



Updated  
29 SEP 2021



# Tiltrotor Formation and Aerial Refueling Procedures F0201 / F0301



This Presentation is Classified:  
**UNCLASSIFIED**



# Purpose

- The purpose of this presentation is to provide the student with the requisite knowledge to conduct the **F3101** Tiltrotor Formation sim and **F4201** Tiltrotor Formation flight in the T-44C.



# Learning Objectives

- Describe tactical formation fundamentals
- Identify and describe tactical formation maneuvers
- Preview F4201
- ~~• Describe Head-On Offset RV / Aerial Refueling~~
- Discuss Formation Coordinating Instructions
- Identify and describe division formations



# References

- MAWTS-1 Courseware (Tactical Formation Maneuvering)
- MV-22 Maneuver Description Guide (MDG)
- NTTP 3-22.5 Assault Support Tactical SOP (ASTACSOP) August 2016
- Air NTTP 3-22.5-MV22 Combat Aircraft Fundamentals
- NAVAIR 01-T44AAC-1 – T-44C NATOPS
- Multi-Engine FTI T-44C 2014 Rev 9-14 Change 5
- Advanced M-E Low Level and TACFORM FTI 2006 Rev 06-06
- ~~(Aerial Refueling Pubs listed later)~~



# Outline

- Formation Description and Objectives
- Formation Types
- F4201 Kneeboard Card
- Parade Sequence
- Tactical Formation Maneuvers
- ~~Aerial Refueling~~
- RTB / Overhead Recovery
- Coordinating Instructions / Contingencies
- Division Formations Considerations



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# Formation Description

- Maneuver Element – smallest element of a flight that may engage in independent maneuver during tactical evolutions
  - Section = 2 aircraft, single maneuver element, smallest, basic component towards construction of larger formation, easiest C&C, and most flexible
  - Division = 3 or 4 aircraft, largest maneuver element or two sections
  - Flight = 2 or more maneuver elements / 5 or more aircraft



# Formation Description

- Unity of effort for mission accomplishment
- Maneuverability and flexibility
- Mutually supportive lookout doctrine
- Ease of control and coordination

There is an optimum size for every formation



# Considerations

- METT-TSL
  - Mission
  - Enemy (Threat)
  - Terrain and Weather
  - Troops and Fire Support
  - Time
  - Space
  - Logistics



# Outline

- Formation Description and Objectives
- Formation Types
  - Parade
  - Cruise
  - Tactical
- F4201 Kneeboard Card
- Parade Sequence
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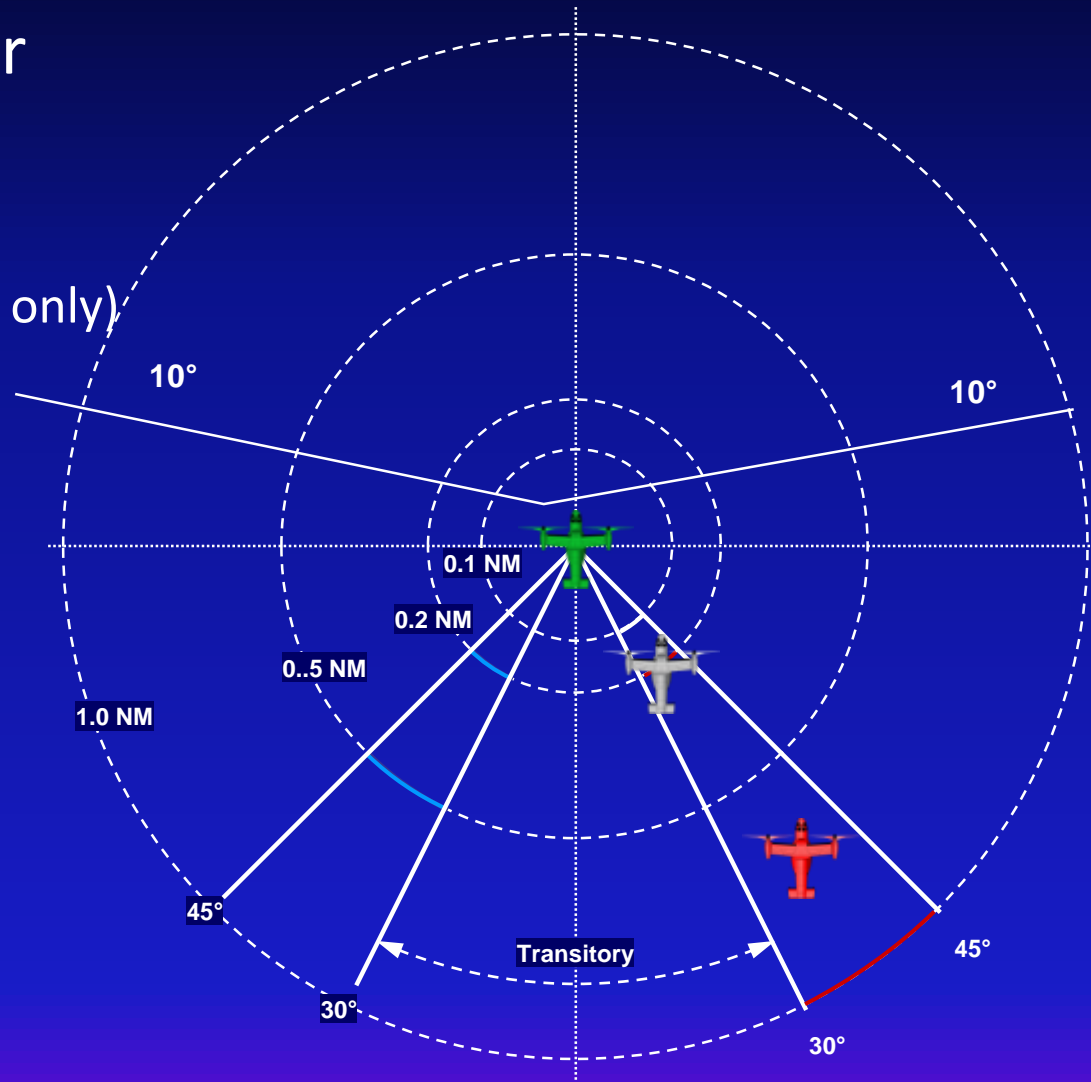
# Formation Types

- Parade
  - Fixed bearing (45°) and distance
  - Good for airshows or coming in for the break.
  - Administrative type formation with reduced flexibility (request to crossunder)
- Cruise
  - Varying bearing and distance using radius of turn between the 30-45° bearings at 0.0-0.2 DME
  - Administrative type formation
  - Useful when traveling through controlled airspace to keep the formation tight and away from other aircraft (Course Rules entry.)
- Tactical (Combat)
  - Combat Cruise – radius of turn
  - Combat Spread – Tactical Formation Maneuvers (TFM) and flight leadership



# Cruise / Combat Cruise

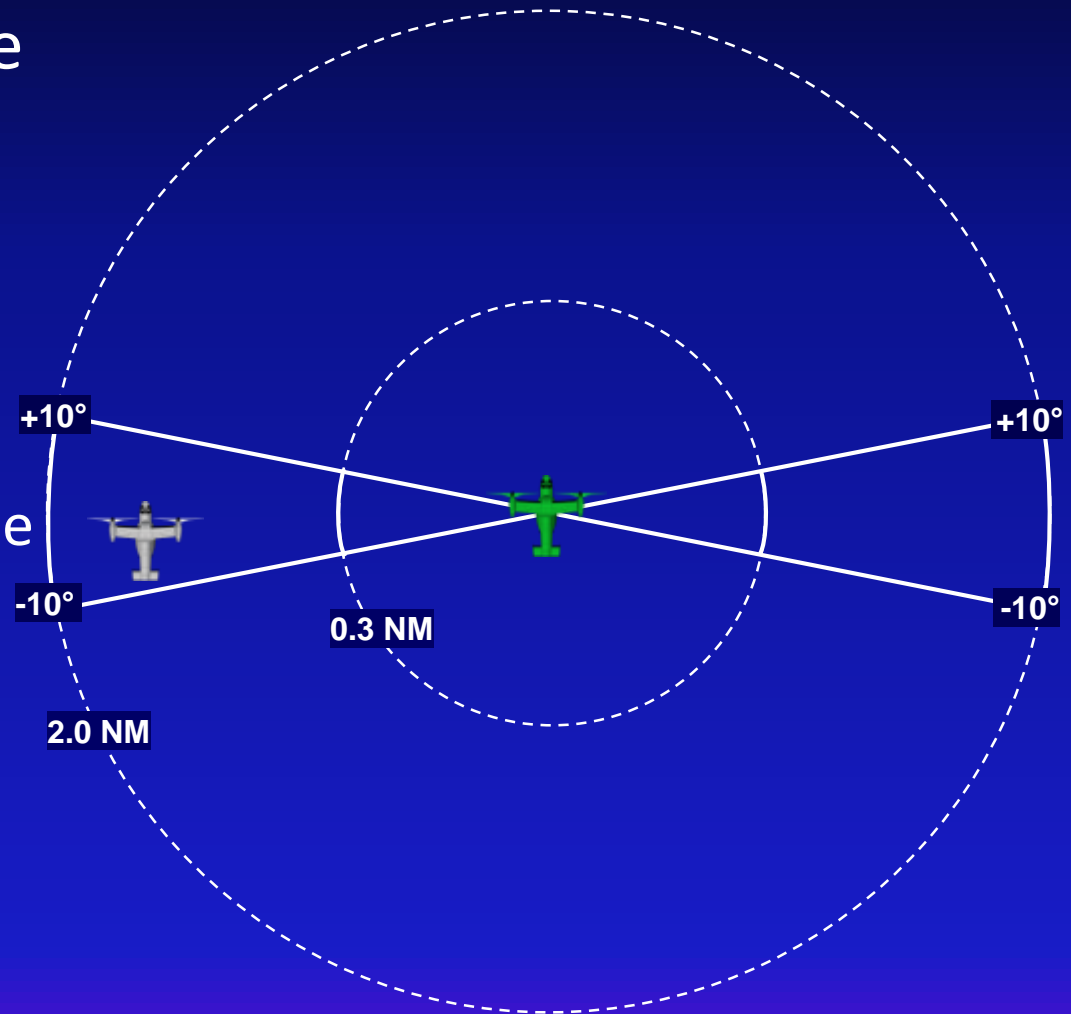
- 30-45° bearing on either side of lead
  - 5 or 7 o'clock
  - Avoid the 6 o'clock (transient only)
- Separation:
  - Cruise 0.0-0.2NM
  - Combat Cruise 0.3 to 1.0NM





# Combat Spread

- +10° bearing either side of lead
  - Abeam position
- Separation
  - 0.5 to 2.0 NM
  - 1.0 NM is optimal for the T-44C





# Combat Spread

- Why do we have this?
  - Unsure of enemy location
  - Don't want to alert enemy for a second shot
  - More time focused on identifying threat / hazard than avoiding lead
  - Wider field of view / mutual support
  - One shot does not equal two kills





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# TILTOR HIGH FORM BRIEF/MANEUVERS

21JUN21

VT-35 / T-44C

LEAD: \_\_\_\_\_ A/A: \_\_\_\_\_ DASH 2: \_\_\_\_\_ A/A: \_\_\_\_\_

## 1. WEATHER / NOTAMS / BASH / DECONFLICTION

## 2. RADIO PROCEDURES AND FREQUENCIES

- OUT OF CHOCKS WITH BASE 140.325
- INTRAFLIGHT: PRIMARY: 140.52 / SECONDARY: 140.95 / TERTIARY \_\_\_\_\_
- COMM DELEGATION (BASE/PEG BASE/ATIS)

## 3. GROUND PROCEDURES

- LEAD COORDINATES CLEARANCE AND TAXI
- NAV LIGHTS ON
- RAMP'S UP AFTER RUNUP COMPLETE

## 4. TAKEOFF AND CLIMBOUT PROCEDURES

- "UNLESS OTHERWISE SPECIFIED IN BRIEF, CLIMB/DESCENT RATES SHOULD BE 1000FPM."
- LD MAX Q 1200 LB-FT IN CLIMBS AND IN ACCELERATION,
- LD MIN Q NOT LESS THAN 400 LB-FT DESCENDING/DECEL

## 5. INITIAL RENDEZVOUS

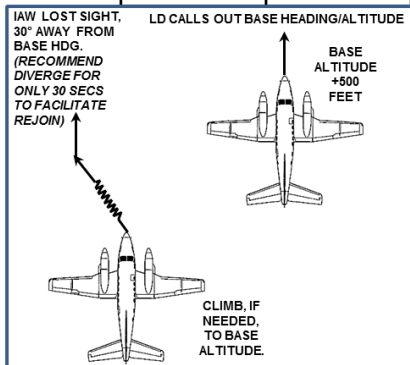
- RUNNING: (140KTS) WING NO GREATER THAN 10 KTS CLOSURE PER 0.1 DME
- TACAN: RADIAL / DME AS ASSIGNED BY LEAD

## 6. FLIGHT PATH / OPERATING AREA

## 7. EVENTS (ORDER AT LEADS DISCRETION)

- LUBE THE LINE (150 KTS)
- STARBOARD PARADE  
    TURNS INTO / TURNS AWAY
- CROSSUNDER
- PORT PARADE  
    TURNS INTO / TURNS AWAY
- BREAKUP AND RENDEZVOUS (X3)
- IIMC / LOST SIGHT (BLIND) PROCEDURES
- TACAN RV (LD: 150 KTS/30 AOB)
- LEAD CHANGE
- REPEAT FOR NEW LEAD / WING
- TACFORM (180 KTS)
- FREE CRUISE

Ramp's Up	
Souls	
Fuel	
Alpha Chk	
Yardstick	
FENCE	



## 8. RTB PROCEDURES

- WING PASSES ATIS TO LEAD
- OVERHEAD

## 9. SAFETY PROCEDURES

- UNDERRUN PROCEDURES
- TERMINATE/KNOCK IT OFF

## 10. EMERGENCIES

- ABORTS
- MIDAIR
- AIRCRAFT MALFUNCTIONS
- INADVERTENT IMC (ESA/MSA)
- LOST SIGHT / BLIND
- LOST COMM

TAC TURN L / R

-O/B TURNS FIRST

-I/B TURNS  
WHEN LOOKING  
DOWN FUSELAGE

SHACKLE  
-45° AOB  
-45° HDG  
-(SUCKED ACFT TURNS  
LESS THAN 45°  
-ACFT WITH MOST SA  
CALLS RESUME

HOOK L / R

CROSS TURN,  
Dash-2 COVER

-45° AOB  
-WING SHADED  
OUTSIDE (HIGH)

CHECK TURN

-30° AOB  
≤45° HDG  
CHANGE

PUMP L / R

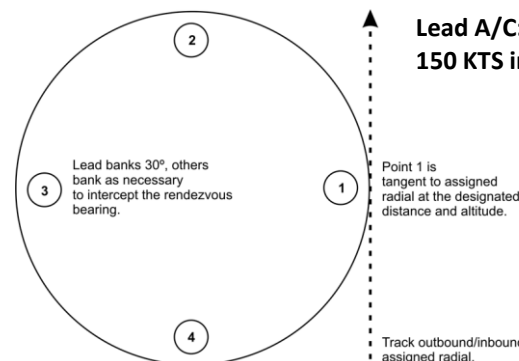
45° AOB

PINCH

45° AOB  
30° HDG CHANGE  
RESUME

DI  
G

## TACAN RENDEZVOUS



## FREE CRUISE

WING & LEAD 900 LB FT

LEAD 45 DEG AOG  
A/S 120 – 200  
+/- 20 DEG PITCH

WING IS LIMITED TO NATOPS  
UTILIZES LEAD/PURE/LAG PURSUIT  
TO MAINTAIN INTERVAL



# Call Signs and A/A TACAN

- Call signs
  - First flight of the day, lead is 11, -2 is 12, etc.
  - Second flight of the day, lead is 21, -2 is 22, etc.
- Use Lead's callsign as the base, add 63 to Dash two
  - LEAD: Stingray 11      A/A: 11Y
  - DASH 2: Stingray 12      A/A: 74Y



# Preflight

- 1. Weather
- 2. Radio Procedures and Frequencies
  - Out of chocks on base, then push flight to intraflight
    - Primary: 140.52 / Secondary: 140.95
    - Tertiary could be fingers/gradeschool (123.45), cheerleader (246.8), Winchester (303.0)
  - Positive switches (use your callsign) for switch and check-in
  - Can use “Two” after that unless frequency intruded upon
- 3. Ground Procedures
  - Lead coordinates clearance and taxi
    - Nav Lights on, single taxi calls
    - If delayed due to lineman etc, lead judgment to taxi as singles, join runup.
  - Ramp’s up after runup complete
    - Courtesy call of just “ramp’s up” until all report it, then:
    - “Ramp’s up, fuel state, souls, Alpha Check, Yardstick check, FENCED IN (exceptions)



# Takeoff and Climbout

- 4. TAKEOFF AND CLIMBOUT PROCEDURES
  - - TAKEOFF POSITIONING BASED ON WINDS
  - AIRSPEEDS, CLIMB/DESCENT RATES AND PWR REQ:
    - “UNLESS OTHERWISE SPECIFIED IN THE BRIEF [...] CLIMB AND DESCENT RATES SHOULD BE 1000FPM.”
    - AIRSPEEDS SHOULD NORMALLY BE 150KIAS OR AS REQUIRED ON COURSE RULES.
    - LEAD MAX TORQUE 1200 FT-LBS IN CLIMBS AND IN ACCELERATION, NOT LESS THAN 400 FTLBS DESCENDING/DECEL”
- 5. INITIAL RENDEZVOUS
  - - RUNNING: WING NO GREATER THAN 10 KTS CLOSURE PER 0.1 DME SEPERATION
  - - TACAN: RADIAL / DME AS ASSIGNED BY LEAD
- 6. FLIGHT PATH / OPERATING AREA (USUALLY FOXTROT OR JULIETT)
- 7. SEQUENCE OF EVENTS:
  - - LUBE THE LINE (150 KTS)
    - - STARBOARD PARADE
    - TURNS INTO / TURNS AWAY
  - - CROSSUNDER
  - - PORT PARADE
    - TURNS INTO / TURNS AWAY
  - - BREAKUP AND RENDEZVOUS (X3)
  - - IIMC/BLIND BREAKUP
  - - TACAN RV (LD: 150 KTS/30 AOB)
  - - LEAD CHANGE
  - - REPEAT FOR NEW LEAD / WING
  - - TACFORM (180 KTS)
  - - FREE CRUISE

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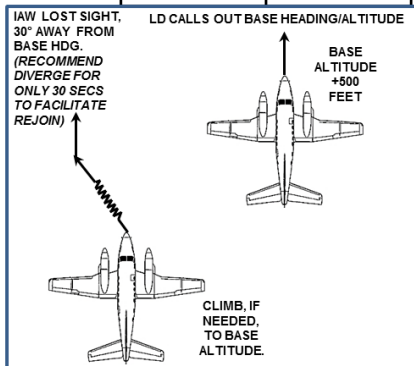
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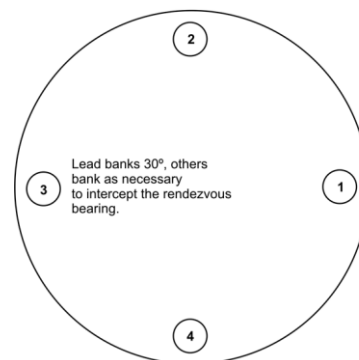
45° AOB

PINCH

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30° HDG CHANGE  
RESUME

DI  
G

## TACAN RENDEZVOUS



Lead A/C: 30° AOB  
150 KTS in holding.

Point 1 is  
tangent to assigned  
radial at the designated  
distance and altitude.

Track outbound/inbound on  
assigned radial.

## FREE CRUISE

WING & LEAD 900 LB FT

LEAD 45 DEG AOG  
A/S 120 – 200  
+/- 20 DEG PITCH

WING IS LIMITED TO NATOPS  
UTILIZES LEAD/PURE/LAG PURSUIT  
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# RUNNING RENDEZVOUS

RIDE THE 45 DEGREE  
BEARING IN



ABEAM: 3-5 plane widths

CLOSURE: 30kts MAX

LD/WG airspeeds initially  
after takeoff as briefed by  
flight lead.



# STARBOARD PARADE

HORIZONTAL STAB ON  
UHF ANTENNA



VERTICAL STAB  
THROUGH THE STAR

# STARBOARD PARADE

## ACUTE

SPACE HORIZONTALLY BETWEEN  
HORIZONTAL STAB & UHF ANTENNA



VERTICAL STAB OUTSIDE STAR

**STARBOARD PARADE**

**SUCKED**

HORIZONTAL STAB AHEAD OF  
AND COVERING UHF ANTENNA



VERTICAL STAB INSIDE STAR

**STARBOARD PARADE**

**HIGH**

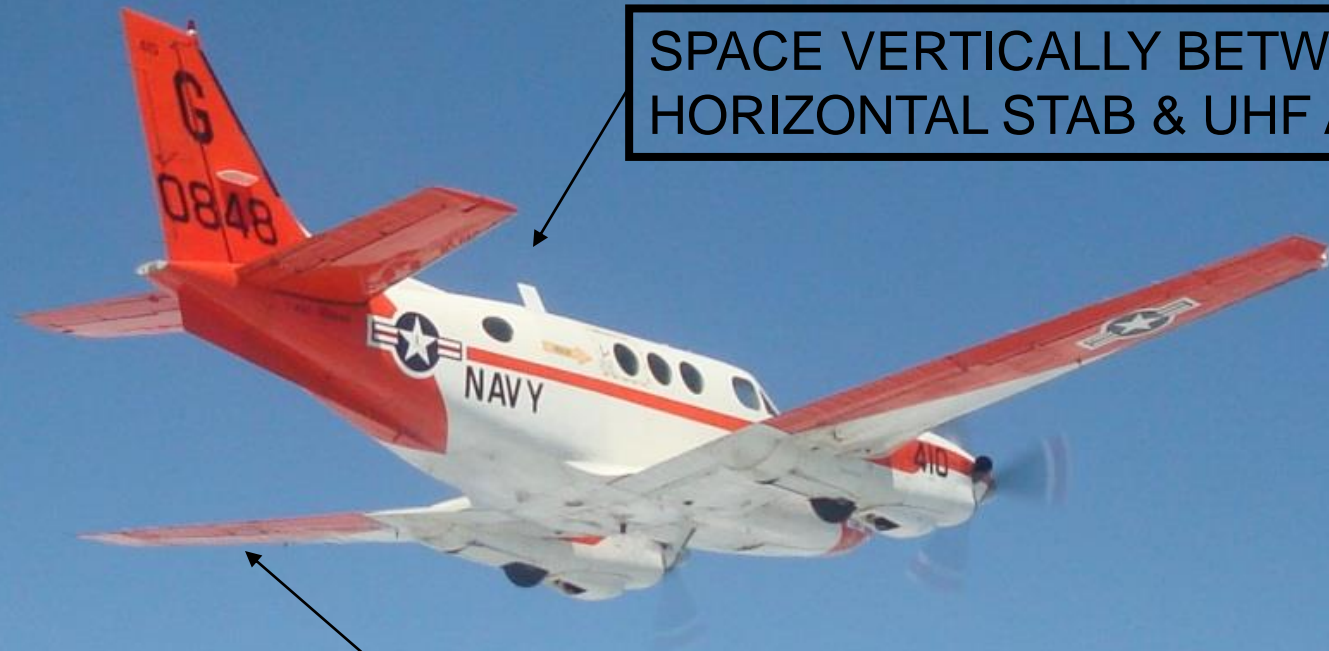
**HORIZONTAL STAB  
BELOW UHF ANTENNA**



# STARBOARD PARADE

## LOW

SPACE VERTICALLY BETWEEN  
HORIZONTAL STAB & UHF ANTENNA



STAR NO LONGER VISIBLE

## STARBOARD TURNS AWAY

***LD: "STGRY 11 FLIGHT, LEFT 180 WITH ROLLOUT."  
WG: "TWO." [COMMAND OF EXECUTION]***



UHF ANTENNA IN-  
LINE WITH FWD  
EDGE OF  
HORIZONTAL STAB

FUSELAGE ON HORIZON

INBOARD EXHAUST STACK ON  
OUTBOARD ENGINE VISIBLE

## STARBOARD TURNS INTO

***LD: "STGRY 11 FLIGHT, RIGHT 180 WITH ROLLOUT."***

***WG: "TWO."***



**SAME CHECK POINTS AS  
STARBOARD PARADE**

# CROSSUNDER

***LD: "STGRY 11 FLIGHT, CLEARED TO CROSSUNDER."***

***WG: "TWO."***



**DOUBLE STEPDOWN CHECKPOINTS**



**CROSSUNDER**



**TOO LOW – EXCESSIVE GAP  
BETWEEN STACK AND FUSELAGE**

# CROSSUNDER

LEAD



WING



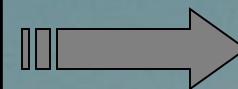
3-5 DEGREE HEADING CHANGE

# CROSSUNDER



CONTINUE OUT UNTIL THE OPPOSITE  
INBOARD EXHAUST STACK IS BEHIND  
THE ROTATING BEACON

RELATIVE MOTION OF LEAD



CROSSUNDER

PORT DOUBLE STEP DOWN



**PORT PARADE**

HORIZONTAL STAB  
ON UHF ANTENNA



VERTICAL STAB IN LINE  
WITH MIDPOINT OF  
OUTBOARD WING

# PORT TURNS AWAY

***LD: "STGRY 11 FLIGHT, RIGHT 180 WITH ROLLOUT."***

***WG: "TWO."***



FUSELAGE ON HORIZON

INBOARD EXHAUST STACK ON  
OUTBOARD ENGINE VISIBLE

UHF ANTENNA IN-  
LINE WITH FWD  
EDGE OF  
HORIZONTAL STAB

**PORT TURNS INTO**

***LD: "STGRY 11 FLIGHT, LEFT 180 WITH ROLLOUT."***

***WG: "TWO."***



**SAME CHECK POINTS AS PORT PARADE**

**BREAKUP & RENDEZVOUS SIM**

**LD:** *“STGRY 11 FLIGHT, BREAK AND RENDEZVOUS TO THE LEFT / RIGHT.”*

**WG:** *“TWO.”*



**LEAD:** 45° AOB 180 DEGREE TURN

**WING:** WITH LEAD AT 10 O’CLOCK,  
45° AOB TURN, 200’ STEPDOWN

**CONSTANT POWER SETTING!  
USE CRUISE PRINCIPLES!**



## BREAKUP & RENDEZVOUS SIM



WING: WHEN IN TRAIL REPORT "COLUMN"

LEAD: WING FLASH 45° THEN ESTABLISH 20° AOB,  
MAY ENGAGE AUTOPILOT ROLL MODE

## BREAKUP & RENDEZVOUS

USE 20-30 AOB WITH CONSTANT POWER SETTING TO ESTABLISH 60 BEARING LINE INDICATED BY OPPOSITE WING TIP ALIGNED WITH TRAILING EDGE OF VERTICAL STAB.



## BREAKUP & RENDEZVOUS



AS YOU LOSE SIGHT OF THE OUTER WINGTIP TRANSITION TO THE HORIZONTAL STABILIZER ABOVE THE STAR.

## BREAKUP & RENDEZVOUS

PORT TURNS INTO (DOUBLE STEPDOWN)  
HORIZ STAB, ANTENNA IN LINE  
INBOARD STACK OUTBOARD ENGINE VISIBLE



“JOIN UP PHASE BEGINS AT 150’ (3 WINGSPAN) DISTANCE  
TRANSITION TO STARBOARD SIDE:  
WING DIP  
POWER ADVANCE  
CROSS UNDER AND UP INTO STARBOARD TURNS AWAY

## LEAD CHANGE



CROSS UNDER FROM THE STARBOARD POSITION  
AND CONTINUE OUT 2-3 PLANE WIDTHS.



# Lead Change COMMs

- FTI Lead Change:
- Lead: “Cleared to position for lead change.”
- Wing: “Two.”
- When in position: “STGRY 12 in position for the lead.”
- Lead: “STGRY 12, you have the lead.”
- Wing: STGRY 12, has the lead.”

LEAD CHANGE



CLIMB TO PUT WING TIP  
ON ORANGE STRIPE

## LEAD CHANGE



ADD POWER AND DRIVE FORWARD  
DO NOT REPORT ESTABLISHED UNTIL YOU ARE AT  
9-10 O'CLOCK POSITION ON OTHER AIRCRAFT

WING IS RESPONSIBLE FOR SEPARATION AT ALL TIMES



## LEAD CHANGE

THIS IS WHAT LEAD WILL SEE AS WING TAKES THE LEAD. WING AIRCRAFT SHOULD BE SLIGHTLY STEPPED UP.



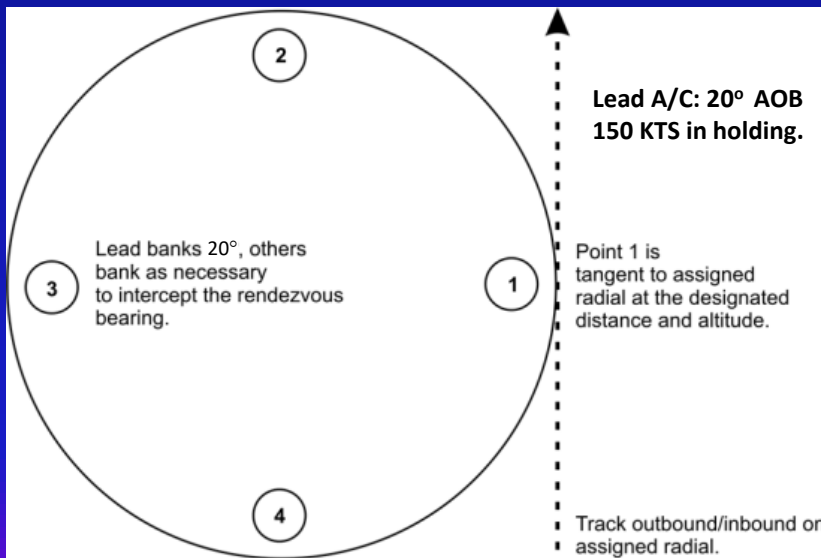


# Parade Sequence



## TACAN Rendezvous

- Flight: Minimum of 500' separation until visual.
- Lead A/C: 20° AOB 150 KTS in holding. Announce “pt 1, pt 2, etc.” over C2 until wing is visual.
- Wing A/C: Controls their own inbound geometry to join.



## Free Cruise

- Wing takes ~0.3 NM separation
- Flight: Set 900 lb ft TQ
- Lead Limits:
  - 45 deg AOB
  - A/S 120-200 kts
  - +/- 20 deg Pitch
- Wing:
  - Utilize lead/lag pursuit to maintain interval
  - Only limited by NATOPS
  - Technique: Always target the inside of the turn. If going acute, go to the outside. It's easy to get separation, hard to gain closure.



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# TACFORM – Basic Principles

- Wingman responsible for separation
- Employ adequate intraflight separation to ensure single target engagement and facilitate maneuver flexibility while maintaining mutual support
- Maneuver in proportion to threat

Wingmen are always working to maintain position.  
Lead is always working to facilitate wingmen maintaining position.



# TACFORM – Energy Management

- Awareness and preservation of the aircraft energy state during a series of maneuvers
- Potential energy
  - Energy based upon position (altitude,  $Q_m$ )
- Kinetic energy
  - Energy based upon motion (airspeed)
- Energy continuously changes states
  - Airspeed to altitude in climb (kinetic to potential)
  - Altitude to airspeed in dive (potential to kinetic)



# TACFORM – Maneuver Contracts

- All maneuvers are called from Combat Spread ONLY
- Airspeed 180KIAS
- All Turns at 45° AOB (except check turns)
- Rollout headings will be called for every maneuver despite degrees of turn assumed
- Command of execution is when Dash-2 says “TWO”
- Dash-2 is always the one who steps up when warranted (cross turn)



# TACFORM – Successful Execution

- Relative positioning within the element prior to execution
- Geometries of the planned maneuver relative to tactical considerations (terrain, conditions, threat)
- Desired relative position following maneuver completion
- Takes SA, flight leadership, and good airwork by both aircraft



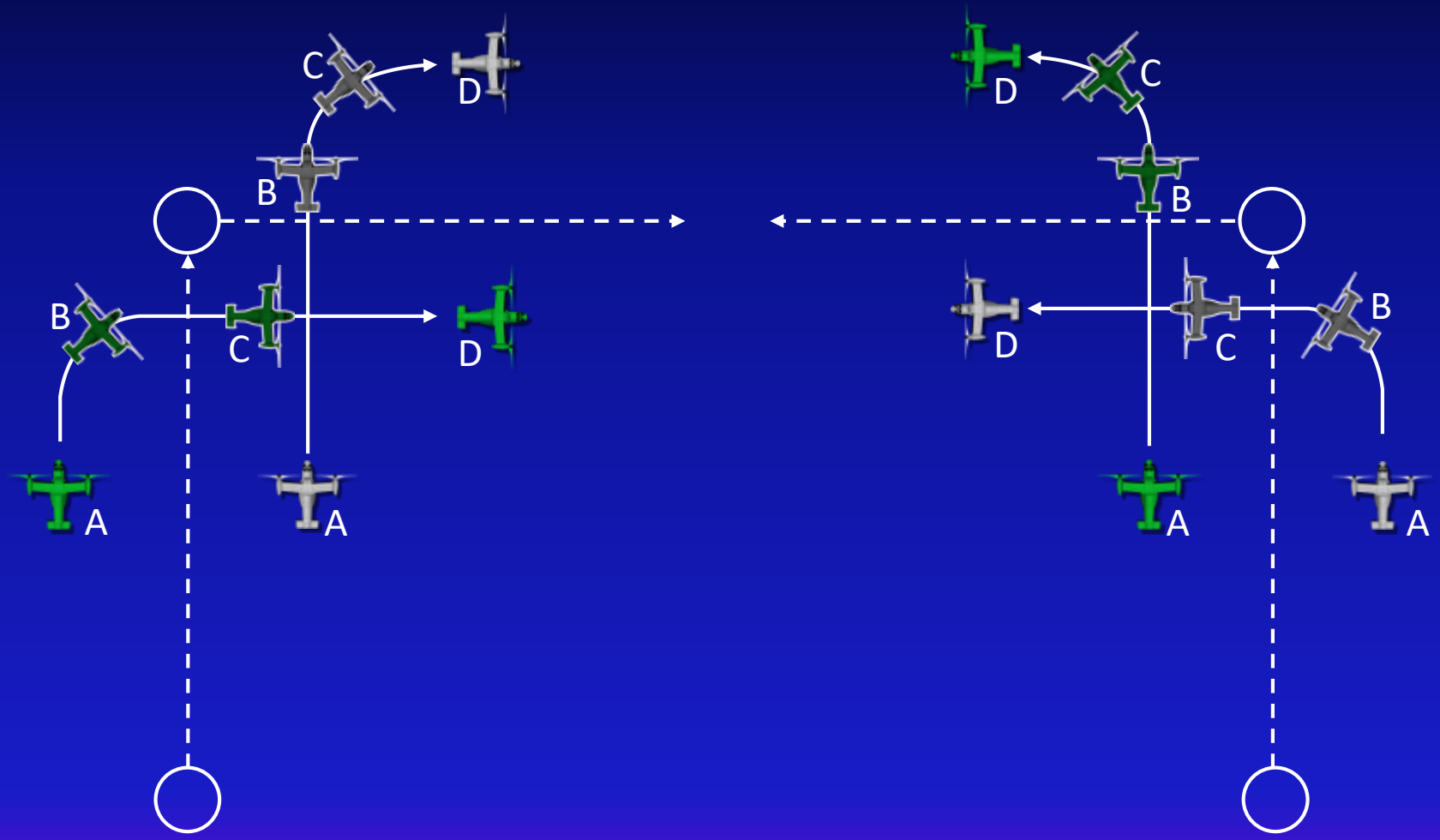
# Tac-Turns

- Change the direction of the element right / left 60-120° (90° assumed)
  - Direct the execution of a planned route turn
  - Modify element orientation towards a more positive flight condition
- Types
  - Turns Into Wingman
  - Turns Away From Wingman
- Aircraft on outside of turn always turns first
- “Stingray 11, tac-left/right, 090° ”
- “Two.”





# Tac-Turns





# Shackle

- Initiate change of sides within formation
  - Tactical necessity (clear 6 o'clock)
  - Moderately slow downrange travel
  - Primarily used to assist wingman regain position (excessive separation and/or sucked)
- Maintain energy and course or in conjunction with a moderate course change



# Shackle

- Turn towards flight 45° heading change
  - May require more turn by lead and less by wing, or vice versa, so don't get set on a specific heading change
- “Stingray 11, shackle” / “...shackle left / right 030°”
- “Two.”
- Resume course at cross and judge turn to regain separation
  - The aircraft with the most SA will call “Resume”
  - In the fleet, the crew chief will do this for you



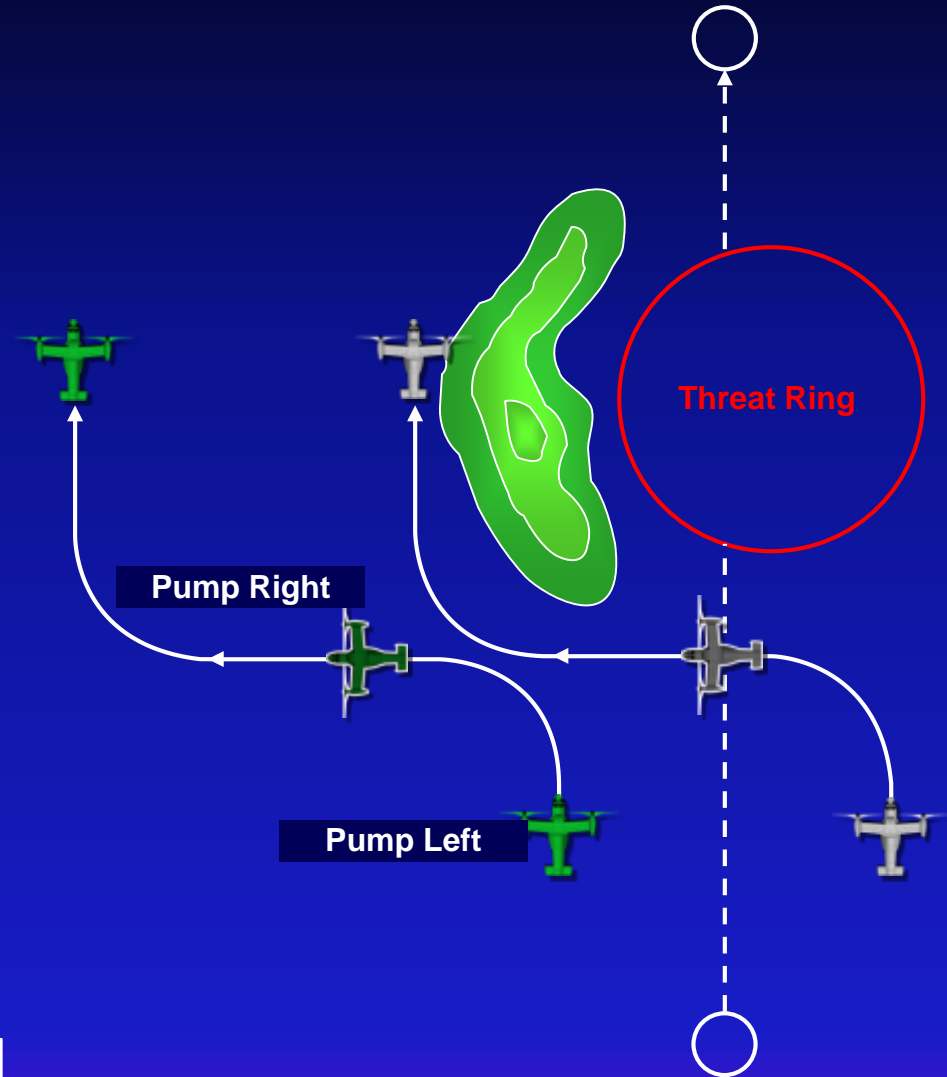
# Shackle





# Pump

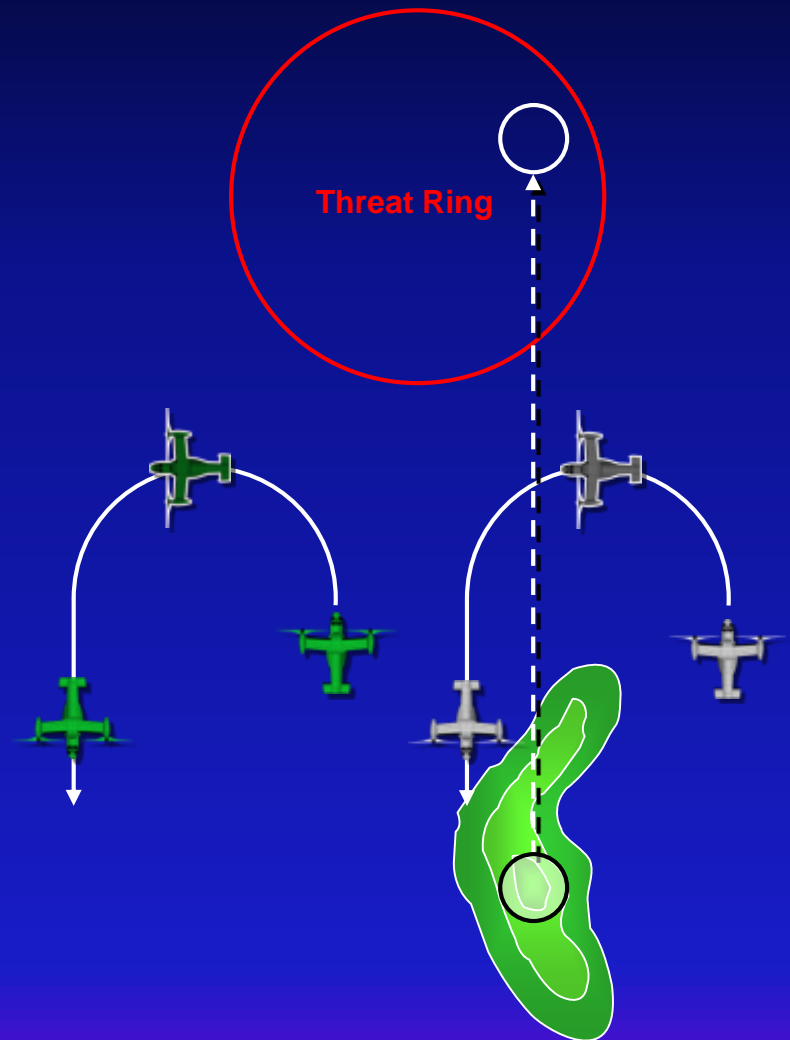
- Immediately stop downrange closure on an obstacle, weather condition or threat system
- 90° left / right heading change
- “Stingray 11, Pump left / right, 270°”
- “Two.”
- Normally followed by pump back to original heading
  - NOT a resume call
- Separation retained in trail





# Hook Turn

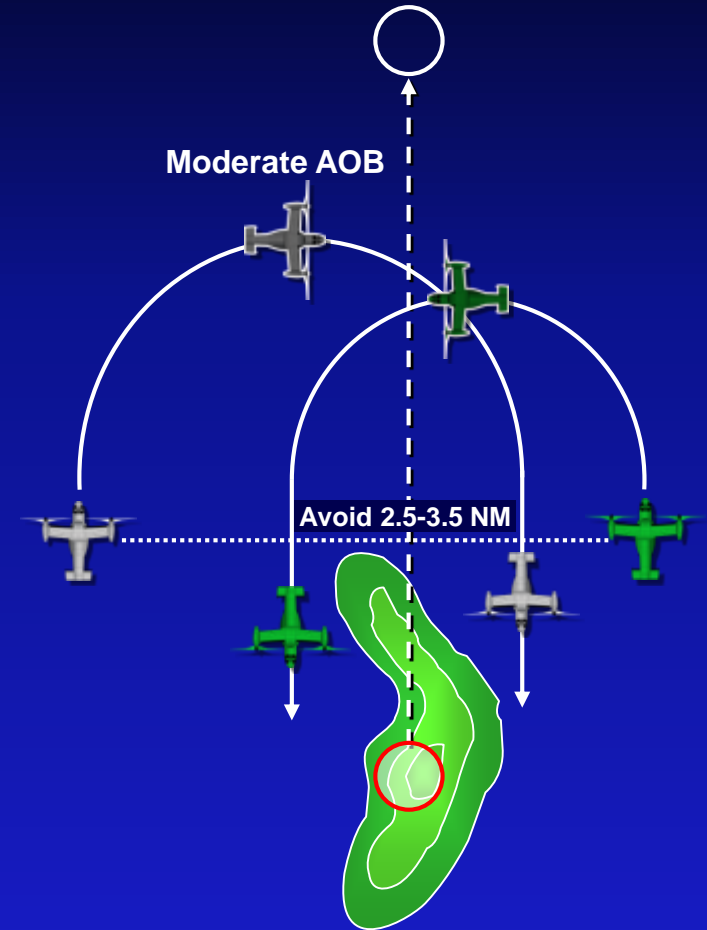
- Change orientation of element 120-240°
  - Towards a threat in engagement parameters in rear quadrant
  - Away from threat outside of engagement parameters in forward quadrant
- Established intra-flight separation maintained
- Displaces element 1.5 NM right / left of original course line
- “Stingray 11, Hook left / right, 180°”
- “Two.”





# Cross Turn

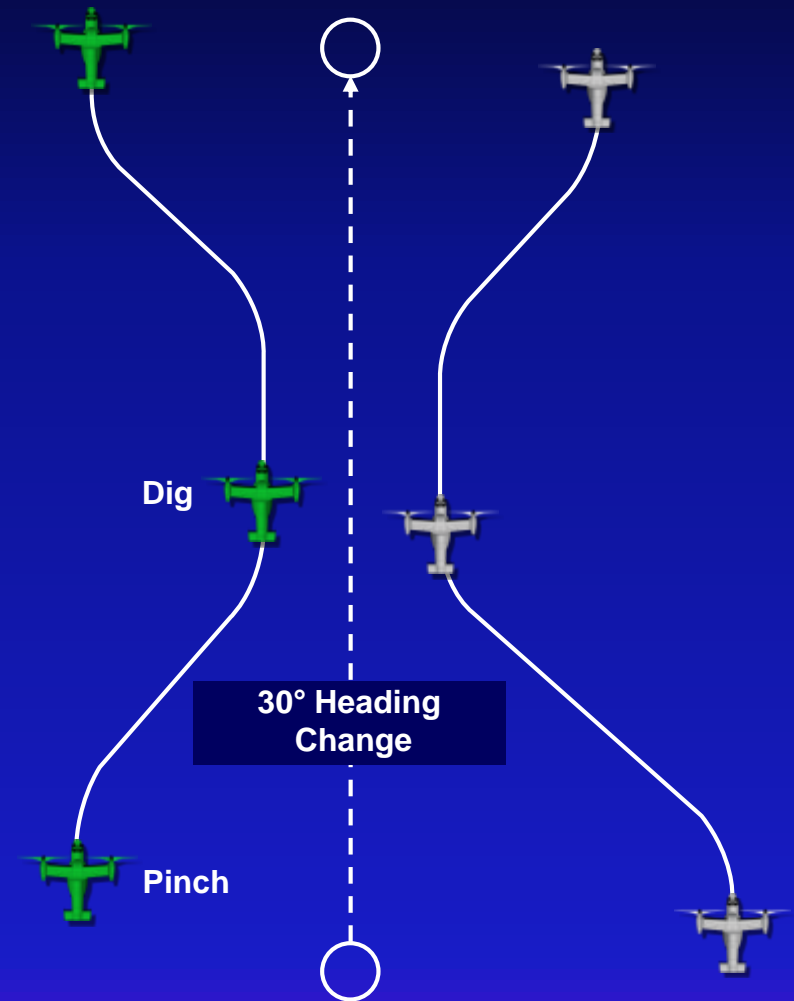
- Change orientation of element 120-240°
- Hard Turn executed towards other element aircraft
- Intra-flight separation based upon entrance separation
  - Avoid 2.5-3.0 NM
  - 1.5 NM away at initiation yields 1.5 NM separation
- “Stingray 11, Cross, 180°”
- “Two.”





# Dig / Pinch

- Adjust lateral separation within element while maintaining course orientation
- 45° AOB for 30° Heading change
- “Stingray 11, Dig / Pinch”
- “Two.”
- “Resume.”

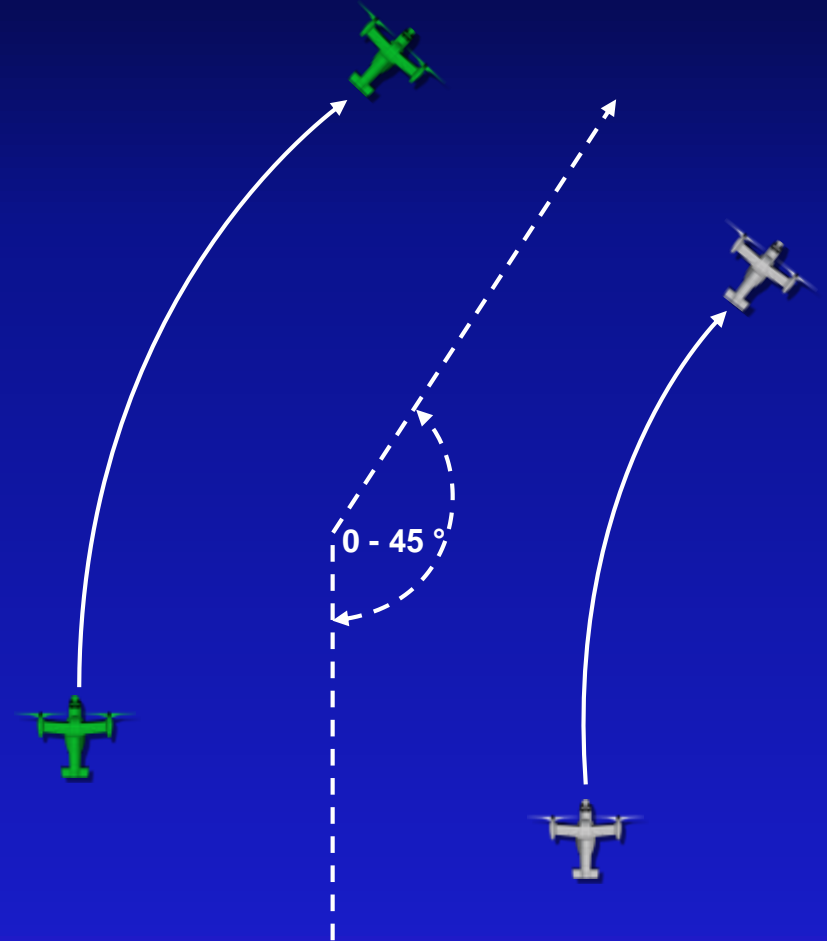






# Check Turn

- Adjusts flight orientation for heading changes of  $45^\circ$  or less
- Execute SRT, simultaneous, no change of sides
- “Stingray 11, Check right / left  $030^\circ$ ”
- “Two.”





# Other

- Cover can be added to any maneuver (Dash-2)
- Adjust AOB, turn, altitude to manage position / separation (thinking Wingman)
- Lead rollout for proper separation by .2 - .4 NM
- Once you collapse to Cruise/Combat Cruise/Parade, NO MORE REFERENCE HDGs.



# Contracts (cont)

- Wingman is always working towards proper bearing and separation
- Element aircraft will not continue a maneuver unless visual contact is established by at least one aircraft in the section
- If aircraft is blind call wingman; expect a:
  - “visual / continue” or
  - “blind / terminate”
- Rollouts assume 90 / 180 turns, but will still specify reference headings in the calls



# Outline

- Formation Description and Objectives
- Formation Types
- F4201 Kneeboard Card
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- Coordinating Instructions / Contingencies
- Division Formations Considerations



# RTB / Safety Procedures

- 8. RTB procedures
  - WING passes ATIS to LEAD
  - Automatic collapse to parade on appropriate side at Pt. Shamrock
  - Overhead (see next slide)
- 9. Safety procedures
  - Underrun procedures
  - Terminate / Knock it off

## OVERHEAD RECOVERY

LEAD: 200 KTS, TURN 45° AOB, THEN  
POWER IDLE, CONFIGURE ON SPEED.



WING: WITH INTERVAL FROM LEAD (~9 or 3 o'clock)  
45° AOB, THEN POWER IDLE, CONFIGURE ON SPEED,  
BOTH AIRCRAFT LAND ON CENTERLINE.



# RTB / Safety Procedures

- 8. RTB procedures
  
- 9. Safety procedures
  - Underrun procedures
    - 1. Increase step-down
    - 2. Keep lead in sight.
    - 3. Level the wings (it's ok for relative motion to move you outside lead's turn vs. belly-up)
    - 4. Reduce power to idle to avoid passing ahead of lead.
    - 5. Transmit "underrunning."
    - 6. When relative motion is under control, join in the assigned posn.
      - *(Lower, level, idle, call)*
  - Terminate / Knock it off



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# Coordinating Instructions



- **ABORTED T/O**
  - Lead abort: Wing aborts with Lead, Lead calls abort on tower (Ch. 4)
  - Wing abort: Wing calls abort on tower (Ch. 4) when Lead off deck
- **MIDAIR COLLISION**
  - IAW FTI CHAPTER 5
- **A/C EMERGENCIES / SYSTEM DEGRADATION (MALFUNCTIONS)**
  - Aviate (climb to cope), Navigate, Communicate
  - Advise wing/lead when safe to do so
- **LOST SIGHT / BLIND**
- **IIMC**



# Coordinating Instructions: Lost Sight

- **LOST SIGHT, BLIND:**

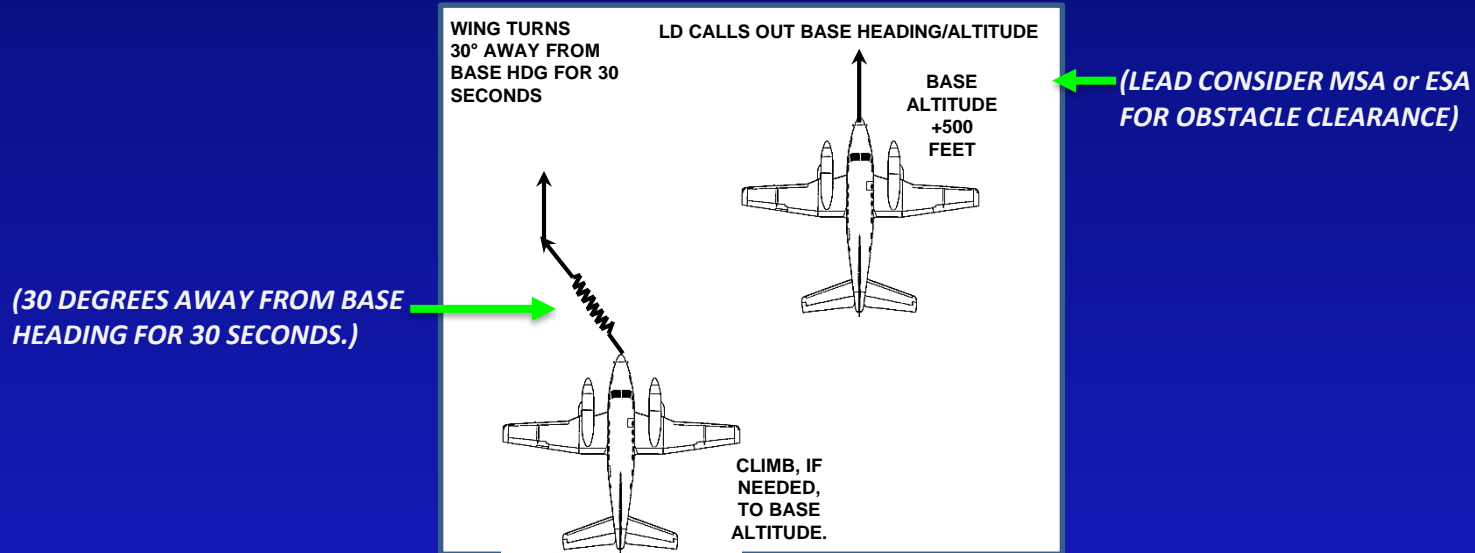
- WING TRANSMITS “LOST SIGHT” or “TWO’S BLIND” AND ALTITUDE ON INTERNAL FREQUENCY
- IN LEVEL FLIGHT – WING INCREASES STEP-DOWN 500 FEET
- IN A CLIMB – WING HOLDS ALTITUDE, LEAD CONTINUES CLIMB 500 FT.
- IN A DESCENT – WING CONTINUES DESCENT 500 FT, LEAD HOLDS ALTITUDE
- TURNS INTO – LEAD ROLLS OUT AND CALLS OUT HDG. WING CONTINUES TURNING FOR 30° PAST LEAD’S HDG.
- TURNS AWAY – WING ROLLS OUT AND CALLS OUT HDG. LEAD CONTINUES TURNING FOR 30° PAST WING’S HDG.
- WING CAUTIOUSLY MANEUVERS TO REGAIN VISUAL CONTACT AND REJOIN ENSURING SAFE ALTITUDE SEPARATION WHILE MANEUVERING.
- *USE OF THE FOLLOWING SLIDE TO FACILITATE REJOIN.*



# Coordinating Instructions: Lost Sight/IIMC



Wing announces "Lost Sight" Wing announces his altitude and lateral separation is initiated IAW the existing Lost Sight procedure, ***except, if wings level, Wing gains lateral separation by turning away from Lead's last known position for 30 seconds.*** Lead is directive regarding heading assignments and altitude assignments, giving consideration to obstacle clearance if needed. Lead will climb 500 feet above Wing's assigned altitude."



## Recommended Comms:

**WING:** "TWO HAS LOST SIGHT. ALTITUDE XXX"

**LEAD:** "STINGRAY FLIGHT, IMC FAN BREAK...BASE HDG XXX, BASE ALTITUDE X FT."

**WING:** "TWO TURNING LEFT"

**LEAD:** ANNOUNCES JOIN UP INSTRUCTIONS IF VMC, COORDINATES IFR HANDLING IF STILL IMC  
**BOTH ACFT SHOULD BEGIN SQUAWKING IF BREAKUP OCCURS.**

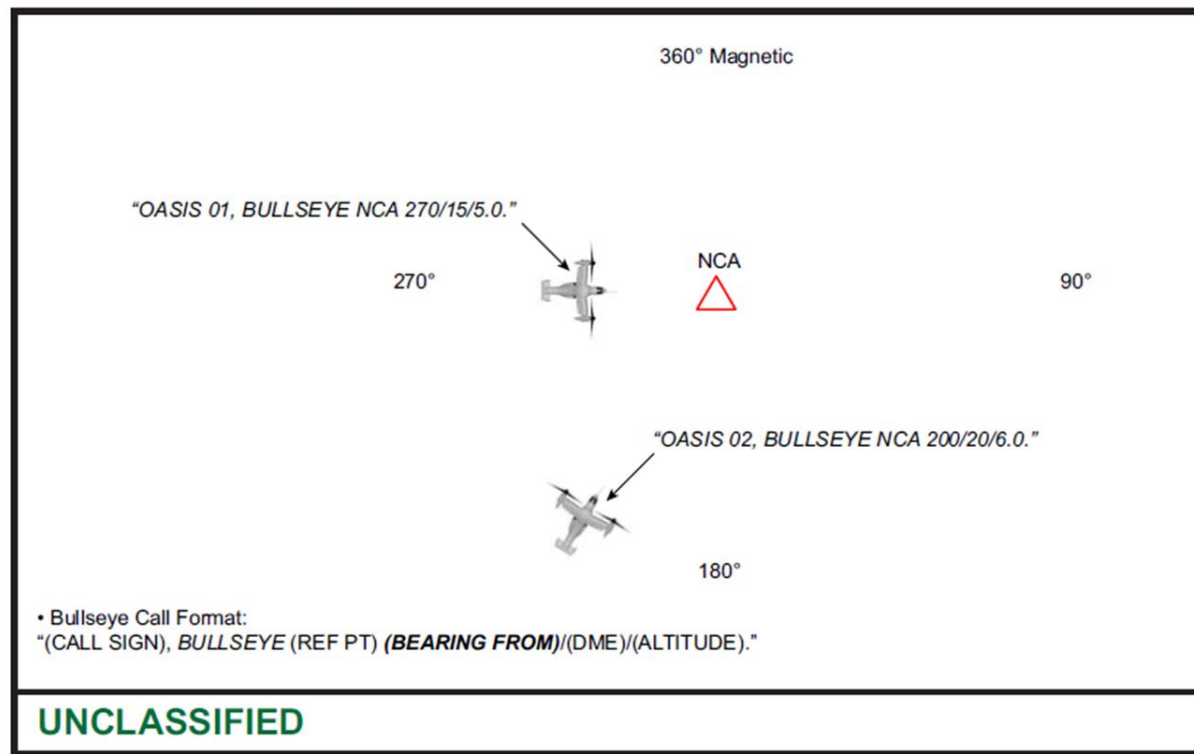


# Coordinating Instructions: Lost Sight

- **REJOIN AFTER LOST SIGHT**

- BULLSEYE call to the next checkpoint in the following format:
  - “(call sign), BULLSEYE (ref point), (bearing from), (DME), (altitude).”
  - Ex: “**STINGRAY 11, BULLSEYE POINT MIKE 195 AT 24.5, 1300’ MSL.**”
  - Ex: “**STINGRAY 12, BULLSEYE POINT MIKE 180 AT 23.8, 800’ MSL.**”
- Lead announces: rendezvous point, holding course / speed / 5-nm legs / direction of turns, altitude assignments for separation, specifies if join is high → low or low → high.

Figure 5.1 Bullseye Example.

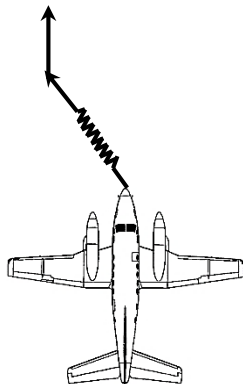


# IIMC Formation Breakup “Packages:” Fan Break

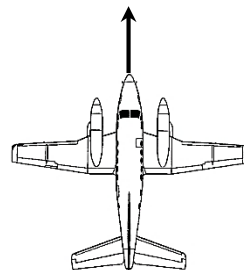


LD CALLS OUT BASE HEADING/ALTITUDE ← (LEAD CONSIDER MSA or ESA FOR OBSTACLE CLEARANCE)

30° AWAY FROM  
BASE HDG.  
RETURN TO BASE  
HDG AFTER 30 SECS  
TO FACILITATE  
REJOIN



CLIMB TO  
BASE  
ALTITUDE



BASE  
ALTITUDE  
+500  
FEET

## Recommended Comms:

**WING:** “POPEYE, TWO HAS LOST SIGHT.”

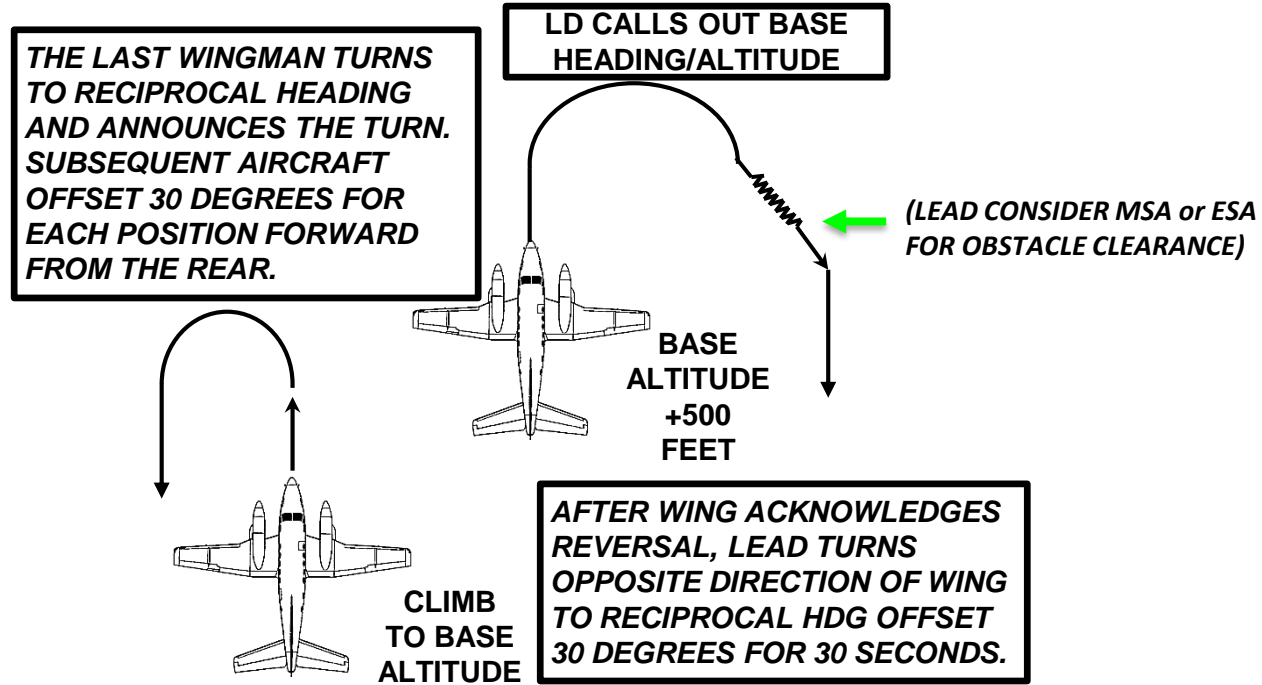
**LEAD:** “STINGRAY FLIGHT, IMC FAN BREAK ...BASE HDG XXX, BASE ALTITUDE X FT.”

**WING:** “TWO TURNING LEFT”

**LEAD:** ANNOUNCES JOIN UP INSTRUCTIONS IF VMC, COORDINATES IFR HANDLING IF STILL IMC

**BOTH ACFT SHOULD BEGIN SQUAWKING IF BREAKUP OCCURS AND USE TAS HITS TO INCREASE SA.**

# IIMC Formation Breakup “Packages:” Reversal



## **Recommended Comms:**

**WING:** "POPEYE, TWO HAS LOST SIGHT."

**LEAD:** "STINGRAY FLIGHT, IMC REVERSAL ...BASE HDG XXX, BASE ALTITUDE XXXX FT."

**WING:** "TWO TURNING LEFT" (Dash-last turns to reciprocal of base heading)

**LEAD:** ANNOUNCES JOIN UP INSTRUCTIONS IF VMC, COORDINATES IFR HANDLING IF STILL IMC

**BOTH ACFT SHOULD BEGIN SQUAWKING IF BREAKUP OCCURS.**



# Coordinating Instructions: Lost Comm



- **LOST COMM (FTI DEVIATION)**

- Wing pulls abeam to get attention of good comm A/C (ROCK WINGS, CYCLE LTS)
- Or Lead slows to get attention of good comm A/C (ROCK WINGS, CYCLE LTS)
- Good comm aircraft acknowledges with the same signal and returns lights to the original configuration. “Bad comm” aircraft becomes the tactical wingman.
- Good comm aircraft executes touch and go indicating clearance to land for bad comm aircraft. After landing, wWng gets their own ALDIS lamp signals to taxi to park.

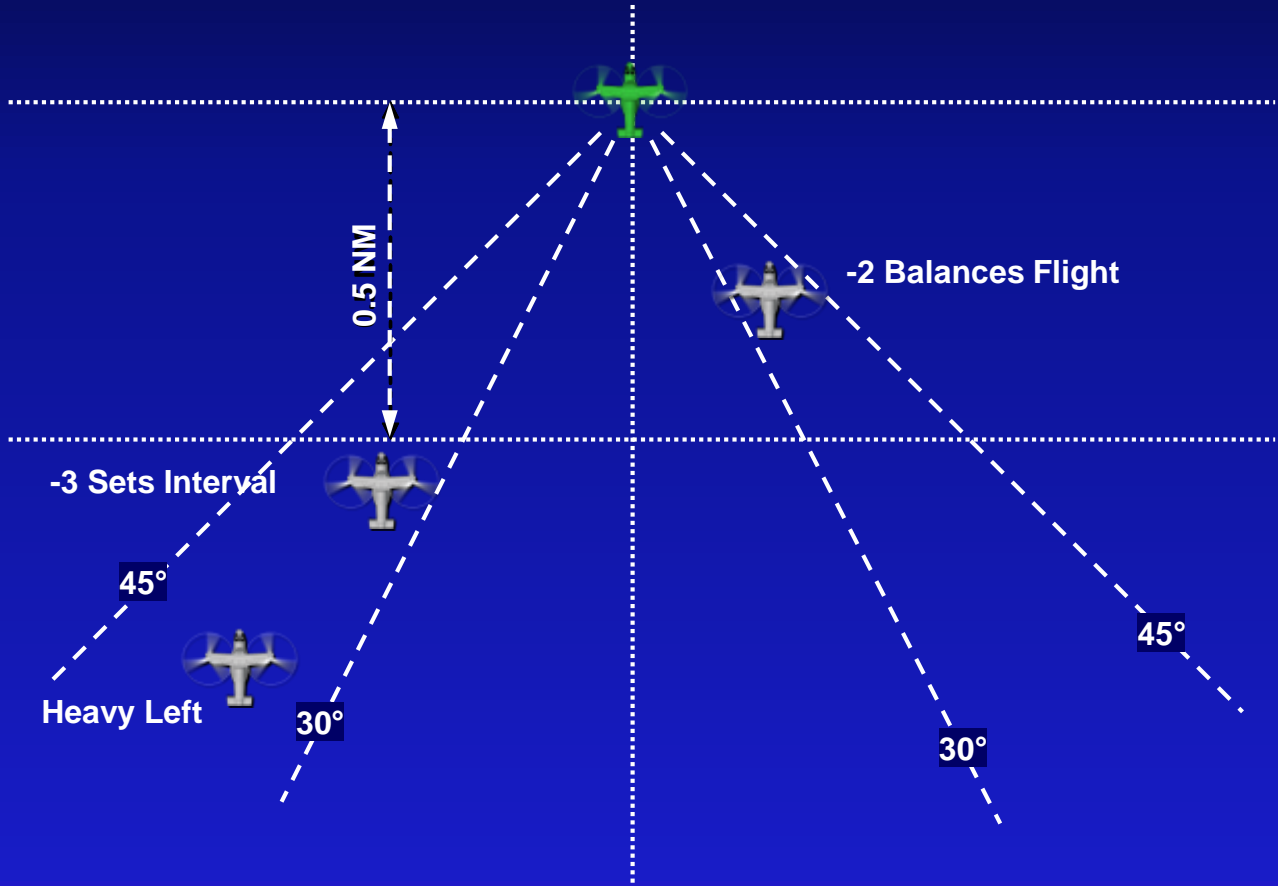


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# Division Combat Cruise - Sections in Combat Cruise

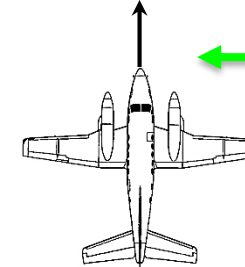


# Division IIMC Breakup Packages: (Echelon/Parade)



MAINTAIN SIGHT OF LEAD.  
IF LOST SIGHT, TURN 30°  
AWAY IAW LOST SIGHT,  
**THEN RETURN TO BASE  
HDG AFTER 30 SECS TO  
FACILITATE REJOIN**

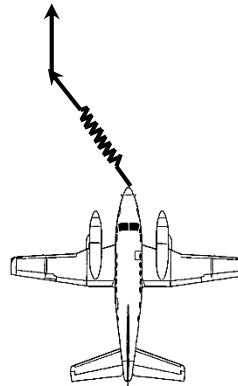
LD CALLS OUT BASE HEADING/ALTITUDE



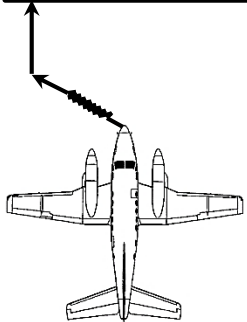
← (LEAD CONSIDER MSA or ESA  
FOR OBSTACLE CLEARANCE)

BASE  
ALTITUDE  
+1000  
FEET

IAW LOST SIGHT,  
**CONTINUE TURN  
60° AWAY FROM  
BASE HDG.  
THEN RETURN  
TO BASE HDG  
AFTER 30 SECS  
TO FACILITATE  
REJOIN**



CLIMB, TO  
BASE  
ALTITUDE  
+500  
FEET



CLIMB TO  
BASE  
ALTITUDE

## Recommended Comms:

**DASH 3 :** "POPEYE, THREE HAS LOST SIGHT."

**LEAD:** "STINGRAY FLIGHT, IMC BREAKUP [FAN OR REVERSAL]...BASE HDG XXX, BASE ALTITUDE X FT."

**DASH 3:** "THREE TURNING LEFT"

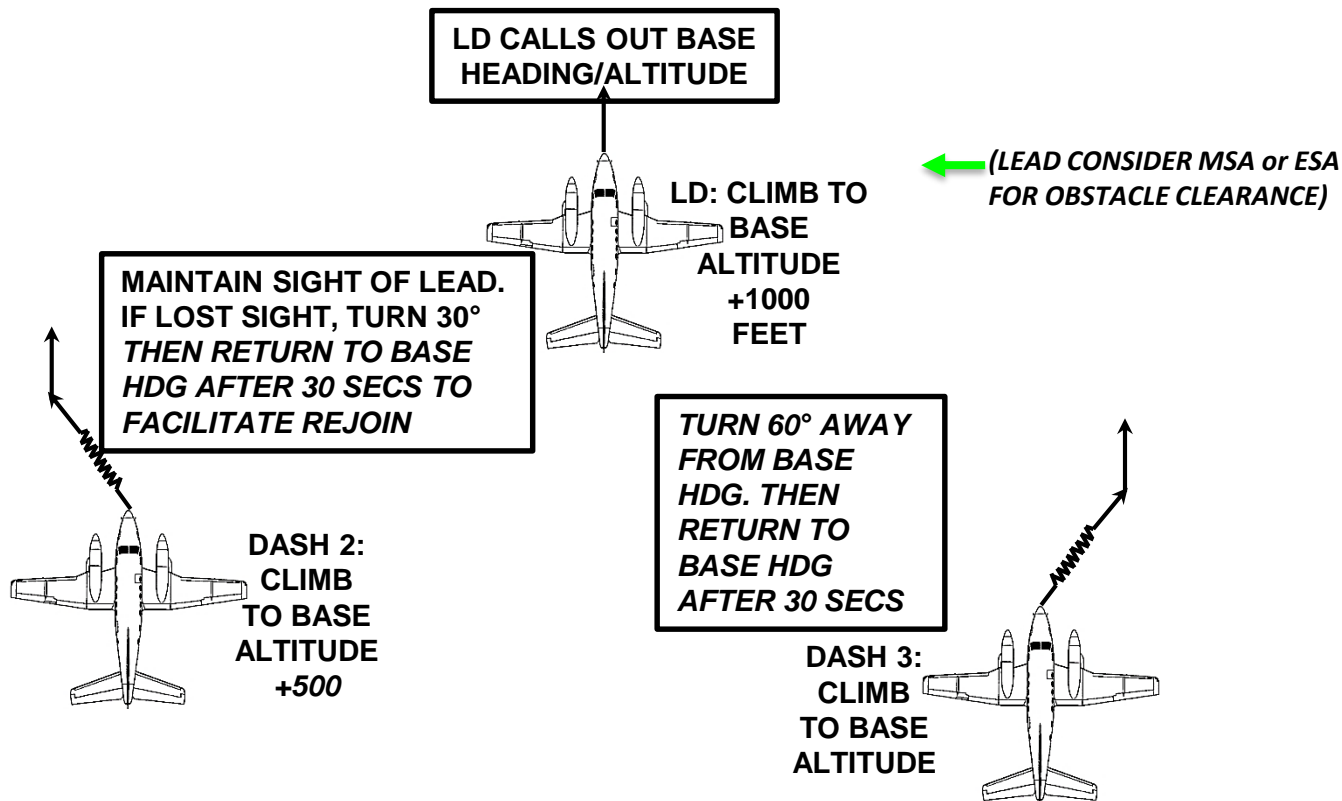
**DASH 2:** MAINTAIN SIGHT OF LEAD. IF LOST SIGHT, "TWO TURNING LEFT"

**LEAD:** ANNOUNCES JOIN UP INSTRUCTIONS IF VMC, COORDINATES IFR HANDLING IF STILL IMC.

**ALL ACFT SHOULD BEGIN SQUAWKING IF BREAKUP OCCURS AND USE TAS HITS TO INCREASE SA.**

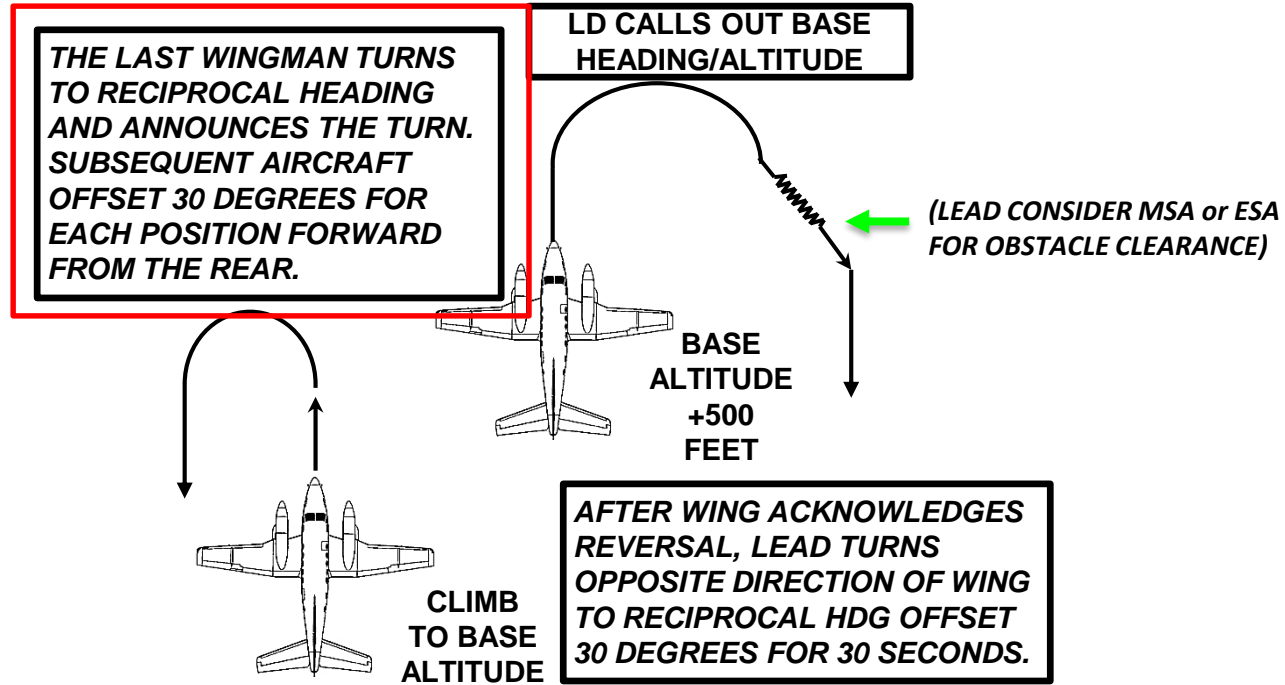
**IF REVERSAL, THE CONTINUED TURN WILL BE EXECUTED BACK TO FRONT (DASH 3 to base heading, DASH 2 to base heading minus 30 degrees, LD to base heading minus 60 degrees)**

# Division IIMC Breakup Packages: Balanced Division (Combat Cruise)



THIS IS A DEPICTION SHOWING THAT THE ASSIGNMENTS PER POSITION *REMAIN THE SAME (FOR SIMPLICITY) REGARDLESS OF THE FLIGHT'S GEOMETRY (ECHELON VS. BALANCED)*.  
RECOMMENDED COMMS REMAIN THE SAME.

# IIMC Formation Breakup “Packages:” Reversal



## **Recommended Comms:**

**WING:** “POPEYE, TWO HAS LOST SIGHT.”

**LEAD:** “STINGRAY FLIGHT, IMC REVERSAL ...BASE HDG XXX, BASE ALTITUDE XXXX FT.”

**WING:** “TWO TURNING LEFT” (Dash-last turns to reciprocal of base heading)

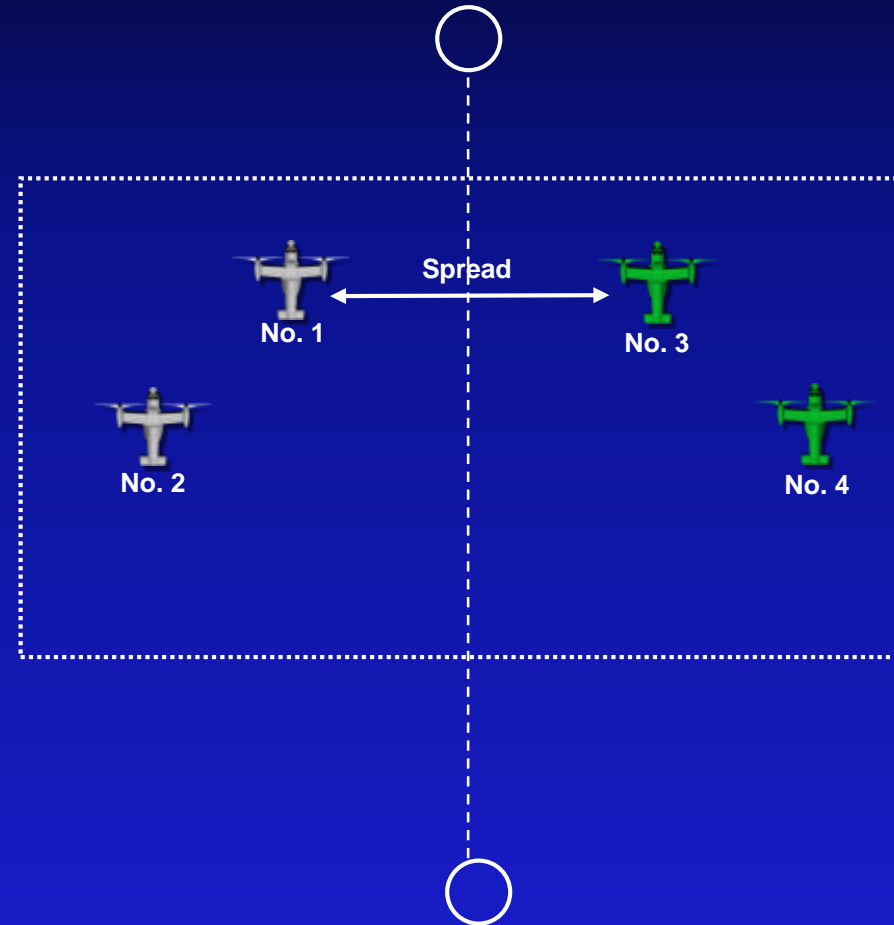
**LEAD:** ANNOUNCES JOIN UP INSTRUCTIONS IF VMC, COORDINATES IFR HANDLING IF STILL IMC

**BOTH ACFT SHOULD BEGIN SQUAWKING IF BREAKUP OCCURS.**



# Fluid Four

- Flight in Combat Spread
- Sections in Combat Cruise
  - Wingman on outside
  - Wingman change sides during large turns to remain on outside using radius of turn
- Fluid Four (-)





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Questions?



# Critiques





This Presentation is Classified:  
**UNCLASSIFIED**