Allied Air Academy

Allied High Command
Training Command

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Section 1
Fighter Strategy and Doctrine

1.1   Gunnery and Weapon Familiarization

Gunnery is key to master. If you do not excel in the offensive, you will be completely reliant on your defensive skills and that does not make kills. This section will teach you information on the different weapons used within Allied aircraft as well as the information you need to make them deadly.

Fighters with nose- or cowling-mounted weaponry have a very distinct advantage over fighters with wing-mounted guns. Because the centrally placed guns are aligned with the fighter's longitudinal axis, the guns fire straight forward to there max range without trouble, making gunnery considerably easier. Wing-mounted guns on the other hand must be harmonized to deliver a concentration at a specific range or convergence as known by pilots. As you fire with wing-mounted guns, you will notice a slight "wobble" from side to side; this is the physical affect of non-harmonized gunfire. Because of this, fighters with wing-mounted guns are only 100% effective when firing with the target at or close to the convergence point. Where to set your convergence is highly dependent on your weapon, your typical fighting style and at what range you normally open destructive fire. Ammo conservationists who tend to fire only when the target fills the pipper will prefer a fairly close convergence setting, whereas a distance marksman who tends to find the 200m+ in his favor will bump convergence settings out.

Some scenarios will allow you to pick and choose where you would like to place your shot, however, this is not always the case. If you are given the opportunity to place rounds on specific points do so by this order of importance:
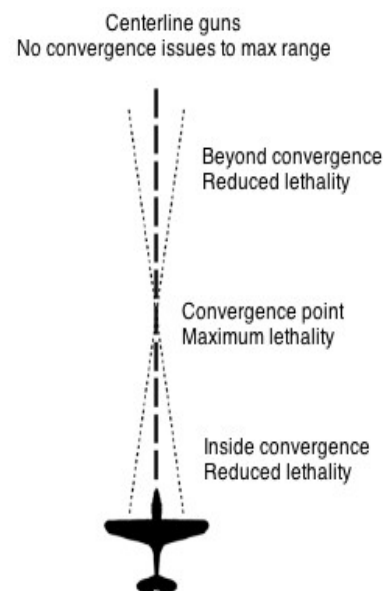
Centerline guns
No convergence issues to max range

Beyond convergence
Reduced lethality

Convergence point
Maximum lethality

Inside convergence
Reduced lethality

Illustration 1.1

1. Engine – Placing rounds here will do one of only a few things. It will likely kill the engine if rounds used have the penetration needed, if not then it will rake the plane from nose to tail with enough rounds to seriously affect the flight dynamics or if lucky, kill the pilot.

2. Pilot - Well placed rounds and concentrated fire on on the cockpit will nearly always seriously wound or kill the pilot.

3. Fuel Tank – There are a few reasons you would benefit from a well placed shot on an enemy full tank. The first is obvious, no fuel means the engine will not run. If your able to score a hit on an enemy fuel tank with the tracer round of your belting, you have an opportunity to see the target fall out of the sky in flames and pieces of debris. Fuel tanks are located depending on the type aircraft, the key thing to remember is "in front of the pilot, behind the pilot". There is not a fighter aircraft in WW2OL that does not contain a fuselage tank in one of those 2 locations. When all else fails another aim point for the fuel tanks are at the wing-roots.

Illustration 1.2

4. Tail Section – Most commonly encountered from the Dead Six chases this is your last resort to place rounds on target. There are ways to gain deflection in order to keep ricochet's to a minimum including "rudder kicks" and other Air Combat Maneuvers.
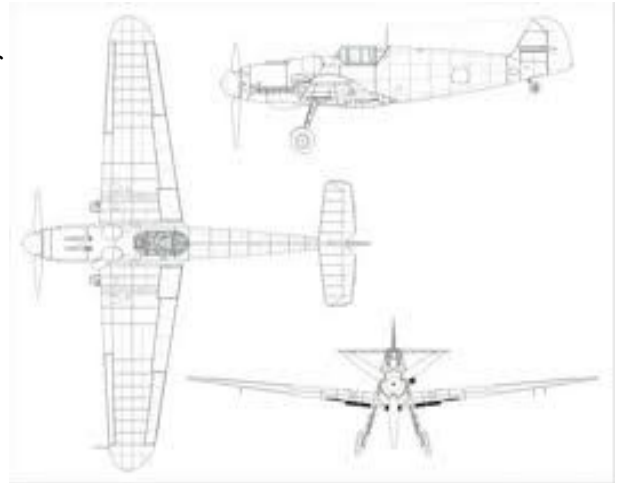
The most important factor for good gunnery is to get close, as in real close, before opening up. Fire only when the enemy fills the gunsight! This again requires you to fly behind the enemy, and to manage your closure rate. This technique allows bullet drop to be void of the equation allowing more accuracy and less rounds needed, which can then be used on your next victim.

The second most important factor is to fire without any back pressure on the stick whatsoever. You will then be flying arrow-straight and delivering a concentrated burst of fire. This requires you to be trimmed correctly.

The third most important factor is to NOT use the zoomed-in gunsight view when closing and firing. This subject is highly debatable however, it can not be denied that the zoomed-in view robs you of Situational Awareness and conspires to give you a faulty idea of the range and vectors involved in the shot. Use the zoomed-in only for steady long-range shots against non-maneuvering targets, and for identification.

The fourth most important factor is to NOT fly at near stall speeds while aiming. Making yourself slow and vulnerable will do nothing to help get the kill. Not only are you placing yourself in a high risk situation, but your gunnery will severely suffer as well while trying to fight the stick in the sight. Bullet trajectory will be off as well, rounds require the aircraft speed in addition to muzzle velocity to reach those longer shots accurately.

There are many things you must consider when the heat is on and your sight is full of an enemy aircraft. Bullet drop is the highest factor in missed rounds. This must be compensated by leading the target a determined amount, long range means more lead and higher elevation whereas the shorter ranges can be fired nearly centered on the aim point. At higher altitudes, rounds will slow down less making them more accurate. The

reasoning behind this is Air Density. In higher altitudes the air is "thin" allowing the bullet velocity to be higher and less drag to be place on the bullet aerodynamics , however bullet drop is slightly more due to lower speeds. Rounds fired will leave the muzzle at their muzzle velocity plus the velocity of the gun. For example, the .303 AP round has a muzzle velocity of 723m/s and my Spitfire is traveling at 360mph; the bullet is realistically leaving its barrel at 883m/s. Always take aircraft speed into consideration, it could easily mean wasted rounds. Higher Aircraft speeds will increase the rate rounds lose there velocity, even superman could only go so fast. Remember each round type (.303 , 20mm , 7.5mm etc) all vary in the rate they lose velocity in addition to aircraft speed, air density and gravity. To correct bullet drop pilots learn there weapons and use a technique known as Deflection.

Deflection is only mastered, like everything else in the cockpit, with practice. When firing there are numerous factors to consider: your speed, targets speed, manuvering, bullet drop, altitude etc. All these things combined is deflection. Aim for the targets "soon-to-be" location or where your target will be compared to where it is visibly.

Head-on attacks are very risky and rarely forgiving. Pilots who fly aircraft containing only wing-mounted guns should avoid head-on attacks at all costs, there is always something else you can do to avoid it. Nose mounted guns will win this battle hands down 99.9% of the time.
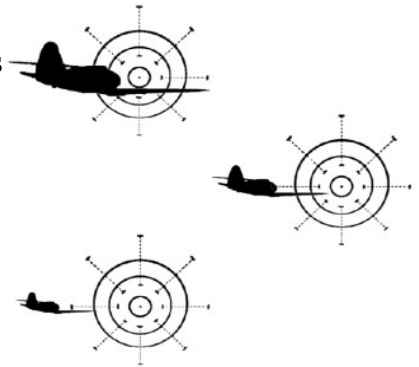
Illustration 2: Deflection

Listed below are Ballistics Table's for each Allied Aircraft Gun

.30 Caliber Ballistics Table

Rate of Fire: 19/s	.30cal AP	.30cal Tracer	.303cal AP	.303cal Tracer
Dimensions	7.62x63mm	7.62x63mm	7.7x56mm	7.7x56mm
Ammo Mass	10.5g	10.5g	10.6g	10.6g
Explosive Mass	0g	0g	0g	0g
Muzzle Velocity	711m/s	711m/s	723m/s	723m/s
100m Velocity	615m/s	615m/s	615m/s	615m/s
500m Velocity	337m/s	337m/s	321m/s	321m/s
100m Penetration	8mm	8mm	8mm	8mm
500m Penetration	3mm	3mm	3mm	3mm
Typical belting (.30cal): ap, ap, ap, ap, ap, tracer		Aircraft: Hawk 81		
Typical belting (.303cal): ap, ap, ap, ap, tracer		Aircraft: Spitfire, Hurricane, Havoc, Blen		

7.5mm Ballistics Chart

Rate of Fire: 16.6/s	AP	Tracer
Dimensions	7.5x54mm	7.5x54mm
Ammo Mass	9.2g	9.2g
Explosive Mass	0g	0g
Muzzle Velocity	727m/s	758m/s
100m Velocity	619m/s	649m/s
500m Velocity	322m/s	322m/s
100m Penetration	9mm	9mm
500m Penetration	3mm	3mm
Typical belting: ap, ap, ap, ap, tracer Aircraft: Hawk 75, Dewo		

.50 Ballistics Chart

Rate of Fire: 12.4/s	AP	Tracer
Dimensions	12.7x99mm	12.7x99mm
Ammo Mass	43.3g	43.3g
Explosive Mass	0g	0g
Muzzle Velocity	863m/s	863m/s
100m Velocity	841m/s	841m/s
500m Velocity	767m/s	767m/s
100m Penetration	15mm	15mm
500m Penetration	13mm	13mm
Typical belting: ap, ap, ap, ap, tracer Aircraft: Hawk 81/87, P38,P39		

20mm Hispano-Suiza 404 Cannon Ballistics Chart

| Rate of Fire: 12/s	AP	AP/Tracer	HE
Dimensions	20x110mm	20x110mm	20x110mm
Ammo Mass	130g	130g	130g
Explosive Mass	0g	0g	~6g
Muzzle Velocity	837m/s	855m/s	854m/s
100m Velocity	780m/s	798m/s	799m/s
500m Velocity	575m/s	594m/s	601m/s
100m Penetration	11mm	11mm	11mm
500m Penetration	7mm	7mm	7mm
Typical belting (D520, P38): HE, HE, HE, HE, AP/Tracer			
Typical belting (P39): AP, AP, AP, AP, AP/Tracer			

20mm Hispano-Suiza Mk II Cannon Ballistics Chart

Rate of Fire: 9.9/s	AP	AP/Tracer	HE
Dimensions	20x110mm	20x110mm	20x110mm
Ammo Mass	130g	130g	130g
Explosive Mass	0g	0g	~6g
Muzzle Velocity	834m/s	830m/s	860m/s
100m Velocity	777m/s	776m/s	804m/s
500m Velocity	575m/s	582m/s	606m/s
100m Penetration	10mm	10mm	10mm
500m Penetration	7mm	7mm	7mm
Typical Belting: HE, AP/Tracer, AP Aircraft: Spitfire			

1.2   Formations

If you have ever flown with a wing-man you have flown in some sort of formation. To make a formation effective you must maintain communication and visibility on your leader. This section will describe common formations used by fighters as well as show how it is to look visually.

Why would I want to be in a fighter formation? This is a question commonly asked but rarely answered to the fullest. Formations are used to unify a group of pilots whether in large or small numbers. If used effectively the overall mission of Air Superiority will be completed with less time spent and with less lives lost. It can also be used as a psychological tactic to that enemy who tends to fly alone, would you attack a visual formation of 4 by yourself? Most "loner" pilots tend to drift away from certain death like this unless they have a wing-man hidden from your sight. On top of the psychological role they play, formations can make quick work of enemy aircraft if working together rather quickly if provoked due to the shear firepower. Lets begin by discussing the most common formations as a refresher.


Echelon

Echelon – This formation is used mostly with smaller groups. The wing-man will form on either the left or right side of the leader slightly behind. If more than 2 aircraft are in formation it will continue with the 3rd pilot slightly behind the 2nd to form a "ladder". The key advantage is to the leader within this formation as his wing-man has a constant view on his 6 o' clock, the wing-man is not as lucky.
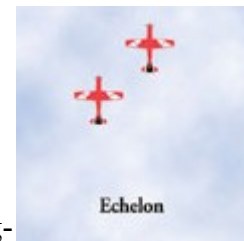
Line Astern

Line Astern - Less used than the "Line Abreast", this formation is a stack of follow the leader. Again, this formation only benefits the leading aircraft as there 6 o'clock can be covered easily.

Line Abreast

Line Abreast - Most common for advanced groups of pilots, this formation can allow full coverage of both leader and wing-man 6 o'clock. This formation is widely used for Search & Destroy Missions as well as BARCAP and can be altered through extending/closing wingtip distance to maximize effectiveness.
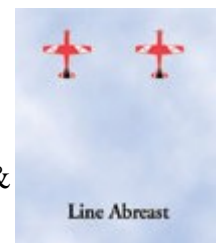

Vic

Vie ("V") - Used mostly in transit to and from the combat zone, numbers is the key in this formation. Most commonly fighters in this formation will be broken into two groups to maximize area coverage.

Common practice is by established Flight Leaders is to spread fighters and tighten bomber's. Fighters will need the additional visibility to complete successful CAP, BARCAP or Intercept Missions, whereas bombers require stealth and strength in numbers. These 4 formations are the basics and foundation of the next few as more concentration and skill are required to maintain them. If you are not part of a squad which practices formation flying, I would not recommend them.

Card 5

Card 5 – Resembling a "5" from a deck of cards, this formation can yield deadly results if correctly used. Recommended at higher altitudes for group BnZ, the two lead aircraft can dive on an unsuspecting enemy and engage while the remaining three fill a reserve status maintaining high
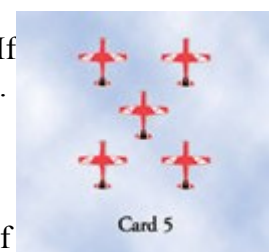
cover for other inbound fighters or even send a third pilot to assist.

Boomerang – Formed by two opposite Echelon's , this formation is used for Combat Air Patrol Missions over target. Flying in a set pattern to patrol for enemy aircraft inbound to target, this formation can severely cripple the enemy air presence in a small area. If at the minimum of four aircraft, two are able to break off to engage and allow the remaining flight continue on patrol.

Delta – Similar the Card 5 formations purpose, this formation can be used for BnZ in addition to Combat Air Patrol at high altitudes. Lead by three fighters in a line, coverage is no issue. Leading aircraft can break in sequence to allow the three rear aircraft to continue on the initial engagement, only to return to high cover or clear their wing-men.

Eagle – Used mostly for escort missions, the Eagle formation allows maximized visibility both left and right of the main flight. This is not a common formation for more than three to four bombers as only two fighters are present (typically). This formation is versatile as it can be altered to contain fighters alone as an enhanced "Diamond" adding two additional aircraft to extend visibility.
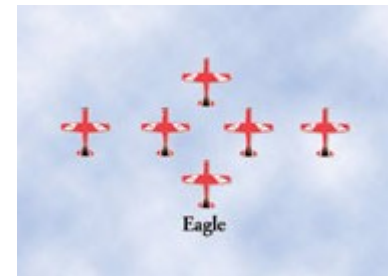
Vulcan – By extending the Vee formation forward by a single fighter you will attain the Vulcan. Made up of three Elements, this formation is easily broken down to engage with only the minimum force necessary to down an enemy while still maintaining cover force sufficient to cover for any incoming aircraft.
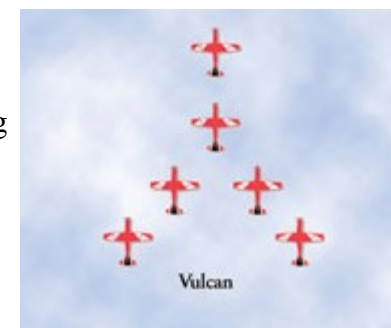
Leaders Benefit – Commonly referred to as "Leaders Benefit", this formation is used to contain enemy airfields within BARCAP Missions. A single fighter will lead the flight at high altitude and steeply dive to gain maximum airspeed until approximately 2km altitude is reached. Once at this altitude the fighter will level off and maintain a steady climb back to the formation while searching the nearby area for enemy aircraft on the deck. Once this fighter has reached the formation altitude, he will take over an outside position and the center pilot will move forward to lead position, readying for his dive.

There are many other formations out there designed for specific purposes and missions. These will benefit you and your wing-men to practice and perfect. Using a combination of Air Combat Maneuvers and Formations will yield deadly results for both you and your fellow pilots. The deadliest part of a pilot is his wingman.

1.3   *Escort*

Behind every ground assault is a good bomber pilot supporting from the air. Even the ground guys need help from time to time and thats when they look to the sky for the angels to rain hell and brimstone on the enemy, however the skies are hostile and even angels require protection...this is where you come in!

Bomber escort is broken down into 5 specifics (if numbers allow)

- ○ (Fighter) Sweep
- ○ Remote escort
- ○ Detached escort
- ○ Close escort
- ○ Reception escort

The Sweep is a free-ranging force of at least four fighters that precede the main force by some 5-10 minutes along its general course with the intent of breaking up and deflecting assembling enemy forces. This small force's only purpose is to eliminate or distract the threat to allow the following formation to pass safely.

The Remote Escort is similar to the fighter sweep in as much it cruises beyond visual range of the actual strike force, whereas the fighter sweep operates independently and over a wide area, the remote escort should match pace with the bombers and stay within easy reach of the strike force at no more than a few minutes worth of flight time away. Within normal operation the remote escort will be considered "Fighter Reserves" and maintain an altitude a minimum of 1km above the strike force and within a distance of short flight time (10-45 seconds). The primary purpose of this formation as mentioned is to serve as a reserve if the strike force is engaged by enemy fighters. In this scenerio the Detatched Escort group will be engaging and breaking from the main strike force as the Remote Escorts assume the main defence role becoming the new Detatched Escort.

The Detached Escort is the main escort package and bears the brunt of fighting, hence this group of fighters should be the numerically strongest. If fighter numbers are low, all available fighters should be assigned to this task. The Detached Escort operates just inside visual range to the bombers and above the strike forces altitude by a minimum of 1km.

Detatched Escort's Rules Of Engagement:

- Fixed positions of 4-8 Fighters at each location allows maximum coverage and visibilty. It also allows easy identification of enemy fighters.

- When engaging enemy fighters bombers are no longer priority for this group, role is assumed by Remote Escorts

- Stay at least 3000 ft (1 km) higher than the bombers.

- Formations are still used within the Fixed Positions to allow maximum ability to cover strike force.
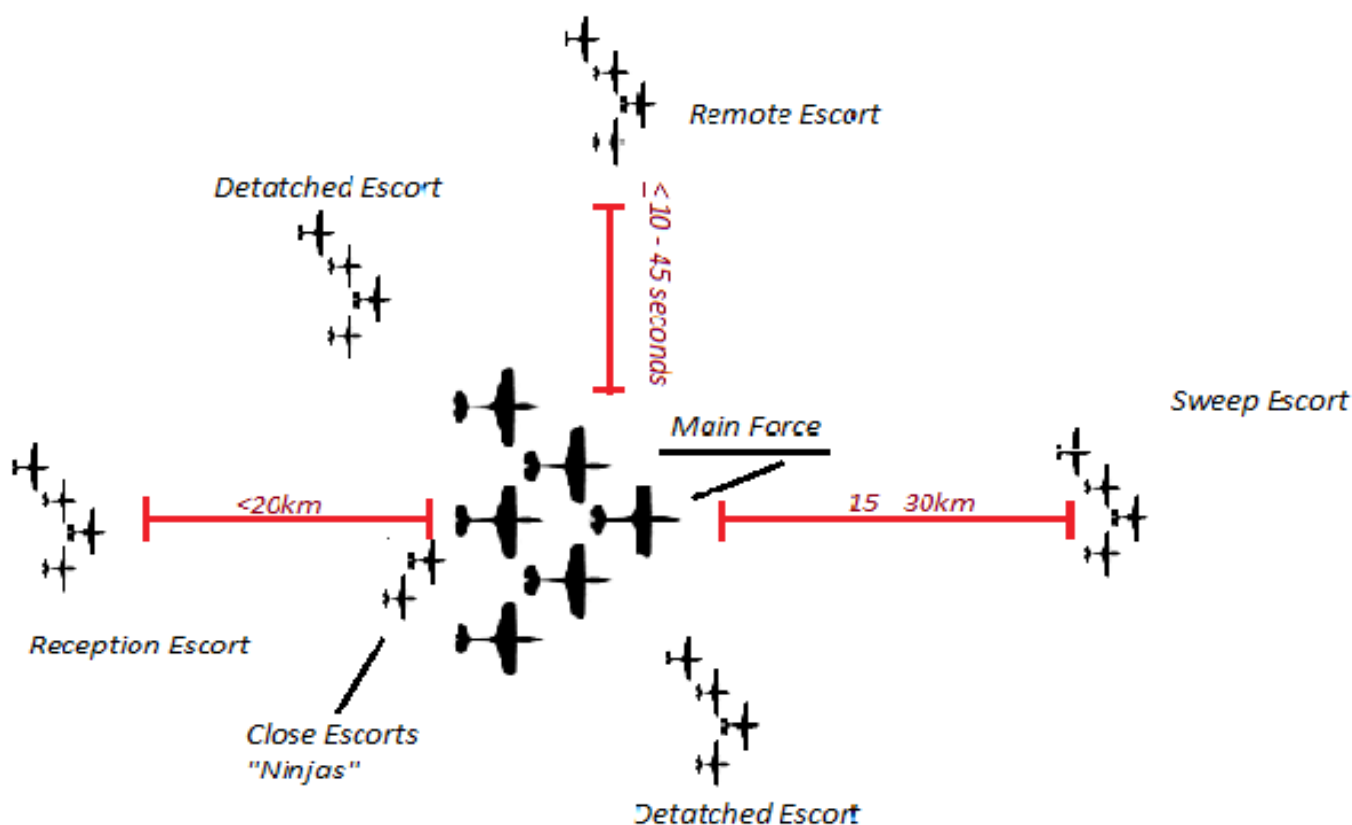
A Close Escort, flying herd on the bombers at no more than one full turn radius distance, is for all intents and purposes a complete waste. A maximum of 4 Fighters should ever be used for this escort in a single formation and only in a formation of 15+ Bombers. Such an escort cannot profitably engage any enemy except the most slow and pitiful by anything other than head-on attacks. These are sometimes known as "Ninja's" for there main goal of hiding within the large strike force and picking off fighters who become Target Fixated.

Reception escorts have a single purpose of protecting the stragglers. Damaged bombers will need escort as well to return safetly home. The Reception escort flight will follow the main strike force and remain within 20km behind the main strike force. All bombers that are damaged in the assault or strategic bombing raid will form on a new Flight Lead and will be escorted by this flight alone and Egress/RTB to the nearest friendly airfield.

"Its all fun and games until someone loses a bomber"

-Unknown

Below is a Diagram of how the escorts should be assembled according to the Main Strike Force.

Remote Escort

Detatched Escort

< 10 - 45 seconds

Sweep Escort

Main Force

<20km

15   30km

Reception Escort

Close Escorts
"Ninjas"

Detatched Escort

1.4   *Intercept*

RDP Raid Inbound!! ... Something we all have witnessed on chat or comms before. Those pesky Heinkels are at it again and releasing bombs over our factories damaging our war effort. Key importance in victory is Defence and with defence is born Bomber Intercept.

2 Stages of Bomber interception

The first task is to gain visual contact with the enemy called the "Interception Phase". Look for tell-tale signs of combat: tracer, AA bursts and plumes of smoke. Good search pattern is a line formation 1500m apart at +/- 1000m Altitude of each other. This stage is the most time consuming and tedious. Pay close attention to the Map Radar Air Warning System (AWS) for last known locations of the Enemy Flight if you pay close enough attention to this you can anticipate the course set by the strike force. Factory Flak normally is defaulted to 4km -4.5km to explode, though we have seen those rare occasions of being hit at 5km. This being the case the enemy will on average fly above 5km, so this gives a good starting spot for an altitude but not guaranteeing you will spot them at or above this altitude. Knowing the Heinkel He-111 flight ceiling is 21,980ft or 6700m we can now narrow this search window altitude to a small 2 km of airspace.

Second stage is the "attack" Stage. In any attack against bombers of whatever size or strength it is vital to deliver a series of high and fast attacks. The common term used for these attacks are "Boom-N-Zoom" or BnZ. It is a high angle high speed deadly attack that concentrates firepower into a single lethal location of the enemy aircraft; knowing the He-111 weak points, the Left Engine is the primary target for these attacks. As

mentioned in the Gunnery and Weapon Familiarization section of this handbook Convergence is key, set your convergence to a greater distance of around 300-400m to allow yourself ample strafing time on the bombers.

Most interceptors tend to park behind the bombers at matching speeds, and pay the penalty for their folly – especially against sizable bomber formations and in the face of active escorts. You will usually need several passes to down a bomber and it is therefore vital to keep your speed up so that you may recover high on the sides, parallel to the bombers and pointed in their general heading rather than opposite to it, following each attack. The lateral distance should be approximately two turn radii to allow time enough to turn in and stabilize on your attack run.

It is unwise to try and attack a bomber force if an escort force is in attendance and positioned with a considerable energy advantage. You must first deny the escorts the opportunity to influence your attack, and this can only be accomplished by first climbing to superior altitude. It is good to include a few fellow pilots with the intent of engaging escort fighters. Fighter Formations are key even within the intercept purpose; once the flight is sighted allow your fellow wingmen to join you before beginning your attack runs, and allow more experienced fighter pilots to distract the escorts prior to beginning your endless rain on the bombers.

"Gentlemen, remember...Always above, seldom on the same level, never underneath."
-Unknown

1.5   *Flights and Flight Management*

The Fighter Sweep is a free-ranging foray deep into enemy territory with the objective of finding, deflecting and preferably destroying enemy air assets before they can make themselves useful in the frontline or against friendly bombers on strategic missions. Fighter sweeps are per definition conducted by fighters in formation whereas a lone fighter on the same kind of mission would rather be said to conduct a Reconnaissance or a single Patrol. The fighter sweep should ideally fight a mobile combat, i.e. avoid bogging down in lengthy and largely static free-for-all "furballs" but employ drag-and-bag tactics instead, and strive to keep moving along a predetermined track or in a designated sector. This is far from the norm however, as most fighter sweeps you will see or partake in are likely to dissolve in general fighting over a ground battle objective or enemy airfield.

Combat Air Patrol (CAP) is similar in nature to the Fighter Sweep though usually more tightly centered on a ground battle objective. Positioned low and close to the objective, the CAP fighter is not only purely defensive but entirely predictable as well. Enemy air approaching at virtually any altitude is guaranteed a free first strike and may even disengage before the CAP fighter becomes aware of their presence. If enemy air is not a factor, the CAP fighter is sorely tempted to act in the CAS capacity: leaving the field fully open for later arriving enemy air; causing him to suffer loss of position, energy and SA, aside from the very real risk of getting nailed by AA fire.

BARCAP is an extension of the CAP as discussed above, projected further away from the ground battle and closer to the enemy origin (their airfields and/or rendez-vous points). Thus the BARCAP force interdicts the enemy flow well before the opponents have a chance of making themselves felt in the frontline.

The benefits of a coordinated BARCAP effort are numerous:

- The enemy is pinned to an entirely unproductive fight at an entirely inconsequential location
- The BARCAP force chooses when and where to fight
- The BARCAP fighters engages with advantages of position, energy and surprise
- The enemy must divert considerable forces to combat the BARCAP and must thus suffer diminishing returns in his other missions

The Armed recon mission has a general "search and destroy" objective in and just beyond the ground frontline and is best flown in the low altitude band from the deck up to 3000 ft (1 km) – sufficiently low to spot ground targets and sufficiently high to escape small caliber AA. Generally this mission designation is only for Fighter-Bomber type aircraft.

Flight Management is key to maintain a successful sortie. Flight Lead's at times make there own checklists to remember key items during flight checks. Here are a few key things you must make sure you monitor as flight lead:

- Fuel Quantity
- Engine Temperature
- Ammunition Quantity
- Current Status (Damage, problems etc.)
- Active Sightings of Enemy Aircraft

These items are self explanitory in themselves so it isnt necessary to go over them individually, but they are all required for your flight to be considered Mission Capable. During your management process of the flight you must maintain active Comms, consistant communication is key. Call all heading changes and formation changes, a well informed flight is a deadly flight. Ensure your flight members know to NOTIFY ALL CONTACTS IN RELATION TO THE FLIGHT AND ITS HEADING;   "BF109 2o'clock of formation, 1500m above flights altitude". This will eliminate scrambled comms and the consistant "where's and what alt's".

" Only air power can defeat air power. The actual elimination or even stalemating of an   attacking air force can be achieved only by a superior air force."

-Major Alexander P. de Seversky, USAAF

1.6   *Air Combat Maneuvers*

Air Combat Maneuvers (ACM) is key to being able to survive in any dogfight. Know that it is exceptionally easy to defend against any type of attack – though it presupposes that you can SEE the developing attack and have enough energy to manouevre against it. Lose sight, lose the fight!

Key to understanding guns defence is knowledge and awareness of the attacker's manouevre and guns "envelopes", i.e. what actions the enemy is capable of given his speed, guns and approach. These envelopes are narrow enough, as you may have experienced already by trying to gun someone down.

Energy or "E" is key to survival in any dogfight. You create energy by cranking up the engine and by stashing its output in a combination of speed and altitude. This is a simplistic approach though, for you must also compare your energy with that of the enemy's. In simple terms, a fighter which travels 10 ft off the ground

at maximum speed has less energy than a similar fighter that travels 1,000 ft off the ground at maximum speed – because the high fighter can convert his altitude to an overhead of speed beyond that what the low fighter can produce.

In other words, you can improve your Energy situation considerably by using Time (spent on climbing) in converting your present energy to potential energy. This potential energy can be spent at a later time, by diving. By stashing up on altitude even the slowest aircraft can dominate the fastest aircraft, at least for a while – until the energy difference is leveled.

ACM Maneuver Examples

- Immelman – This maneuver is the simplest of all ACM's. Simply pull back on the stick until your canapy is seeing the ground now perform a simple roll maneuvre until level with the horizon.

Illustration 3: Immelman

- Split-S – The Split S is simply the Immelman in reverse. Roll your aircraft inverted and pull back on the stick until you are level with the earth again.

- Cuban-8 – As seen with the immelman you can see that it is mearly a modified immelman and split s combination creating the image of an eight.

- Hammerhead – The hammerhead is the least useful of all ACM's as usual the more experienced pilots will eat you alive if attempting this maneuver. Pull back on the stick while level until the nose of your aircraft is fully vertical and climb until your aircraft begins to stall, at the *Illustration 4: Cuban-8* tip of the stall hit hard left or right rudder to slide nose over wingtip and decend regaining speed.
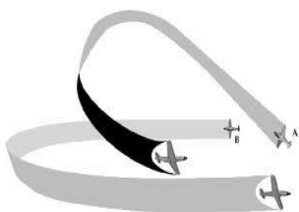
- High Yo-Yo – Used when the pursuer has higher speed and less turning ability. Once the enemy goes into a turn, to avoid an over-shoot and give yourself an opportunity to be shot out of the sky, pull nose up slightly until you are climbing above them and turn with them above them decending back onto their six once they level.

Illustration 5: High Yo-Yo

- Low Yo-Yo – Opposite of the High Yo-Yo as in to decend instead of climb. Best if pursuit aircraft has lower speed but more maneuverability.

- Flat Scissors – Known for the limited turning used, the flat scissor is a consistant battle of climb and decent by the 2 pilots. As the chased aircraft decends the the pursuit aircraft must follow, once this is seen the defender will then climb slightly and again decend creating a horizontal ripple look as they attempt to shake the other.

- Rolling Scissors – The most common ACM known to pilots, Rolling Scissors is the roll edition of the Flat
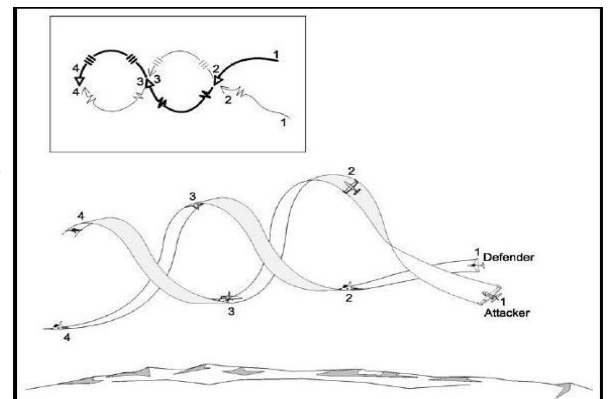
Illustration 6: Rolling Scissors

Scissors. Same concept however in this instance the aircraft are rolling top to top of one another as they attempt to gain advantage.
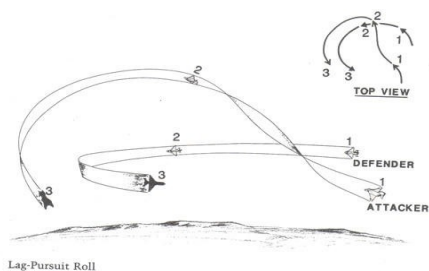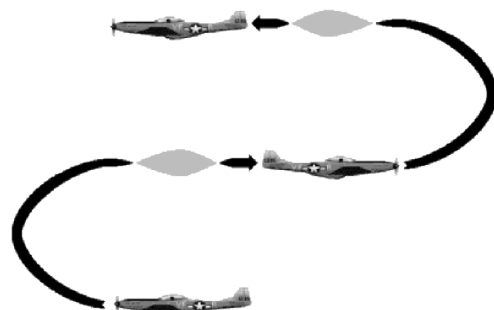

Illustration 7: Lag Roll

Illustration 8: Rope-A-Dope

- Lag Roll – Seen as a modified High Yo-Yo, the Lag Roll is very effective against all aircraft whether superior or inferior turing capabilities but only if you have superior speed. As you attack from your enemies six climb to approximately 200-400m above them rolling on your top to maintain visibility, however the engine cannot take this for long. Once you see their intent to turn or continue straight you can now roll back level as you decend to firing position againl.

- Rope-A-Dope – 2 combined Immelmans will create this combat maneuver. Some fighter pilots use this method to gain altitude fast by extending the middle portion.

- Defensive Spiral – Not all times will you win a high altitude turn fight and if you do this will become your best friend. With enemy on your six put your aircraft into a slight turning spiral downward, some enemy fighters will overspeed and lock up eliminating any change in direction without extreme effort to do so allowing you to excape or turn and engage.
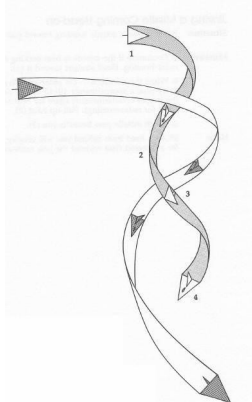
Illustration 10: Defensive Spiral

- Thatch Weave – This maneuver requires the assistance of a wingman at co-altitiude and speed, usually used when flying in the Line Abreast formation. As the enemy closes on your six begin by going into a slow Flat Scissors with your wingman, on the beginning of each turn this puts your wingman with a firing solution on the enemy aircrafts top side allowing for easy kill.
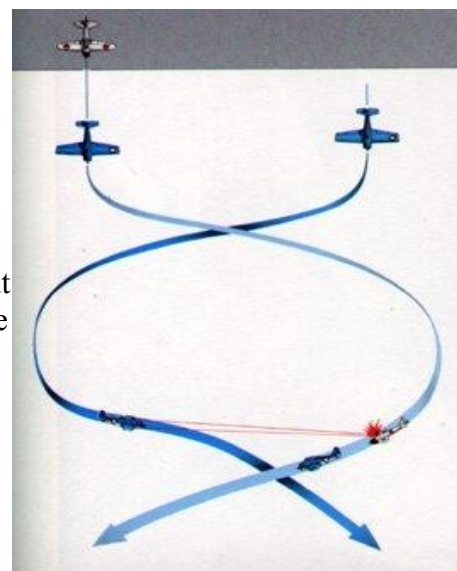
Illustration 9: Thatch Weave

"Aerial Gunnery is 90% instinct and 10% Aim"
  – Captain Frederick C. Libby, RFC
  –

1.7   Enemy Identification and Familiarization

This Section is strictly to assist in quick identification and famililiarization with the opposition.
FIGHTERS

BF109 E-1

Armament	Top Speed
4 x 7.92mm MG-17 Machine Guns	565 Km/H

*Identified by: Yellow Nose/ Green Camo

BF109 E-4

Armament	Top Speed
2 x 7.92mm MG-17 Machine Guns 2 x 20mm Cannon	576 Km/H

*Identified by:Yellow Nose/Wingtips Green Camo

BF109 F-2

Armament	Top Speed
2 x 7.92mm MG-17 Machine Guns 1 x 15mm MG151 Cannon	601 Km/H

Identified by: Red lower Eng panel, Gray Camo, No black on nose cone

BF109 F-4

Armament	Top Speed
2 x 7.92mm MG-17 Machine Guns 1 x 20mm MG-151/20 Cannon	635 Km/H

* Identified by: Grey Camo, White/Black Nose cone

BF109 G-6/U4

Armament	Top Speed
1 x 30mm MK 108 Cannon 2 x 13mm MG-131 Machine Gun	630 Km/H

*Identified by: Yellow Rudder, Spiral White/Black Nose cone

FW190 A-4

Armament	Top Speed
4 x 20mm Cannons 2 x 7.9mm Machine Guns	671 Km/H

*Identified by: Nose cone, Engine sound

BF110 C-4

Armament	Top Speed
2 x 20mm MG-FF Cannon 4 x 7.92mm MG-17 Machine Gun 1 x 7.92mm MG-15 Machine Gun (Tailgunner)	518 Km/H

*Identified by: Green Camo, Red prop hubs

Fighter-Bombers

BF110 F-B

Armament	Top Speed
2 x 20mm MG151/20 Cannons 4 x 7.92mm MG17 Machine Guns 1 x 7.92mm MG15 Machine Guns (TailGunner) 2 x 250Kg Bombs	560 Km/H

*Identified by: Gray Camo, Green Prop hubs

JU87 Stuka

Armament	Top Speed
2 x 7.92mm Machine Guns 1 x 7.92mm Machine Gun (TailGunner) 4 x 50kg Bombs 1 x 250kg Bomb	387 Km/H

*Identified by: Wing angles, gear doesnt retract

BOMBERS

He111 H-2

Armament	Top Speed
5 x 7.92mm Machine Guns 8 x 250Kg Bombs	418 Km/H

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Section 2

Bomber Strategy and Doctrine
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2.1   Close Air Support

To be effective, CAS requires CAP for protection. The point of the ground attack mission is that its target (its exact location and nature) is known beforehand and can be scientifically engaged with a high degree of success because little further reconnaissance is necessary prior to delivering the attack.

If AA is a factor, either go for very low or very steep attack angles – attacking in straight lines at 30-45 degrees off the horizontal is a recipe for disaster when looking down the barrels of active defences. The ground attack mission is best executed in strength of at least four fighter-bombers or attack bombers. Strafe in pairs or more from different directions to split the defensive attention. Be certain to be trimmed correctly so as to deliver concentrated bursts. Dive bombing is launched at 90 to 60 degrees off the horizontal, glide bombing describes an attack at any angle below 60 degrees.

Glide bombing is eminently simple. Pass the target to the side and wing into a dive at a 30-60 degree angle. Cut throttle if the attack starts above 2 km/6,000 ft lest you enter compressibility and lose elevator control for your recovery. Aim slightly high of the target, pickle bombs at none too low altitude (500 m/1500 ft is good but the absolute minimum is very much lower) and begone without staying to watch the fireworks.

Another form of CAS is mixed with the Strategic Bombing doctrine using the same techniques used in High Altitude Bombing. It has been labeled "Air Quake"-ing and shows promise if used correctly at the correct time. Forming alone or by ones self with the correct sight settings, a DB7 Aircraft can actually fly Low Altitude Level Bombing over an Army Base and release hell on earth killing everything within the blast radius and shaking the ground throwing off the sights of anyone not killed in the drop. The specific sight settings are considered Classified by Pilots of 617th Dambusters who are known for there 4 Ship formation using this technique.

2.2   Strategic Bombing

The immediate benefit of the massed bomber raid is that only the lead bombardier needs to have prior experience in lining up a target correctly.

In the case of your mission fielding more than eight bombers, it is highly recommended to attack in

waves at intervals of 30-60 seconds, as victims of the first wave will then be comfortably located close to the spawnpoints and ready for a second helping of "teh pwn". Alternatively you may want to salvo half of your load on the first pass and chuck the rest after reversing and setting up anew – this is of course depending on the situation both on the ground and in the air.

A bomber force increases its survivability by cruising at higher than normal altitudes, for obvious reasons. While it takes time to climb up to 20-25,000 ft (7-8 km), a good turn of speed at high altitude is the bombers' best insurance against effective interception. Fighters perform worse at high altitude and must spend far more time in setting up their attacks, particularly repeated attacks, than if the bombers are encountered at a more leisurely altitude of 12-15,000 ft (4-5 km). At high altitude fighters can therefore be combated more effectively with additional counter-measures such as defensive turns and defensive armament.

Keep enemy interceptors guessing by flying a zig-zagging course. AWS will show your general location, offset by a small delay, so this tactic will only reap marginal benefits. A good form of stealth is to "hide" the bomber force in already active AWS sectors (preferably where friendly air superiority is in effect) and to split the bomber force into several smaller groups that "blank out" a wide swathe of the AWS network by flying parallel headings.

Greater numbers in the strike force quite naturally yields greater destructive power and more effective use of defensive armament. Four to eight bombers flying in close formation causes the interceptor to attack with far greater prudence and such a formation is more likely to fend off attacks that would otherwise be lethal. Although numbers are intimidating, the drawback is that they do also tend to draw a heavier response.

The bomber's defensive armament is a weak deterrent against a determined attacker, but a tight formation of 8+ bombers can produce sufficient volume of fire to defeat sloppy and slow attacks. The most important aspect is to hold your fire until the bandit is inside 350 meters range.

FACTORY ALTITUDES

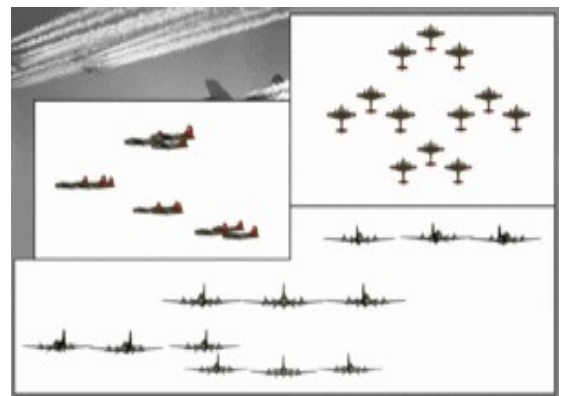Essen   85m / 279ft
Dusseldorf   38m / 125ft
Koln   49m / 161ft
Frankfurt   115m / 377ft

2.3   Formations

Formations are useful for every mission type if used properly and with the intent of there design.

Illustration 11: Combat Box

Combat Box - a tactical formation used by strategic bombers to maintain a defensive posture warding off any enemy air. Also refered to as "Staggered

Formation". Combat Box used 4 elements of   bombers staggering altitudes but remaining tight   enough together to maximize gunnery firepower.

Echelon (left or right) - This formation is used mostly with smaller groups. The wing-man
       will form on either the left or right side of the leader slightly behind.
       If more than 2 aircraft are in formation it will continue with the 3rd pilot
       slightly behind the 2nd to form a "ladder". The key advantage is to the leader
       within this formation as his wing-man has a constant view on his 6 o' clock,
       the wing-man is not as lucky.

Illustration 12: Echelon (Left)

Illustration 13: Vie

Vie ("V") - Used mostly in transit to and from the combat zone, numbers is the key in
      this formation. Most commonly fighters in this formation will be broken into
      two groups to maximize area coverage.

Column – General "Follow the leader" Formation, one aircraft is directly at his leaders 6 o'clock position.

Staggered column- The best formation that even most beginners can be expected to maintain is the double
      column – two groups in line astern flying a parallel course.

2.4   Flight Management

Flight Management is key to maintain a successful sortie. Flight Lead's at times make there own checklists to remember key items during flight checks. Here are a few key things you must make sure you monitor as flight lead:

- Fuel Quantity
- Engine Temperature
- Ammunition Quantity
- Current Status (Damage, problems etc.)
- Active Sightings of Enemy Aircraft (A BLIND PILOT IS A DEAD PILOT)

These items are self explanitory in themselves so it isnt necessary to go over them individually, but they are all required for your flight to be considered Mission Capable. During your management process of the flight you must maintain active Comms, consistant communication is key. Call all heading changes and formation changes, a well informed flight is a deadly flight. Ensure your flight members know to NOTIFY ALL CONTACTS IN RELATION TO THE FLIGHT AND ITS HEADING;   "BF109 2o'clock of formation, 1500m above flights altitude, heading W" -or- "BF109 2o'clock of formation, 5km altitude, heading W". This will eliminate scrambled comms and the consistant "where's and what alt's".

For bombers special care must be taken for stealthy raids that involve proper flight management. With current AWS (Air Warning System) Settings, a single aircraft will set off the system in a sector within 5 minutes or another words initial detection of an aircaft once above taxi speeds is > 300 seconds. Once more than approximately 15-20 friendly aircraft are in a single sector the AWS will turn to "Heavy" and this will ruin a bomber raids day. To eliminate this possiblity, leaders may divide into two or even three flights depending on fighter support for escort making a general rule of 10 Bombers to a flight. Bomber Flight Commanders will ONLY Manage bomber pilots in their flights alone and will not manage fighter escorts and the Bomber Group Commander will manage through the Flight Commanders of pertinate problems or concerns.

BOMBER GROUP COMMANDER FLIGHT MANAGEMENT LIST
- Flights Status (Overall good/bad)
- Waypoints / R.O.E / Target Changes

BOMBER FLIGHT COMMANDER FLIGHT MANAGEMENT LIST
- Fuel Quantitys
- Engine Temperatures
- Ammunition Quantitys
- Current Status (Damages, problems etc.)
- Active Sightings of Enemy Aircraft (A BLIND PILOT IS A DEAD PILOT)
- Report any issues immediately to Group Commander

2.5   Ordnance Familiarization

Aircraft	Qty	Size(kg)	Size(lb)	Qty	Size(kg)	Size(lb)
Douglas DB-7	8	117*	257			
Douglas Havoc MkI	8	113	250			
Bristol Blenheim MkIV	2	227	500	8	18	40
Hawker Hurricane MkIIC	2	227	500			
Bell Model 14a/P-39D-1	1	225*	495			
Bristol Blenheim Mk.IF	8	18	40			

Section 3
High Command Strategy

**Most of the information is taken directly from Air OIC Handbook V1 Nov 2009

3.1   Supply Management

.du And Supply Checking

   .du shows resupply tickets - ***2 hour: 1*spitVb*** means that one spitVb will be back in the spawnlist, ready to be used, in two hours

   .du can be used in conjunction with the Unit codes, eg .du gives the information for the Bde you are currently in; ***.du gb18*** gives the information for Groupe de Bombardement d'Assault 18

   .du allows you to check supply without having to join the brigade, create a mission and see the spawnlist

.ne, Fallback And Routing

   .ne shows the movement timer and Fallback destination of a Unit

   .ne can be used in conjunction with the Unitcodes (see below), eg ***.ne*** gives the information for the Bde you are currently in; ***.ne 52w*** gives the information for 52 Squadron

      The **movement timer** will be either '***Ready***' (the unit can be moved now) or will give the time in minutes until possible movement

      The **Fallback destination** will give either an Allied AF (the previous deployment of the unit) or ***'None'***. If the Fallback is None, the unit will be routed to Training for 12 hours if the current AF bunker is captured. Therefore P1 when **any** Allied AF goes frontline (ie links to an Axis town) is to verify the Fallback destinations of all of the other Air Units. The best way to secure Units that do not have valid Fallback destinations is to rotate the Units to a safe AF.

Example:

Axis are attacking Schilde. If Axis capture Schilde, Antwerp becomes frontline and so Air Units cannot move into Antwerp. At this point the Air OiC must check the Fallback locations of all Air Units; any Units that were last deployed to Antwerp will show a Fallback destination of 'None'. These Units should be rotated to ensure they have a valid Fallback destination, especially those close to the frontline where the danger of imminent bouncing is highest.

      HQ flags (both fighter and bomber HQs) have no bomber supply but do have good fighter supply and therefore can be used as functional Fighter Bdes, meaning each country has a total of FOUR Fighter Units and FOUR Bomber Units. While it is recognised that HQs are treated as Fighter Units, because mission creation is less obvious from HQs, Fighter Brigades are used in preference to Hqs.

RAF UNIT	RAF Code	FAF UNIT	FAF CODE
60 Fighter Wing	60fw	Groupment de Chasse 21	gc21
60 Fighter Squadron	60w	Groupe de Chasse I/1	gci1
61 Fighter Squadron	61w	Groupe de Chasse III/3	gciii3
70 Bomber Wing	70bw	Groupe de Bombardement 6	gb6
52 Bomber Squadron	52w	Groupe de Bombardement I/12	gbi12
70 Bomber Squadron	70w	Groupe de Bombardement d'Assault 18	gb18
75 CAS Bomber Squadron	75w	Groupe de Bombardement d'Assault 19	gb19
76 CAS Bomber Squadron	76w	Groupe de Bombardement III/12	gbiii3

3.2   Air OIC

There are few absolute rules for Air OiC; this handbook should be seen as a guide.

Movement Rules
- Air units cannot be moved to a frontline AF (ie a town that directly links to an Axis town)
- Air units are bounced to their Fallback destination if the AF Bunker is capped by the enemy
- Air units will rout to training for 12 hours if the AF Bunker is capped and the unit does not have a valid
- Fallback destination (not valid = Axis AF or frontline AF)
- Air units within a pocket will Fallback as standard if AF Bunker is capped

- Work with the Map OiC at all times; Map P1 should be Air P1
- Be sure to rotate depleted Units out once new Units are moved in, allowing the fresh supply at least 10 minutes to trickle through. Also remember an HQ brought in will take on its daughter Unit missions.

Communication
Channel 55 Allied Air Channel
Channel 30 Allied Naval Channel (consider tuning for shipping patrols)

When moving Units, communication to the pilots affected is vital; announce on Ops and 55 before moving. It is good practice to enter the active missions within that brigade and announce the move on Mission chat. A typical message would be:
"RAF 70SQ leaving Brussels. Fresh 52SQ is in"

The Air OiC role is not just about supply management, but also to arrange and promote grouped activity; lead fighter sweeps and bomber raids to P1. It is good practice to have a Fighter or Bomber Bde deployed in the UK and at Amiens/Abbeville to intercept Axis factory runs. It also is good practice to have a FAF Bomber UBde at Lille/Seclin for our own bombing raids. Stacking an AF with many units is not good practice - it leaves that our air forces vulnerable to vulching fighters and AF campers.

Bomber Bdes are typically deployed at the front for quick turn-around CAS raids. Fighters need distance to gain altitude to combat the Axis BnZ aircraft and so are better placed slightly withdrawn. This reduces the likelihood of enemy vulching crews bouncing our fighters as they seek to gain altitude. Best practice is to **not** automatically rotate Units out when the top tier fighters are depleted; consider other supply and other TZ. Consider that the key aircraft in a Bomber Bde are the bombers and the fighter-bombers. The fighters in the spawnlist are not the primary aircraft and so the Unit does not necessarily need to be moved out if the fighter supply drops. Also consider supporting a Bomber Bde at the front with a Fighter Bde slightly back.

Air OiC should not hoard supply but should also not make all supply freely available. Air OiC needs to manage the supply intelligently, while also providing pilots with aircraft.

Air OiC job varies and is entirely dependent on the state of the map. Short fronts (small areas, fewer AFs) are usually easier to manage than large fronts (but it is possible to go through a lot more supply a lot faster if we have a lot of pilots in the air with targets being close to a few of our AFs). Air OiC must understand the level of activity in both RAF and FAF and must use their judgement as necessary.

3.3   Weekly Reports

(Please check with your HC to find out what applies to you as this changes)

SECTION 4: GLOSSARY / NOTES

(This section has been instated into this manual to allow pilots to make notes and place terms that they as an individual need to remember. Please feel free to print this manual to allow highlighting and notetaking.)