War in the Clouds

World War Two in the air of Western Europe
Introduction

• A second Thirty Years War (1918-1945)
  – The third (and bloodiest part) (1939-1945)
  – This part consisted of five wars

• One of these was the European Theater of Operations (ETO)
  – The ETO can be broken up into two campaigns, one of which was the loss and subsequent reconquest of western Europe with the final defeat of Germany.

• That is the air war we’re going to study.
Overview

• We will break the study up into six sections
  – Pre-War aviation development
  – The Battle of France (Spring- 1940)
  – The Battle of Britain (June to October 1940)
  – The Blitz (Oct 1940 to May 1941 and then off and on to March 1945)
  – The reconquest of western Europe (1941-1945)
  – The strategic bombing campaign against Germany (1939-1945)

• There will be a lot of statistics in order to make some key points.
  – (Focus on the key points, not the statistics)

“War causes death, destruction, and suffering, but above all it generates statistics.” Jean Lopez
Aviation in the 20’s & 30’s

• Coming out of World War 1 (Slow Biplanes)

• The most important technical developments between the wars:
  – Increased engine power
  – Improved aviation gasoline
  – Superchargers
  – Variable pitch propeller systems
  – Lo-drag, cantilever monoplanes

• Fighters: Speed vs. Maneuverability ??
From this (180 mph)

To this (310 mph)

The 1930’s
Increasing Firepower

• Increased speed meant “gun on target time” became smaller and smaller
• Result: increasing demand for firepower
• Two ways to do this
  – More small guns (.30 to .50 cal. machine guns) (US & Britain)
  – Fewer big guns (20-37mm cannon) (everyone else)
  – In the late 1930’s neither is right or wrong but…..
  – By the end of WW2, everyone but the US was using cannon.
Air Doctrine

• Between the wars, four areas of air doctrine developed
  1. Coordination between air forces and ships
  2. Coordination between air forces and land armies
  3. Independent strategic operations (strategic bombing)
  4. Air defense

• Different nations went in different directions, but in each the air commanders pushed towards an independent air force.
Air Doctrine (2)

- **Italy, France & Britain**: Strategic Bombing and Air Defense
- **Soviet Union**: Air/Army coordination and Air Defense
- **Germany**: Air/Army coordination and Air Defense
- **Japan**: Air/Army Coordination and Air/Ship Coordination.
- **United States**: Officially Air/Ship and Air/Land coordination combined with Air Defense, but unofficially there was also a major emphasis on Strategic Bombing.
So, what did these “True Believer” believe?
• Therefore, the True Believers accepted as axiomatic that:
  1. The bomber will always get through and
  2. The only defense against strategic bombing was counter-strategic bombing.

• Bottom line: A strategic air campaign properly executed could win the war without the need for an army or navy!

• One exception: in the US, a “Bomber Mafia” developed
  – ACTS (1926-1929)
  – They replaced Douhet’s terror bombing with precision bombing.

• These axioms, corollaries, and conclusions were accepted without any recourse to rigorous analysis or operation testing.
  – This is although in late WW1, the Germans suffered 35% losses trying to bomb France and England and the British lost 70%(!) trying to bomb Germany
Douhet’s Axiom
“The Extreme Consequences”

• “To conquer command of the air means victory: to be beaten in the air means defeat and acceptance of whatever terms the enemy may be pleased to impose.”

• Corollaries
  1. “In order to assume an adequate national defense, it is necessary – and sufficient – to be in a position in case of war to conquer the command of the air” (and)
  2. “All that a nation does to assure her own defense should have as its aim procuring for herself those means which, in case of war, are most effective for the conquest of the command of the air.”
Everyone agreed that aviation was important. However, there was significant disagreement on why:

- Was it a war winning strategy? (The True Believers) Or
- Was it a support strategy for the army and navy?

Note: The moral question was not really considered by the military.

- Gen. Mitchell: “Dropping a few gas bombs on civilians is much preferable to blowing thousands of soldiers to bits with cannons or butchering them with bayonets.”
- Going into WW2, national governments all agreed that bombing civilians was wrong (except for Japan).
Germany going into WW2

- Germany was late to get into this game because the Versailles Treaty effectively banned her from developing military aircraft.
- Luftwaffe declared in January 1935 (end of Versailles Treaty)
- Shortly thereafter Luftwaffe doctrine was formally promulgated
  - Luftwaffe-Dienstvorschrift 16 (L. Dv. 16)
  - Operational priorities:
    1. Destruction of enemy air power
    2. Support the army
    3. Strategic bombing (only if necessary)
  - These priorities support the Nazi doctrine of a short war with attrition only if it absolutely cannot be avoided.
Germany going into WW2 (2)

- L. Dv. 16 called for materiel and training emphasis in five areas:
  - Speed
  - Operational mobility
  - Tactical versatility (Development Suitability)
  - Logistical sufficiency
  - Bombing accuracy

- Note that none of these would lead them in the direction of large multi-engine strategic bombers.

- They would however lead directly to a force designed to fight and win a short war by destroying the enemy’s army. (consistent with Nazi philosophy)

- Germany did use terror bombing of civilians, but with an interesting twist (Guenica, Madrid, Warsaw, & Rotterdam)
Result of all this

• Most countries had independent air forces with some sort of air superiority doctrine.
  – However, air power historians now agree that these inter-war doctrines depended primarily on the hopes and beliefs of “true believers” and not on rigorous analysis.

• The British split the difference between strategic offense and defense by creating “commands”

• The German air force was seen as an adjunct to the army.
  – Air armies assigned to army groups
  – Indigenous AA units
  – Goring did plan on 800 heavy bombers and 2400 medium by 1942 but Hitler did not support this plan (long view vs. short war)
Result of all this (In the US)

• The USAAC (later to be the USAAF) had three official strategic priorities (in order):
  1. Air supremacy in the theater
  2. Interdiction of the flow of enemy supplies and reinforcements in a zone five to fifty miles behind the front.
  3. Close air support

• The “Bomber Mafia” **Motto: We make progress unhindered by custom.**

“It was recognized that fighter escort was inherently desirable, but no one could quite conceive how a small fighter could have the range of the bomber yet retain its combat maneuverability. Failure to see this issue through proved one of the Air Corps Tactical School's major shortcomings.”
Loss Statistics

• Both sides routinely overestimated kills (often by 2x or 3x)
• Why?
  – The nature of high-speed air-to-air combat
  – Enthusiasm and inexperience
  – Characteristics of individual planes (Me-109, P-47)
  – The “Bomber Stream” effect
• This factor was important because it often drove operational decision making.
• We will use “coming home” numbers.
Two Important Definitions

• Air Superiority
  – Situation where one side has the ability to use air forces at a location and time of its choosing to achieve local operational objectives.

• Air Supremacy
  – Situation where one side has complete control of the air such that it can achieve its operational objectives while denying that ability to the enemy.
The Battle of France
(“Thank God for the French Army”)

Thank God for the French Army
The Battle of France

- The French generals and their British counterparts prepared to fight and win the last war.
- The German General Staff did the same thing but ultimately Hitler chose Manstein’s radical new plan.
  - Original plan compromised
  - Ardennes Forest
- The German plan worked to perfection as the Allies did everything exactly as Manstein predicted.
- Result: Allied retreat at Dunkirk (16 days) and France’s complete defeat (46 days).
The Battle of France: The Air War

• The French Air Force put all it’s faith in the heavy bomber but then failed to develop one.

• Doctrine called for fighters to help defend against incoming strategic bombers.

• There was no provisions for either offensive or defensive ground support.

• The French air force had only 75 truly modern effective fighters (Dewoitine D.520)

• However, it did have 3000 aircraft. But,
  – only 1540 aircraft in northern France (700 fighters, 440 bombers, & 400 recon aircraft) of which 70% were combat-ready.
  – It had about 500 in the south and another 1000 were in N. Africa.

• The RAF had 2000 aircraft but only 250 in France
French Bombers

Amiot 143
Farman F222
LeO 451
Bloch MB 210
French Fighters

Dewoitine D.520

Curtis C75 (US P-36)

Morane-Saulni MS 406

Potez 63.11
Bloch 174

Arguably the best recon plane in the world going into WWII and a clear forerunner of the famous British de Havilland DH.98 Mosquito
Summary of French Air Force

• Their best planes were the equal of the German best but few in number.
• Many models however were just about obsolete.
• Training was excellent. However, there was no doctrinal support for ground forces.
• Aircraft and engine manufacturing was slow and inefficient.
• There were major problems with spare parts availability.
German aircraft

• We will hold off on discussing German aircraft until the Battle of Britain except for
  – The Junkers 87 (Stuka)
  – Arguably the most important aircraft of the Battle of France
British Aircraft

• We will hold off discussing British aircraft until the Battle of Britain with the except for:
  – The Fairey Battle
  – Arguably the worse aircraft of the Battle of France

13/32, 7/8, 6/9, 4/5, and 35/40
The Battle of France: The Air War (2)

• But France only committed about 500 to the original battle, keeping some 1000 “in reserve”.
  – They would add about 2900 by the end of the war.
• By war’s end the RAF committed 1072 planes of which 680 were modern fighters (Hawker Hurricanes)
• The Germans committed 1800 aircraft to A/G B and about 1600 each to A/Gs A & C. (total – 5000, 1100 modern fighters, Me 109s & 110s)
• So each side had about 5000 aircraft but…
• …the real difference makers were
  – Airfield location
  – Sortie rate ($\approx$ 600/day vs. 1500/day)
  – Response time (6 hours vs. 30 minutes)
Air Combat

• Allies actually did reasonably well, shooting down 1236 German planes (French – 788, British – 448)
• The Allies lost 1233 planes in air-to-air combat
• However, the Allied total losses were 2233 aircraft (French -1274, British – 956)
• So, what accounts for these extra 1000 Allied losses?
  – Luftwaffe AA units attached to the army (586)
  – Caught on the ground (414)
Air Combat (2)

• For those of you thinking ahead, these would be two things the RAF would not face in the Battle of Britain.

• Conversely, German air support of their army was textbook.
  – This is now accepted as a key reason that the Germans won the Battle of France so convincingly.

French aircraft destroyed on the ground during the early days of the Battle of France
Strategic Air Campaign

• Allied efforts to carry out their strategic vision was a disaster
  – The battle moved way too fast to allow for an attritional strategic bombing campaign
  – The bomber didn’t always get through
  – When it did, it generally couldn’t hit its targets
  – The political will to “terror bomb” civilians did not exist.

• Both Bomber Command and the Armee de l’Air ended up conducting “leaflet” and anti-shipping campaigns.
Support of the Battle

• The allies made vigorous efforts to use bombing to slow down the German army. These failed completely.
  – The Germans simply massacred the poorly trained allied bomber forces

• By the time they retreated to Dunkirk, the allies had lost 70% of their committed bomber force without effect:
  – Terrible bombing accuracy
  – Excellent German AA fire
  – Focus of German fighters on allied bombers

• The RAF was somewhat successful in holding the Luftwaffe at bay during the retreat at Dunkirk (shooting down 150 Germans for a loss of 106) but received little credit for it.

“Where the hell were our planes?” was a common refrain on the beaches of Dunkirk
The End

• After the retreat at Dunkirk which was completed by June 4th, the French attempted to defend their remaining country.

• They were totally overwhelmed both in the air and on the ground.

• In the air, this was despite:
  – The failure of Operation Paula on June 3. (1000 vs. 120)
    • Luftwaffe claims: 75 a/c in the air, >400 on the ground
    • Actual: 15 in the air, 20 on the ground.
  – The French now having 2000+ aircraft (they had lost 787 so far)

• French serviceable rate was ≈ 29% (due to lack of parts and repairs)
Three weeks later (25 June), a totally defeated and demoralized France surrendered.

“What General Weygand called the 'Battle of France' is over. I expect that the Battle of Britain is about to begin.”

Churchill
Why did the Allies loose this battle?

• The usual stated cause is tactical
  – The tactical superiority of German armored forces
  – The tactical superiority of the Luftwaffe

• True enough but, the real cause was doctrine and strategy:
  – The allied commitment to a strategic air campaign without the tools to carry one out
  – The allied failure to develop air support of a ground campaign
  – The Luftwaffe commitment to air/armor coordination and air defense
  – Manstein’s brilliant strategic vision.

• Historian Andrew Roberts also went on to add psychology, moral, surprise, leadership, movement, concentration of effort, and retention of the initiative to the list of German advantages.
A Historian’s View

• “The essential task (of warfare) is fighting. In 1940, German forces did not outnumber the Allies; they had no special technological lead; they were not notably more courageous; but without question the Allies were outmatched by the German ability to fight.”
The Battle of Britain
To understand Hitler’s attitude towards an invasion of Great Britain you have to understand his world view.
Hitler’s invasion threat

- Or was it???
- Hitler’s invasion thinking went through the following stages:
  1. No invasion necessary, England will quit.
  2. (July 16) Plan (sort of) for invasion. In preparation for this possibility, achieve air supremacy.
    - Goering’s confidence in the Luftwaffe (5 weeks?)
    - The Battle of Britain
  3. (Sept 17) Call off the invasion because of the failure to achieve air supremacy.
  4. “Taking London through Moscow”
  5. Revisit invasion if after all that, the British still won’t quit.
Basic Situation

• France surrenders – 25 June 1940
• Key points!
  – Neither Hitler nor Goering understood the basic concept of air battle as one of attrition.
  – The German leadership did not appreciate that crossing the English Channel was not the same as crossing the Meuse River.
• Compared to Operation Overlord in 1944, the German planning in 1940 was never serious and was completely inadequate.
Luftwaffe Organization

  - Luftflotte 1 (Poland)
  - Luftflotte 2 (The Netherlands, Belgium, Northern Germany)
  - Luftflotte 3 (France, Luxembourg, Middle Germany)
  - Luftflotte 4 (Austria and Czech Republic)
  - Luftflotte 5 (Norway and Denmark)
 RAF Organization

- Fighter Command @ Bentley Priory (Dowding)
- Five Groups:
  - 10 Group; Southwest England
  - 11 Group; Southeast England (“Hells Corner”)
  - 12 Group; North of 11 Group (East Anglia & the Midlands)
  - 13 Group; North England & Scotland
  - 14 Group; Scotland (Pilot Training)
Basic Situation (2)

- **Serviceable** Aircraft availability (for this battle):

<table>
<thead>
<tr>
<th></th>
<th>German</th>
<th>British</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 seat Fighters</td>
<td>805</td>
<td>754</td>
</tr>
<tr>
<td>2 seat Fighters</td>
<td>224 (1029 total fighters)#</td>
<td>149 (903 total fighters)</td>
</tr>
<tr>
<td>Level Bombers</td>
<td>998</td>
<td>560</td>
</tr>
<tr>
<td>Dive Bombers</td>
<td>261</td>
<td>----</td>
</tr>
<tr>
<td>Reconnaissance</td>
<td>151</td>
<td>----</td>
</tr>
<tr>
<td>Coastal Patrol &amp; Rescue</td>
<td>80*</td>
<td>500*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2439</td>
<td>1463</td>
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# In terms of modern fighters, the Germans have a 4 to 3 edge

* These units are not included in the total as they did not play a significant combat role in the battle.
German Aircraft
The Messerschmitts

**Bf 109**
Fast, heavily armed
Superb high-altitude performance
Tough & reliable
Narrow wheel-base
Short range
This plane was a prime example of “Development Suitability” (36,000 were produced in 11 variants)

**Bf 110 (Zerstörer)**
Long-range bomber escort
Very heavily armed
Another example of “Development Suitability” (6000 produced in 8 variants)
A much better aircraft than its reputation would suggest
On 13 July, these became legitimate targets. This would play an important part in the number of pilots the Germans lost “in the drink”.

He 59
**Spitfire Mk 1**
- Extremely agile
- Excellent low altitude performance
- Very reliable
- “A pilot’s plane”
- Another example of “Development Suitability” (20,000 built in 24 variants)
- Short legs

**Hawker Hurricane**
- A good basic aircraft. Not quite as good as the Spitfire or the Bf 109 but…
- It was arguably the most important aircraft of the Battle of Britain. The reason was ease of manufacturing and repair

There were 2 ½ Hurricanes for every Spitfire and this percentage actually increased through the battle.
Boulton Paul Defiant
Developed as a bomber killer. Its performance went from terrible to just awful after the development of the “defensive circle”. However, it would become an early successful night fighter.
So, which plane is better??

Answer: It makes no difference. The good pilot in either plane defeats the poor or inexperienced pilot in either plane.