

Building the Wrong Navy:

Pre-World War II

American Capital Ship Construction

By

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Premise

In the Pacific, after Pearl Harbor, the United States Navy found itself fighting with an inadequately sized aircraft carrier fleet. This '1942 aircraft carrier shortfall' raises an obvious question: How did the world's premier industrial power, known for its technological sophistication, end up trailing Japan, which lagged in both technology and industrial prowess?

After Japan opted out of the Naval Treaties, President Roosevelt, the Navy Department's civilian leadership, and senior Navy leaders consistently prioritized battleship construction over that of aircraft carriers. That decision, to favor the well-understood battleship over the new and untested aircraft carrier, reflected the judgment, understanding, and biases of a small group of men who equated battleships to naval power and, thus, created the 1942 aircraft carrier shortfall.

Impact of the Naval Treaties

The 1922 Washington Naval Treaty¹ 'grandfathered' existing aircraft carriers,² declaring existing ships to be 'experimental' and not counting their tonnage against the treaty limits. The Treaty constrained America, Great Britain, and Japan's future aircraft carrier construction to 135,000, 135,000, and 81,000 tons,³ respectively.⁴ Additionally, the Treaty limited all new carriers to a maximum size of no greater than 27,000 tons, with two exceptions:⁵

- the United States would reconfigure two battlecruisers, then under construction, as 33,000-ton aircraft carriers; and
- Japan would reconfigure two battleships, then under construction, as 33,000-ton aircraft carriers.

The melding of warplanes and warships challenged naval architects. The 14 carriers built before or during the Naval Treaty regime did poorly in combat, with:

- five sinking⁶ when aerial bombs caused aviation gasoline leaks and subsequent uncontrollable fires, which quickly burned out the ships;
- three sinking⁷ when struck by submarine-launched torpedoes that caused either uncontrollable flooding or fires; and
- one succumbing to naval gunfire.⁸

The five remaining pre-1934 carriers⁹ finished the war as auxiliaries, aircraft ferries, or assigned to pilot training duties. After World War II, the American and British navies rapidly disposed of all their carriers commissioned before or during the Naval Treaty era.

Naval Construction after Japan's Denunciation of the Naval Treaties.

On the last Saturday of 1934, Japan announced that she would no longer abide by any Naval Treaty provision after 1936. Great Britain, the United States, and France continued to negotiate naval limitation agreements¹⁰ but, realistically, the arms race, which the earlier Naval Treaties had curtailed and, in the case of battleships blocked, reignited, as Table 1 demonstrates:

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Table 1

Capital Ship Orders: 1 Jan.1936 to 31 Aug. 1939			
Ship Type Ordered	Great Britain	Japan ¹¹	United States
Aircraft Carriers	6 ¹²	4 ¹³	1 ¹⁴
Reconfigured to Carriers	0	4 ¹⁵	0
Battleships	6 ¹⁶	3 ¹⁷	8 ¹⁸

Clearly, the United States had very different ideas *vis-a-vis* Great Britain and Japan concerning the types of capital ships needed to prosecute the next naval war.

As Table 2 shows, on 7 Dec. 1941, the United States had a modest-sized carrier fleet, several of which had significant flaws.

Table 2

CV	Name	Size (1000 tons)	Aircraft (Approx.)	Vulnerability /Limitation
2	<i>Lexington</i> ¹⁹	33	80	Battle damage causes gasoline leaks and then an explosion that sinks the ship. ²⁰
3	<i>Saratoga</i>	33	80	Torpedoed twice, repurposed after bomb damage
4	<i>Ranger</i> ²¹	14	70 ²²	Too slow, small for Pacific theater
5	<i>Yorktown</i> ²³	20	80	
6	<i>Enterprise</i>	20	80	
7	<i>Wasp</i> ²⁴	15	70	Submarine torpedoes cause fires that burned out the ship
8	<i>Hornet</i>	20	80	Not operational on 7 December 1941

When Germany invaded Poland, the American Navy's carrier fleet could deploy a maximum of 390 carrier-based aircraft. By the latter half of 1940, with the addition of the USS *Wasp* (CV-7), the United States' deployable carrier aircraft strength had increased to roughly 460 planes, maximum. By way of comparison, Japan's Mobile Striking Force (the *Kido Butai*) deployed 387 aircraft to Hawaiian waters, of which 353 participated in the Pearl Harbor attack. Given the United States' much larger industrial base; its underutilization of that base; the Depression-era chronic unemployment, and underemployment, one might well have expected the Americans to order more than nine capital ships, a number that only marginally surpassed Japan's seven. From a steel usage standpoint, in spite of possessing a ten times larger industrial base, American capital ship orders barely exceeded Japan's commitment of approximately 300,000 tons.²⁵

Changing Course: Bombers versus Naval Ships Prior to Pearl Harbor

Around the world, throughout the 1930s, the general public certainly recognized the ever increasing aerial threat. In Abyssinia, Spain, and China, the totalitarians had employed aircraft with increasingly devastating effect. After Guernica,²⁶ city-dwelling civilians, with good reason,

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developed a morbid fear of aerial bombardment. The British government responded to their citizenry's *angst* with the radar-based *Chain Home* warning system, anti-aircraft batteries around urban areas, a dedicated metropolitan fighter force,²⁷ and civil defense measures. Nevertheless, when the Germans invaded Poland, in a four-day period, British parents moved 1.4 million children and their escorts from urban areas to the countryside as a precautionary measure.²⁸

Reacting to the aerial threat, navies armed their new²⁹ and, when possible, their rebuilt battleships³⁰ with increasingly numerous antiaircraft guns, deck armor, torpedo bulges, and improved fire control. These, the battleship proponents claimed, would repel and defeat air attacks. However, pre-Pearl Harbor, British naval losses (see Table 3) confirmed just how dangerous bomber aircraft had become to surface ships:

Table 3

British Warships Sunk by <i>Luftwaffe</i> & Italian Aircraft				
Theater	Date	Cruisers ³¹	Destroyers ³²	
Norway	9 Apr – 10 June 1940	1	2	
Dunkirk	26 May – 4 June 1940	0	5	
Crete	20 May – 1 June 1941	3	5	
Other	3 Sep 1939 – 7 Dec 1941	<u>1</u>	<u>8</u>	
Total	3 Sep 1939 – 7 Dec 1941	5	20	

Events at Taranto, Italy on the night of 11-12 November 1940 presaged Pearl Harbor. On that night, British torpedo bombers from the carrier HMS *Illustrious* torpedoed three Italian battleships³³, forcing each to run aground to avoid sinking in deep water and thus becoming a total loss. For all the damage inflicted, the British lost only two aircraft. In May 1941, Germany's *Kriegsmarine* learned the hard way that even woefully outdated British Swordfish biplanes could cripple the *Bismarck*, their newest battleship.³⁴

Impact of Axis Expansion on the United States Navy

After Germany's quick conquest of Poland, the European land war quieted into the 'Phony War' with minimal contact between Allied and German air and ground forces. At sea, however, German U-boats and surface raiders vigorously attacked Allied naval and merchant shipping, primarily in the eastern Atlantic Ocean. However, in spite of the deteriorating international situation, the United States did not order any additional capital ships during the Phony War period (6 Oct. 1939 – 8 April 1940) although:

- Germany was intensifying the Atlantic sea war,³⁵
- Japan was continuing its aggression deeper into China,
- Fighting along the Franco-German border and in the Low Countries was imminent, and
- the Soviet Union had invaded Finland.³⁶

After invading Denmark and Norway on 9 April 1940, Germany's *Wehrmacht* and *Luftwaffe* attacked the Allied armies in the Low Countries and France on 10 May 1940. By late May, Belgium and the Netherlands had capitulated. In early June, the British Expeditionary Force,

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after abandoning its equipment, fled France for England. Fighting in Norway ended on 10 June; France surrendered on 22 June.

Spurred by the German onslaught, the United States Congress enacted the 1940 Naval Expansion Act (14 June 1940) that authorized the Navy Department to order:

- two 45,000 ton *Iowa*-class battleships,³⁷ and
- three 27,000 ton *Essex*-class aircraft carriers.³⁸

Believing these five capital ships constituted only a partial response, the Congress, under the leadership of Carl Vinson,³⁹ disregarded the Administration's much smaller requests and authorized the Two-Ocean Navy Act,⁴⁰ which the President signed on 19 July 1940. This monster appropriation bill, which appropriated funds for 15,000 aircraft and ships of all types, permitted the Navy Department, on 9 September 1940, to order:

- eight additional *Essex*-class aircraft carriers,⁴¹
- two more *Iowa*-class battleships,⁴² and
- five 58,000 ton *Montana*-class battleships.⁴³

All told, on 10 September 1940, the United States had in various stages of construction or on order: seventeen battleships and twelve aircraft carriers. Unfortunately, the expanded 1940 American carrier building program:

- Lagged the start of the British naval rearmament program by four and a half years,
- Trailed the Japanese *Shōkaku*-class aircraft carrier build program by at least 15 months, and
- Would not deliver any *Essex*-class carriers to the fleet until 1944.

All eleven *Essex*-class carriers ordered in 1940 saw combat,⁴⁴ supplying the bulk of America's carrier-based air power. Conversely, only three⁴⁵ *Essex*-class ships out of sixteen fleet carriers ordered and commissioned⁴⁶ after Pearl Harbor, saw World War II combat.

1940 Diplomatic Use of the Battleship Navy

With the Allied military *debacle* came the demise of the European colonial powers. Japan now saw opportunities in Southeast Asia. Intent on curbing Japanese expansionism, the FDR administration restricted trade⁴⁷ and redeployed the battleship-heavy Pacific fleet to Hawaii (7 May 1940).

Not at all deterred, intent on severing the flow of supplies to the Chinese Nationalist forces, Japan ignored Vichy government protests and forcibly occupied the port of Haiphong (26 Sep. 1940).⁴⁸ Next day, Japan signed the Tripartite Pact with Germany and Italy. Thus, any American armed intervention against Japan would also trigger a war with Germany and Italy.

Admiral Richardson, the Pacific Fleet's commander and an expert on Japanese naval strategy, repeatedly protested against the fleet's deployment to vulnerable Pearl Harbor. Tiring of Richardson's continuing opposition, the President replaced his contentious subordinate⁴⁹ with a much more compliant, relatively junior, Admiral Husband E. Kimmel.⁵⁰

Well aware that mock air attacks by US carrier-based aircraft had twice annihilated battle fleets moored at Pearl Harbor,⁵¹ the presence of US battleships in Hawaiian waters did not deter

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the Japanese militarists.⁵² Rather, the 1940 redeployment and the 1941 oil embargo⁵³ galvanized Japan's planning of their Pearl Harbor attack.

1941 Realization

1941 German successes and British weakness motivated the FDR administration to redeploy 25% of the Pacific Fleet's capital ships to the Atlantic.⁵⁴ By December 1941, the United States' Pacific and Atlantic fleets had roughly equal numbers of capital ships.⁵⁵ However, the Pacific Fleet, which in 1940 had maintained a rough parity with Japan, by late 1941 with the advent of the *Shōkaku*-class⁵⁶ ships, found itself decidedly inferior in numbers of carriers.⁵⁷

Personally searching for an alternative to large carriers and their long build cycles, President Roosevelt asked the General Board of the United States Navy about the feasibility of reconfiguring *Cleveland*-class cruisers already under construction into aircraft carriers. The Board recommended not pursuing the concept on 13 October 1941.⁵⁸ The President's idea languished until its resurrection after the Pearl Harbor disaster. Then, with no new carriers exiting the construction pipeline anytime soon, the thinking on reconfigured cruisers did an about-face, with the Navy ordering nine⁵⁹ between January and June 1942.

Impact of United States Navy Aircraft Carrier Shortfall

When war came, the American leadership's 1930s emphasis on battleships came home to roost. Table 4 illustrates its impact on the Pacific War's five carrier vs. carrier battles.

Table 4

Battle of	Date	American Carriers Participating				
		<i>Lexington</i> Class	<i>Yorktown</i> Class	<i>Essex</i> Class	<i>Independence</i> Class	Carrier Aircraft
the Coral Sea ⁶⁰	May 1942	1	1			128
Midway ⁶¹	June 1942		3			233
the Eastern Solomons ⁶²	Aug. 1942	1	1			154
the Santa Cruz Islands ⁶³	Oct. 1942		2			136
the Philippine Sea ⁶⁴	June 1944		1	6	8	956

As Table 4 details, the 1930s prioritizing of battleships over aircraft carriers resulted in the commissioning of all *Essex* and *Independence*-class carriers *after* the four 1942 battles. Hence, America had to rely solely on her three *Yorktown* and two first-generation *Lexington*-class carriers to battle alone against the more numerous Japanese carrier fleet. From an aircraft perspective, the aircraft carrier shortfall prevented a super-industrialized United States of 140 million from deploying more than 233 planes in any of the critical 1942 naval battles.

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Causes of the 1942 Aircraft Carrier Shortfall

After World War II, the popular wisdom attributed the nation's failure to prepare for the conflict to ill-conceived pacifist and isolationist opposition. Undoubtedly reduced political opposition in the 1930s would have resulted in more defense spending earlier. However, in the particular case of capital ships, would less opposition have resulted in more aircraft carriers? With the newsreels showing *Luftwaffe* aircraft pounding Allied troops and cities, pre-Pearl Harbor American capital ship orders, which had favored the battleship 8 to 1 in the 1936 to 1939 period, in 1940 modestly favored the aircraft carrier, 11 to 9. However, from a tonnage perspective, the orders still favored the battleship by a wide margin, 470,000⁶⁵ to 297,000 tons.⁶⁶

Why?

The Preeminence of the Battleship Proponents

In 1933, President Roosevelt, a former Assistant Secretary of the Navy during World War I, appointed then 71-year-old Claude Augustus Swanson⁶⁷ to serve as Secretary of the Navy. FDR much enjoyed actively participating in naval matters and having an elderly Secretary⁶⁸ of the Navy, often in poor health, made that participation all the easier. Swanson—a four-term senator, born before Robert E. Lee assumed command of the Army of Virginia—served as the Navy Department's top civilian until his death on 7 July 1939 at age 77. Twenty-eight years old when the Navy laid down its first battleship⁶⁹ in 1890, dedicated to a powerful Navy, Swanson effectively campaigned in Congress for a naval rearmament centered on battleships.

On 1 July 1933, sixty-year-old Admiral William H. Standley,⁷⁰ who had commanded destroyer and cruiser squadrons, but who had no aviation or aircraft carrier command experience, assumed the position of Chief of Naval Operations (CNO). During his tenure, whenever illness incapacitated Secretary Swanson, Standley also served as Acting Secretary of the Navy. Under Standley, the Navy ordered the last three carriers⁷¹ that would be operational on 7 Dec. 1941.

Admiral William D. Leahy,⁷² age 61, succeeded Standley as CNO on 2 January 1937. An expert in naval gunnery,⁷³ upon achieving flag rank, he commanded destroyers and then served as Commander Battleships, Battle Force. Like his predecessor, Leahy never commanded aircraft carriers or aviation units. During Leahy's tour, the Navy ordered eight battleships⁷⁴ and a single carrier.⁷⁵

On 1 August 1939, 58-year-old Admiral Harold R. Stark⁷⁶, whom Eisenhower would characterize as a "nice old lady,"⁷⁷ succeeded Leahy as CNO. Stark had extensive battleship command experience, but never direct command of aviation units or aircraft carriers. While Leahy had pushed for battleships, under Stark new capital ship orders lagged until the Allied collapse caused the Congress to take charge and override the President's reluctance to provoke isolationist opposition.

With Secretary Swanson's passing (7 Aug. 1939), the Secretary of the Navy position remained vacant until 2 January 1940 when Charles Edison⁷⁸, a battleship advocate,⁷⁹ age 49, took over. Promised by the President before his appointment that he could step down early, on 24

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June 1940, as France capitulated, Edison left the Navy Department to run successfully for governor of New Jersey.⁸⁰

After 11 months of having either a vacancy or a caretaker, on 11 July 1940, the Navy Department finally got a full-time Secretary, sixty-six-year-old William Franklin ‘Frank’ Knox.⁸¹ A former member of Teddy Roosevelt’s ‘Rough Riders,’ a career newspaperman, and the 1936 Republican Vice Presidential candidate, Knox had no previous experience managing naval affairs.

A ‘Battleship Mentality’ Versus Being ‘Air-Minded’

Of course, President Franklin Roosevelt recognized the growing importance of air power, but from a distance, as an observer. Aircraft did not factor in his personal life. Only in 1943 did the President take his first airplane trip, flying to the Casablanca Conference.⁸² Conversely, during his pre-1933 bids for chancellor, Adolf Hitler made campaign trips around Germany in a Lufthansa-supplied airplane. As Germany’s *Führer*, Hitler had a personal pilot,⁸³ and his principal subordinate, Hermann Goering, head of Germany’s *Luftwaffe*, had commanded Imperial Germany’s elite fighter squadron, *Jagdgeschwader 1* (aka ‘the Flying Circus’).

The travel plans and writings of President Franklin Roosevelt and British Prime Minister Winston Churchill⁸⁴ give some idea of the hold that battleships had on the minds of men educated before the Wright brothers’ Kitty Hawk flight. On multiple occasions, the President⁸⁵ and the Prime Minister⁸⁶ undertook extended journeys on battleships, battlecruisers, and heavy cruisers. On no occasion did either wartime leader travel on, or even tour, an aircraft carrier.⁸⁷

In *The Grand Alliance*,⁸⁸ Sir Winston wrote extensively about the USS *North Carolina* (BB-55) and HMS *King George V*, as if these two battleships would likely fight hostile equivalents. The Prime Minister’s secretaries had scarcely filed his communications when a series of British naval disasters and Pearl Harbor destroyed five Allied battleships⁸⁹ and sank five others⁹⁰, all without inflicting significant damage on their attackers.

In contrast to the American leadership’s practice of giving older men the most important positions, the German and Japanese leadership elevated younger men who were developing and directing the use of leading-edge weapons technology. For example, Hitler backed Hermann Goering (*Luftwaffe*), Heinz Guderian (tanks), Karl Doenitz (submarines), and Wernher Von Braun (rockets), all of whom achieved prominence before celebrating their fiftieth birthdays.⁹¹ Similarly, in the late 1930s, at age 54, Admiral Isoroku Yamamoto,⁹² who had played a key role in developing Japanese naval aviation, became the *de facto* leader of the Imperial Japanese Navy.

Firmly in control of the United States Navy, the battleship-oriented civilian and uniformed leadership limited opportunities for naval aviators to advance to the position of CNO, most notably Ernest J. King,⁹³ whom the Navy promoted to Vice Admiral on 29 January 1938 and made Commander, Aircraft, Battle Force. In line for a promotion to CNO, the Administration, instead, passed over King, assigning him to the General Board of the U.S. Navy, a purely advisory body. Eventually, then CNO Stark rescued King’s career from oblivion by appointing him as Commander in Chief, Atlantic (CINCLANT).⁹⁴

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Evolutionary versus Revolutionary Change

Not unexpectedly, experts have a good understanding of evolutionary changes and their impact, but often they fail to appreciate revolutionary changes. For example, the design and construction of America's World War II battleships represented a generational leap in technology over the post-World War I battleships. However, the airplane's revolutionary impact on warfare, heralded by the sinking of the *Ostfriesland*,⁹⁵ while recognized outside the Navy Department, did not convince 1930s naval experts and the senior Navy leadership that air power had made battleships obsolete.

The End of the Battleship Dominated United States Navy

In the wake of Pearl Harbor, FDR realized that Stark's position as CNO was untenable and replaced him with 63-year-old Admiral Ernest J. King,⁹⁶ who had led the 1938 mock air attack⁹⁷ on Pearl Harbor. In addition to aircraft carriers, King also had command experience in submarines and destroyers, but none in battleships. He transformed the Navy into a carrier-centric force by:

- ordering an additional 13 *Essex*-class^{98,99} and six *Midway*-class carriers,¹⁰⁰
- overseeing construction of more than one hundred escort carriers, and
- canceling or stopping construction of seven battleships.¹⁰¹

Conclusions

1. The 1930s American naval leadership's prioritizing of battleships over the aircraft carriers created a 1941 United States Navy only marginally prepared for the carrier war against Japan.
2. The US Navy's experience of the 1930s demonstrates that collective decisions made by people with similar backgrounds, experiences, and outlooks will tend to reflect their biases and ignore alternatives.
3. President Roosevelt appointed older politicians to be Secretaries of the Navy, who were elderly by the era's standards.
4. During his presidency, FDR did not adequately manage the Navy Department by:
 - a. entrusting its management to an elderly, often ill Secretary;
 - b. leaving the position vacant at a critical time;
 - c. entrusting its management to a caretaker focused on his political future; and
 - d. appointing a wartime Secretary, who had little knowledge of naval affairs.
5. During the 1930s, the Navy Department selected CNOs with naval gunnery backgrounds to the exclusion of all other backgrounds. None had naval aviation command experience.
6. Not recognizing how naval air power had evolved to make the battleship obsolete, the FDR administration based the Fleet in highly vulnerable Pearl Harbor, thus:
 - a. ignoring the warnings of the Pacific Fleet commander, a well-respected Japanese strategy expert;
 - b. disregarding the successful British attack on the Italian battle fleet at Taranto; and
 - c. failing to heed the lessons of two US naval exercises.

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The Future

Like the 1930s, today's Navy faces a rapidly evolving environment of new concepts (e.g., artificial intelligence, laser weapons, railguns) and maturing technologies (e.g., drones, stealth aircraft, UCAVs). Constrained, as always, by limited resources and time commitments, the Navy must choose when to stick with the tried and true, and when to break with the past. And when it decides the past has had its day, the Navy must then correctly choose between alternatives and select the ones that will best achieve the nation's future naval objectives.

Will today's Navy repeat the 1930s and choose leaders with similar backgrounds, who champion agreed-upon solutions? Or, will the Navy, mindful of the past, seek diverse backgrounds and different approaches when determining the correct path to reach the Service's objectives?

¹ Washington Naval Treaty: www.loc.gov/law/help/us-treaties/bevans/m-ust000002-0351.pdf

² Washington Naval Treaty, Article VIII

³ NB: All tonnage figures are in standard tons and because of manipulation by national authorities have only an approximate correlation to actual displacements, which are usually substantially greater.

⁴ Washington Naval Treaty, Article VII

⁵ Washington Naval Treaty, Article IX

⁶ HMS *Hermes*, USS *Lexington* (CV-2), IJN *Akagi*, IJN *Kaga*, and IJN *Ryūjō*

⁷ HMS *Courageous*, USS *Wasp* (CV-7), and HMS *Eagle*

⁸ HMS *Glorious* (8 June 1940)

⁹ USS *Saratoga*, USS *Ranger*, HMS *Furious*, HMS *Argus*, IJN *Hōshō*

¹⁰ Second London Naval Treaty: Signed 25 March 1936

¹¹ Keel laid down

¹² 4 *Illustrious*-class & 2 *Implacable*-class

¹³ IJN *Hiryū*, 2 *Shōkaku*-class, and IJN *Taihō*

¹⁴ USS *Hornet* (CV-8)

¹⁵ 2 IJN *Zuihō*-class & 2 *Hiyo*-class

¹⁶ 5 *King George V*-class & HMS *Vanguard*

¹⁷ 3 *Yamato*-class

¹⁸ 2 *North Carolina*-class, 4 *South Dakota*-class & 2 *Iowa*-class

¹⁹ en.wikipedia.org/wiki/Lexington-class_aircraft_carrier

²⁰ USS *Lexington* (CV-2) Sinking: www.history.navy.mil/research/histories/ship-histories/danfs/l/lexington-cv-2-iv.html

²¹ [en.wikipedia.org/wiki/USS_Ranger_\(CV-4\)](http://en.wikipedia.org/wiki/USS_Ranger_(CV-4))

²² <http://www.airgroup4.com/operation-torch.htm>

²³ en.wikipedia.org/wiki/Yorktown-class_aircraft_carrier

²⁴ [en.wikipedia.org/wiki/USS_Wasp_\(CV-7\)](http://en.wikipedia.org/wiki/USS_Wasp_(CV-7))

²⁵ Standard tons (kilo tons, very approximate) Great Britain 368, Japan 302, US 323

²⁶ The 26 April 1937 bombing caused numerous civilian deaths. Estimates range from 126 to 1654 (en.wikipedia.org/wiki/Bombing_of_Guernica).

²⁷ RAF Group 11

²⁸ upi.com/Archives/1989/08/27/World-War-II-Britain-goes-to-warUPI-NewsFeature/6268620193600/

²⁹ *North Carolina* design: en.wikipedia.org/wiki/North_Carolina-class_battleship#Secondary_battery; *South Dakota* design: [en.wikipedia.org/wiki/South_Dakota-class_battleship_\(1939\)#Armor](http://en.wikipedia.org/wiki/South_Dakota-class_battleship_(1939)#Armor)

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- ³⁰ *Queen Elizabeth*-class upgrades: en.wikipedia.org/wiki/Queen_Elizabeth-class_battleship#Between_the_wars;
IJN *Nagato* upgrades: en.wikipedia.org/wiki/Japanese_battleship_Nagato#Armament; USS *West Virginia* (BB-48) upgrades: [en.wikipedia.org/wiki/USS_West_Virginia_\(BB-48\)#Interwar_period](https://en.wikipedia.org/wiki/USS_West_Virginia_(BB-48)#Interwar_period)
- ³¹ en.wikipedia.org/wiki/List_of_Royal_Navy_losses_in_World_War_II#Cruisers
- ³² en.wikipedia.org/wiki/List_of_Royal_Navy_losses_in_World_War_II#Destroyers
- ³³ RN *Caio Duilio*, RN *Conte di Cavour* & RN *Littorio*
- ³⁴ *Bismarck*: Aerial torpedo disabled rudder 26 May 1941; pounded by naval gunfire, scuttled 27 May 1941
- ³⁵ 290 ships (≈1,008,000 tons) sunk; uboot.net/allies/merchants/losses_year.html
- ³⁶ 30 Nov 1939 – 13 March 1940
- ³⁷ USS *Missouri* (BB-63) and USS *Wisconsin* (BB-64) (12 June 1940)
- ³⁸ CV-9, CV-10, and CV-11 ordered on 3 July 1940
- ³⁹ *Carl Vinson : Patriarch of the Armed Forces*, [James F. Cook](#), Mercer University Press, pages 152-3
- ⁴⁰ Also known as the Vinson-Walsh Act.
- ⁴¹ CV-12 thru CV-19
- ⁴² USS *Illinois* (BB-65) and USS *Kentucky* (BB-66), never commissioned
- ⁴³ Never laid down
- ⁴⁴ 1943 CV-9,10,16 & 17; 1944 CV-11, 12, 13, 14, 18 & 19; and 1945 CV-15; Total Battle Stars 85
- ⁴⁵ 1945 CV-20, 31 & 38; Total Battle Stars 6
- ⁴⁶ Essex: CV-20, CV-21, CV-31 thru CV-34; CV-36 thru CV-40, CV-45 & CV-47; and Midway: CV-41 thru CV-43
- ⁴⁷ Export Control Act of 1940: Passed 5 July 1940 restricted the sale of scrap iron and raw materials to Japan.
- ⁴⁸ Japan occupied all of French Indochina on 28 July 1941
- ⁴⁹ FDR-Richardson disagreement leaked to press (26 Oct. 1940); Richardson dismissed on 1 Feb. 1941;
en.wikipedia.org/wiki/James_O._Richardson
- ⁵⁰ Husband E. Kimmel (26 Feb. 1882 – 14 May 1968): Commander of US naval forces during Pearl Harbor attack
- ⁵¹ Fleet Problems XIII (March 1932) and XIX (April-May 1938)
- ⁵² 1936 Japanese War College conclusion: ... *in case the enemy's main fleet is berthed at Pearl Harbor, the idea should be to open hostilities by surprise attack from the air.* ussflierproject.com/tags/1932-attack-on-pearl-harbor/
- ⁵³ 26 July 1941 US freezes all Japanese assets in America. Britain and the Dutch East Indies followed suit. Japan loses 88 percent of its imported oil.
- ⁵⁴ USS *Yorktown* (CV-5) and three *New Mexico*-class battleships; 20 April - May 1941;
history.navy.mil/research/histories/ship-histories/danfs.html
- ⁵⁵ Capital Ships (Dec. 1941): Battleships: Atlantic – 8, Pacific - 9; Carriers: Atlantic – 4, Pacific – 3;
history.navy.mil/research/histories/ship-histories/danfs.html
- ⁵⁶ IJN *Shōkaku* (Aug. 1941); IJN *Zuikaku* (Sep. 1941)
- ⁵⁷ Fleet carriers in the Pacific (Dec. 1941): US – 3; Japan – 6
- ⁵⁸ en.wikipedia.org/wiki/Independence-class_aircraft_carrier
- ⁵⁹ *Independence*-class light carriers CVL-22 thru CVL-30
- ⁶⁰ en.wikipedia.org/wiki/Battle_of_the_Coral_Sea
- ⁶¹ en.wikipedia.org/wiki/Battle_of_Midway
- ⁶² en.wikipedia.org/wiki/Battle_of_the_Eastern_Solomons
- ⁶³ en.wikipedia.org/wiki/Battle_of_the_Santa_Cruz_Islands
- ⁶⁴ en.wikipedia.org/wiki/Battle_of_the_Philippine_Sea
- ⁶⁵ Four 45,000 ton *Iowa*-class and Five 58,000 ton *Montana*-class
- ⁶⁶ Eleven 27,000 ton *Essex*-class carriers, CV-9 thru CV-19
- ⁶⁷ Claude Augustus Swanson (31 March 1862 – 7 July 1939)
- ⁶⁸ White male life expectancy: 1930 – 59.7, 1935 – 61.0, 1940 – 62.1; infoplease.com/life-expectancy-birth-race-and-sex-1930-2010
- ⁶⁹ USS *Indiana* (BB-1)

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- ⁷⁰ William H. Standley (18 Dec. 1872 – 25 Oct. 1963)
- ⁷¹ USS *Yorktown* (CV-5), USS *Enterprise* (CV-6), and USS *Wasp* (CV-7)
- ⁷² William D. Leahy (6 May 1875 – 20 July 1959)
- ⁷³ Upon assuming the presidency, Leahy told President Truman, "That is the biggest fool thing we have ever done. The atomic bomb will never go off, and I speak as an expert in explosives." *Memoirs: Years of Decisions*, Volume I, Harry S. Truman
- ⁷⁴ Two *North Carolina*-class, four *South Dakota*-class, and two *Iowa*-class
- ⁷⁵ USS *Hornet* (CV-8)
- ⁷⁶ Harold R. Stark (12 Nov. 1880 – 20 Aug. 1972)
- ⁷⁷ Eisenhower Diary entry, 10 March 1942
- ⁷⁸ Charles Edison (3 Aug. 1890 – 31 July 1969); Assistant Secretary of the Navy (18. Jan. 1937 – 2 Jan. 1940)
- ⁷⁹ As Assistant Secretary of the Navy, he campaigned for construction of the 45,000 ton *Iowa*-class battleships
- ⁸⁰ 21 Jan. 1941 – 18 Jan 1944
- ⁸¹ William Franklin 'Frank' Knox (1 Jan. 1874 – 28 April 1944)
- ⁸² 14 Jan. 1943 to 24 Jan. 1943
- ⁸³ Hans Baur (19 June 1897 – 17 Feb. 1993)
- ⁸⁴ Sir Winston Churchill (30 Nov. 1874 – 24 Jan. 1965)
- ⁸⁵ *Indianapolis* (South America in 1936), *Tuscaloosa* (Argentina in 1941), *Iowa* (Teheran Conference in 1943), and *Quincy* (Yalta in 1945)
- ⁸⁶ Argentina on *Prince of Wales* (1941), Washington on *Duke of York* (1941), Quadrant Conference on *Renown* (1943), and Cairo Conference on *Renown* (1943)
- ⁸⁷ During June 1957 Dwight Eisenhower was the first sitting President to sail on a carrier, the USS *Saratoga* (CV-60).
- ⁸⁸ *The Grand Alliance*, Winston S. Churchill, Houghton Mifflin Co., 1950, Appendix M, pages 782-3
- ⁸⁹ HMS *Barham*, USS *Arizona* (BB-39), USS *Oklahoma* (BB-37), HMS *Prince of Wales* & HMS *Repulse*
- ⁹⁰ HMS *Queen Elizabeth*, HMS *Valiant*, USS *California* (BB-44), USS *Nevada* (BB-36) & USS *West Virginia* (BB-48)
- ⁹¹ Hermann Goering (12 Jan. 1893 – 15 Oct. 1946); Heinz Guderian (17 June 1888 – 14 May 1954); Karl Doenitz (16 Sep. 1891 – 24 Dec. 1980); Wernher Von Braun (23 March 1912 – 16 June 1977)
- ⁹² Isoroku Yamamoto (4 April 1884 – 18 April 1943)
- ⁹³ Ernest J. King (23 Nov. 1878 – 25 June 1956)
- ⁹⁴ King's CINCLANT appointment: 1 February 1941
- ⁹⁵ *Ostfriesland*: Bombed and sunk in a series of sensational and controversial attacks led by air power advocate Gen. William Mitchell (21 July 1921)
- ⁹⁶ 26 March 1942
- ⁹⁷ Role in mock Pearl Harbor attacks: 1932, Captain, USS *Lexington* (CV-2); and 1938, Admiral commanding USS *Saratoga* (CV-3) task force.
- ⁹⁸ USS *Bennington* (CV-20) and USS *Boxer* (CV-21) were ordered 15 Dec. 1941 prior to King's CNO appointment.
- ⁹⁹ Three saw WW II combat. Two ships were cancelled.
- ¹⁰⁰ None saw WW II combat. Three ships were commissioned and three were cancelled
- ¹⁰¹ USS *Illinois* (BB-65), USS *Kentucky* (BB-66), and all five *Montana*-class battleships