

OCA/DCA BVR Tactics (rev1.0)

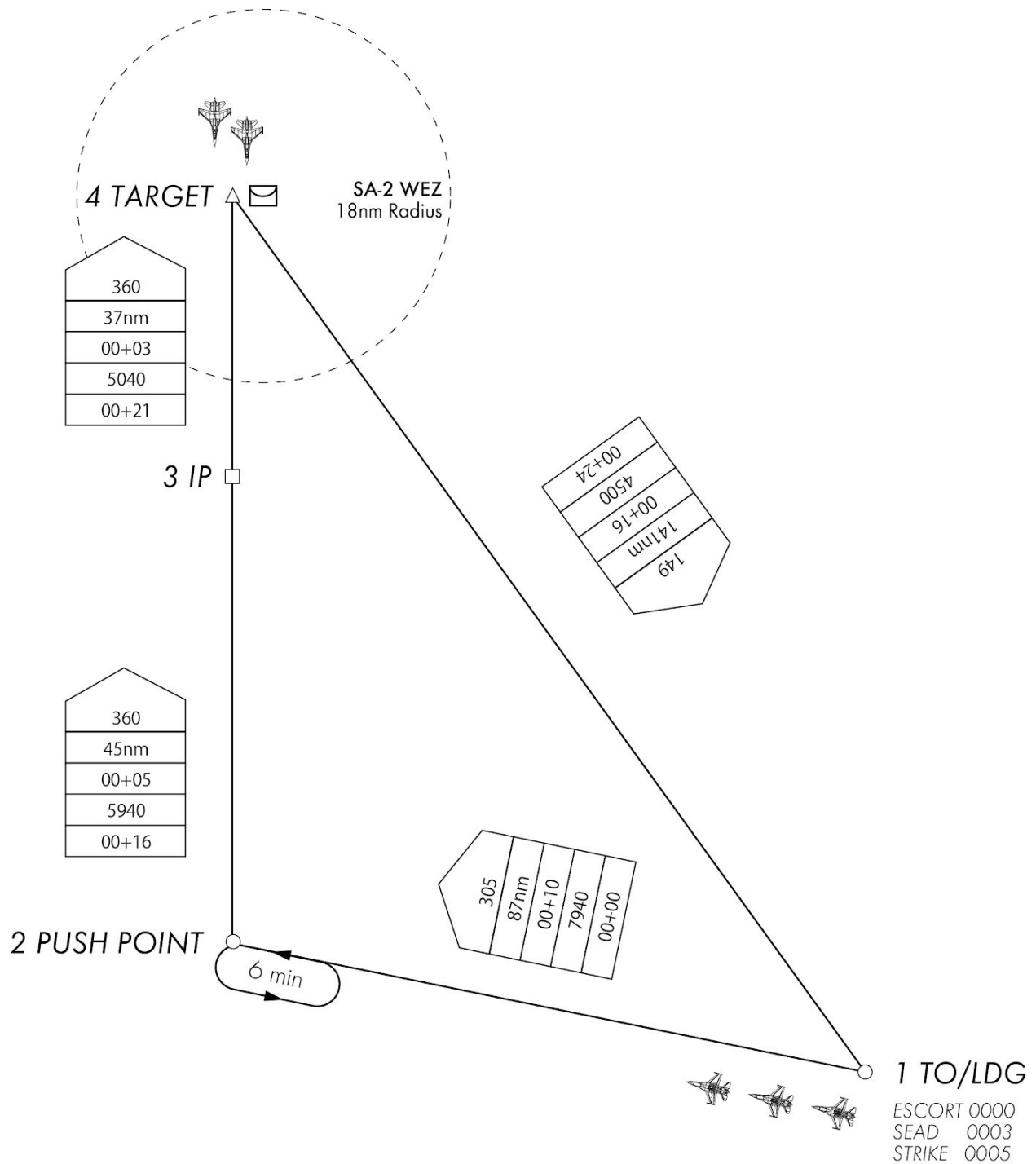
Shizuoka ANG Standards

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OCA (Offensive Counter Air)

This chapter will explain how to plan an OCA package in the example flight plan image below.



Planning

Calculate Time and Fuel

The above image has a “doghouse” which shows Heading, Distance, Leg Time(hh+mm), Minimum Fuel(lbs) to continue, and Elapsed Time(hh+mm).

360	Heading
45nm	Distance
00+05	Leg Time
5940	Minimum Fuel To Continue
00+16	Elapsed Time

Time and Fuel can be calculated roughly from following math.

Time

- Mach0.9 = 9nm/min
- Mach0.8 = 8nm/min
- Mach0.7 = 7nm/min

Fuel

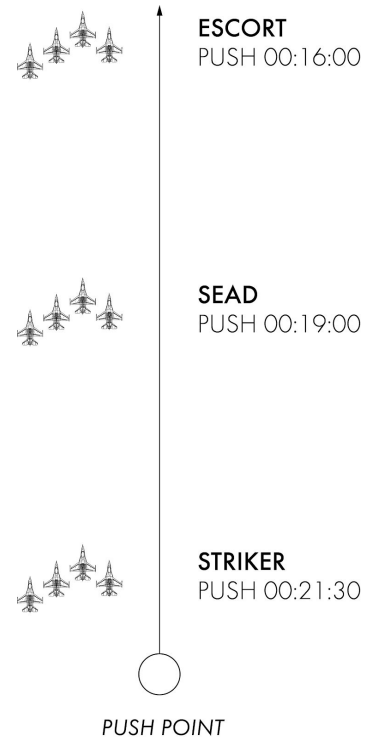
- Below 5,000ft = 20lbs/nm
- 5,000-25,000ft = 15lbs/nm
- Above 25,000ft = 10lbs/nm

(Only applicable for F-16 drag factor 150 480kt GS)

If you are using a fuel rate value based on a clean configuration ... add 30% for each 100 points of drag factor. If you are using a fuel rate value based on a fuel rate at sea level ... subtract 10% for each 5000ft.

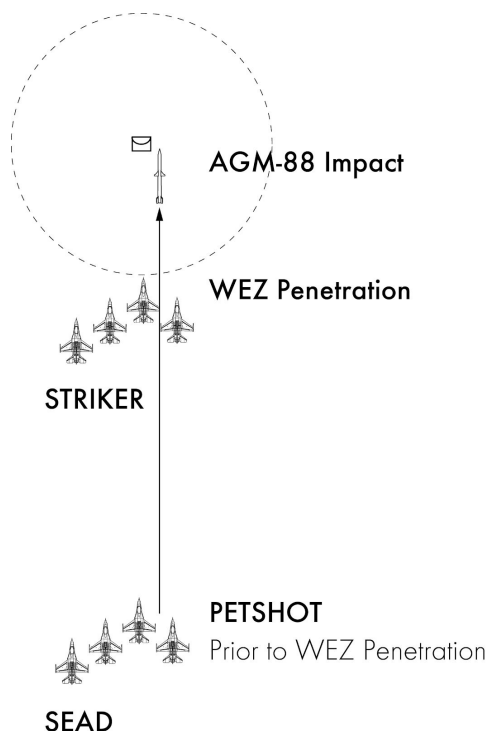
Push Time

Push point is the steer point where each flight pushes to the target area at their own push times. Let's say MAR = 25nm then $25(\text{nm}) / 9(\text{nm}/\text{min}) = 2.7\text{min}$ spacing. We maybe like to separate ESCORT and STRIKER twice the range of MAR then $2.7 * 2 = 5.4 =$ approximately 5.5 min separation of push time. Therefore if ESCORT push time is 00:16:00 then STRIKER push time would be 00:21:30. SEAD can push somewhere between those 2 flights so let's say 00:19:00. The push time where the first flight pushes is also "vul (vulnerable) start" time and the package should complete Roll call, War call and Low down before vul starts.



TOT Window

TOT(Time On Target) Window is a time period STRIKER can deliver weapons to the target. Egressing from the TARGET point to LANDING point has 141nm of distance which consume $141 * 20(\text{consider someone damaged and have to fly low level}) = 2820\text{lbs}$. We need 1500lbs fuel for landing if weather condition is IMC. $2820 + 1500 = 4320\text{lbs}$ so BINGO can be set to 4500lbs, JOKER: 5500lbs, FUEL RED: 6500lbs and FUEL YELLOW: 7500lbs. Calculating the steerpoint distances and 6 minutes orbit time before PUSH TIME, Let's say we will carry 2 tanks = 12000lbs in total and fly with Mach0.9 all the time. STRIKER can reach TARGET point with 8655lbs fuel remaining at maximum. $8655 - 7500(\text{FUEL YELLOW}) = 1155\text{lbs}$. $1155(\text{lbs}) / 15(\text{lbs}/\text{nm}) = 77\text{nm}$. $77(\text{nm}) / 9(\text{nm}/\text{min}) = 8.5\text{min}$. It means we have 8.5 minutes of battle time. TOT WINDOW will be 00:29:30 - 00:38:00.



SPIN

The TOT can be set to 00:29:30 and MC(Mission Commander: commands the entire package, usually lead of STRIKER flight do this job) call "SPIN" for every 3 minutes TOT delay. SPIN ALPHA would be 00:32:30 and SPIN BRAVO will be 00:35:30. Maybe we can also set SPIN CHARLIE for 0:38:30 which sounds late TOT but we have fuel margin.

WEZ Penetration

WEZ penetration is a time when a flight enters SAM WEZ. This is used for SEAD's PETSOT. PETSOT is a tactic to shoot a AGM-88 HARM prior to other flights entering SAM WEZ so that it may impact SAM radar just on time the other flight penetrates WEZ. You can calculate WEZ penetration time and SEAD can shoot

HARM on time monitoring TOT of HARM inbound at WPN page. Let's calculate WEZ penetration time for the STRIKER flight. SEAD pushes prior to STRIKER but while they fight as backup for ESCORT, STRIKER passes through SEAD and they enter SAM WEZ. In the above example, STRIKER pushes PUSH POINT at 00:21:30 and may enter SA-2 WEZ at 00:27:30 ($45\text{nm} + 27\text{nm} - 18\text{nm} = 54\text{nm}$. $54\text{nm} / 9(\text{nm}/\text{min}) = 6\text{min}$). Remember to add 3 minutes every time MC calls SPIN. SPIN ALPHA PET SHOT TOT : 00:30:30 and BRAVO TOT: 00:33:30.

ESCORT

ESCORT fights should push away adversary fighters from the TARGET area so that STRIKER can deliver weapons to the DMPI. BVR will be explained in the following chapters but keep in mind the general idea of BVR tactics is "Do not enter the range you may be killed" but not "Enter the range you can kill the target definitely". Shooting MRM can cause adversaries to drag and go away for seconds. If you can continue to commit and abort effectively there can be a chance adversaries are too far away to kill the STRIKERS delivering weapons above the TARGET. ESCORT should set WEAPON RED/YELLOW status. 4 ship can have $4 * 6 = 24$ AMRAAMs then RED = 4 left and YELLOW = 8 Left (as an example).

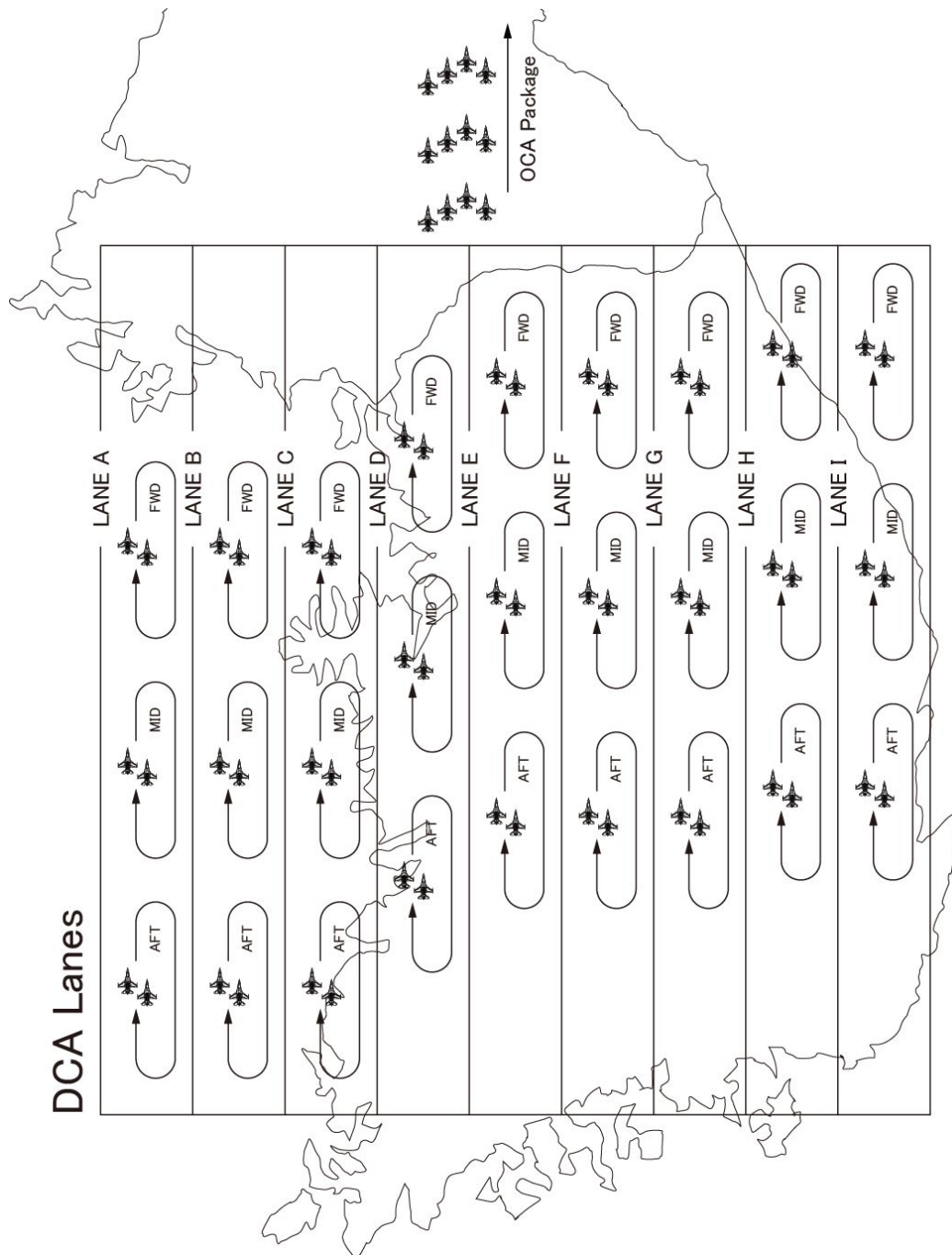
Timeline

Event	Zulu Time	Vul +
Takeoff	Escort 00:00:00 SEAD 00:03:00 Striker 00:05:30	
Push	Escort 00:16:00 SEAD 00:19:00 Striker 00:21:30	00:00:00 00:03:00 00:05:30
Striker WEZ Penetration (SA-2)	NO SPIN: 00:27:30 SPIN A: 00:30:30 SPIN B: 00:33:30 SPIN C: 00:36:30	00:11:30 00:14:30 00:17:30 00:20:30
TOT	NO SPIN: 00:29:30 SPIN A: 00:32:30 SPIN B: 00:35:30 SPIN C: 00:38:30	00:13:30 00:16:30 00:19:30 00:21:30

DCA

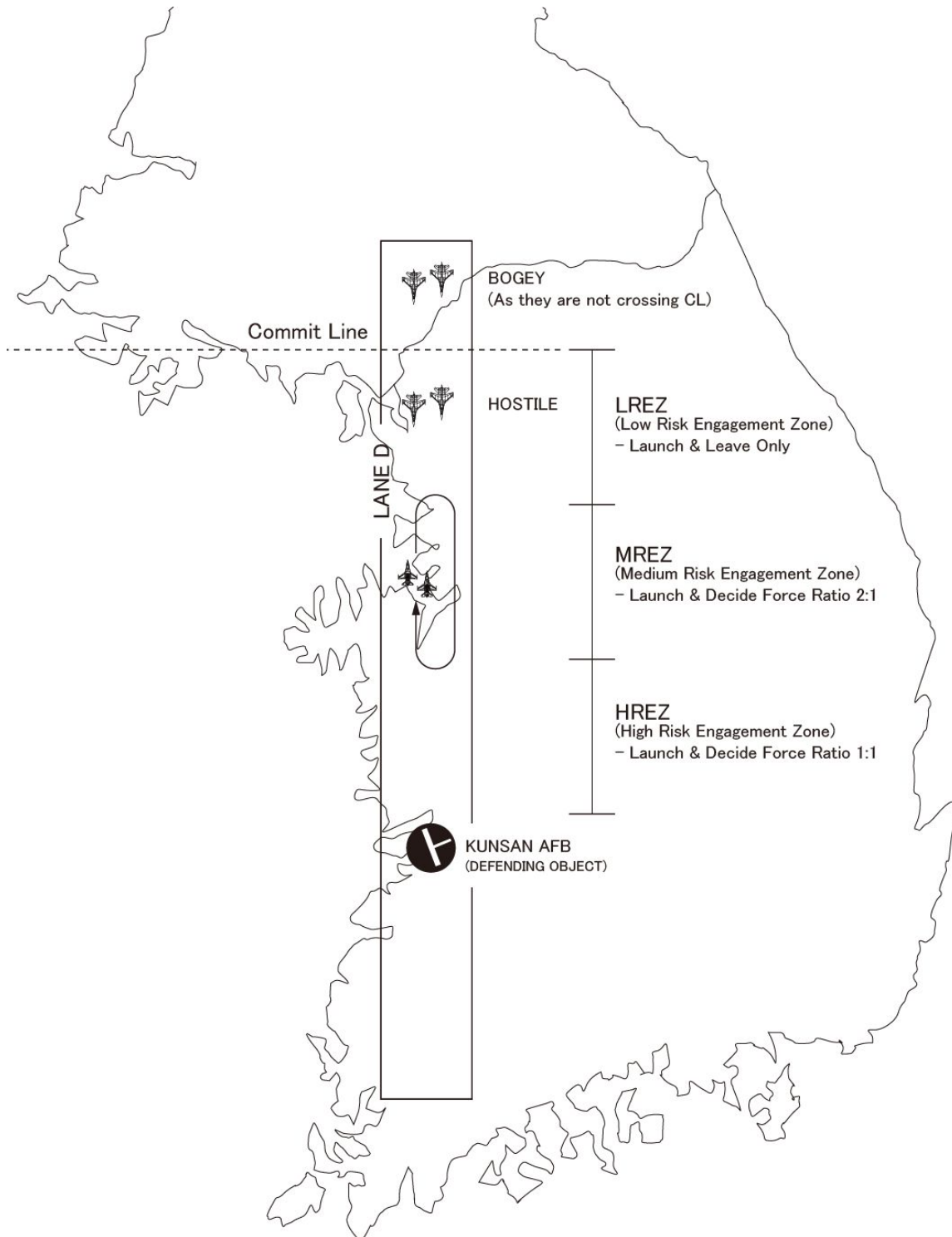
Lane Defense

Each flight is assigned to lanes to defend. Each lane is assigned a sign starting from alphabet A for identification purposes.



Low/Mid/High Engagement Zone

(The engagement rules in each zone is an example)



BVR (Beyond Visual Range)

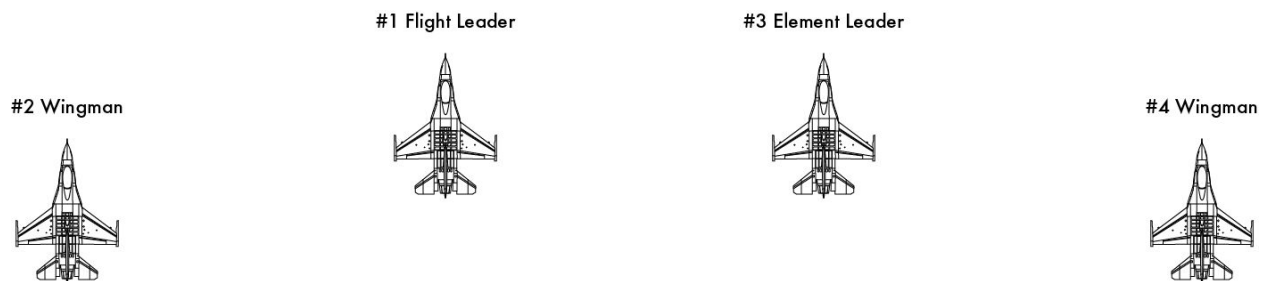
Flight

Flight consists of 4 fighters.

#1 will be a **leader** of the entire flight and manage all flight members.

#3 will be a **element leader** of #3,4 element

#2,4 is a **wingman** for #1,3 (#2 is for #1, and #4 is for #3)



Wingmen Role

Wingman's task priority is as follows:

1. Stay **Visual** on Lead
(If lost visual on lead call "Blind")
2. Keep **Formation** to the Lead
(Commonly line abreast is applied)
3. Check **Radar**

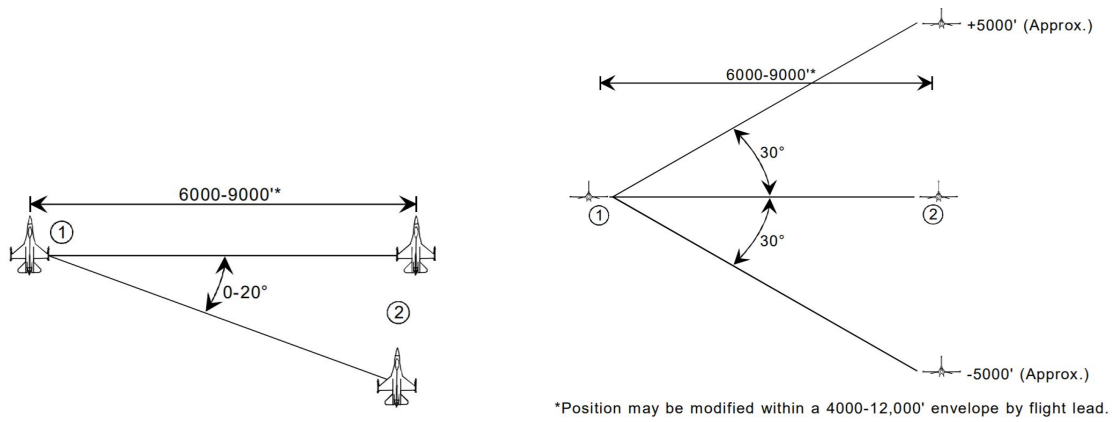
Wingmen usually don't have to watch radar that much unless AOR search is directed. This is because in a **Visual Mutual Support** they should stay in visible formation so that leader and wingmen should see the same contact in their FCR page.

Inexperienced wingmen often try to check radar more than keep visual on his lead and end in "**Blind**". They also often move to Trail (wingman goes behind the lead) or Fighting Wing but BVR Timeline changes if range to the adversary differs between lead and wingman. **Line Abreast** is the ideal formation inside the element.

OCA/DCA BVR Tactics

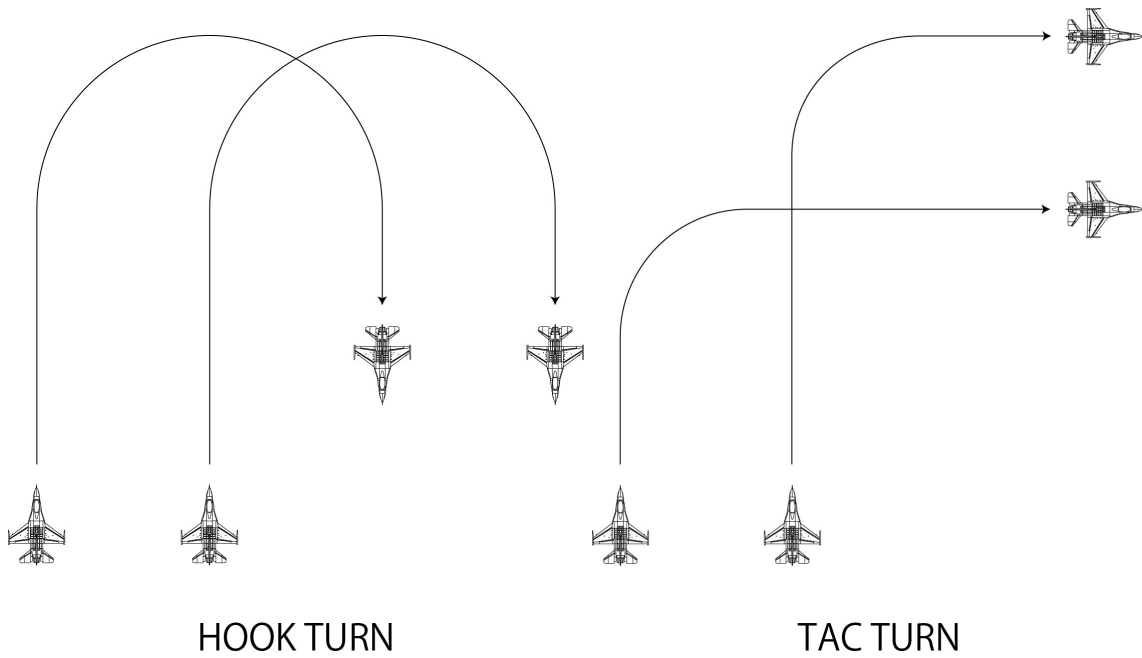
Line Abreast

Line abreast formation is as follows:



Tac Turn

Use **hook turn** or **tac turn** to keep the formation.



Leader's Role

BVR will be a continuous cycle of **commit** (heading to the adversary to shoot) and **abort** (turn away from adversary).

Tactic

Leader has to decide the tactic prior to each commit. Commonly either **Wall** or **Grind** will be applied.

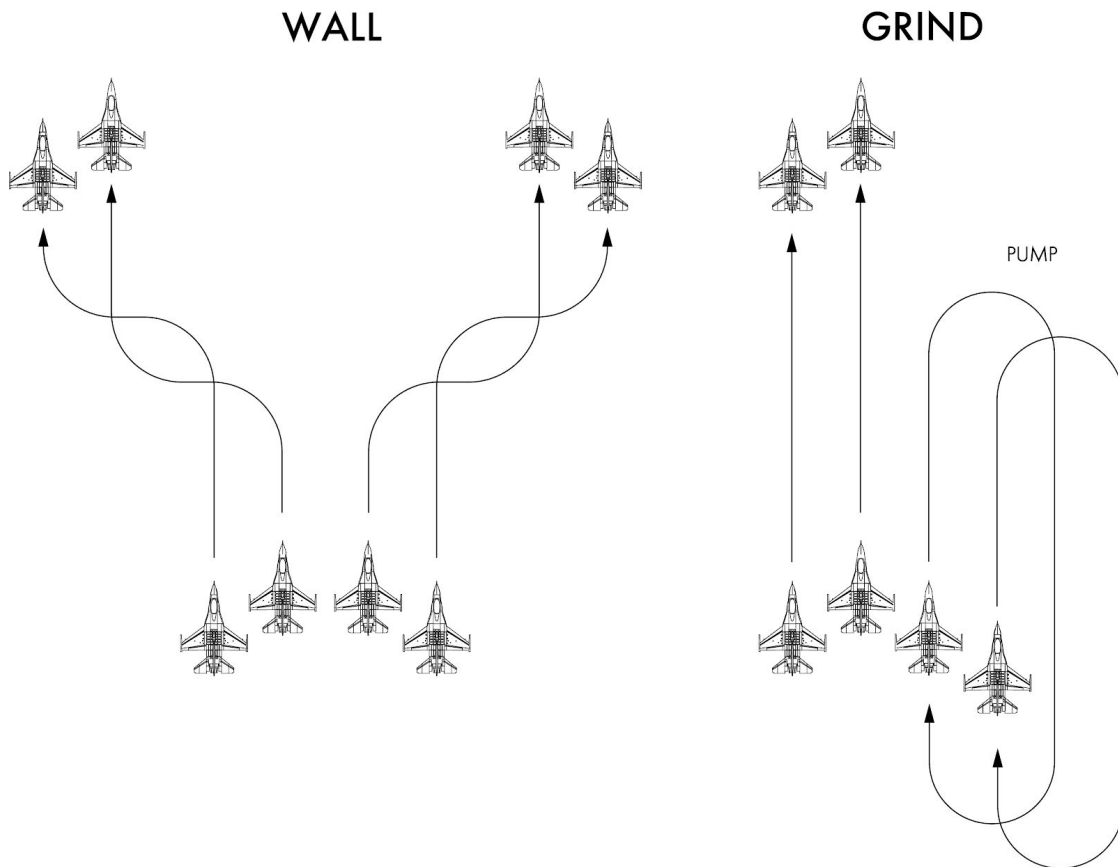
Wall

Deploys two elements line abreast.

Grind

Deploys two elements in trail formation.

When you decide the Grind tactic, **Pump** either one of the elements before pre-briefed Pump Range.



Flow

Leader has to decide “**Skate**”, “**Short Skate**” or “**Banzai**” prior to each commit.

Skate

Skate is a “**launch and leave**” tactic. FOX3 before **TR(Transition Range)** will allow HUSKY before you reach **DOR(Desired Out Range)**. You should abort before DOR and it would defeat the adversary's **FLO(First Launch Opportunity)** shot and preserve enough distance to recommit with “launch and decide” tactics.

DOR = DR + Adversary Closing Range while Aborting and Recommitment.

Short Skate

Short Skate is another “launch and leave” tactic. You should abort before **MAR(Minimum Abort Range)** or **DR(Decision Range)**. Aborting before MAR would defeat the adversary's FLO(First Launch Opportunity).

MAR = Max F-POLE of FLO Shot + Turn Radius.

Banzai

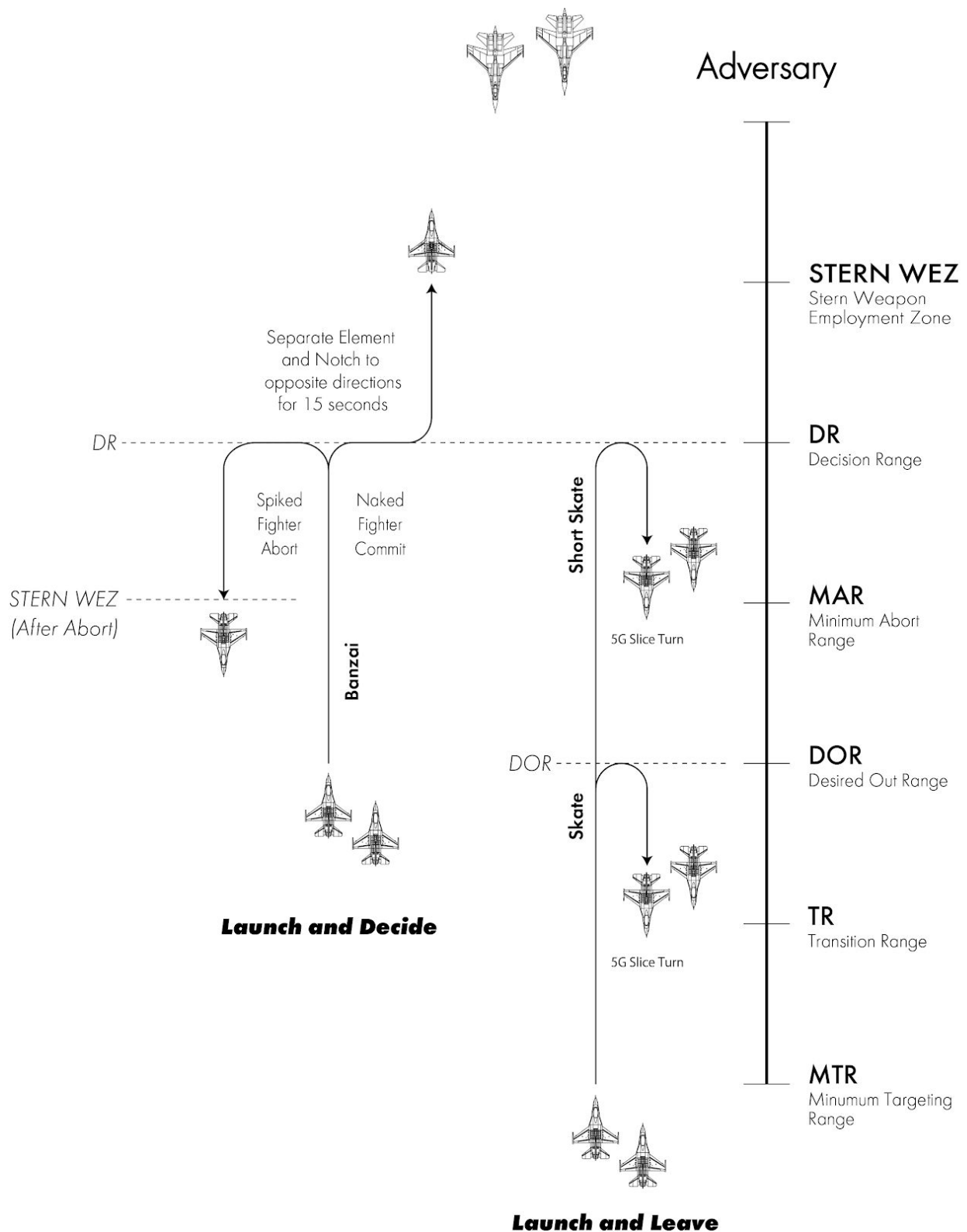
Banzai is a “**launch and decide**” tactic. FOX3 before DR(Decision Range) and separate element for opposite direction to notch against adversary (for ex: if adversary is at 360 then notch to 270 and 90). Keep notching for pre-briefed time (commonly 15 seconds) and check if you and your wingman has been spiked or not. If spiked then abort and you will be outside of a **STERN WEZ**. STERN WEZ is a range where an adversary's shot will hit you even if you are turning away from them. If you are naked and got no spike while notching, then turn in to pursue the adversary and push away them.

DR = STERN WEZ + Adversary Closing Range While Notching for 15 seconds than aborting.

OCA/DCA BVR Tactics

BVR Timeline

BVR Timeline is defined by the distance to the adversary.



Targeting

Leader has to decide targeting before committing adversaries. If you are going to Short Skate you should decide it before **MTR(Minimum Targeting Range)**.

Targeting

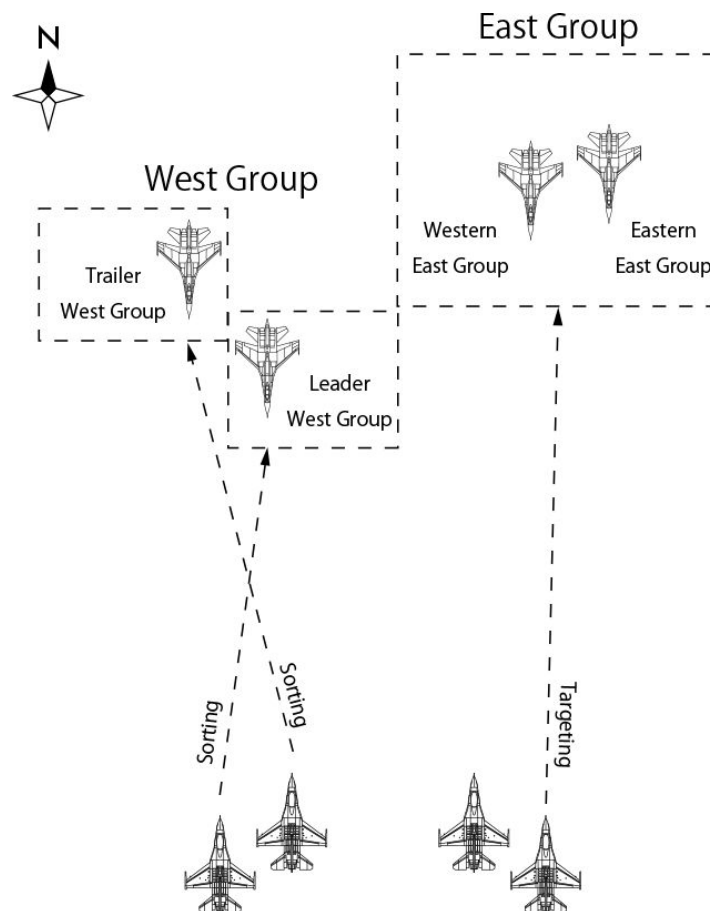
Fighter targeted a group (contact within 3 nm) has a responsibility to engage the targeted group with a directed flow. Once targeted a group you can FOX3 at pre-briefed timing. If you completed targeting then call "<Callsign> Targeted <Targeted Group Labeling>".

ex: "#4 Targeted East Group"

Sorting

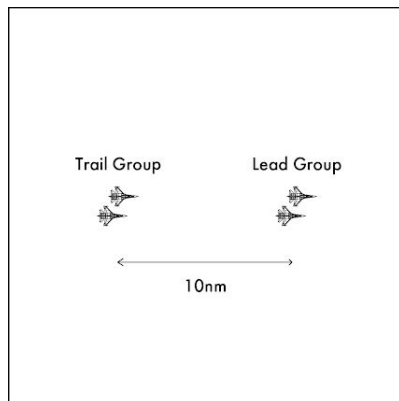
Fighter Sorted an inner group has a responsibility to engage a sorted inner group with a directed flow. Once sorted an inner group you can FOX3 at pre-briefed timing. If you completed sorting then call "<Callsign> Sorted <Sorted Group Labeling>".

ex: "#2 Sorted Leader West Group"

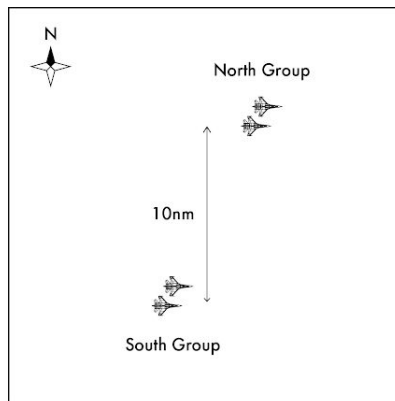


Labeling

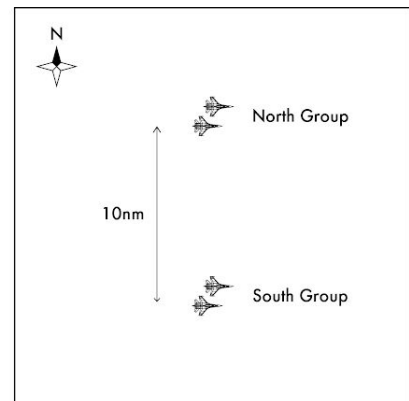
Group Picture



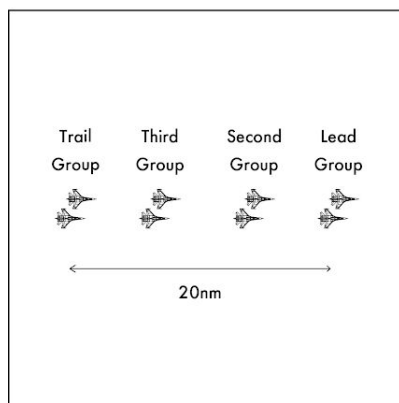
2 GROUP RANGE 10



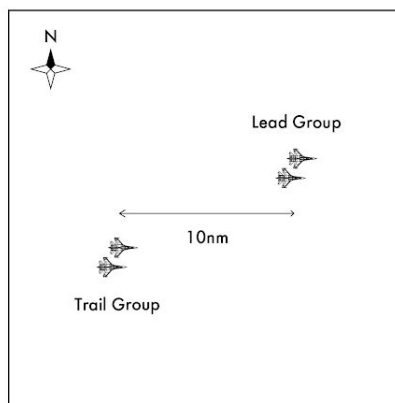
2 GROUP AZIMUTH 10
ECHELON SOUTH WEST



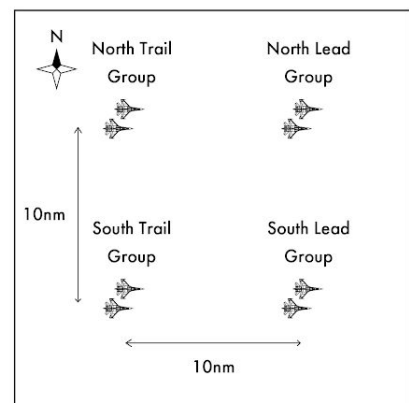
2 GROUP AZIMUTH 10



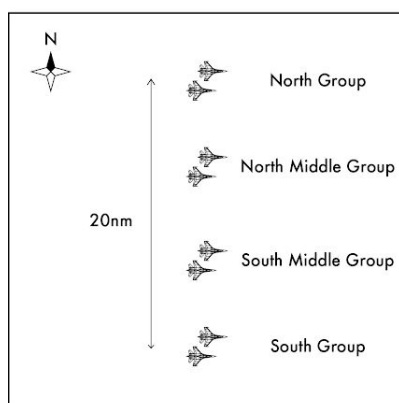
4 GROUP LADDER
20 DEEP



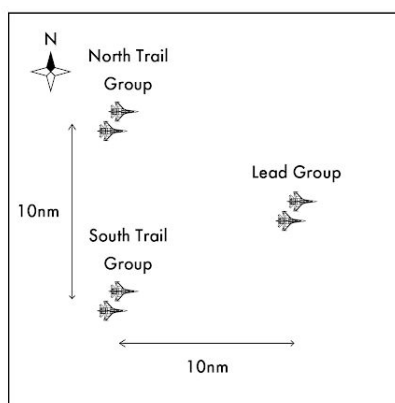
2 GROUP RANGE 10
ECHELON SOUTH WEST



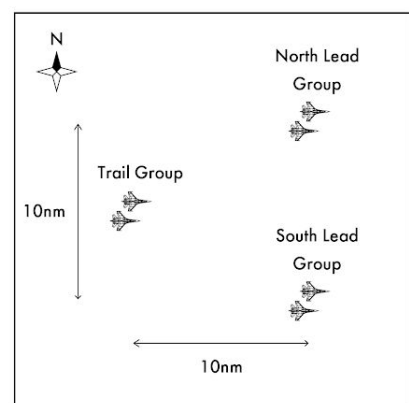
4 GROUP BOX
10 WIDE 10 DEEP



4 GROUP WALL
20 WIDE



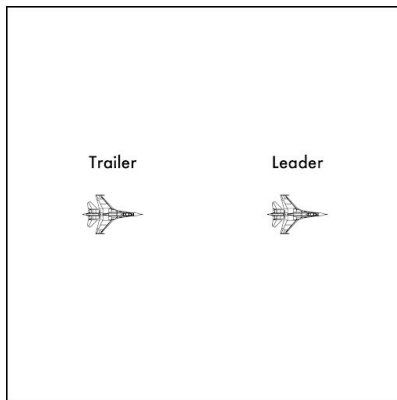
3 GROUP VIC
10 DEEP 10 WIDE



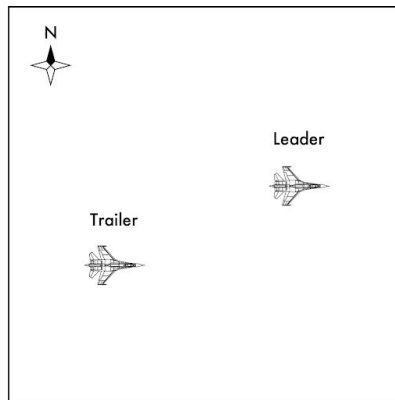
3 GROUP CHAMPAGNE
10 WIDE 10 DEEP

OCA/DCA BVR Tactics

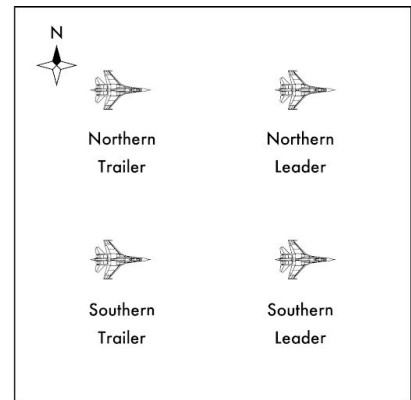
Inner Group Picture



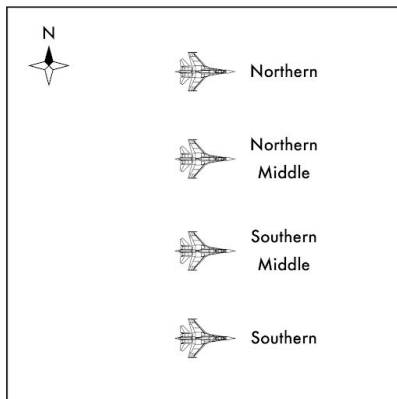
LEAD TRAIL



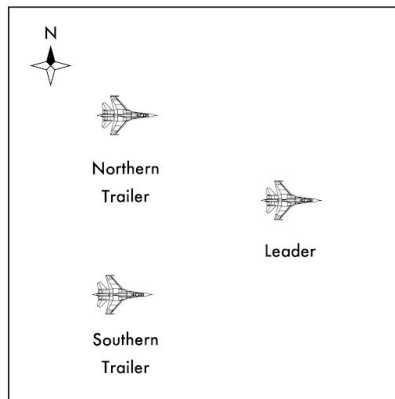
SWEPT



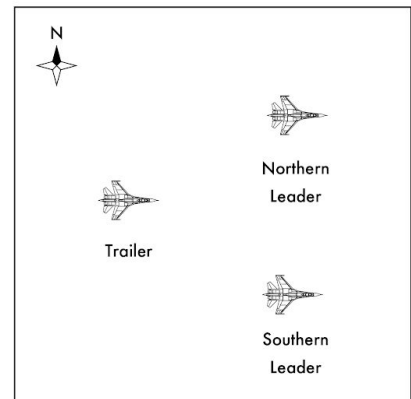
CONTAINER



LINE ABREAST



WEDGE



STINGER

Picture Examples

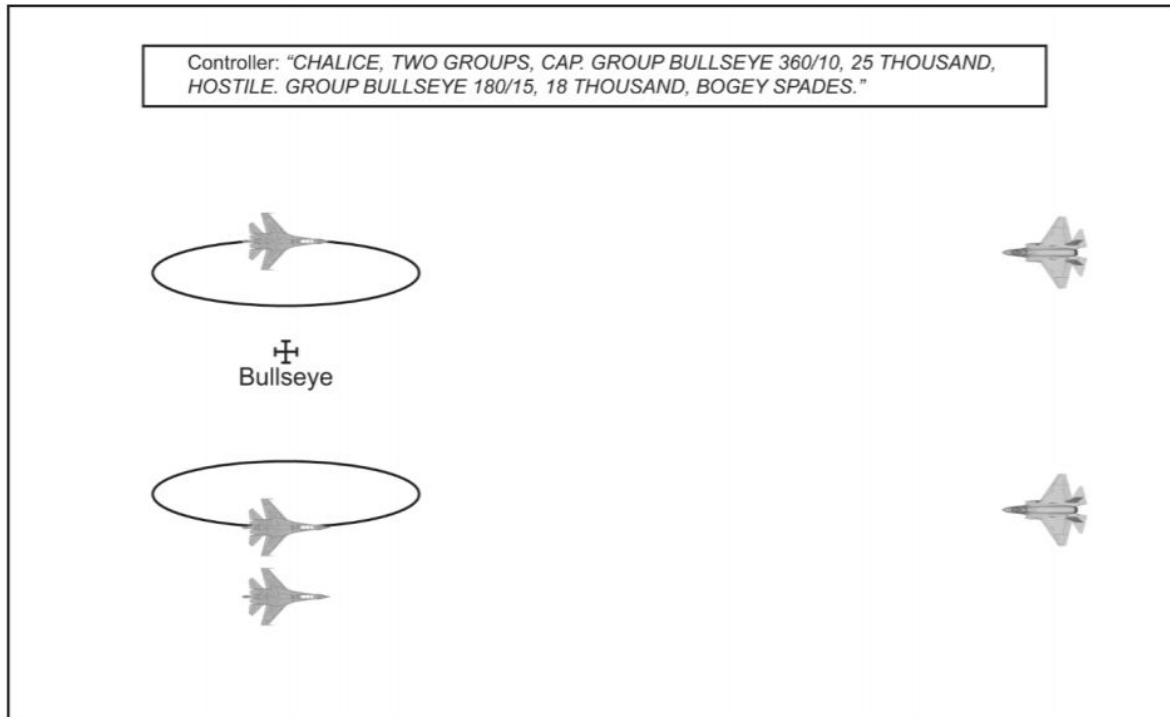


Figure 3. Pre-COMMIT Core Information

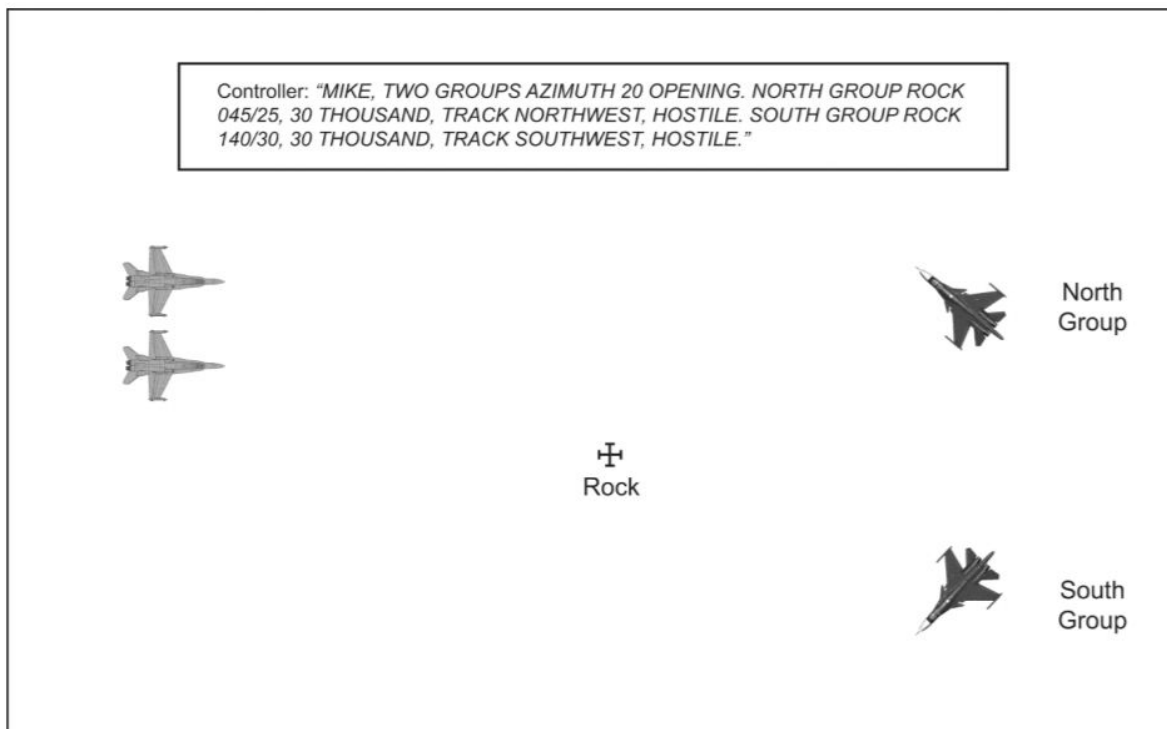


Figure 4. OPENING

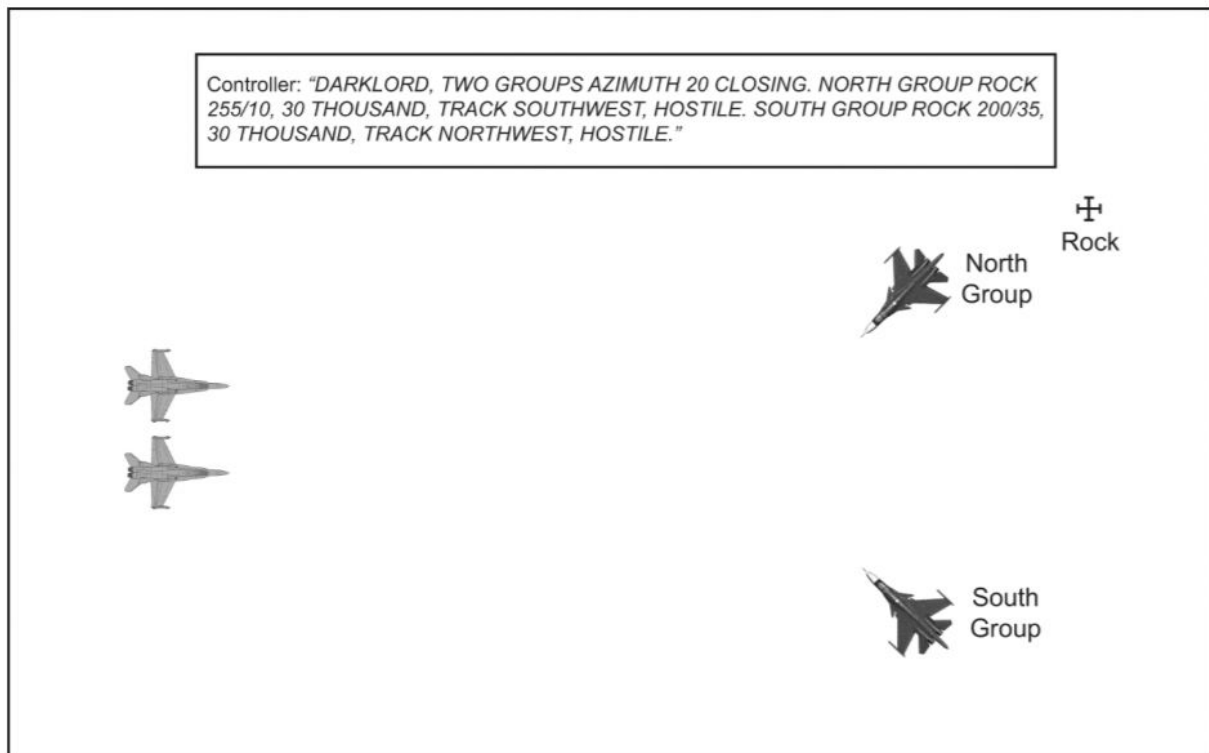


Figure 5. CLOSING

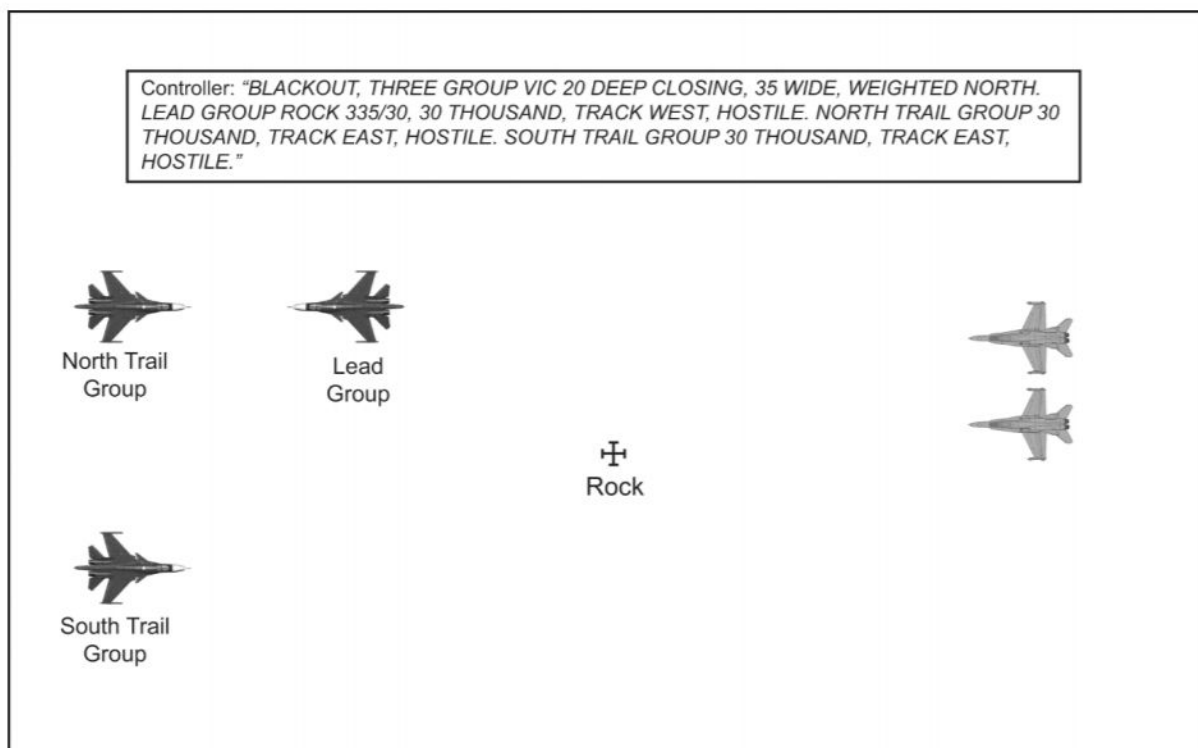


Figure 6. VIC WEIGHTED NORTH

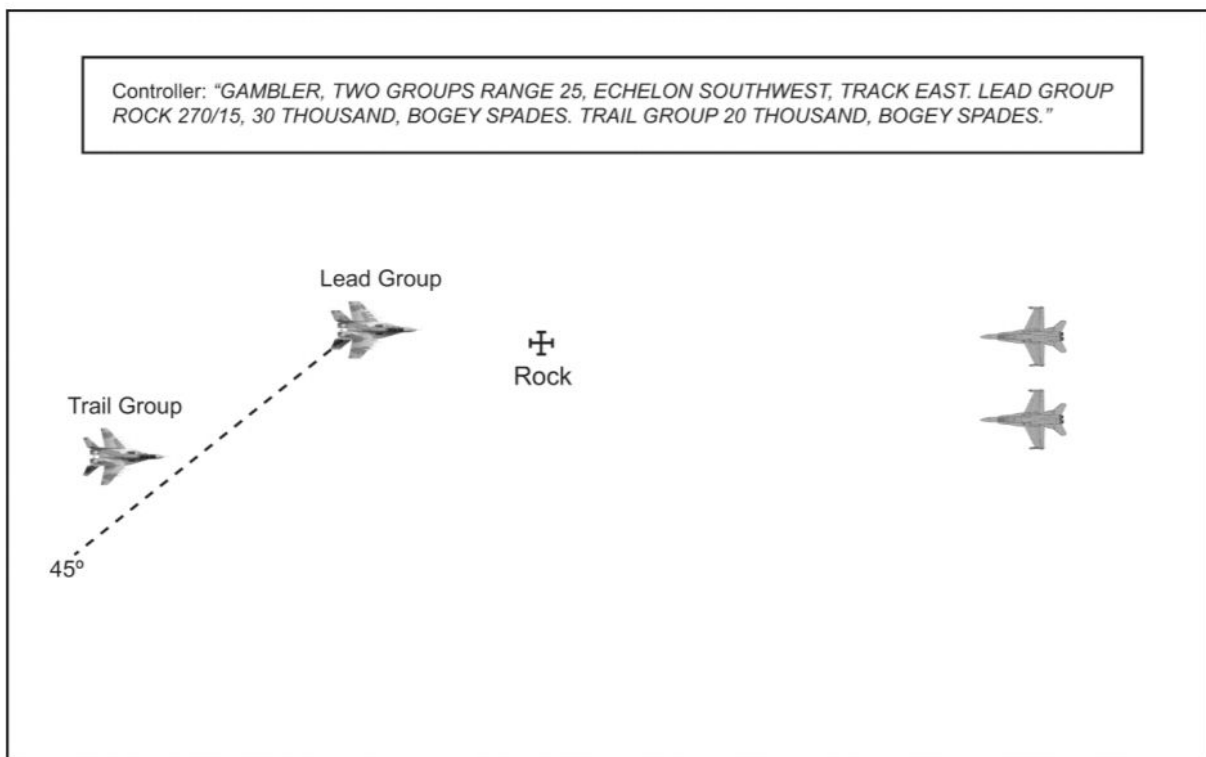


Figure 7. RANGE with ECHELON

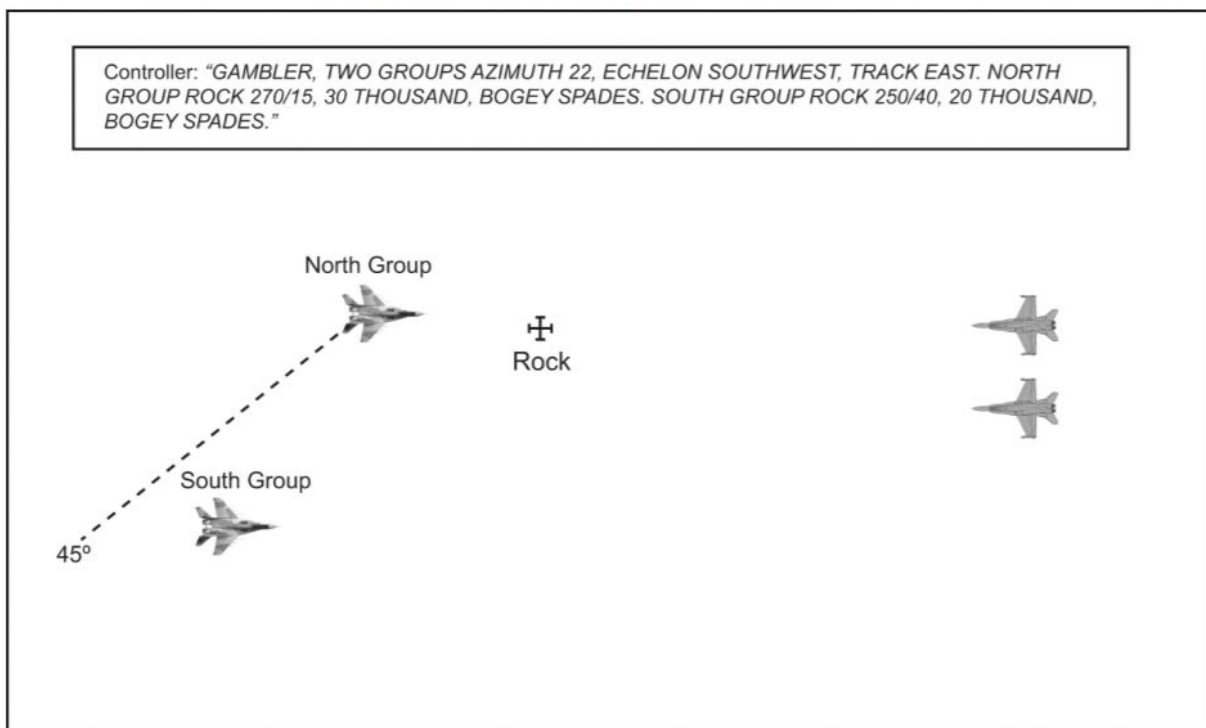


Figure 8. AZIMUTH with ECHELON

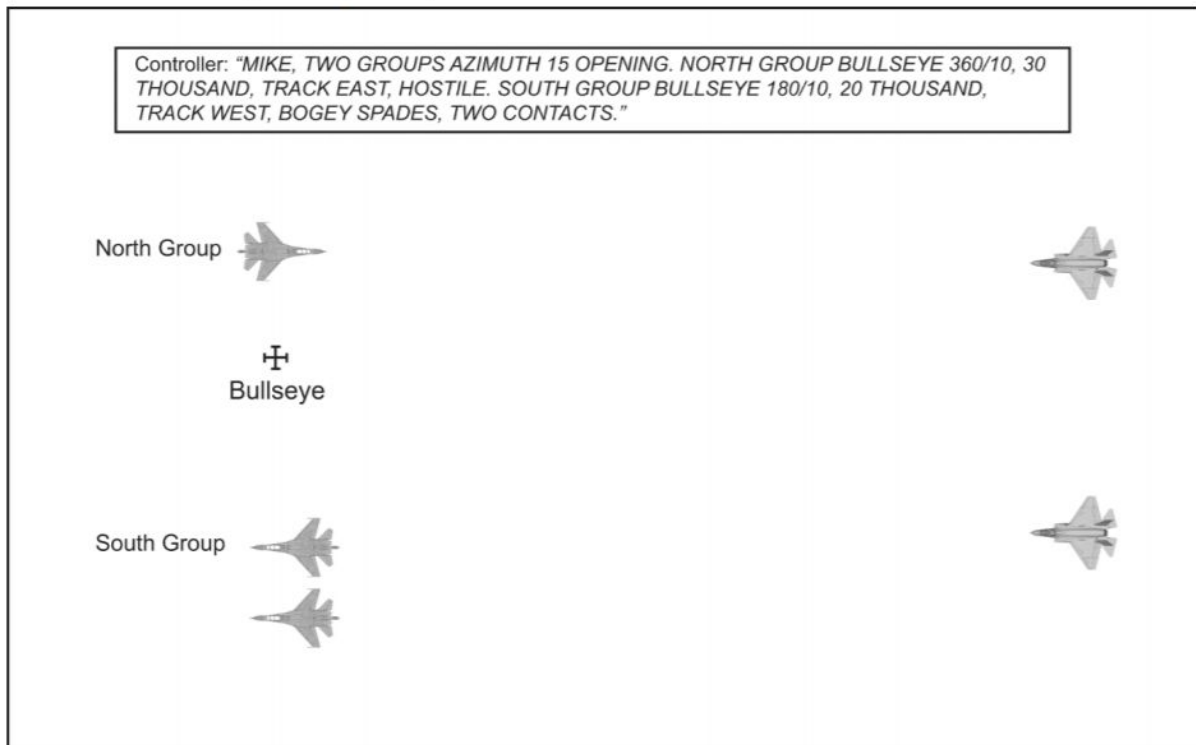


Figure 9. Two GROUPs AZIMUTH

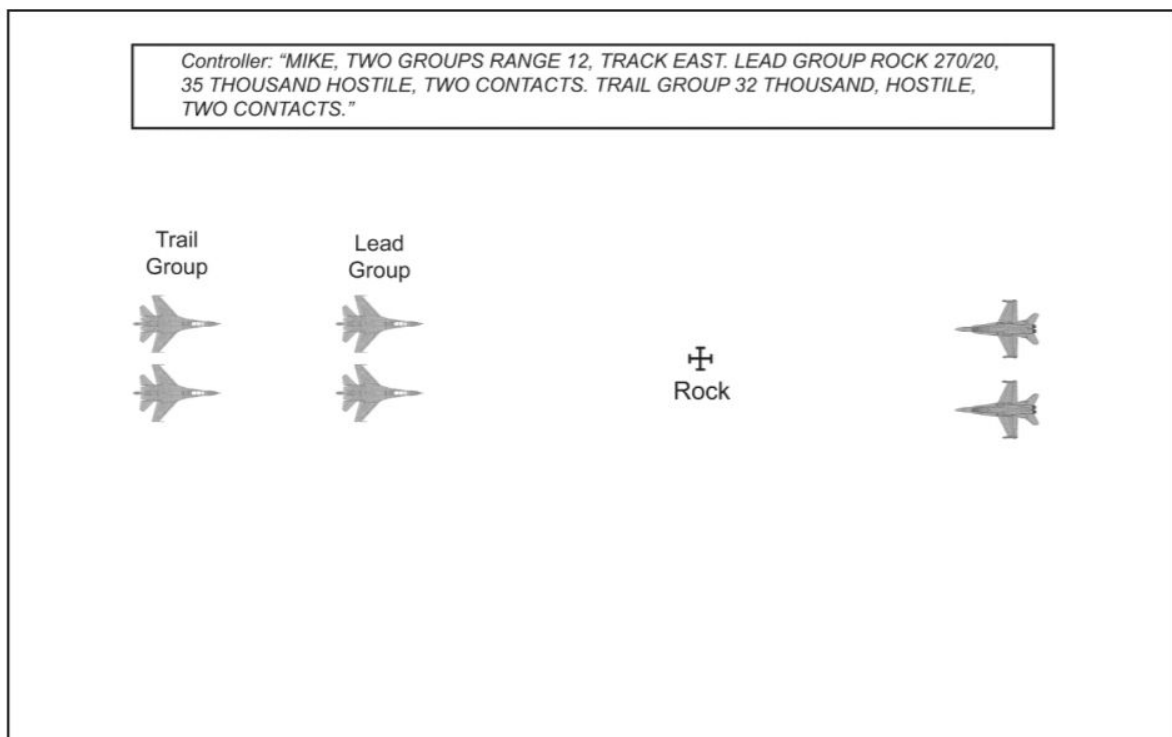


Figure 10. Two GROUPs RANGE

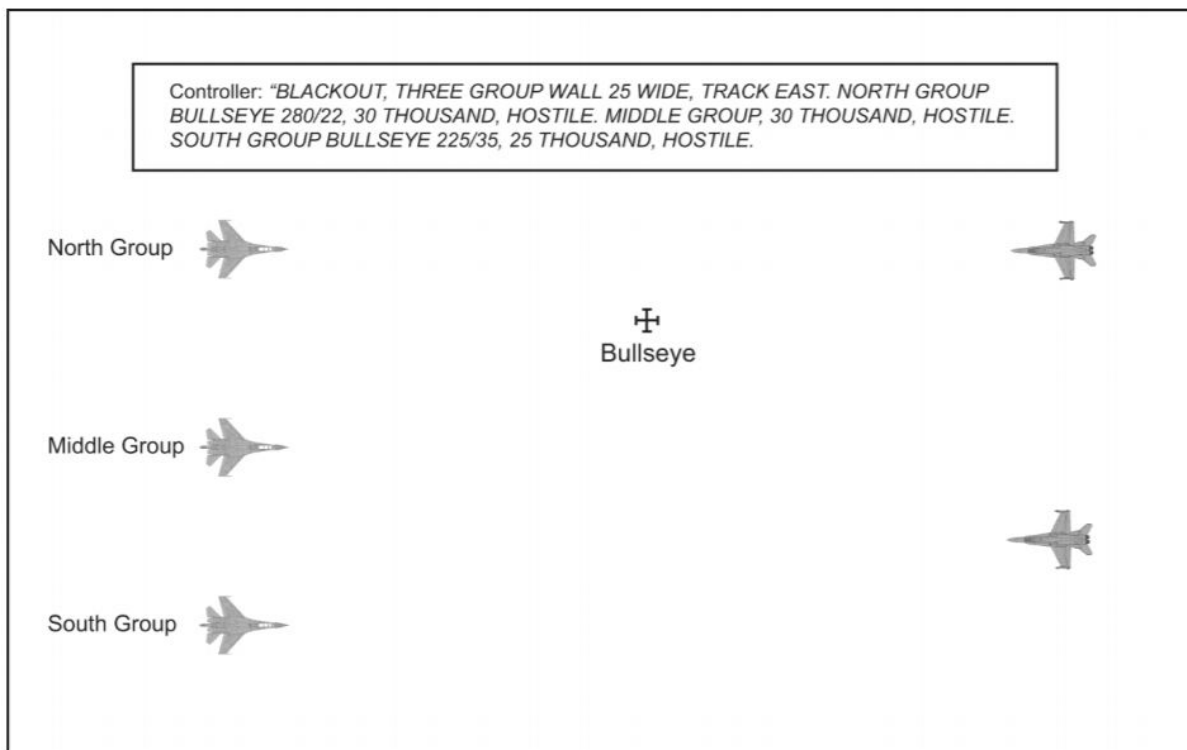


Figure 11. Three GROUP WALL

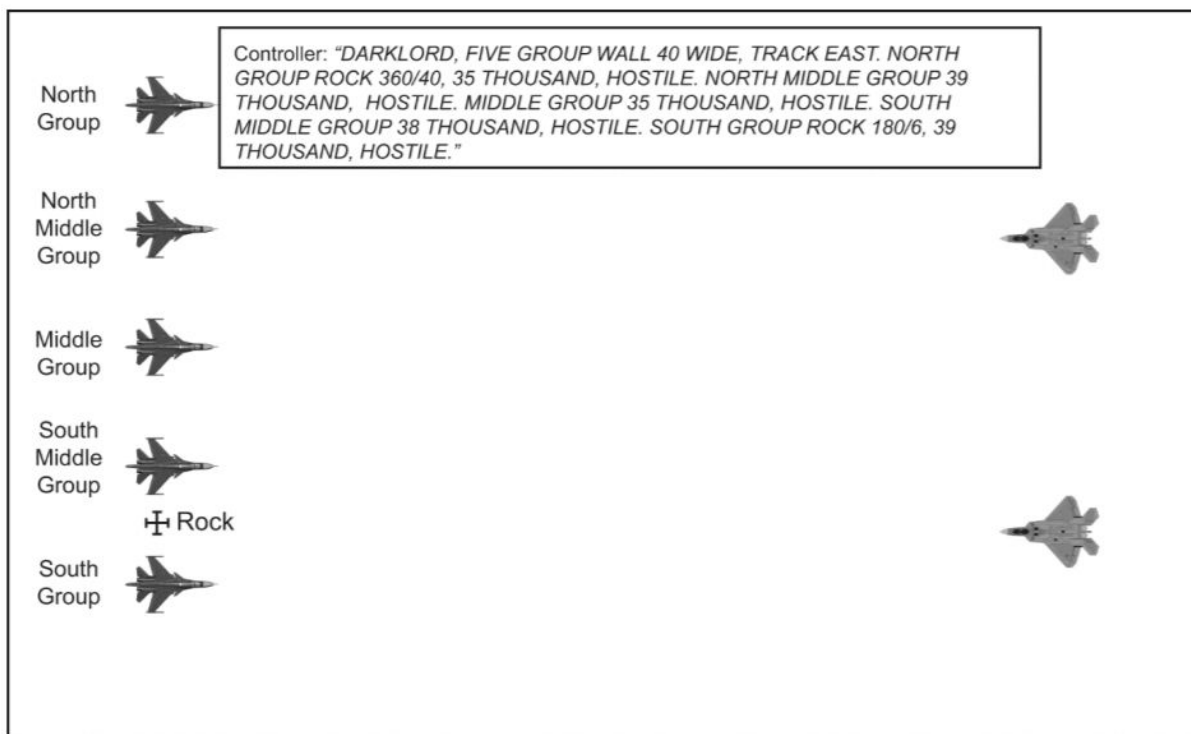


Figure 12. Five GROUP WALL

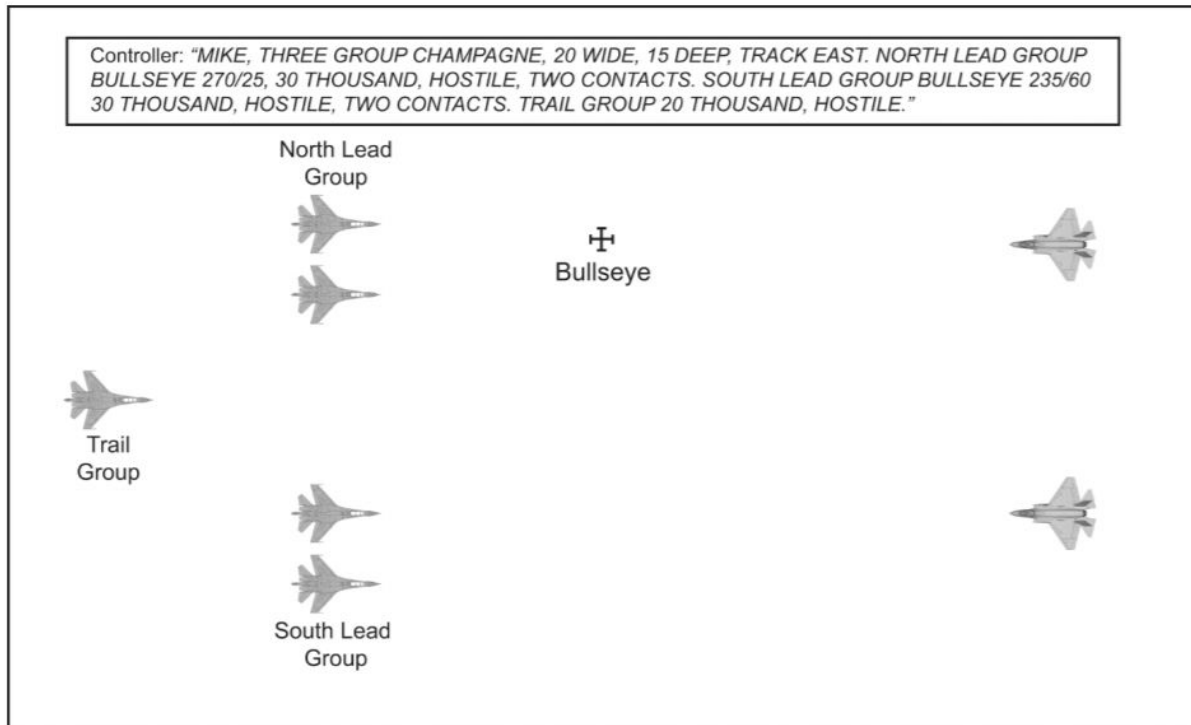


Figure 13. CHAMPAGNE

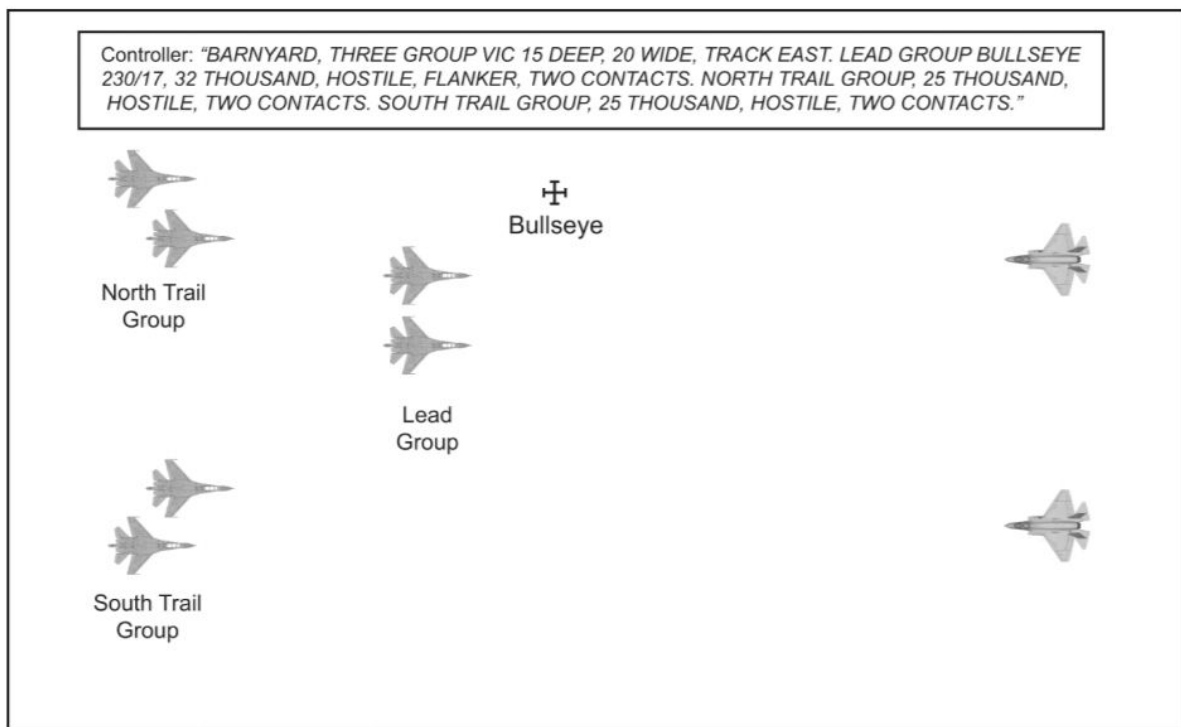


Figure 14. VIC

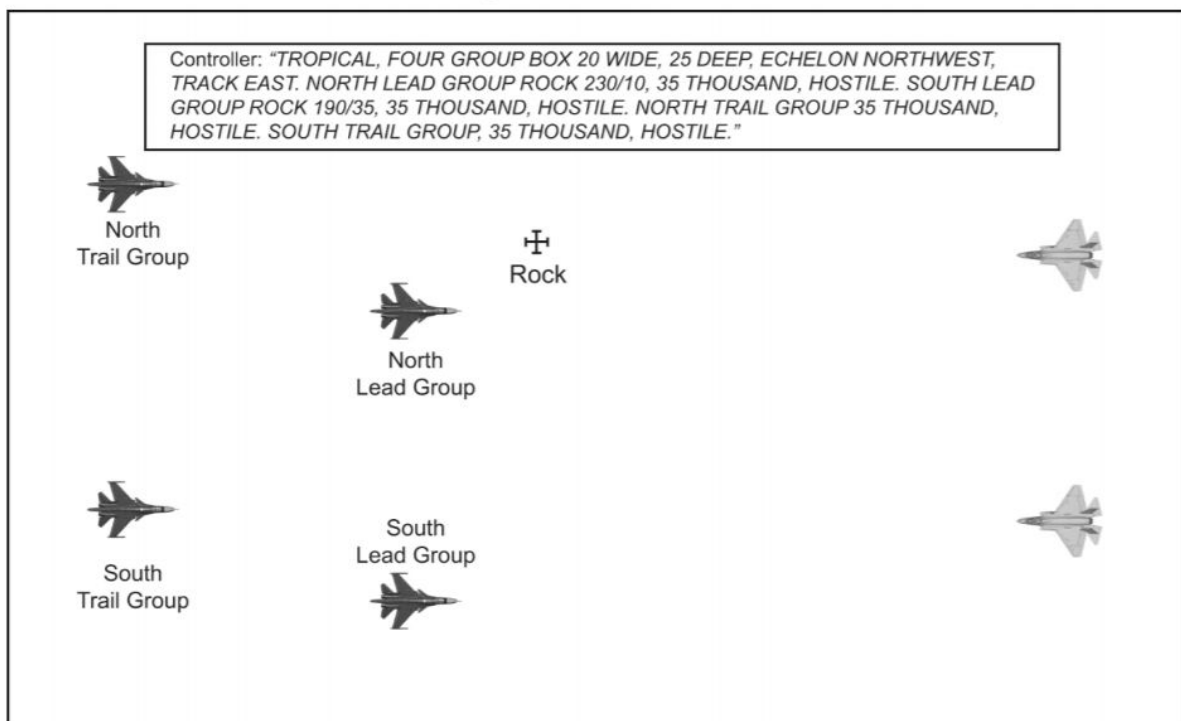


Figure 15. BOX

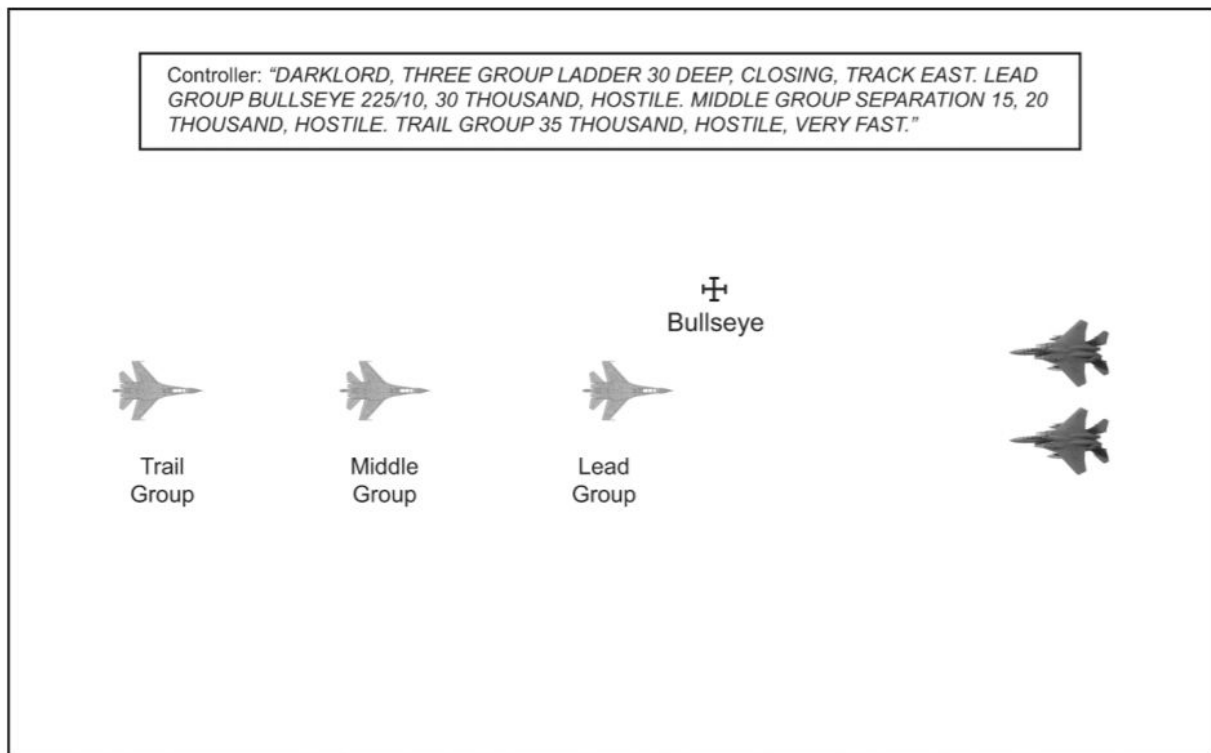


Figure 16. Three GROUP LADDER

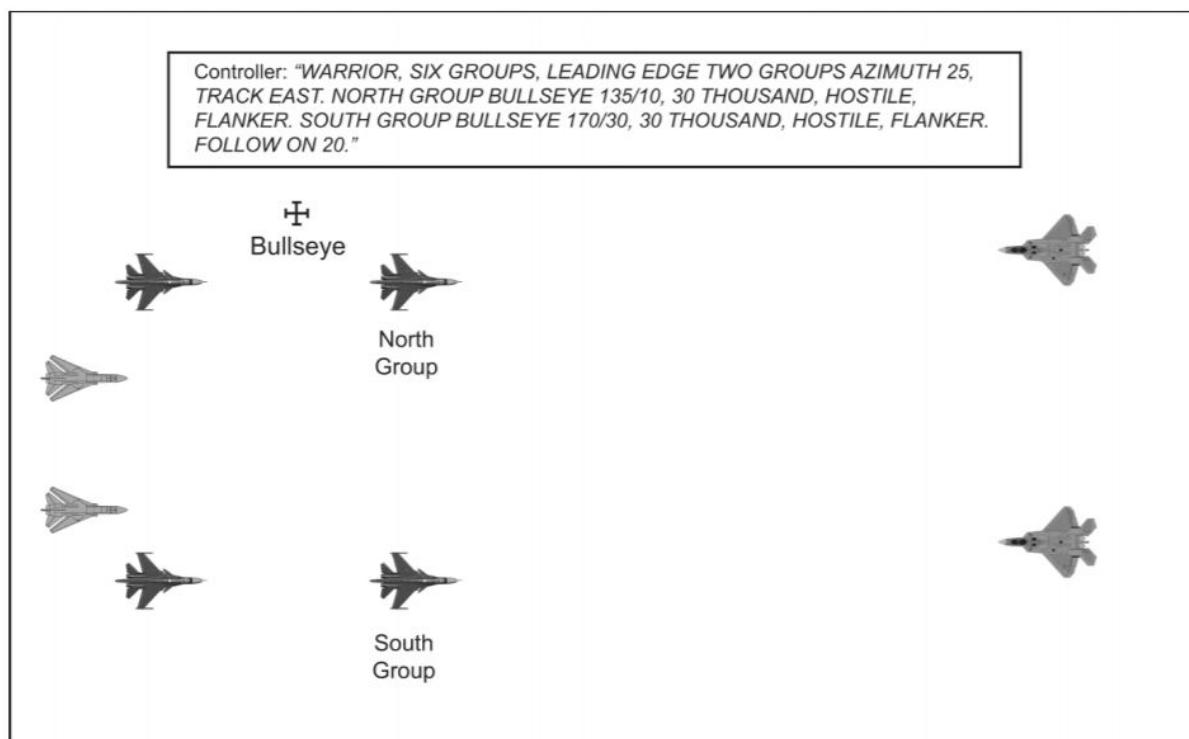


Figure 17. LEADING EDGE

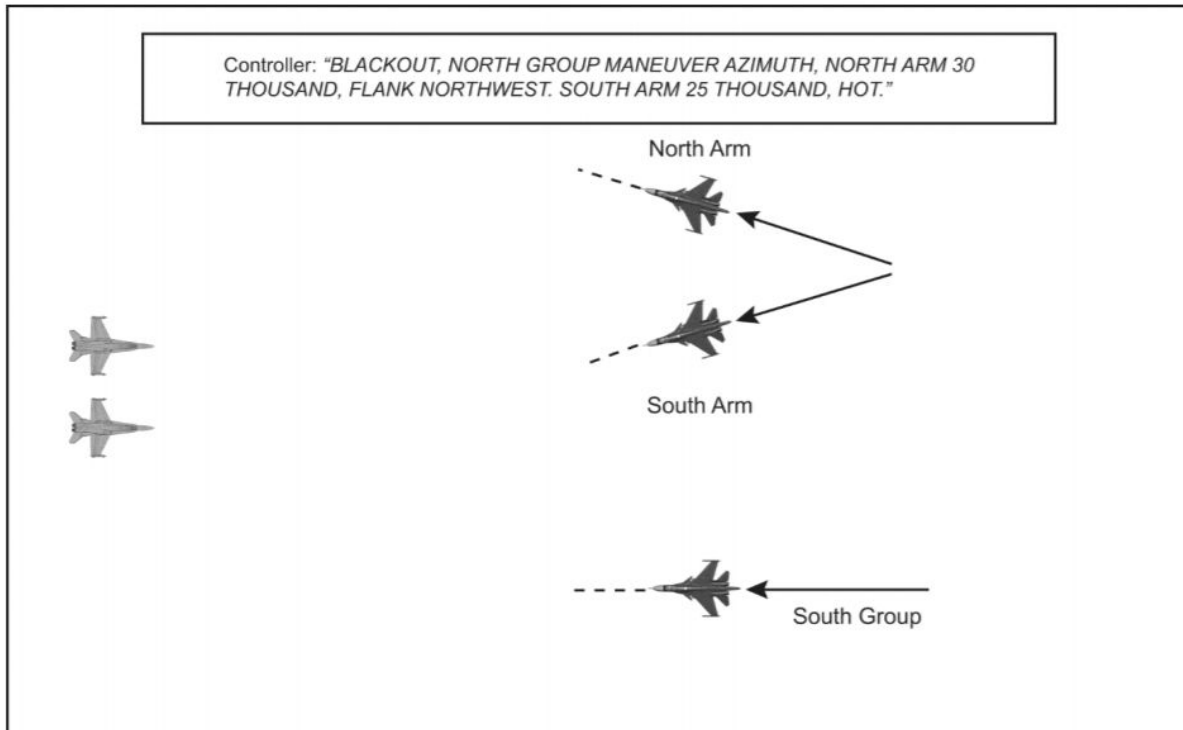


Figure 18. MANEUVER AZIMUTH

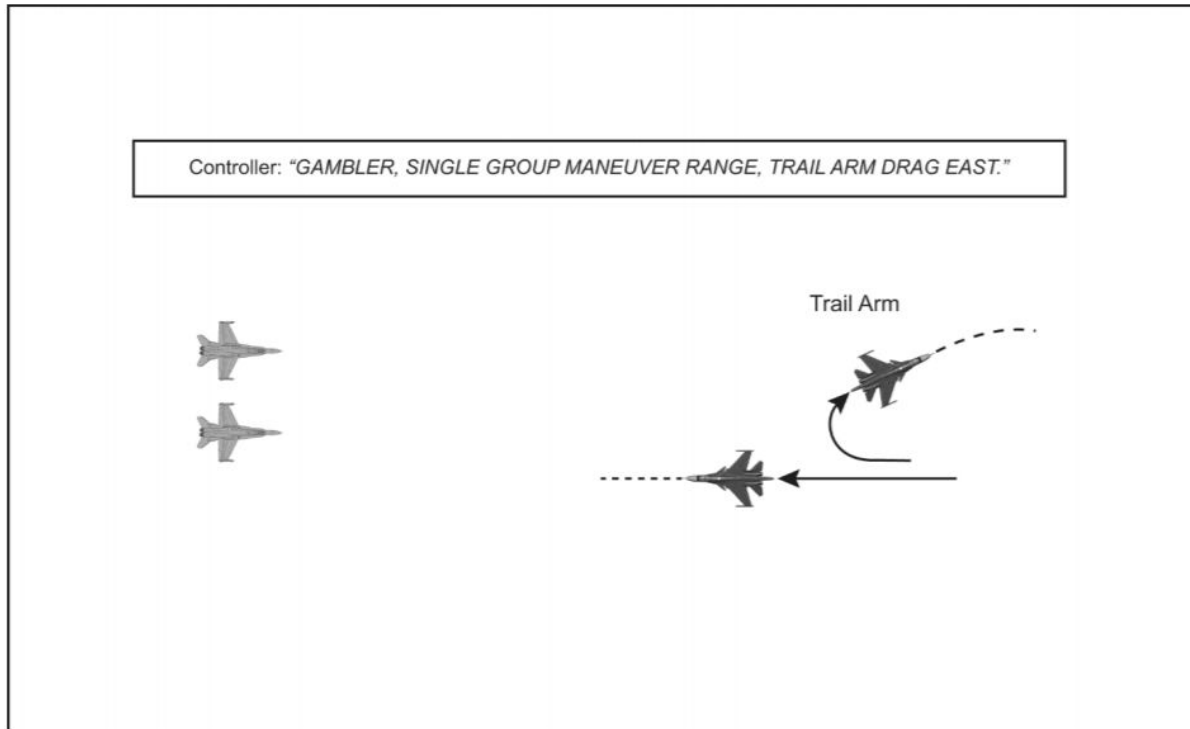


Figure 19. MANEUVER RANGE

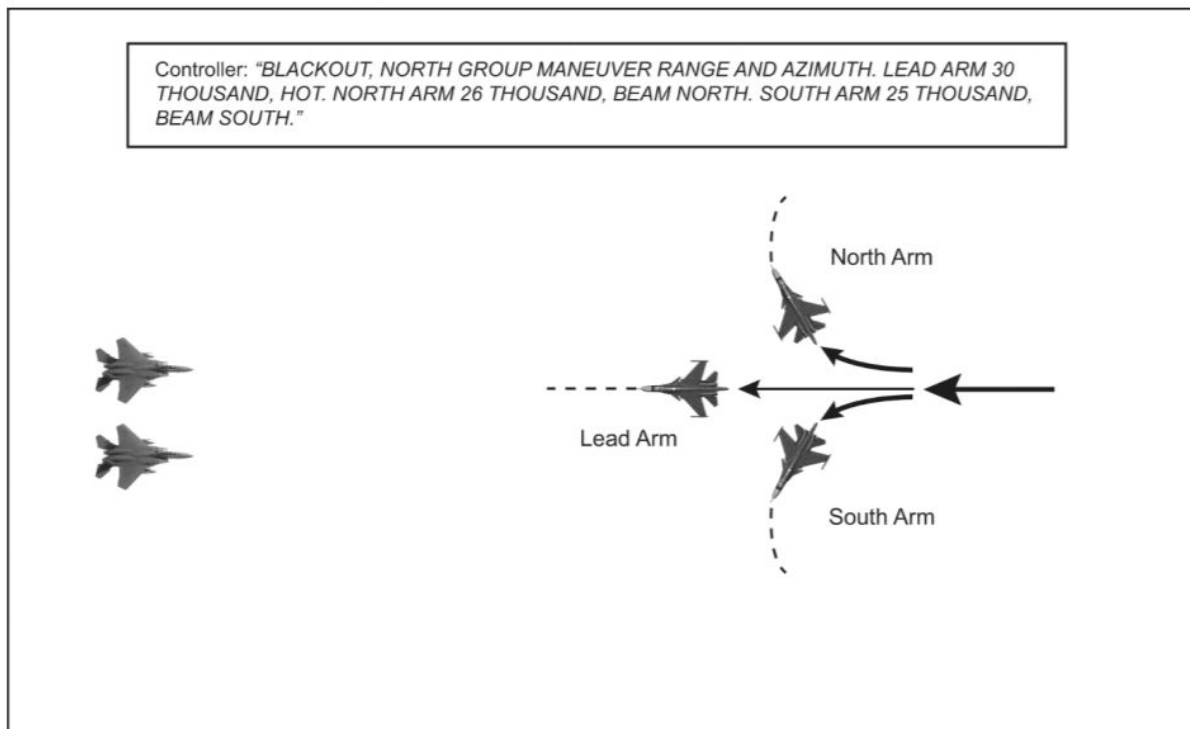


Figure 20. MANEUVER RANGE AND AZIMUTH

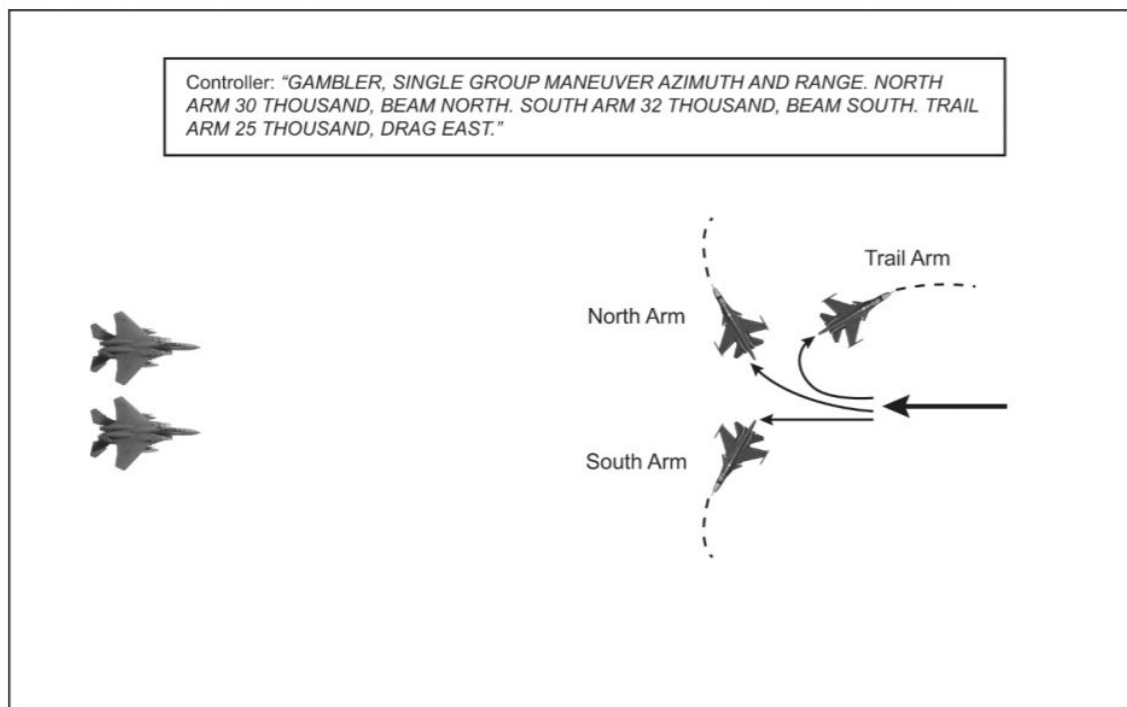


Figure 21. MANEUVER AZIMUTH AND RANGE

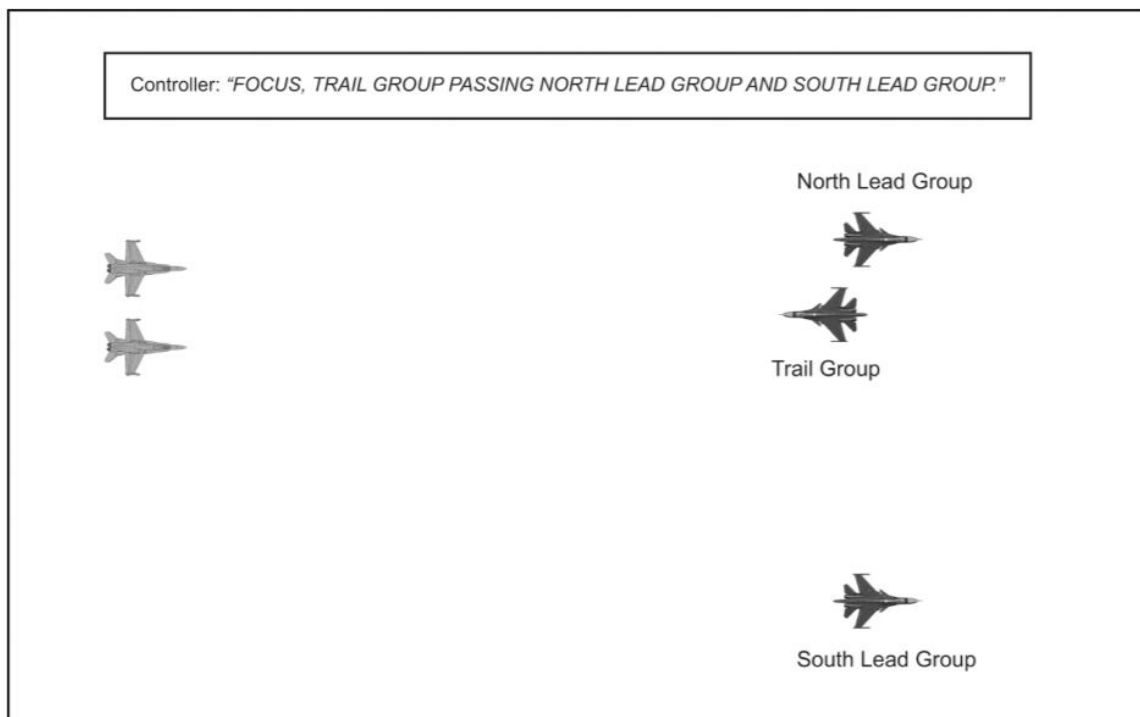


Figure 22. PASSING

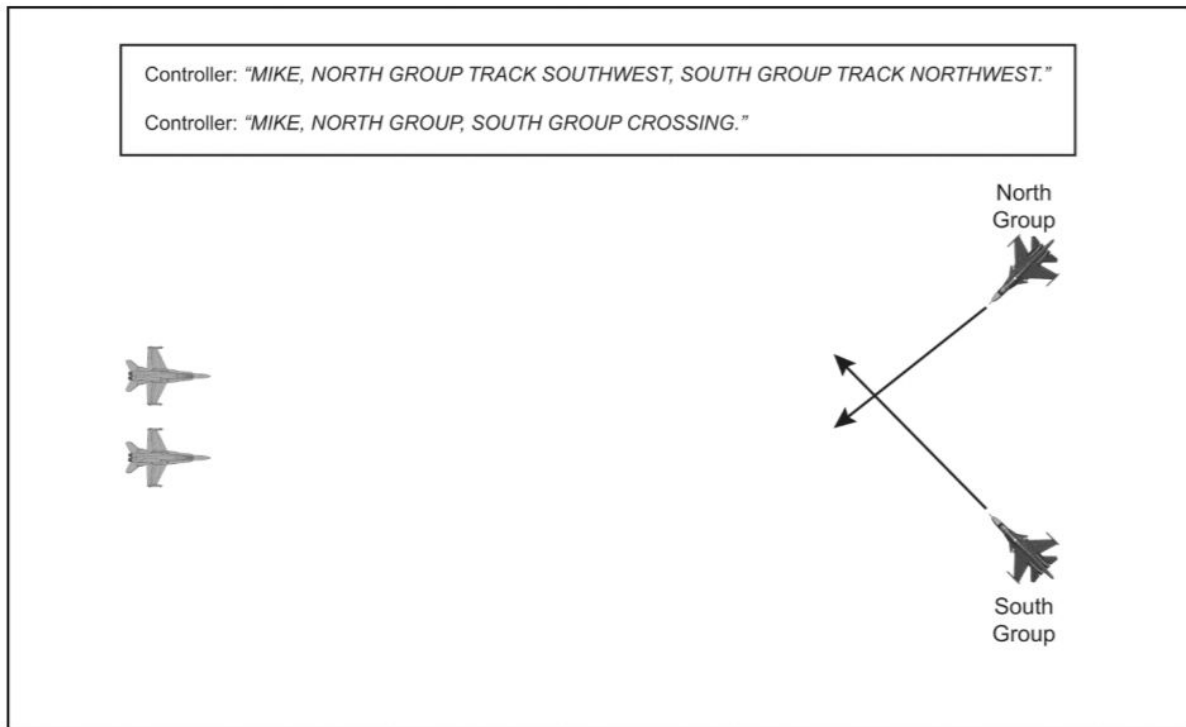


Figure 23. CROSSING

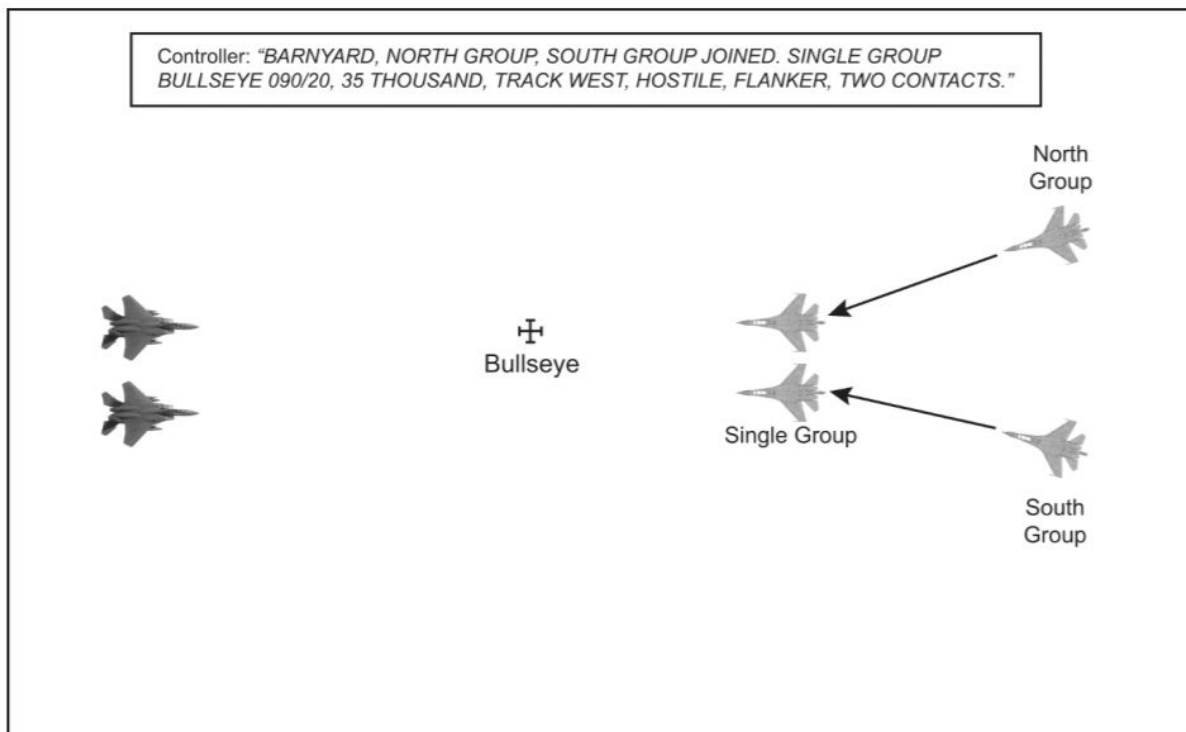


Figure 24. JOINED

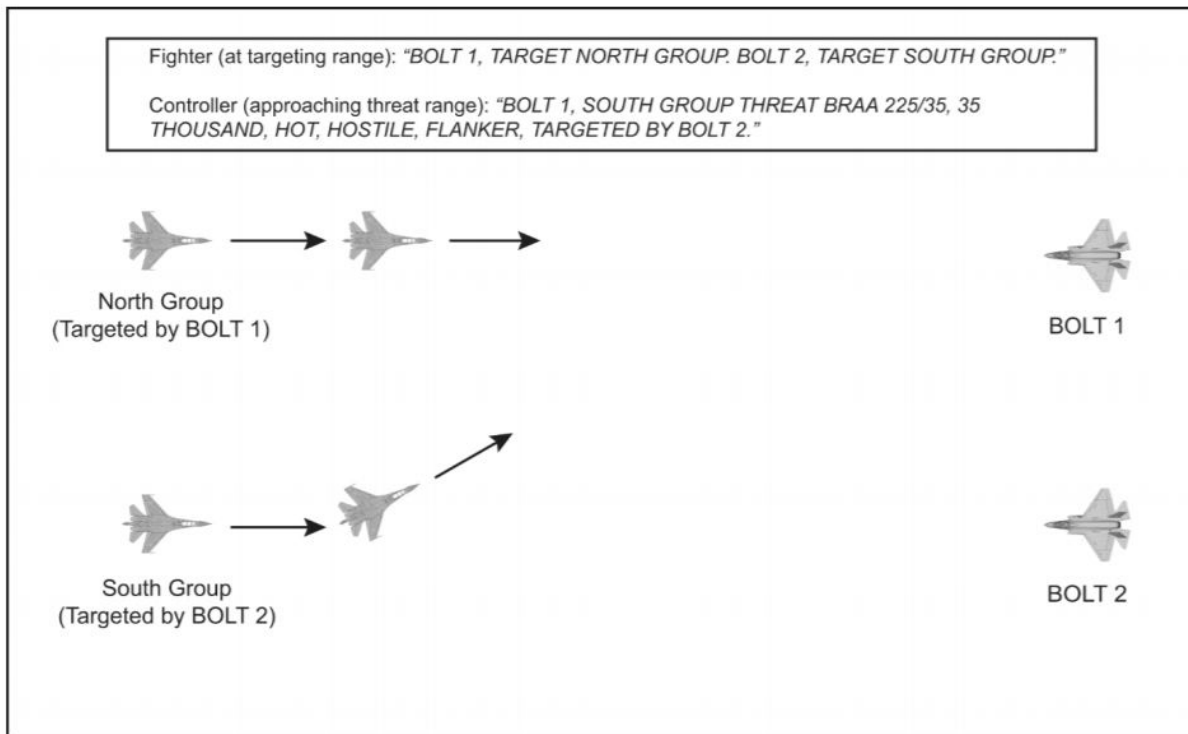


Figure 25. Cross-court THREAT Call

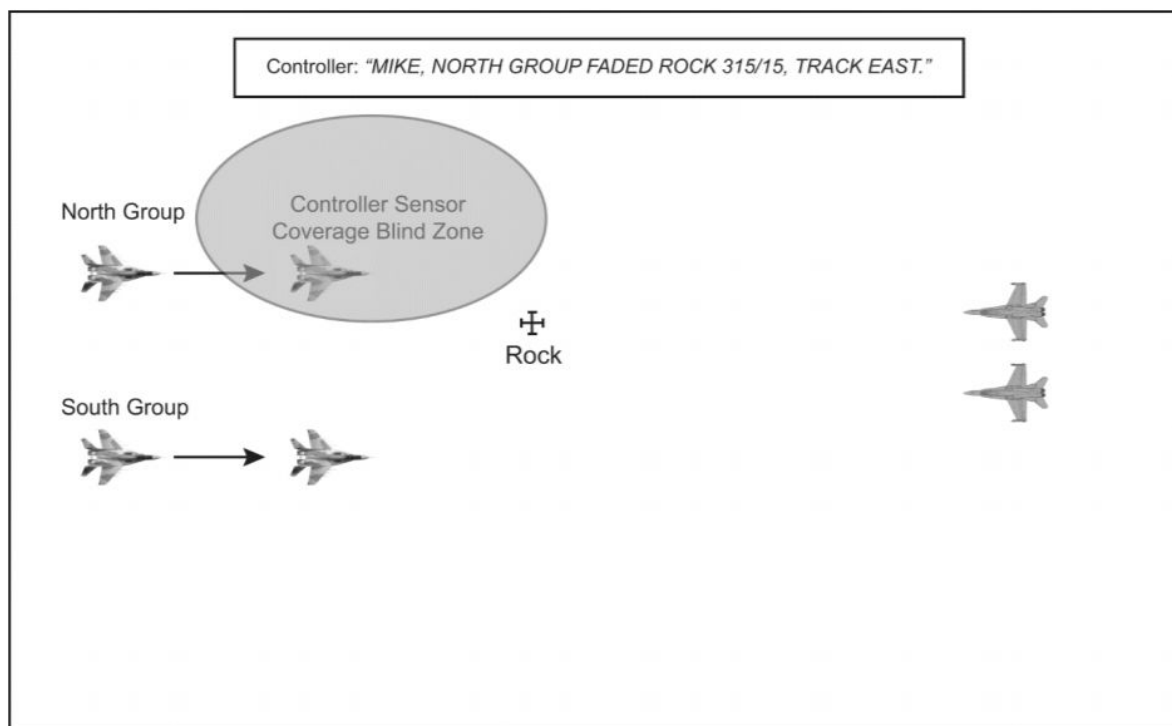


Figure 26. FADED

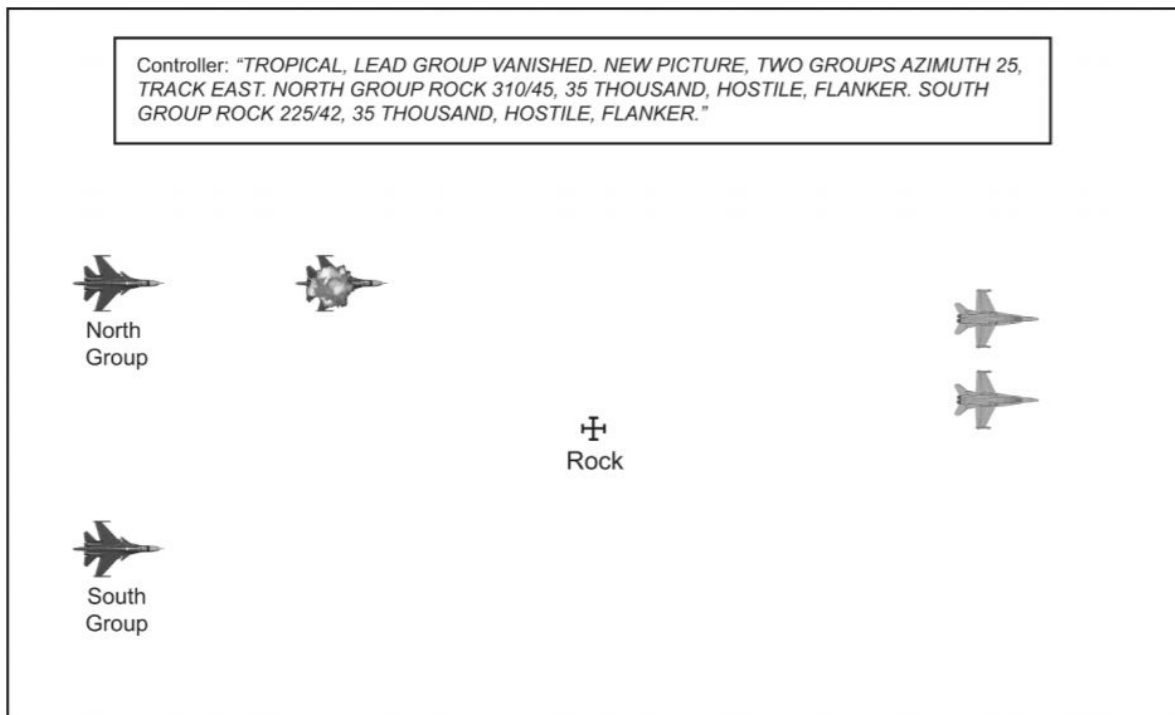


Figure 27. VANISHED

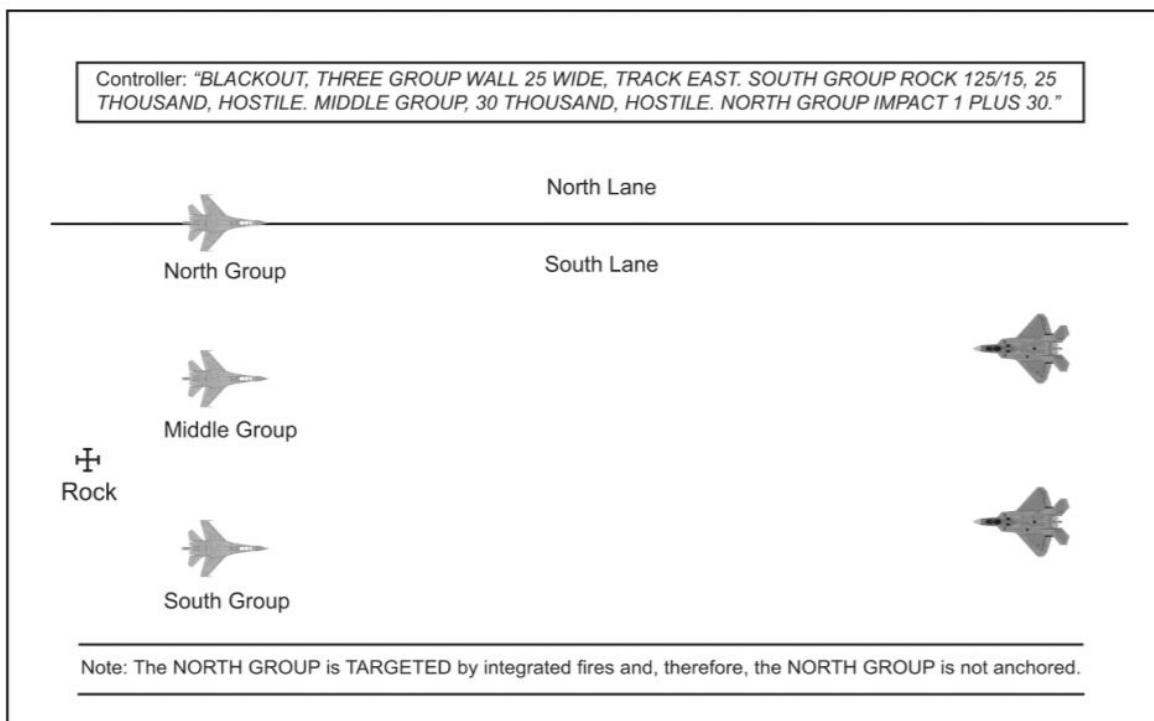
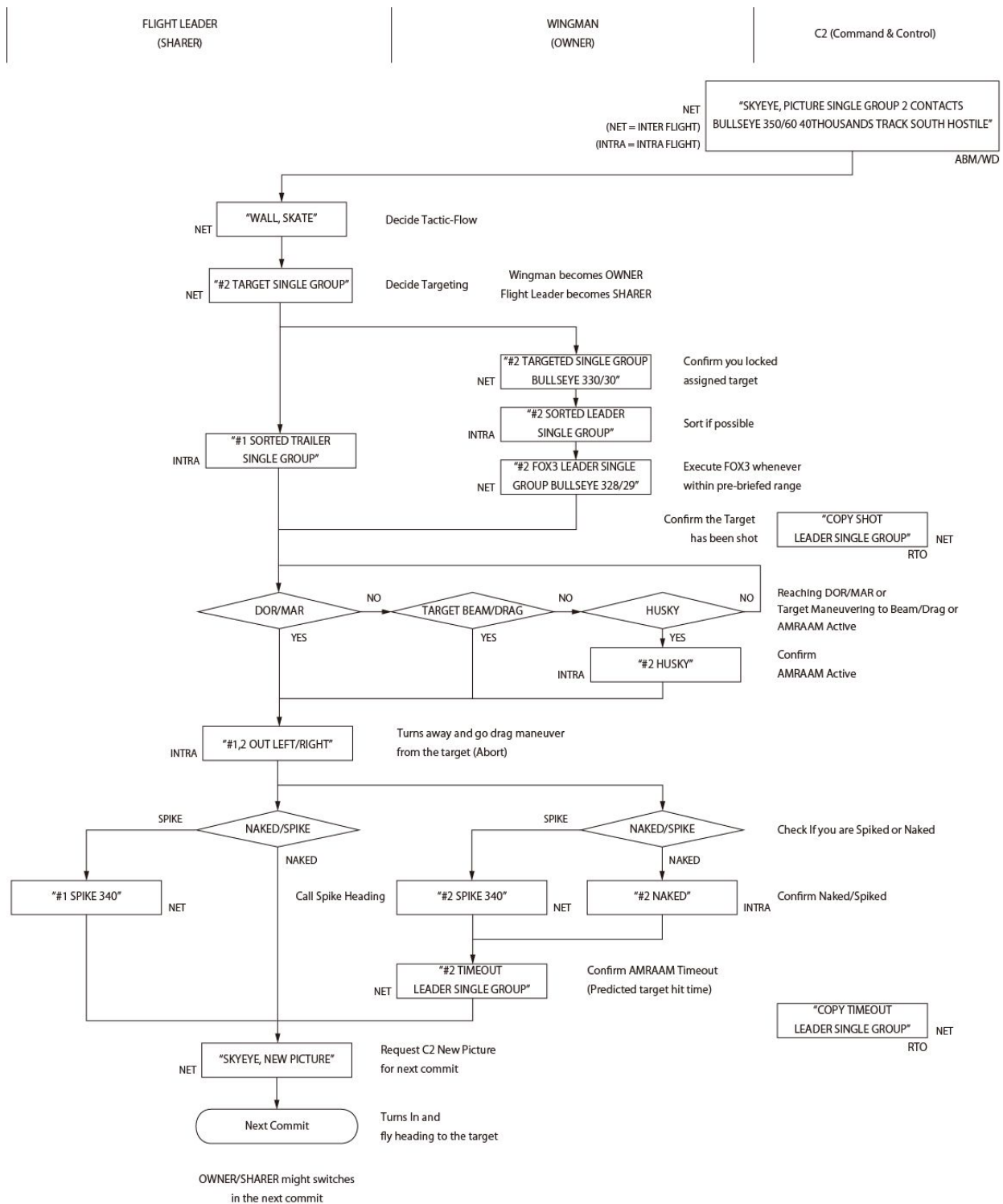


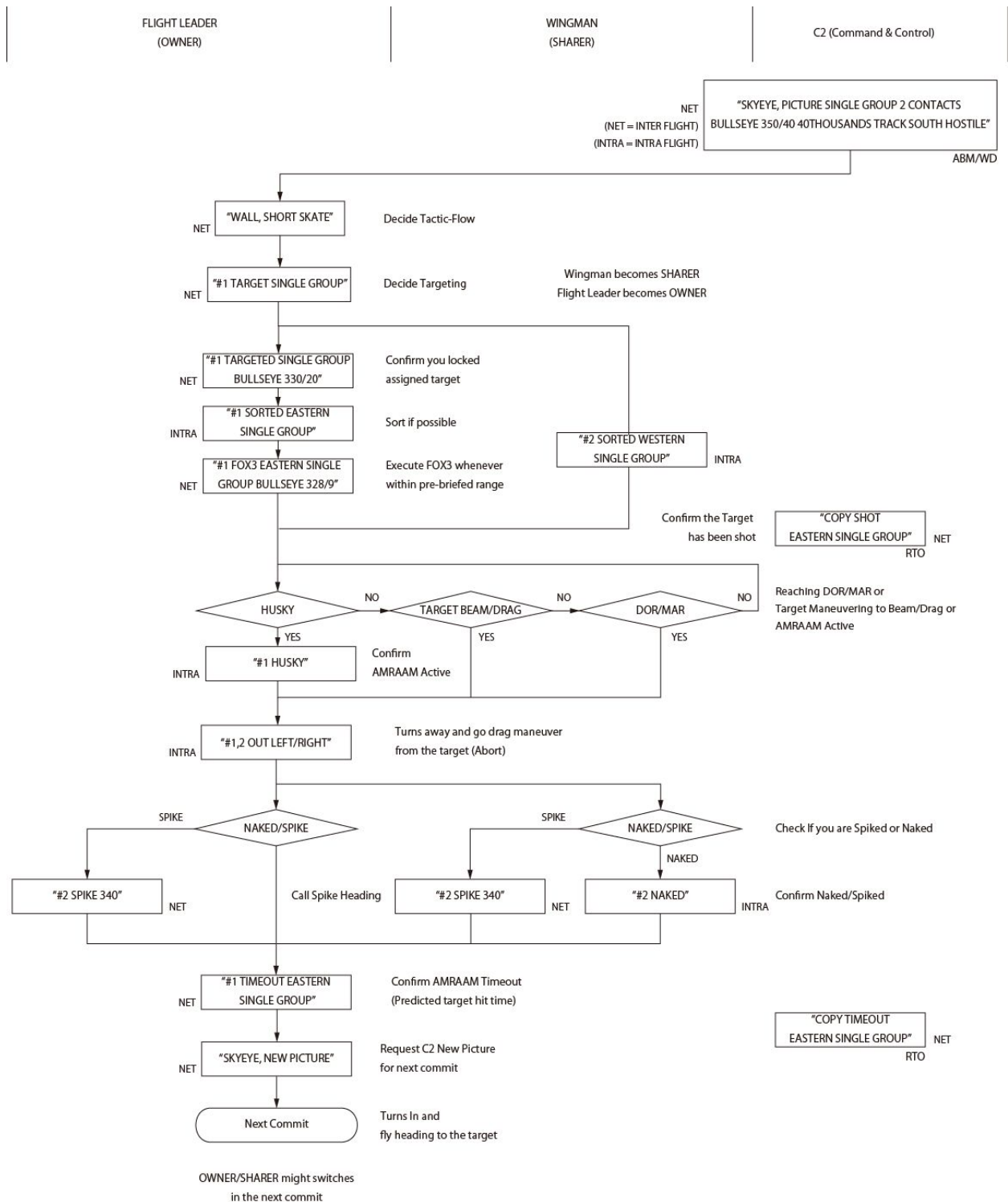
Figure 28. LANE RIDER

BVR Flow Chart

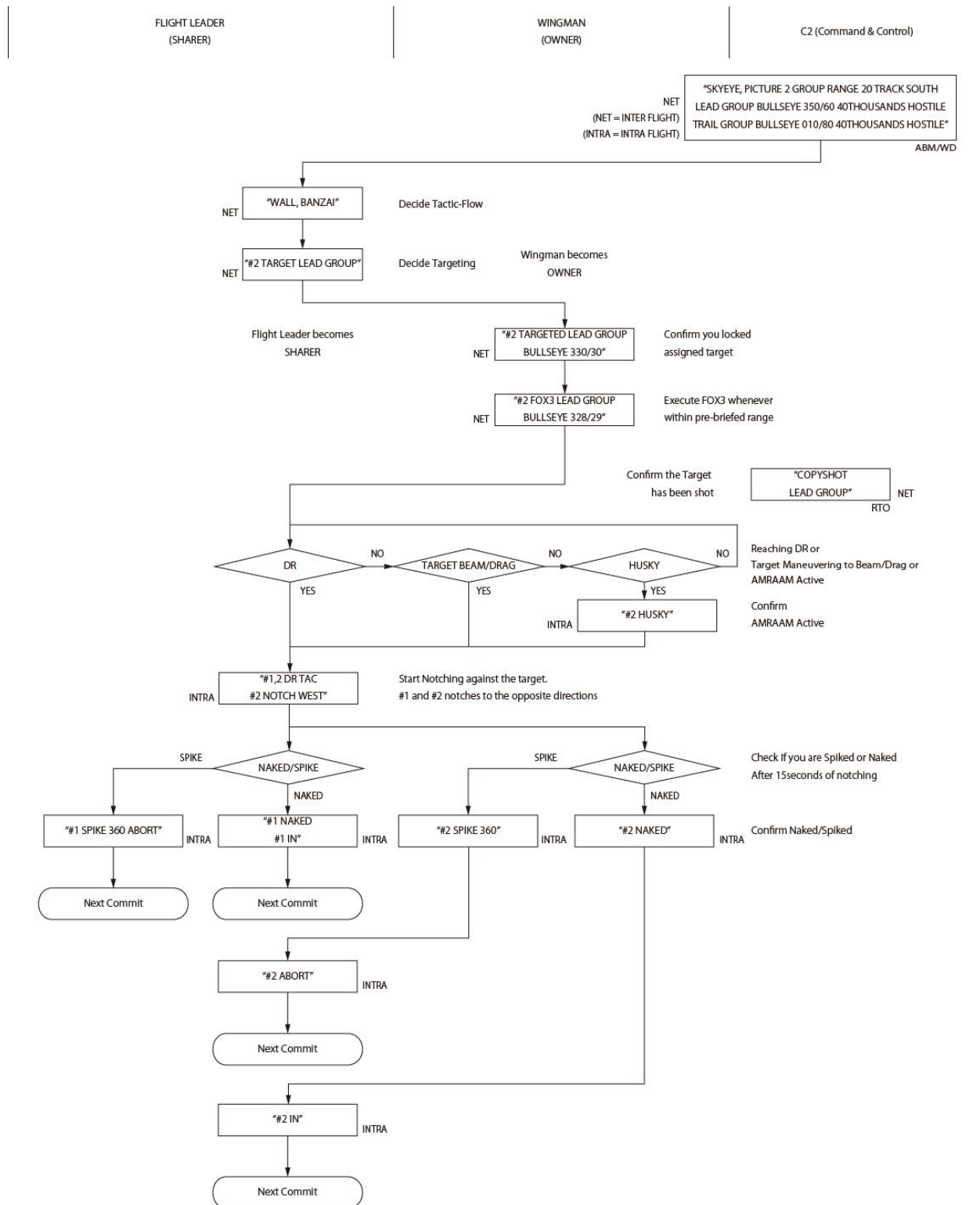
Traditional Launch & Leave Example (FL Sharer)



Traditional Launch & Leave Example (FL Owner)



Traditional Launch & Decide Example



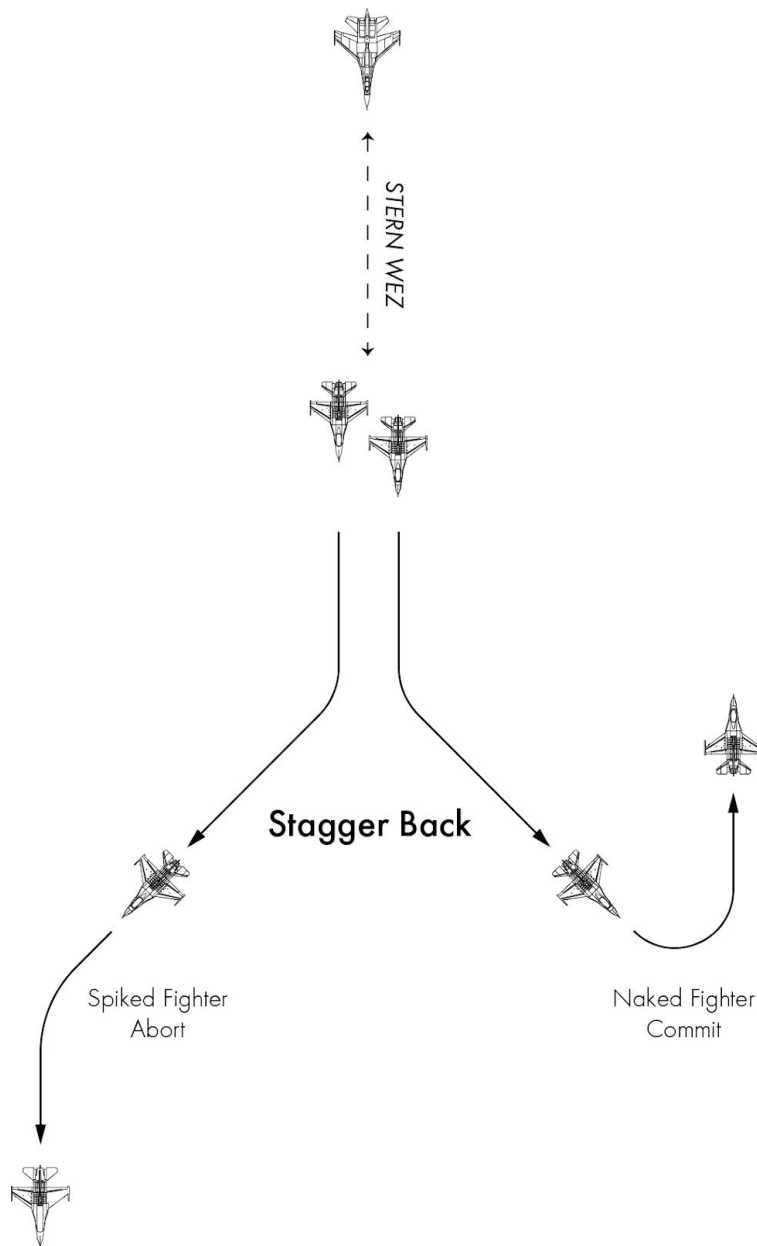
Cold OPS Game plan

2 ship options - stagger back, notch back

4 ship option - delouse

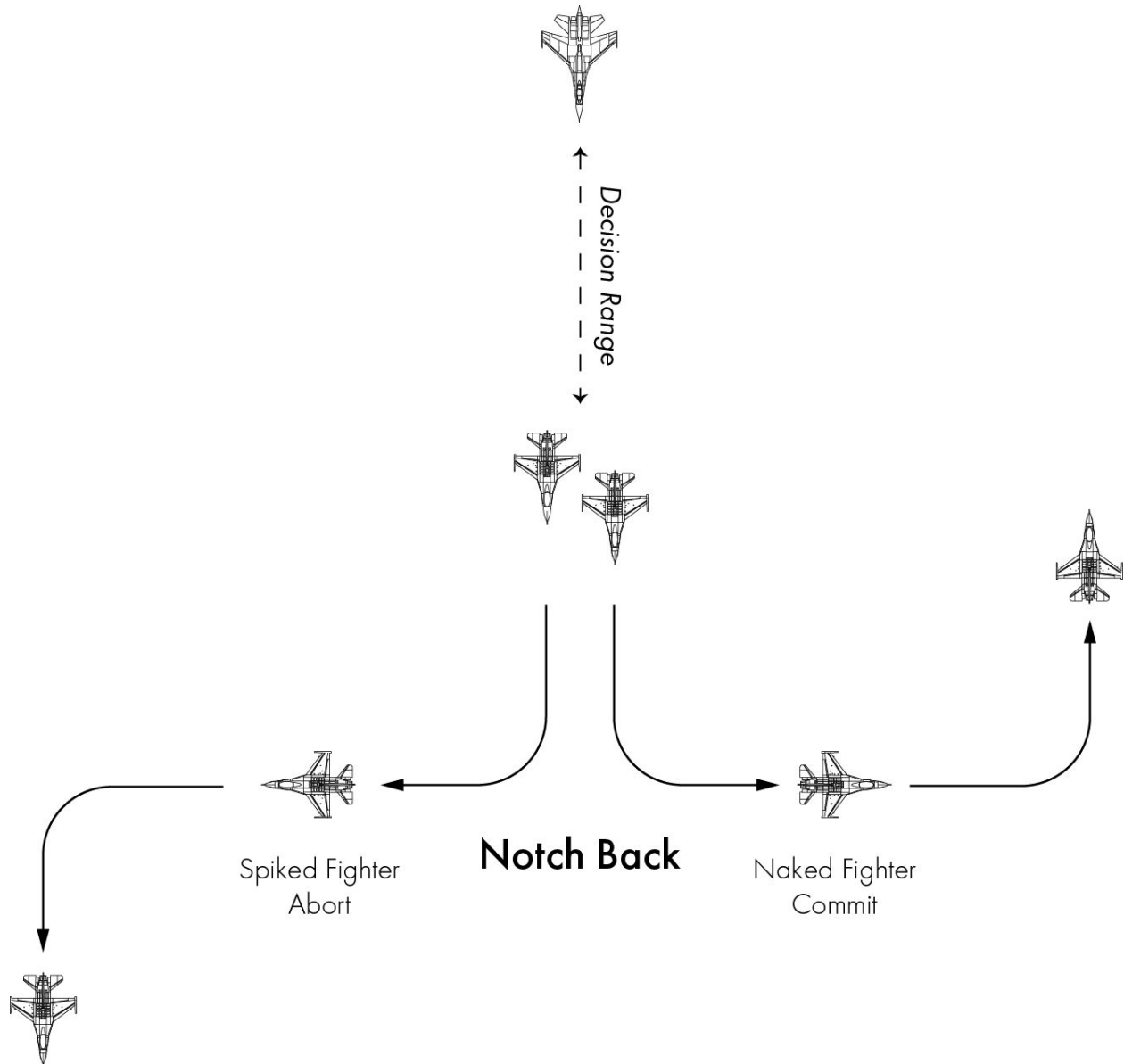
Stagger Back

A spiked fighter will run until pitchback criteria are met and untargeted fighter will pitchback.



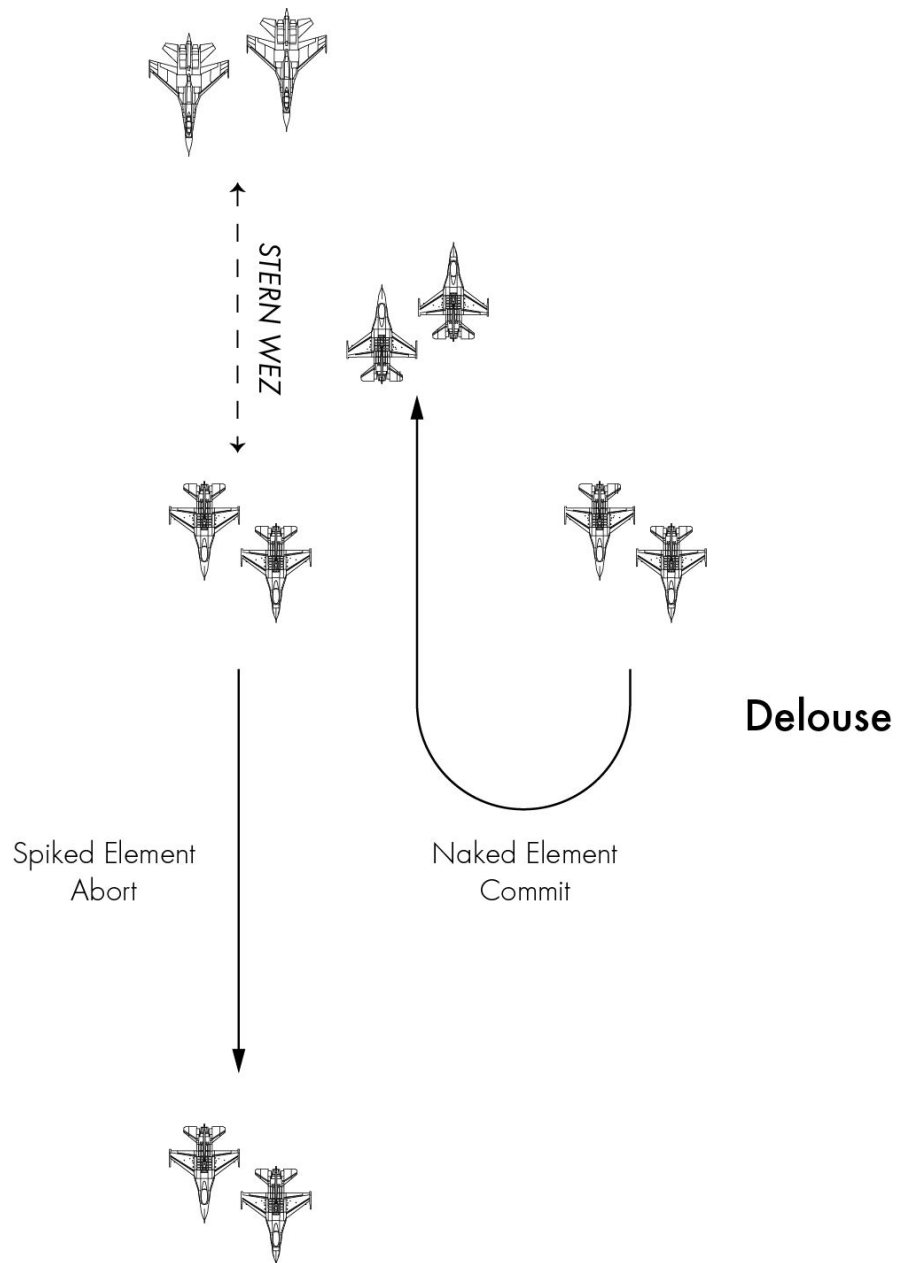
Notch Back

One fighter being spiked but continuing cold is not an option (boundary or stranger etc). at the expiration of the notch, the spiked fighter will access pitchback criteria.



Delouse

Element being leaned on runs while other element recommits and targets.



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Contact

ShizuokaANG is a Japan(GMT+9) based Falcon BMS community.

We train

- IFF (Introduction to Fighter Fundamentals)
- IQT (Initial Qualification Training)
- MQT (Mission Qualification Training)

referring to AFTTP(Air Force Tactics, Techniques, and Procedures) and other USAF public (but most people don't notice) documents.

If you are interested and willing to participate in our activities,

Contact @chihirobeldo on BenchmarkSimsForum.

<https://www.benchmarksim.org/forum/member.php?73101-chihirobeldo>

Our philosophy

We don't play PvP to compete for victory or defeat. We build missions to study air operations and tactics through the simulator. The BMS AI shows excellent BVR tactics, but it still has some inconveniences in what we do. That's why we ask human players to play the role of the Aggressor in COOP if we have the right number of players. The adversary fighters do not fight for their victory, but are expected to be an instructor who presents the right situation so that Blue Forces players can learn what they need to learn that day.

Why FalconBMS ?

Visual Aid

BMS has a visual aid "Smart Scaling" which is based on a study paper Serfoss 2003. You can maintain visual of your leader/wingman in 3nm and can detect their orientation. Which is quite important as real combat formation for example WEZ In-Depth requires 1.5-3.0nm distance from your lead and keep visual on him and watch his turn.

Missile Defeating Logic

BMS air to air missiles can't be defeated by notch-doppler and has a great lethal range. You have to drag at a certain range to defeat them. This lets you execute realistic AFTTP referred BVR timeline. You don't evade all missiles by notch and go dogfight but you have to "push" air superiority so that strikers can deliver weapons.

BMS HARM is also truly high speed as their name implies and you can execute a scheduled shot on time ESCORT/STRIKER penetrates SAM WEZ aka PET SHOT.