



1 (F) SQUADRON

STANDARD OPERATING PROCEDURES



OPERATING PROCEDURES -SQUADRON SOP-

Version 0.1



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INTRODUCTION

The following document is intended to be a detailed description of the basic procedures within our squadron. Even though this is the SOP, sometimes in a tactical situation there is room for a flight lead to use your own discretion.

Sources used in this document:

RAF AIR UK SOP

Falcon 4.0 Korea Manual



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CHAPTER 1 - THE ROLES OF LEAD AND WINGMAN

During missions the flight lead and wingman cooperation and mutual support are an essential part of having a fun and successful flight. The wingman needs to be a thinking member of the flight and know where he needs to be and assist the flight lead in achieving the mission and be ready to step up if lead does something stupid. Flight lead needs to trust his wingman and should not micromanage. Thinking is a good thing to do, generally.

Mutual support responsibilities:

1. FLIGHT LEAD

- a. Think
- b. Navigate - find target
- c. Maneuver the formation
- d. Plan and perform the attack
- e. Mutual support for the wingman
- f. Communication with control, FAC's, package etc.

2. Wingman

- a. Think
- b. Formation integrity
- c. Monitor navigation and situational awareness
- d. Mutual support for the leader



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CHAPTER 2 - GROUND HANDLING

When entering the aircraft you'll perform your pre-flight checks. In this phase you prepare your aircraft for departure.

Once seated in the cockpit you'll check in with the ground crew and determine if you have to correct stores loaded on your aircraft. This is generally given during the flight briefing. You will ask yourself the following:

- *Are my weapons and fuel loaded correctly?*
- *What is my take off time?*
- *Do I know what the active runway is?*
- *Do I know what takeoff procedure we are going to take?*
- *Do I know what number I am in the flight and what is expected from me?*

After you have a rough idea of these points, It's time to start the aircraft up. You'll go through the start up procedure and make sure your aircraft is fully started up and ready for taxi.

RADIO

You'll then make sure you have the radios set to the correct frequency. The Harrier has two radios. In the aircraft they are called COMMS 1 and COMMS 2. In the squadron we reference the radios to BOX 1 and BOX 2. Within the radios there are different presets. You can alter these If required. The presets are called STUD in our squadron. Example: BOX 1 STUD 2 means Radio 1 preset 2. Once you have power, you dial in the correct radio frequencies. On BOX 2 that will be your internal net and BOX 1 is used for stations like ATC, AWACS, TAC and FAC frequencies.



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Once you dial in the internal net on BOX 2, you'll conduct a radio check with your flight. First you wait a few seconds to see if there are no ongoing broadcasts. After that you'll do a quick radio check. In the line of:

"This 2 on 130.1, RADIO CHECK"

You start with your own number, frequency you conduct the radio check and say RADIO CHECK. Other party will respond in a similar fashion:

"1, LOUD AND CLEAR"

The other party will respond with either LOUD AND CLEAR, BROKEN or UNWORKABLE.

In this phase the flight lead will give instructions on the take off. He will brief the following: Nozzle Rotation Angle Speed (NRAS) This is the speed at which point the rotation of the nozzles should take place. This is dependent on weather, altitude and takeoff weight. Most used take off are the short takeoffs, which generally use a nozzle rotation of around 55 to 60 degrees.

"Flight, short take off, NRAS 80 kts at 60 degrees"

Before taxi flight lead will call out a last radio check before stepping off.

"FLIGHT, Sound off by the numbers"

You respond by stating your own number in chronological order.

After that you start your taxi



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ASKING CLEARANCE UNCONTROLLED FIELD

Most airfields are uncontrolled. We state our intentions on the net. This is conducted by the flight lead. There is no need to use DCS AI ATC.

BEFORE TAXI

"KOBULETI TRAFFIC, COLT 1 FLIGHT, 4 SHIP HARRIERS, TAXIING TO RUNWAY 7"

Nice and simple. Before lining up you say: Station, Callsign, lining up runway 7, departure parameters. Can be to the west, east, north or south or runway heading. Which is called a straight out departure.

"KOBULETI TRAFFIC, COLT 1, LINING UP RUNWAY 7 FOR STRAIGHT OUT DEPARTURE"

Once on the runway you do your before take off checks. Make sure your NSW is set to ANTI SKID, your nozzle STOP is set, flaps and water (if required) are set.



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CHAPTER 3 - LINEUP

TYPES OF LINEUPS

A line up is when aircrafts in a flight will place themselves on the runway for departure. Line ups happen in different ways. It can be a formation lineup, element lineup or a trail lineup. Lineups and type of takeoff will be briefed beforehand.

ELEMENT LINEUP

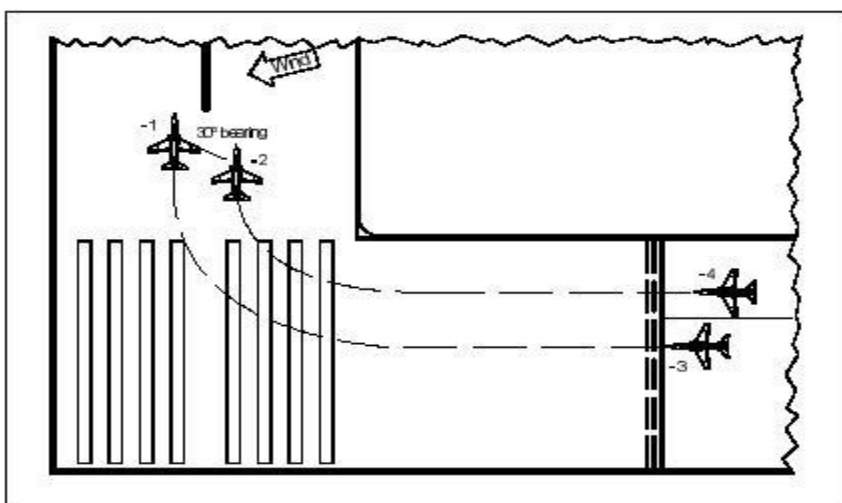


Figure 1: Element line up

In this lineup one element lines up on the runway. Flight lead is lined up left of the center line with the wingman lined up 30 degrees offset from lead on the left side of the centerline. The second element is holding short of the runway, waiting for the first element to depart. Once the first element starts rolling, the second element can line up on the runway. Best used in IMC, VMC and Night conditions.



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FORMATION LINEUP

A formation lineup is when the whole flight lines up on the runway together. The elements lineup the same way as the element lineup (lead left of centerline, wing left of centerline offset 30 degrees). The second element is lined up behind the first element. This is used in VMC conditions.

TRAIL LINEUP

In some instances there is no room to have aircraft line up next to each other. In these situations the flight can line up in trail on the runway. There has to be at least 150 feet separation between aircraft.



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CHAPTER 4 - TAKEOFFS

There are two ways to takeoff: interval and formation takeoff. The interval takeoff is used to create more distance between single aircraft in the formation. This can be useful due to weather. The first aircrafts takes off and the wingman takes off a few seconds later. The amount of seconds differ, only If this is briefed beforehand.

FORMATION DEPARTURE

A formation takeoff is when the element starts rolling down the runway at the same time. This is used when there is a small takeoff window and you need to have aircraft airborne quickly. **The wingman is responsible for deconfliction at all costs.**

Both aircraft are ready and lined up on the runway.

LEAD: "SPOOLING UP"

- Full toe brakes applied
- Throttle runup to 80% RPM
- Verify engine parameters

WINGY: "TWO, IN THE GREEN"

LEAD: "RELEASE"

- Release toe brake
- Full throttle to max RPM
- Wingman maintains formation integrity

LEAD: "ROTATE"

- When NRAS is reached put nozzles to correct position to rotate



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WINGY: "TWO, AIRBORNE"

- Called out when positive rate of climb

WINGY: "TWO, GEAR UP"

- When positive climb rate, put gear up and put flaps up when between 150 to 200 kts and turn off water. Move the nozzles forward till in forward flight.

WINGY: "TWO, IN POSITION"

- When you are in formation with your lead, you call out that you are in position.



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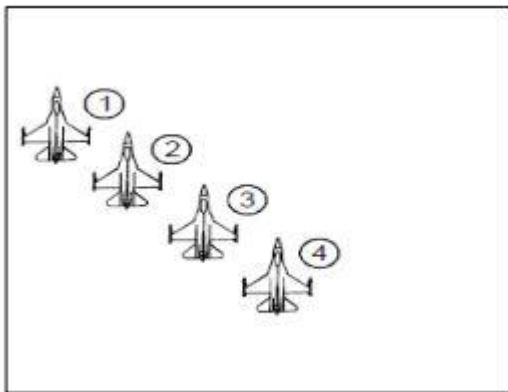
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CHAPTER 5 - FORMATIONS

Within our squadron we use a couple of formations that we use during our sorties. There are echelon, cruise, battle and trail formations.

ECHELON

Known as Echelon or Fingertip, this formation can be used for Departures and Arrival in areas of no conflict. This formation is used for the overhead break and for the pre-form up with the tanker.



Echelon formation

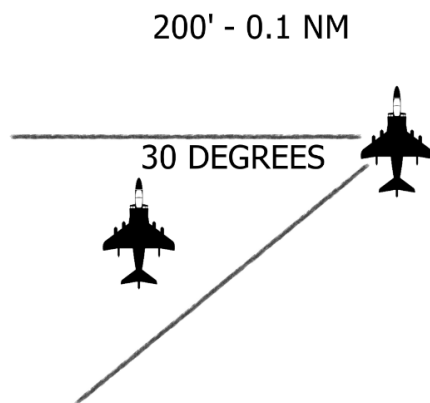


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CRUISE

Known as Cruise, this formation is used for transiting Area of Operations (AOR) where hostilities may occur, but not usually within that AOR. A rough order of magnitude for the distance between aircraft is 4 to 6 aircraft lengths.



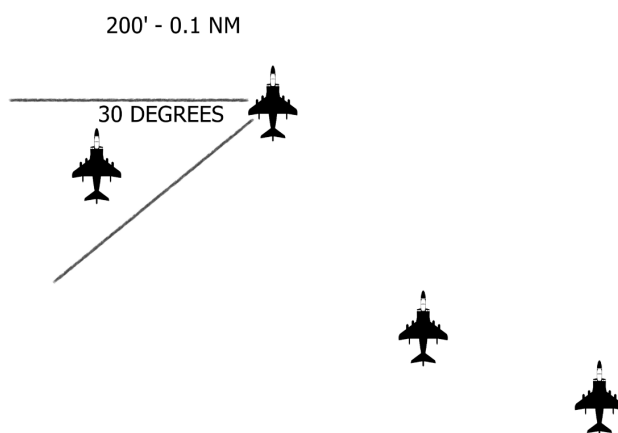
Cruise formation



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In a four ship it looks like this:



FOUR SHIP CRUISE



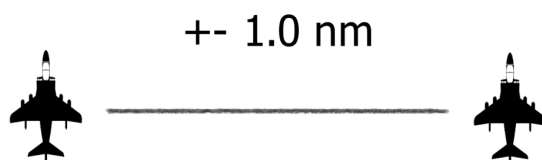
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BATTLE

Known as Battle, this formation is used whilst in a hostile area and provides excellent Situational Awareness (SA) for both aircraft. It also derisks the chance of a blue on blue with your wingman so that both AC can fire weapons safely at a hostile group.

Distance between AC should be 1nm +/- 0.4nm in normal circumstances, but this can be up to any distance, as long as it's briefed.



BATTLE FORMATION

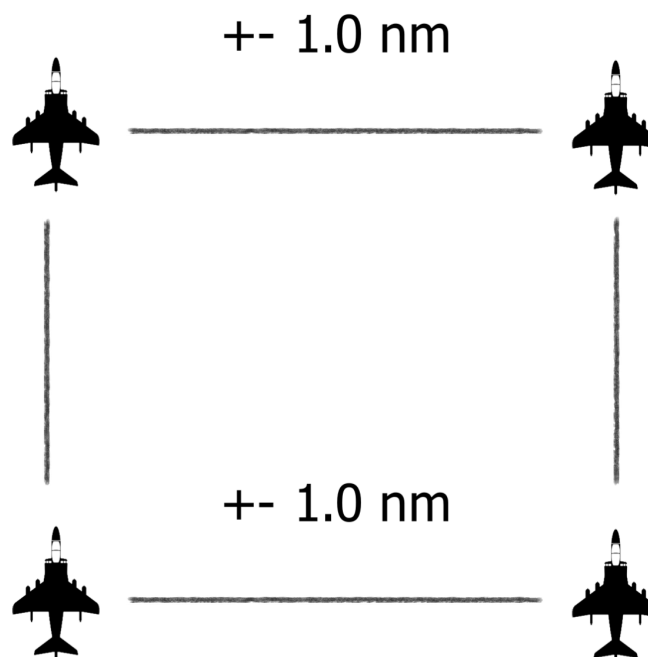


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BOX FORMATION

When flying in a formation of four or more aircraft in Battle, the battle formation is called a BOX formation.



TRAIL FORMATION

Trail formation is self explanatory: It's a formation where everyone is in trail. Separation is usually 30 seconds, but it can be anything. As long as it is BRIEFED.



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CHAPTER 6 - REJOIN

After the formation has taken off, the rejoin happens. Lead will speed up to 300 KIAS and will climb and maintain 4000 ft. He will head, If terrain allows it, to fly 10 nm on runway heading to let the flight form up. Flight lead can alter 30 degrees left or right from the runway heading.

Once the rejoin is completed, the formation will speed up and maintain 380 knots **GROUND SPEED (GS)**. Ground speed is used to estimate TOT and timings during navigation. Unless otherwise specified, the speed during navigation (minus the IP to TGT run) should be on 380 kts GS. Once all are in formation and on speed, the formation will climb (or decent) to its designated altitude. Climbs and descents are generally done in 5 or 10 degrees nose up or down.



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CHAPTER 7 - OPS CHECK

Operational checks, also called OPS CHECK, is a tool for flight leads to check If all flight members are ready for the mission. In the check the flight members will check their systems and check If there are any faults. This is conducted after the aircraft reach their assigned altitude and are enroute.

The checks in the cockpit are best done working from LEFT to RIGHT

WHERE	VERIFY
OXYGEN	Check if OX is on
LIGHTS	Check If lights are set as briefed
MPCD	Check navigation is set, TACAN etc.
STORES	Check stores panel If parameters and weapons are set correct
RADIOS	Check all frequencies are set correct
RWR	Check RWR is on
CMS	Check If chaff and flare dispensers are on and JAMMER if required
FUEL	Check fuel state
WARNING PANEL	Check there are no faults

LEAD: "FLIGHT, OPS CHECK"

WINGY: "TWO, ALL GREEN"



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CHAPTER 8 - AIR TO AIR REFUELING

Air to air refueling is an essential part of conduction operations. Aircraft are to locate the tanker they require and call "Request rejoin" to that specific tanker on the radio. The tanker will respond to the pilot and give their altitude and IAS at which point the pilot will match that altitude with a closure speed commensurate with catching up but not overshooting the tanker.

Flight members will rejoin in an echelon left when at 30 nautical miles from the tanker. The aircraft with the lowest fuel refuels first. That aircraft is the most right of the echelon and 'leads' the flight.

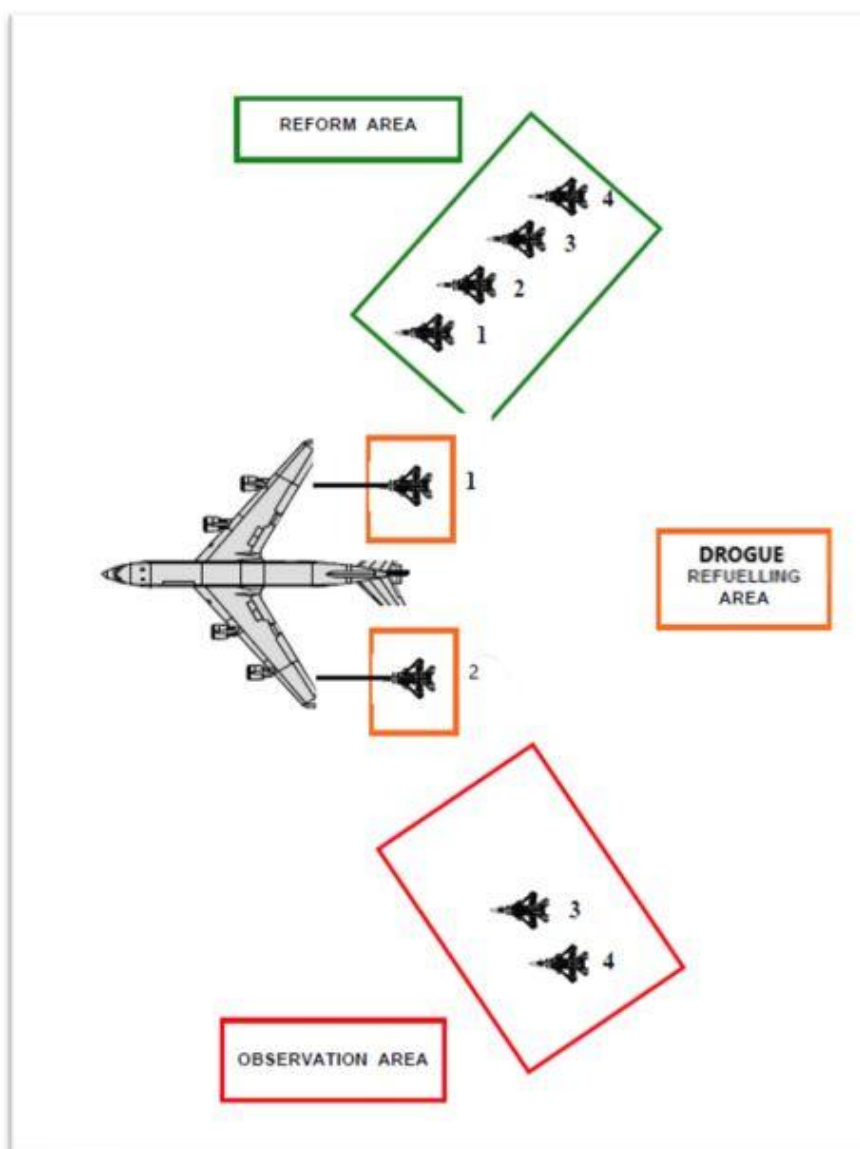


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OBSERVATION AREA

Upon rejoining with your chosen tanker, all pilots will enter the "Port Observation" position. See diagram below:





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ON THE BASKET

Once you are given permission to attempt to refuel, you will slide across to your assigned hose/boom and close up to "Pre-contact" position. The pilot will contact the tanker via radio and request "Ready pre-contact" and will await "Cleared contact" from the tanker. At this point you are cleared to engage with the basket and take on fuel. Ensure you only take on the fuel you need to complete the task and Return to Base (RTB) safely as brimming off all internal and external tanks when you are 5 minutes from landing will result in fuel being dumped to reach maximum landing weight.

REJOIN TO REFORM AREA

Once the pilot has successfully refuelled to the required level, they will disconnect from the basket. If not topped off, the pilot must call the tanker on the radio with "Abort rejoin". This will allow for a small DCSism that sometimes stops other jets connecting to the basket as the original aircraft is thought to still be attached.

After disconnecting, the pilot will maintain a watch behind and slide gently back in a straight line until they can clearly see the reform position on the Starboard wing and that the transition to this location is clear. Once this is achieved, the pilot will slide over to the reform position, taking the next available slot to the right of any aircraft already in the reform and will maintain this formation until all aircraft within their flight have completed refuelling.

DEPART TANKER

Once the Flight lead is content that all aircraft have sufficient fuel for the remainder of the flight/task to be achieved and to safely recover to a coalition base, the flight lead will call on the internal net the way to depart. Either High right, Low right or low left

LEAD: *"Flight, depart high right"*



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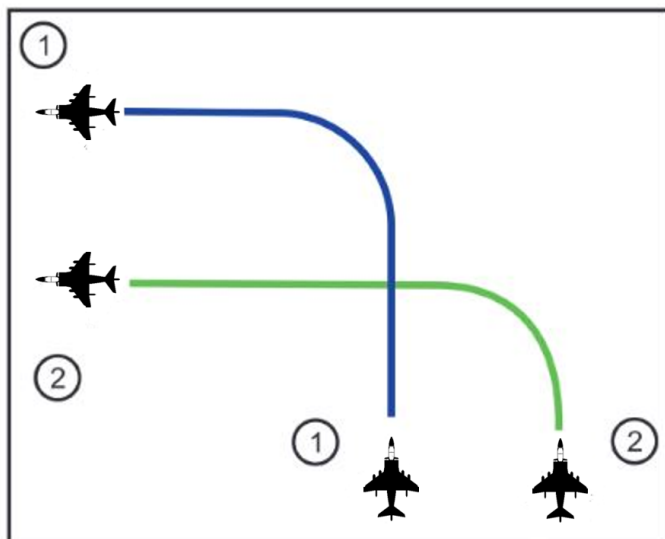
CHAPTER 9 - TACTICAL TURNS

TAC TURNS

Tactical Turns or Tac Turns, are a series of set turns used in order to maintain formation integrity while in Battle. This way the flight maintains their SA and keeps the flight in a tactical formation during the whole length of the route. Tac turns can be performed on the waypoint or in advance of the waypoint.

90 DEGREES TAC TURN

In this tac turn the formation will do a course change of around 90 degrees left or right. The flight lead might call them out, although it is expected from a wingman to know when and how to perform a tac turn, so that in situations of radio silence the flight maintains the formation.



A 90 degree left tac turn

In the diagram above the wingman initiates the turn. He applies more throttle input and does a sustained turn to maintain the contract speed, which in most cases is 380 kts GROUND SPEED. Unless otherwise specified. The pilot on the OUTSIDE of the turn initiates the turn. Number one will initiate the turn when he sees the wingman facing him in his turn behind him.

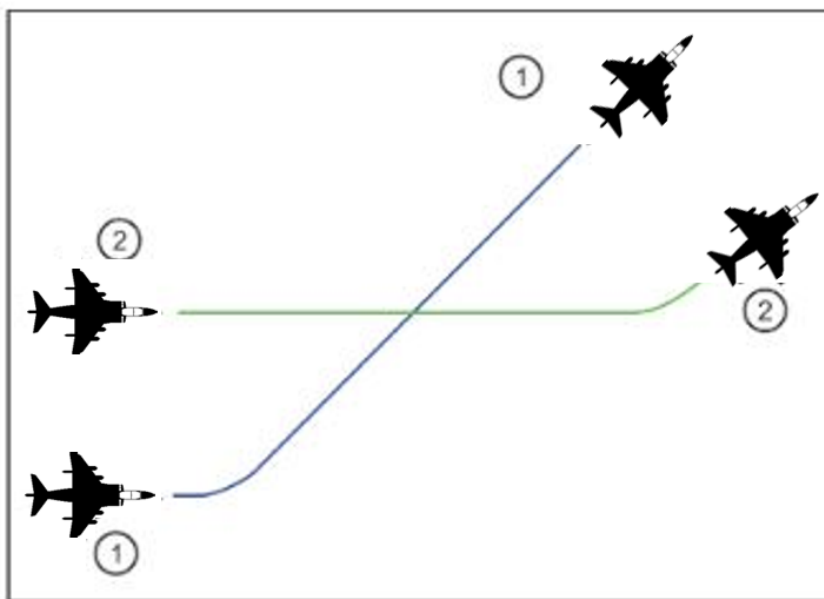


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45 DEGREES TAC TURN

In this turn the aircraft does a course adjustment of 45 degrees left or right.



A 45 degree right turn

In this instance aircraft number 1 initiates the turn as he is situated on the outside of the turn. The first aircraft will initiate the turn and move behind the second aircraft. Once the aircraft starts passing behind number 2, he will initiate the turn. Just as the 90 degree turn, always maintain the contract speed in an energy sustaining turn.

GENERAL TIP: If the aircraft ends up in the incorrect position after the turn, like overshoot or lagging behind, just fix the formation and press on.

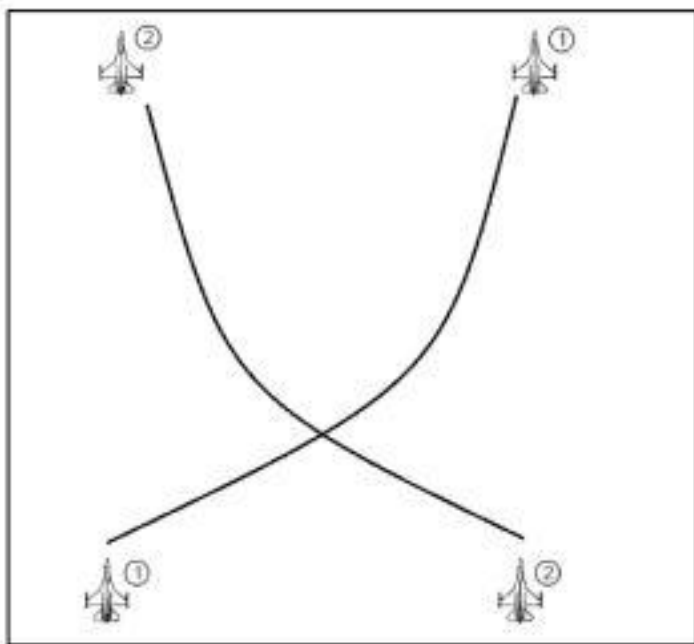


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SHACKLE

This manoeuvre can be used to switch sides for tactical advantage purposes as well as for formation purposes such as coming into land



A shackle turn

Whilst this example above is the correct way to "Shackle" whilst in a hostile AOR, the "Shackle" can also be completed whilst in close formation for landing or departure, should it be needed, by either jet calling "2 Shackle" (where the wingman is 2) at which point, the wingman will descend slightly to fly behind and under the lead jet before rejoining on the opposite wing in close formation again.



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CHAPTER 10 - FENCE IN

FENCE CHECKS

Before entering the area of operations, the flight needs to perform the FENCE CHECKS. This is in place to make sure that all airframes are ready for combat when entering the area of operations. FENCE is an acronym for the following:

FENCE

F - Fire control systems: *Master arm, weapons set up (interval, mode and warm-up IR-MAVS etc)*

E - EW systems (*set RWR, flare programs*)

N - Navigation systems set and ready (*INS, GPS etc*)

C - Communications set on correct frequencies and nets

E - Emitters (*TACAN, DECM, Exterior lights OFF*)

Flight lead will call the flight to FENCE IN. Flight members respond in order when checks are done with fuel state.

"Two, fenced in, 10.5"



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CHAPTER 11 - WEAPONS

*FOR WEAPONS EMPLOYMENT REFER TO THE
RAZBAM AV/8B HARRIER II NIGHT ATTACK
MANUAL OR CHUCKS GUIDE*



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CHAPTER 12 - ATTACKING THE TARGET

*FOR ATTACK PROFILES REFER TO THE TWO SHIP
ATTACK PROFILES AND ATTACK FORMATIONS SOP*



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CHAPTER 13 - BELLY CHECK

BELLY CHECK

When conducting a mission or training anything can happen to the aircraft. AAA and small arms fire can cause quite some substantial damage. Also is it possible for ordnance to not have dropped. This is called a hung store. To make sure the aircraft ordnance is dropped and to check the extent of damage, a so-called belly check is performed.

This procedure is standard practise after completing any training where weapons have been employed or any live mission. The inspected aircraft will fly stable and level. He makes sure he is on autopilot and at a constant speed.

The secondary aircraft will fly slowly from left to right underneath the aircraft. He will then pass on any information that he found. The following:

- *Any hung stores*
- *Any visible damage*
- *Any missing control surfaces (ailerons, flaps, vertical stabilisers and rudder)*



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CHAPTER 14 - VFR & IFR ARRIVALS

*FOR ARRIVAL AND RECOVERY PROCEDURES
REFERENCE THE VFR & IFR RECOVERY SOP*



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CHAPTER 15 - CARRIER OPERATIONS

*FOR CARRIER OPERATIONS REFERENCE THE UK
NAVAL FLIGHT OPS SOP*