

The first application of an aircraft 400 Hz supply so far found was on the **Boeing XB-15**. This was a one of a kind bomber, built in about 1937. It was converted to cargo use and was based in Panama, ferrying supplies from Florida to Panama during WWII. It had two internal gasoline engines driving two APUs, which powered the first two 400 Hz 110 V AC aircraft generators in the world. Honeywell claims that these generators were theirs. Though the XB-15 never entered production and only one aircraft was built, it was the first to utilise 400 Hz.

https://en.wikipedia.org/wiki/Boeing_XB-15



The next use of 400 Hz seems to be on the **Boeing B-36** bomber. This was the first one with Sundstrand CSDs installed on the engines. This was the entry of Sundstrand into Aerospace and dates to 1945.

https://en.wikipedia.org/wiki/Convair_B-36_Peacemaker



This shows a B-36 next to a B-29. The B-29 was a huge WWII bomber and the type that dropped the first atomic bombs on Japan. The B-36 makes it look small in comparison.

Dr. Jim Mitchell, working at Westinghouse, used to talk about the dawn of AC in aircraft. He was a corporal in the US Army Air Corps, in the 1944th Ordnance Ammunition Company in India and Burma. He went to college after the war on the GI bill and was hired around 1950 at Westinghouse. He did not work on the B-36 system, but he was there with the guys who did.

Up to 1945 every aircraft that had electrical power on board used DC. The US Army Air Force was building a super bomber to bomb Japan in WWII and it was really big. They decided that 28 VDC was inadequate for this new super aircraft and it would be AC. Their research scientists picked **400 Hz** as a good compromise on frequency, being high enough to reduce the weight and size, but low enough that feeder impedance losses were manageable. Dr. Mitchell would complain bitterly about that decision years later. He insisted that 360 Hz would have been a better choice, due to it being a multiple of 60 Hz and therefore would have made the ground power carts easier to build in the US.

During development of the B-36 electrical system, the key question was how to derive a constant generator speed from the variable engine speed. It was known that Sundstrand was making constant input, variable output drives for the machine tool industry. In the early days of factories, it was not uncommon to have a water wheel or large stationary steam boiler turning a low speed shaft that supplied the power for all machine tools in a building. Sundstrand invented a hydraulic drive that converted the constant input speed to a variable output speed for the machines, to better serve the requirements of lathes, drills, milling machines and grinders.

In 1944-1945, the Army approached Sundstrand asking them to turn the drive around and take a variable input speed and produce a constant output speed. At the end of WWII, aircraft generators mounted to the Sundstrand **constant speed drive** (CSD) produced the first engine driven, **400 Hz** AC generating system.

The B-36 was finished too late to see service in the Pacific, but it laid the foundation for all AC aircraft electrical systems to this day.