lighting configuration to signify, 'I understand you are lost comm, I will retain the lead.' The lost comm aircraft will then return to the normal lighting configuration to signify, 'You have the lead.' The good comm aircraft will return to the normal lighting configuration to signify, 'I have the lead.'"

"The lost comm aircraft will slide back to the 45º bearing line. The flight will proceed as necessary, returning to base if possible."]

(c). **Disorientation Procedures**

["If either aircraft becomes disoriented, they will call "[Internal Call sign] Magellan." The other aircraft will communicate heading and distance to the next checkpoint. If Lead passes a checkpoint without calling the point or steers off the route more than 1 NM on a 1:250,000 and 500 meters on a 1:50,000, heading deviations of 15º, ± 1 minute timing deviation, Wing will communicate "[Internal Call-sign] Flight Magellan" with heading and distance to the next checkpoint. If both aircraft are disoriented, the flight will orbit present position and altitude using standard rate right hand turns and utilize all assets in the aircraft to become reoriented. Once reoriented, the flight will continue."]

(d). **Downed Aircraft**

["If an aircraft within the section goes down, the remaining aircraft commander will assume the duties of On-Scene Commander and execute the On-Scene Commander Checklist. If the flight should encounter a downed pilot and/or aircraft, the Section Lead will assume the duties of On-Scene Commander and execute the On-Scene Commander Checklist. The other aircraft will remain clear until tasked by the On-Scene Commander. We will stay on station until reaching our bingo state or we are relieved by a more suitable SAR asset."]

(e). **Aborts**

["If an aircraft aborts prior to takeoff, the PAC will notify the other aircrew as soon as possible. On takeoff, if Lead aborts, Wing will abort with Lead if it is safe to do so. If not, Wing will continue to take off, enter a downwind and land clear of Lead. If Wing aborts, Lead will continue to takeoff, enter a downwind and land clear of Wing."]

(f). **Wave-offs**

State the three wave-off scenarios and who makes the internal and external calls.

["All wave-offs are mandatory regardless of who makes the call. All calls for a section wave-off shall be repeated verbatim by each crew. The three scenarios are:

(i). **Scenario 1.** *When someone external to the section makes the wave-off call, Lead will make an internal call. Wing will acknowledge the internal call and both aircraft will wave-off. Once safe to do so, Lead will make the external call.*

(ii). **Scenario 2.** *Someone internal to the section may call for a section wave-off. The other aircraft will acknowledge the internal call and both aircraft will wave-off. Once safe to do so, Lead will make the external call.*

(iii). **Scenario 3.** *If Wing waves off, Wing will make an external call using their own side number. Lead will continue to a landing.]*

xi. **Administration and Logistics**

(a). **Flight Duration**

"We will call outbound for _____." <Reference MCG for Flight Time.>

(b). **Fuel**

(i). *"Mission Fuel is _____ gal."* <This is the amount of fuel needed to complete both student events in entirety and land with 10 gallons.>

(ii). "Bingo from the farthest point in the area is ____ gallons. Bingo from OLF is ____." <Calculated using max range airspeed given current ambient conditions to be on deck at closest fuel source with ten gallons. The closest fuel source for all FRM4000 flights shall be KNDZ. FRM4100 shall be destination airfield.>

xii. **Command and Signal**

(a). **Chain of Responsibility**

Section Lead

"As previously briefed"

(b). **Call-sign**

Internal/External

"As previously briefed"

(c). **Communications**

"Lead will make all external calls using the Section Lead's side number. Wing will initiate all maneuvers. Anyone can make a safety of flight call."

(i). **Frequency/NAVAIDS**

"Frequencies and NAVAIDs will be per the coversheet."

(ii). **Frequency Changes**

["All changes will be positive switches unless over an automatic change point. All switches will require a check-in unless on ground and tower."] <Example of automatic switches are 200 feet prior to the hold short, PT Fish, etc.>

(d). **Terminology**

(i). **Terminate**

["Terminate can be called by any aircrew to discontinue a maneuver by stating "Rooster flight, terminate.' The flight will abort the maneuver, reset, communicate as necessary, and continue with remaining maneuvers when able."]

(ii). **Knock-It-Off**

["Knock-it-off can be called by any aircrew following a safety of flight occurrence that distracts or prevents the continuation of training. By calling "Rooster flight, Knock-it-Off,' the flight will be discontinued, and the respective IPs will ferry the aircraft back as a section. Debrief of the occurrence shall occur once on deck."]

(iii). **Hard deck**

["The Hard Deck for today's flight is _____."] <Your hard deck should make sense based on traffic below you or any restriction from an instruction, e.g., MCG or RWOP.>

(e). **ID and Recognition**

"The Section Lead will squawk the appropriate code in the ALT mode. The other aircraft will squawk the appropriate code in standby. If the flight is dissolved or separated for any reason, each aircraft will squawk the appropriate code in the ALT mode."

(f). **Visual Signals**

"Visual Signals will be per the coversheet."

(g). **Walkthrough**

Let everyone know where and when the walkthrough will occur. This will only be for FRM4001.

(h). **Debrief**

Let everyone know where and when the debrief will occur.

"The flight will debrief as a section at the Paraloft following shutdown."

205. NATOPS-BY-EXCEPTION BRIEF

Immediately following the mission brief, continue with the NATOPS-by-exception brief to cover any remaining NATOPS items not addressed in the mission brief. This is not a rehashing of the entire brief. If it's already been briefed, skip over that item and proceed to the next. This is also when you discuss things particular to PAC and PNAC responsibilities and how you will handle certain situations in your cockpit. For example, you will still have to brief an IIMC plan for the cockpit, e.g., "Level the wings, level the nose, center the ball…"

In the fleet, flight crews will break up and conduct individual NATOPS briefs with crew chiefs and then again with pilots to address NATOPS and SOP items specific to their crew/airframe.

HT Formation Briefing Guide

- **ORIENTATION**
- INTRODUCTION
- TIME HACK
- AIRCRAFT ASSIGNMENTS
  - LEAD _____&_____ IN _____ ON SPOT_____
  - WING _____&_____ IN _____ ON SPOT_____
- SECTION RESPONSIBILITIES & CALL-SIGNS
  - SECTION LEAD _____
  - EXT CALL SIGN _____
  - INT CALL SIGN _____
- SMARTPACK INVENTORY / PEN&INK CHANGES
- MAPS REQUIRED _____
- WEATHER
  - CURRENT _____ _____ _____
  - FORECAST_____ _____ _____
  - REQUIRED_____ _____ _____
- **MISSION EXECUTION**
  - CONCEPT OF OPERATIONS
  - OPERATING AREA
  - BOUNDARIES
  - OBSTACLES
- SCHEME OF MANEUVER
  - PREFLIGHT @ T-30
  - TURN-UP @ T-15
  - CHECK-IN @ T-10 ON UHF BTN ____ and VHF 121.95
  - POS SWITCH GROUND VIA ONE TURN OF ATIS
  - TAXI @ T-5, AUTO SWITCH TOWER 200 FEET PRIOR TO HOLD SHORT
  - TAKE-OFF: CRUISE FORM, CLIMB TO 900 FEET ACCELERATE TO 100 KIAS
  - ROUTE:
- OBJECTIVE AREA
  - SEQUENCE OF EVENTS:
- TL: PROCEED TO _____ POS SWTCH BTN ____, SQWK _____
- LANDING SITE: ROUTE: _____ _____
- LANDING ZONE
  - LANDING SITE EVALUATION (CH 17 NATOPS)
  - LZ BOUNDARIES AND OBSTACLES BRIEF
  - SEQUENCE OF APPROACHES: NORM, HS, LEAD CHANGE, REPEAT (MINUS THE LEAD CHANGE)
- RTB:
  - ROUTE: _____ _____ _____
  - TYPE LANDING _____
- **CONTINGENCIES**
  - EMERGENCIES
  - IIMC (CASE 1, CASE 2, CASE 3)
  - LOSS OF VISUAL CONTACT
  - LOST COMMS
  - DISORIENTATION PROCEDURES / MAGELLAN
  - DOWNED AIRCRAFT
  - ABORTS
  - WAVE-OFFS (SCENARIO 1, SCENARIO 2, SCENARIO 3
- **ADMINISTRATION AND LOGISTICS**
  - FLIGHT DURATION: _____
  - FUEL: MISSION ____gal BINGO ____gal FROM_____ &_____gal FROM OLF_____
- **COMMAND AND SIGNAL**
  - CHAIN OF RESPONSIBILITY
  - CALL SIGN
  - COMMUNICATIONS
  - TERMINOLOGY (TERMINATE/KNOCK-IT-OFF/HARD DECK)
  - FREQUENCIES / NAVAIDS
  - FREQUENCY CHANGES
  - ID AND RECOGNITION
  - VISUAL SIGNALS
- **WALKTHROUGH <REQUIRED FOR F4001>**
- **DEBRIEF**

CHAPTER THREE
TACTICAL FORMATION

300. INTRODUCTION

This chapter introduces the student to the fundamentals of tactical formation flying. The procedures and positions contained herein are intended to provide a foundation for tactical formation flying which will meet most mission requirements.

301. SECTION LOW-LEVEL FORMATION FLIGHT

1. Tactical Formations

There are two basic tactical formations, combat cruise and combat spread, designed to increase Section Lead flexibility in controlling a flight. Cruise principles utilizing radius of turn and altitude to maintain or regain position apply to these formations. Separation between aircraft is dependent on the threat. ***In the training command we will utilize only the combat cruise position and separation will be approximately five rotors*.**

2. Combat Cruise

a. Description

i. Combat cruise is designed to allow maximum flexibility, maneuverability, and time on station while retaining control and flight discipline. Fuel conservation is accomplished through use of radius of turn vice power adjustments to maintain position.

ii. Combat cruise allows Wing to fly anywhere on an arc from ten degrees forward of abeam on the left to ten degrees forward of abeam on the right. The optimum position is on the 45º bearing line with four to five rotor diameters of lateral separation and level with Lead (See Figure 3-1).

iii. During turns, Wing will maintain longitudinal clearance on Lead utilizing radius of turn. Upon rollout, wing will maintain optimum position to support lead.

iv. Prolonged flight in the area within 30º of the tail (blind spot) should be avoided.

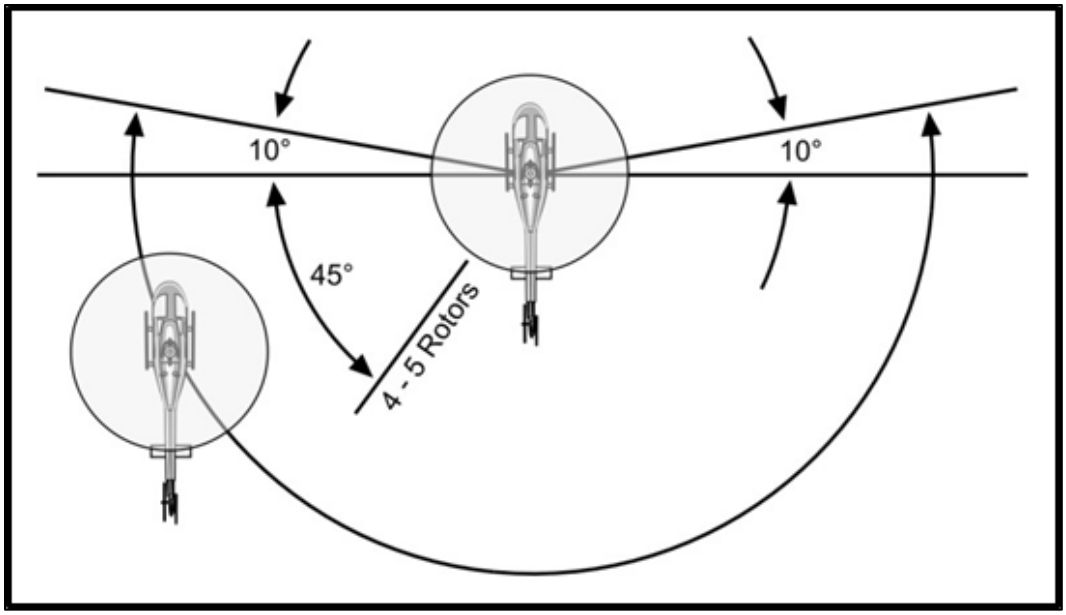

Figure 3-1 Combat Cruise

b. **Common Errors and Safety Notes.**

i. Both aircraft must navigate and provide mutual support.

ii. Be particularly alert for the maneuvering of Lead during tactical navigation with emphasis on turns by Lead towards Wing. It is the navigator's (PNAC) responsibility to keep Wing's PAC apprised of sharp route turning points which might cause conflict between aircraft. Good CRM will enhance anticipation and use of radius of turn by Wing to maintain proper position. Wing should avoid flying forward of the 45º bearing line as the flight approaches a turn.

3. **Formation Maneuvering**

Combat cruise formation increases the Flight Lead's flexibility in controlling the flight and promotes security by providing overlapping fields of view. Section Low-Level Formation Flight is an extremely dynamic environment, which requires a thorough understanding of the radius of turn and cruise turn principles introduced earlier in this instruction.

4. **Section Low-Level Navigation**

The skills required for successful Section Low-Level Navigation are outlined within P-428, Flight Training Instruction, Navigation Advanced Phase, TH-57.

3-2 TACTICAL FORMATION

5. Wing's Responsibilities

During Section Low-Level Navigation, the wing aircraft is not only responsible to remain in position and support Lead, but also to provide a backup for route navigation and aid in clearing the flight of any potential threats or hazards.

6. Procedures

PAC of the wing aircraft is responsible to maneuver the aircraft in such a manner as to best support Lead. This is done by applying the radius of turn and cruise turn principles.

PNAC of the wing aircraft is responsible for secondary navigation of the section. Additionally, the PNAC should provide the flying pilot with items of critical information necessary for mission success. In the training area, this would include information which would allow the flying pilot to successfully maneuver about Lead's axis, always remaining in a supporting position. This information may include:

a. Checkpoint identification.

b. Direction and severity of the next turn so the flying pilot can anticipate the actions necessary to remain in a good supporting position.

c. Rollout information provided as a clock code, this allows the flying pilot to maintain an external scan during high AOB turns.

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APPENDIX A
GLOSSARY

A100. - N/A

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APPENDIX B
FORM COVER SHEET

HT- XX NAME

JULIAN DATE: *6157*	MISSION: *F4101*	INTERNAL C/S : *EAGLE*	EXTERNAL C/S : *FH063*

A/C	SPOT	C/S	AIRCREW	T&R / TMR / SORTIE
063	*C13*	*8BALL 063*	***CAPT SECTION LEAD ENS COPILOT*	*F4001*
095	*C17*	*LUCKY 095*	*LCDR WING 1STLT COPILOT*	*F4001*

TIMELINE	EVENT	VHF	UHF		KNDZ	OLF
T - 10	*CHECKIN*	*121.95*	*6*	HIGE		
T - 5	*TAXI*	*121.95*	*3*	HOGE		
T (1100L)	*TAKEOFF KNDZ*	*121.95*	*4*	END Q / AS		
T + 15	*FORM SEQ*	*121.95*	*17*	RNG Q / AS		
T + 45	*LEAD CHANGE*	*121.95*	*17*	MSA / HDG		
T + 50	*FORM SEQ*	*121.95*	*17*		NAV1	NAV2
T + 1+20	*OLF HAROLD*	*121.95*	*12*	KNDZ	*110.55*	*70X*
T + 1+50	*RTB*	*121.95*	*6 / 4 / 3*	OLF	*115.9*	*70X*

BN	AGENCY	FREQ	BN	AGENCY	FREQ
1	*NDZ ATIS*	*273.575*	*M*	*INSTR CMN*	*121.95*
3	*NDZ GND*	*317.65*	*M*	*PENS APP*	*124.85*
4	*NDZ TWR*	*348.675*	*M*	*EGLIN APP*	*124.05*
6	*HT-18 BASE*	*255.1*	*M*	*BOB SIKES ASOS*	*119.275*
12	*HAROLD*	*237.9*	*M*	*BOB SIKES CTAF*	*122.95*
17	*EASTERN FORM CMN*	*308.65*	*M*	*FLORALA CTAF*	*123.0*

METRO				JOKER	BINGO
SR: *0627*	MR: *0317*	EENT: *2007*	HLL: NVG ONLY	*EFA / Harold*	*EFA / Harold*
SS: *1913*	MS: *1417*	ILLUM: *10%*	LLL: NVG ONLY	*28G / 30G*	*18G / 20G*

NOTES

*** Denotes Section Leader*

Sequence of Events: CO/CT/CD/BR/OR/LD

Lost comm lighting
Anti-Coll Lts Off
Pos Lts Fish Brt

Figure B-1 Formation Smart Card Example

Note. All information in *ITALICS* needs to be changed for each flight

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APPENDIX C
FORM COMMUNICATION SCRIPT

GROUND

LEAD (121.95 VHF) -	*"Rooster flight, check Victor"*
WING (121.95 VHF) -	*"Rooster 2"*
LEAD (BASE UHF) -	*"Rooster flight, check Uniform"*
WING (BASE UHF) -	*"Rooster 2, up and ready 2 souls 80 gallons"*
LEAD (BASE UHF) -	*"Rooster 1, up and ready 2 souls 80 gallons" / "Base, Eightball 100 and 101, outbound to the Eastern Formation Area with Jones and Riley"*
LEAD (BASE UHF) -	*"Rooster flight, push button 3 via one turn in ATIS"*
WING (BASE UHF) -	*"Rooster 2"*
LEAD (CH 3 UHF) -	*"South Whiting Ground, Eightball 100, flight of two, wingman side number 101, taxi VFR to the east 2+30, 2 souls each aircraft, from spots B1 and B2, with information alpha"*

TAXI

LEAD (CH 4 UHF) -	*"South Tower, Eightball 100 and flight, number 1 holding short spot 1, able departure"*

COURSE RULES OUTBOUND

LEAD (CH 17 UHF) -	*"Rooster flight, check-in Uniform"*
WING (CH 17 UHF) -	*"Rooster 2"*

FORMATION AREA

WING (CH 17 UHF) -	*"Rooster flight, crossovers" / "Rooster flight, cruise turns"*
LEAD (CH 17 UHF) -	*"Roger, Rooster flight, crossovers" / "Roger, Rooster flight, cruise turns"*
WING (CH 17 UHF) -	*"Rooster flight, Section Landings"*
LEAD (CH 17 UHF) -	*"Rooster 1"*

COURSE RULES TO OLF

LEAD (CH 17 UHF) -	*"Rooster flight, push button 12"*
WING (CH 17 UHF) -	*"Rooster 2"*
LEAD (CH 12 UHF) -	*"Rooster flight check Uniform"*
WING (CH 12 UHF) -	*"Rooster 2"*
LEAD (CH 12 UHF) -	*"Harold, Eightball 100 and flight Point Racetrack inbound"*

COURSE RULES AT OLF

LEAD (CH 12 UHF) -	*"Harold, Eightball 100, wingman side number 101 splitting left F4001"*
WING (CH 12 UHF) -	*"Rooster flight high speeds"*
LEAD (CH 12 UHF) -	*"Rooster 1"*
LEAD (CH 12 UHF) -	*"Traffic, Eightball 100 and flight, Section high speed approaches Lane 4"*
WING (CH 12 UHF) -	*"Rooster flight RTB"*
LEAD (CH 12 UHF) -	*"Rooster 1"*

COURSE RULES TO KNDZ

LEAD (CH 12 UHF) -	*"Harold Eightball 100 and flight, departing" / "Rooster flight push button 5"*
WING (CH 12 UHF) -	*"Rooster 2"*
LEAD (BASE UHF) -	*"Rooster flight check Uniform"*
WING (BASE UHF) -	*"Rooster 2"*
LEAD (BASE UHF) -	*"Base, Eightball 100 and flight, 10 minutes out" / "Rooster flight push button 4 via one turn in ATIS"*
WING (BASE UHF) -	*"Rooster 2"*
LEAD (CH 4) -	*"South Tower, Eightball 100, flight of two, Point Juniper with information Charlie, request home field break"*
WING (121.95 VHF) -	*"Rooster flight, parade"*
LEAD (121.95 VHF) -	*"Rooster 1"*
LEAD (CH 4) -	*"South tower, Eightball 100 and flight, Point Cypress, Spot 3, request break"*

COURSE RULES TO PURPLE ROUTE

WING (CH 17 UHF) -	*"Rooster flight, proceed to route"*
LEAD (CH 17 UHF) -	*"Roger, Rooster flight, proceed to route"*

TAXI TO FUEL PITS/LINE

LEAD (CH 3 UHF) -	*"South Ground, Eightball 100, flight of two, clear of spot 3 for the fuel pits"*

CONTINGENCY CALLS

Wave-off

Scenario 1:

EXTERNAL CALL -	*"Formation traffic landing Lane 4 wave-off"*
LEAD (CH 17 UHF) -	*"Rooster flight, wave-off"*
WING (CH 17 UHF) -	*"Roger, Rooster flight, wave-off"*
LEAD (CH 17 UHF) -	*"Traffic, Eightball 100 and flight waving off Lane 4"*

Scenario 2:
LEAD (CH 17 UHF) - *"Rooster flight, wave-off"*
WING (CH 17 UHF) - *"Roger, Rooster flight, wave-off"*
LEAD (CH 17 UHF) - *"Traffic, Eightball 100 and flight waving off Lane 4"*

Scenario 3:
WING (CH 17 UHF) - *"Eightball 101, waving off left side"*
LEAD (CH 17 UHF) - *"Rooster 1"*
WING (CH 17 UHF) - *"Traffic, Eightball 101 waving off Lane 4"*

Abort
Scenario 1 (Lead Abort):
LEAD (CH 4 UHF) - *"Eightball 100, abort"*
WING (CH 4 UHF) - *"Rooster 2, abort" (if safe to do so) / "Rooster 2, continuing"*
LEAD (CH 4 UHF) - *"South Tower, Eightball 100 and flight, aborting"* or *"South Tower, Eightball 100, aborting"*

Scenario 2 (Wing Abort):
WING (CH 4 UHF) - *"Eightball 101, abort"*
LEAD (CH 4 UHF) - *"Rooster 1, abort" (if safe to do so) / "Rooster 1, continuing"*
If Lead continues
WING (CH 4 UHF) - *"South Tower, Eightball 101, aborting"*
If Lead aborts
LEAD (CH 4 UHF) - *"South Tower, Eight ball 100 and flight, aborting"*

IIMC

Blue Water Operations
WING (UHF) - *"Rooster 2, Popeye, left side"*
LEAD (UHF) - *"Rooster flight 120º, 1000 feet"*
WING (UHF) - *"Rooster 2, passing through the 90"*

Fan Break Operations
WING (UHF) - *"Rooster 2, Popeye, left side"*
LEAD (UHF) - *"Rooster flight 120º, 1000 feet"*
WING (UHF) - *"Rooster 2"*

Re-Join
WING (UHF) - *"Rooster 2, VMC, 1+20, visual"*
LEAD (UHF) - *"Rooster 1, VMC 1+30, visual"*
LEAD (UHF) - *"Rooster flight, rejoin PT Racetrack, right hand turns, 700' MSL"*

LOSS OF VISUAL CONTACT

WING (UHF) - *"Rooster 2, blind"*
LEAD (UHF) - *"Rooster 1"*

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