

The U.S. Navy Grows Up

Before WWII, the U.S. Navy was an obsolescent, WWI-era force heavily reliant on a traditional battleship-centric doctrine, leaving it ill-prepared for fast-paced carrier warfare against Japan. Key issues included severe defects in torpedoes, underpowered aircraft, and a lack of trained personnel. It was technologically behind in aviation compared to Japan.

Specific weaknesses in the pre-WWII U.S. Navy included:

1. Obsolescent Fleet and Doctrine

- **Battleship-Centric Focus:** The Navy was built around a traditional "battle line" doctrine of heavy battleships (dreadnoughts), many of which were World War I-era vessels.
- **Slow Modernization:** Under international naval treaties (1922-1936), the size and nature of the fleet were restricted, leading to a "stagnant" period where old ships weren't replaced.
- **Neglected Ship Types:** The U.S. largely ignored the development of fast battlecruisers, leaving it "flat-footed" when the war began.

2. Severe Equipment Failures (The "Torpedo Scandal")



The Navy's primary offensive weapons for submarines and destroyers, specifically the **Mark 14 torpedo** (left), were notoriously defective. They often ran 10 feet deeper than set, passing harmlessly under enemy ships. Magnetic exploders often triggered prematurely, while contact exploders frequently failed to detonate even upon a direct hit. Torpedoes were so

expensive that the Navy rarely performed live-fire tests, which allowed these flaws to remain hidden for nearly two years into the war.

3. Strategy and Personnel Gaps

While the Navy had a core of aviators, its overall carrier doctrine and training lagged behind Japan's more advanced air warfare capabilities. War games (Fleet Problems) showed that battleships were vulnerable to carrier-based aircraft, a lesson not fully adopted by leadership, who remained focused on surface combatants. The government viewed manning ships with full, trained crews during peacetime as a "waste of money," assuming there would be time to recruit and train if war broke out. Until the 1940 Two Ocean Navy Act, the U.S. operated on the assumption it would only have to fight one naval war at a time, leaving it vulnerable to a simultaneous conflict in the Atlantic and Pacific. Despite having submarines, the focus remained on surface combat, and the navy did not anticipate the need for advanced antisubmarine tactics, relying on outdated methods.

These issues, particularly the defective torpedoes, caused significant setbacks in the early months of the Pacific War.

4. Bureaucratic Resistance

Senior leadership, often called the "Gun Club," remained stubbornly committed to the supremacy of big-gun battleships, resisting the shift toward aircraft carriers. When submariners reported defective torpedoes, the Bureau of Ordnance initially blamed "user error" rather than acknowledging design flaws.

The U.S. Navy solved its pre-war deficiencies through a combination of field-tested engineering fixes and a massive, legally mandated industrial expansion that transformed it into the world's most powerful maritime force by 1945.

The Torpedo Scandal: Bureaucratic Denial

The Bureau of Ordnance (BuOrd) was a semi-autonomous and incredibly powerful organization that operated with "misplaced confidence" in its own designs.

- **Blaming the Sailors:** When submariners reported that the **Mark 14 torpedo** was failing, BuOrd's first instinct was to blame the "incompetence" of the submarine commanders, claiming they were using the weapons improperly or making fire-control errors.
- **Refusing to Test:** BuOrd refused to conduct live-fire tests because torpedoes were expensive (\$10,000 each). They relied on a single 1926 test and "judgment" rather than scientific data.
- **Security as a Shield:** The magnetic exploder was so "top secret" that even the manuals were never printed. This extreme secrecy prevented technicians from seeing and fixing its obvious flaws.
- **Field Rebellion:** Admiral **Charles Lockwood** eventually bypassed the Bureau by conducting his own "unofficial" tests in 1942, firing torpedoes through fishing nets to prove they ran 11 feet deeper than set. It took until **September 1943**—nearly two years into the war—for the Bureau to finally acknowledge and fix all the defects.

Fixing the "Torpedo Scandal"



It took nearly two years of combat failures and bureaucratic denial before the **Mark 14 torpedo** (*left*), was fully repaired in late 1943. The fixes were discovered largely by officers in the field—like **Admiral Charles Lockwood**—rather than the official Bureau of Ordnance.

After testing torpedoes against fishing nets and cliffs in Hawaii, investigators found the depth sensor was poorly placed. They relocated the sensor to the midbody of the

torpedo to get accurate pressure readings while moving.

The high-tech magnetic detonators were so unreliable and sensitive to local magnetic fields that they were eventually **scrapped entirely** in favour of contact detonators.

At high speeds, the firing pin was so heavy that the impact force would bend or jam it before it could strike the primer.

- **The Fix:** Engineers machined new, lightweight firing pins using **aluminium alloy**.
- **The Irony:** Much of the high-grade aluminium used for these new pins was sourced from **Japanese aircraft** shot down during the attack on Pearl Harbor.

Impact of the 1940 Two-Ocean Navy Act

Signed by President Roosevelt on July 19, 1940, this was the largest naval procurement bill in U.S. history. It aimed to prepare the U.S. for simultaneous threats from Germany and Japan. It authorized a **70% increase** in the Navy's size, adding roughly 257 ships and 1.3 million tons of combat vessels.

While it still included battleships (like the *Iowa* and *Montana* classes), the act significantly boosted **aircraft carrier** production. It authorized 18 new carriers, including the *Essex* class, which became the backbone of the Pacific victory.

The act funded 40 naval shipyards by 1941—four times the number available in 1933—creating the industrial "muscle" needed to out-produce the Axis powers. It also provided \$4 billion to build airfields and renovate facilities at strategic locations like **Guam, Wake Island, Midway, and Hawaii**.

By 1945, this expansion had been so successful that the U.S. Navy was larger than the rest of the world's navies combined.

The Rise of the Aircraft Carrier



Before the war, carriers were seen as "scouts" or support for the battleships. The Japanese attack on Pearl Harbor forced a massive doctrinal shift because the U.S. battleship fleet was decimated, while the carriers were at sea and survived.

By late 1942, carriers had displaced battleships as the "queens of the fleet."

They could project power up to **300 miles**, whereas a battleship's guns were limited to about 30 miles. The **1940 Two-Ocean Navy Act** funded the *Essex*-class carriers. While Japan completed only six fleet carriers during the war, the U.S. completed **17 Essex-class fleet carriers**, which were faster, more durable, and carried up to 90 aircraft.

The U.S. gained a decisive edge through:

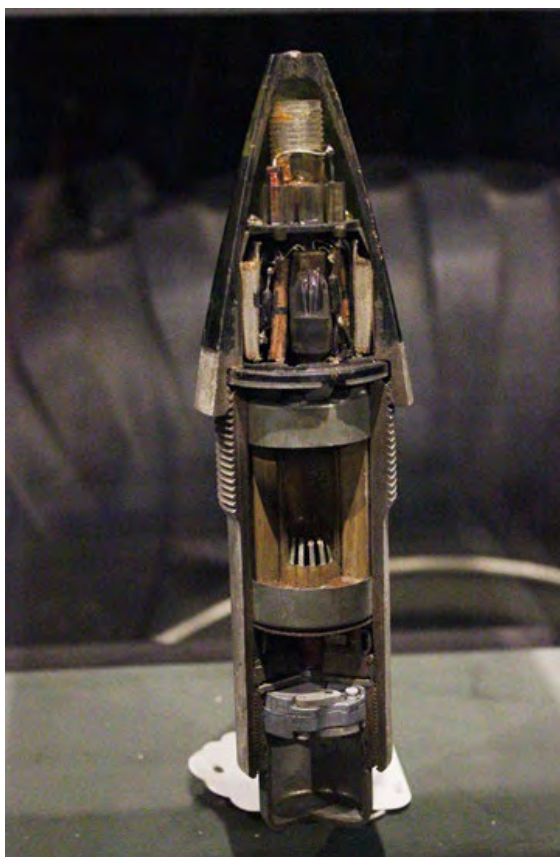
- **Radar:** Allowed for superior fighter direction to intercept enemy strikes.
- **Proximity Fuses:** Revolutionized anti-aircraft defence, making carrier groups nearly suicidal to attack.
- **Damage Control:** U.S. crews became masters of "saving the ship" (e.g., the *USS Franklin*), whereas Japanese carriers often sank from single hits due to poor ventilation and enclosed hangars.

Carriers were the primary players in the five major carrier-vs-carrier battles of the Pacific, including **Midway** and the **Philippine Sea**, which effectively destroyed the Japanese Navy's offensive capabilities. By the end of the war, carrier aircraft were responsible for **70% of all Japanese fleet carrier sinkings** and 55% of their battleship sinkings.

The U.S. Navy's ability to survive the Pacific war relied on two "invisible" advantages: a high-tech "smart" fuse that decimated enemy aircraft and a world-class damage control system that kept crippled ships from sinking.

1. The Proximity (VT) Fuse: "The Tiny Miracle"

(See 'The Tizard Mission' Article. The proximity fuse was a British invention and was handed over to the Americans free of charge along with many other ground-breaking inventions).



Before this invention, shooting down a plane required a direct hit or a perfectly timed fuse. The proximity fuse, codenamed **Variable Time (VT)** (left), to hide its true nature, changed everything by turning every shell into a miniature radar station.

The shell contained a tiny radio transmitter and receiver. As it flew, it emitted radio waves; when it got close enough to a target (about 70–100 feet), the reflected signal would trigger a thyatron tube to detonate the explosive.

Scientists had to miniaturize delicate glass vacuum tubes—originally used in hearing aids—and make them rugged enough to survive 20,000 Gs of force when fired from a 5-inch gun.

It increased anti-aircraft effectiveness by **5 to 10 times**. At the Battle of the Philippine Sea, it was so effective that the Japanese air corps was virtually wiped out in a single day, an event known as the "Great Marianas Turkey Shoot".

It was considered the third most important secret of the war, after the atomic bomb and radar. *(All three of these inventions were given to the U.S. by the British. See 'The Tizard Mission').* For most of the war, it was only used over water so that a "dud" shell could never be captured and reverse-engineered by the enemy.

2. U.S. Damage Control: Built to Survive

While Japanese carriers were often "Roman candles" that exploded after a single hit, U.S. ships were built to take a beating and keep fighting.

- **Everyone is a Firefighter:** Unlike other navies that had small, specialized teams, every single U.S. sailor was trained in basic firefighting and leak plugging. If a ship was hit, "repair parties" were spread out so a single hit couldn't wipe out the ship's ability to respond.
- **Saving the *Yorktown*:** At the Battle of the Coral Sea, the *USS Yorktown* was heavily damaged. Japanese intelligence thought she was sunk, but her damage control teams patched her so quickly that she returned to fight at Midway just weeks later.
- **Counter-Flooding:** If a ship started to lean (list) because one side was filling with water, U.S. officers would intentionally flood compartments on the *other* side to "right" the ship and prevent it from capsizing.
- **Design Advantages:** U.S. carriers had **open hangars**, allowing crews to simply push burning planes or bombs overboard into the sea, rather than letting the fire spread through the hull.

The combination of these factors meant that by 1944, Japanese pilots faced a wall of lethal flak they couldn't fly through, and even if they did hit a ship, the American crew was almost impossibly good at keeping it afloat.

Sources

- Wikipedia
- YouTube
- Reddit
- Association for Asian Studies
- Warfare History Network
- U.S. Naval Institute
- Hoover Institution
- Defense Media Network