



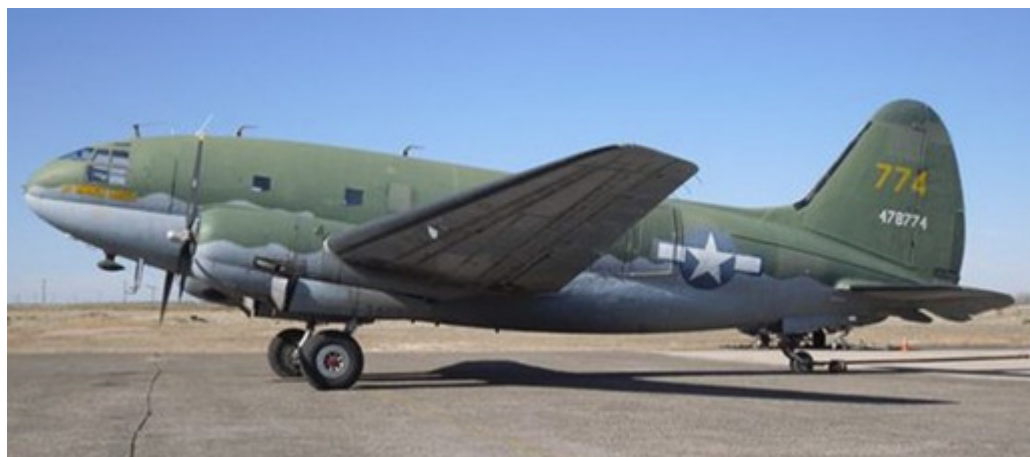
C-46 COMMANDO & 'THE HUMP'



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Curtiss C-46 "Commando" in War & Peace



"The Curtiss C-46 "Commando" was a twin-engine cargo lifter used primarily by the US Army Air Force (USAAF) in World War II, although it saw action with other services during the war, and in later conflicts and limited civil use. The C-46 remains largely forgotten as it was overshadowed by the more famous Douglas C-47 "Skytrain/Dakota" transport.

The superior load carrying and performance of C-46 suited it better to the perilous supply line over "The Hump" (as the Himalaya Mountains were nicknamed by Allied airmen) taking supplies from India to troops in China. Unfortunately the C-46 needed a high level of maintenance and suffered from some fatal defects.

I have looked at a number of websites and those on the C-47 are few and brief. I have thus drawn heavily on the Wikipedia account.

Andy Cornwell

In 1940 the aircraft designation 'C' indicated 'Cargo Transport'. The US Army Air Corps (USAAC) became the US Army Air Force (USAAF) in June 1942 and later separated from the US Army altogether to become the US Air Force (USAF) in 1947.



The Curtiss C-46 "Commando" is inevitably compared with the legendary Douglas C-47 "Skytrain/Dakota". Surprisingly, the C-47 was ordered by the USAAC only in 1940. Being an adaptation of the well-established DC-3 (in airline operation since 1935) it came into military service relatively quickly and by the end of WWII the USAAF had bought 9,348 of them.

The C-46 was also ordered in 1940 and its number suggests that it was in fact ordered before the C-47. Being a new design of aircraft, based on a proposed pressurised airliner, it did not get into volume production until 1944: a total of 3,181 built by the end of the war.

Curtiss C-46 "Commando" – Data [/Comparison]

Cruising Speed: 236 mph [C-47: 160 mph]

Range: 3,150 miles [C-47: 1,600 miles]

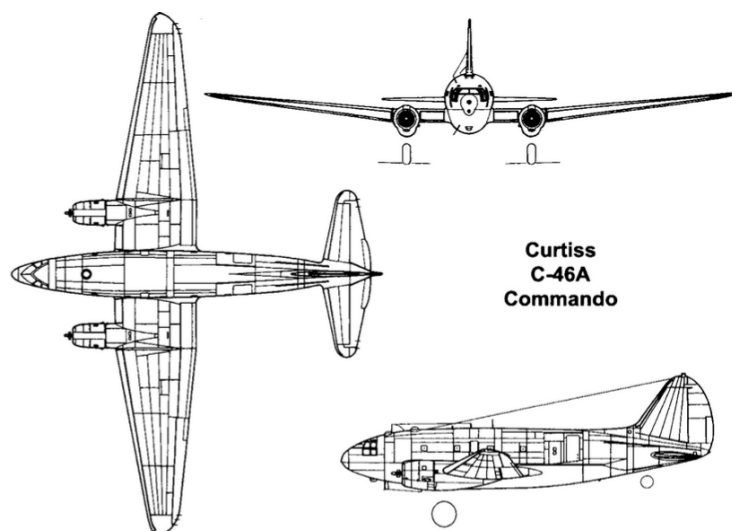
Wingspan: 108 ft' [B-17: 104 ft, C-47: 95 ft]

Length: 76 ft, 4 in

Height: 21 ft, 9 in

Empty weight: 30,000 pounds

Gross weight: 45,000 pounds



Curtiss
C-46A
Commando

Max. payload: 15,000 pounds or 50 passengers

(Take-off weight listed as 50,000 lbs max but was actually loaded up to 53,000lbs in service.)

[Cargo capacity of the C-46 was twice the weight of that of the C-47 and three times the volume]

Engines: 2 Pratt & Whitney Double Wasp engines, with the R-2800-34 variant delivering 2,100 horsepower each, and driving four-bladed Curtiss electrically-operated propellers (replaced by three-bladed Hamilton-Standard propellers due to electrical pitch control problems)

[C-47 engines: 2 Pratt & Whitney R-1830 radial engines delivering 1,100 horsepower each]

The Curtiss CW-20 prototype for what would become the C-46 was designed in 1937 by George A. Page Jr., the chief aircraft designer at Curtiss-Wright. The CW-20 was a private venture intended to compete with the four-engined Douglas DC-4 and Boeing Stratoliner by the introduction of a new standard in pressurized airliners. The CW-20 had a patented fuselage conventionally referred to as a "figure-eight" (or "double-bubble") which enabled it to better withstand the pressure differential at high altitudes.



This was done by having the sides of the fuselage creased at the level of the floor that not only separated the two portions but shared in the stress of each, rather than just supporting itself. The main spar of the wing could pass through the bottom section, which was mainly intended for cargo, without intruding on the passenger upper compartment. A decision to utilize a twin-engine design instead of a four-engine configuration was considered viable if sufficiently powerful engines were available, allowing for lower operating costs and a less complex structure.

Engineering work involved a three-year commitment from the company and incorporated an extensive amount of wind tunnel testing at the California Institute of Technology (Caltech). The resultant design was a large but aerodynamically "sleek" airliner, incorporating the cockpit in a streamlined glazed "dome". The engines featured a unique nacelle "tunnel cowl" where air was ducted in and expelled through the bottom of the cowl, reducing turbulent airflow and induced drag across the upper wing surface. After a mock-up was constructed in 1938 Curtiss-Wright exhibited the innovative project as a display in the 1939 New York World's Fair.

Although the company had approached many airlines in order to obtain their requirements for an advanced airliner, no firm orders resulted: 25 letters of intent were received, sufficient to undertake production. The design of a 24–34 seat passenger airliner proceeded to prototype stage as the CW-20 at the St. Louis, Missouri facility. The initial configuration featured twin vertical tail surfaces. Powered by two 1,700 hp (1,300 kW) R-2600-C14-BA2 Wright Twin Cyclones, the prototype, registered NX-19436 flew for the first time on 26 March 1940. After testing modifications were instituted, including the fitting of a large single tail to improve stability at low speeds.

The first prototype was purchased by the United States Army Air Forces (USAAF) to serve as a master for the series and was designated "C-55" but after military evaluation, the sole example was returned to Curtiss-Wright and subsequently re-sold to the British Overseas Airways Corporation.

During testing General Henry H. "Hap" Arnold became interested in the potential of the airliner as a military cargo transport. On 13 September 1940 he ordered 46 modified CW-20As as the C-46-CU Commando; the last 21 aircraft in this order were delivered as Model CW-20Bs, called C-46A-1-CU. None of the first C-46s purchased by the U.S. military were pressurized and the first 30 delivered to the AAF were sent back to the factory for 53 immediate modifications.

The design was then modified to the C-46A configuration, receiving enlarged cargo doors, a strengthened load floor and a convertible cabin that speeded changes in carrying freight and troops. The C-46 was introduced to the public at a ceremony in May 1942.

A total of 200 C-46As in two initial batches were ordered in 1940, although only two were actually delivered by December 7, 1941 *[Pearl Harbour!]*. At this time one other important change was made; more powerful 2,100 hp Pratt & Whitney R-2800 Double Wasp engines replaced the two Wright Twin Cyclones. By November 1943, 721 modifications had been made to production models, although many were minor, such as fuel system changes and fewer cabin windows were also



adopted. Subsequent military contracts for the C-46A extended the production run to 1,454 examples, 40 of which were for the U.S. Marine Corps, to be designated R5C-1.

The military model was fitted with double cargo doors, a strengthened floor and hydraulically operated cargo-handling winch. Forty folding seats were the sole passenger accommodation for what was essentially a cargo hauler. Tests indicated that the production C-46 was capable of carrying a substantial payload, and could fly well on one engine. When empty, the aircraft could even climb on one engine at 200–300 ft per minute.

The final large production-run C-46D arrived in 1944-45, and featured single doors to facilitate paratroop drops; production totalled 1,430 of this model".

The C-46 was a large and highly capable cargo carrier. It suffered many problems in development and wartime use, mostly minor but at least three of led to catastrophic accidents. Its nicknames included "the flying coffin" (aircrew) and "the plumber's nightmare" (groundcrew).

THE C-46 IN WWII

"The Curtiss C-46 "Commando" was a twin-engine cargo plane used primarily by the US Army Air Force (USAAF) in World War II, although it saw action with other services during the war, and in later conflicts. Initially designed as a pressurised airliner it was requisitioned by the military in 1941 and built as a cargo transporter. It was bigger and more powerful than the Douglas C-47 "Skytrain/ Dakota", having a cargo capacity twice the weight of that of the C-47 and three times the volume [got that the wrong way round in part 1!]. The following article is based on:

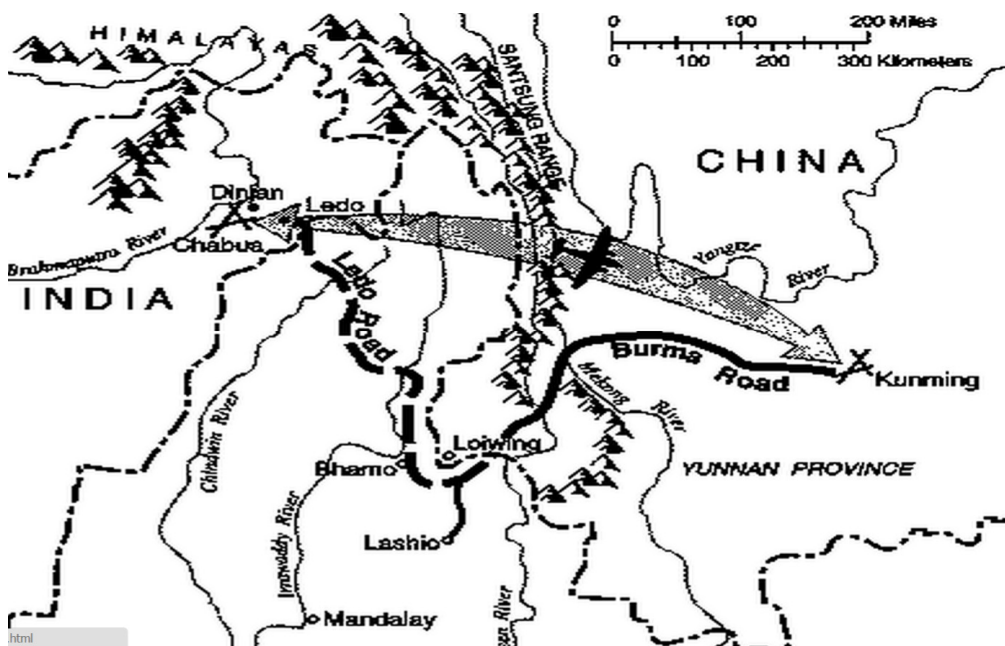
http://en.wikipedia.org/wiki/Curtiss_C-46_Commando

http://en.wikipedia.org/wiki/The_Hump

Two main theatres of operation for the C-46 were in the Far East and in crossing the Rhine in Germany:

The Far-East

The better-known aspect of the war against Japan is the hard-fought Pacific battles and island-hopping campaign by the US Navy and Marine Corp. On land the Fourteenth (British-Indian) Army under General Bill Slim threw back the Japanese army from the borders of India and forced a retreat through Burma. The crucial battles at the turning point were notably Imphal and Kohema, strongpoints that were held only because of RAF and USAAF supply drops. So little did people know about them (then and now) that the 14th called themselves 'The forgotten army'.



The C-46 became most famous for its operations in the China-Burma-India theatre (CBI). The Commando was a workhorse in flying over **"The Hump"** (as the Himalaya Mountains were nicknamed by Allied airmen), transporting desperately needed supplies to troops in China from bases in India. This 525 mile route from the edge of north-east India flying East to China curved north across the Himalayas to avoid Japanese fighters.

The Chinese were engaged in a major land campaign which

is estimated to have tied-up a million Japanese soldiers. The Chinese were highly dependent on Allied (including Russian) air supplies.

A variety of transports had been employed in the campaign, but only the C-46 was able to handle the wide range of adverse conditions encountered by the USAAF. Unpredictably violent weather, heavy cargo loads, high mountain terrain, and poorly equipped and frequently flooded airfields proved a considerable challenge to the transport aircraft then in service, along with a host of engineering and maintenance nightmares due to a shortage of trained air and ground personnel.



After a series of mechanical gremlins were controlled, if not surmounted, the C-46 proved its worth in the airlift operation in spite of continuing

maintenance headaches. It could carry more cargo higher than other Allied twin-engine transport aircraft in the theatre, including jeeps, light artillery, fuel, ammunition, parts of aircraft and, on occasion, livestock. Its powerful engines enabled it to climb satisfactorily with heavy loads, staying aloft on one engine if not overloaded, though "war emergency" load limits of up to 40,000 lbs often erased any safety margins.

The troublesome Curtiss-Electric electrically controlled pitch mechanism on the propellers had been removed when, through wear, it sometimes defaulted to full-feather – with lethal possibilities. The C-46 continued to be employed in the CBI and over wide areas of southern China throughout the war years. Even so, the C-46 was referred to by ATC pilots as the "flying coffin" with at least 31 known instances of fires or explosions in flight between May 1943 and March 1945, and many others missing and never found (a likely explanation was found post-war).

The India-China airlift delivered approximately 650,000 tons of materiel to China at great cost in men and aircraft during its 42-month history. General Tunner's final report stated that the airlift "expended" 594 aircraft.

At least 468 American and 41 CNAC (originally Colonel Chenault's 'Flying Tiger' American Volunteer Group) aircraft were known lost from all causes, with 1,314 air crewmen and passengers killed. In addition, 81 more aircraft were never accounted for, with their 345 personnel listed as missing. Another 1,200 personnel had been rescued or walked back to base on their own.

The following are wartime films on 'The Hump' produced by the US Government – recommended:

www.youtube.com/watch?v=IMpRIx0wQ

www.youtube.com/watch?v=FiLJdgjs12s

The C-46's huge cargo volume, large cargo doors, powerful engines and long range also made it suitable for the vast distances of the Pacific island campaign. In particular, the U.S. Marines found the aircraft (known as the R5C) useful in their amphibious Pacific operations, flying supplies in and wounded soldiers out of numerous and hastily built island landing strips.

Europe

Running from Switzerland to the North Sea the River Rhine has historically stood as a natural barrier defending the German heartland. As the Allied armies approached it Hitler ordered the destruction of all bridges across the river. The US Army managed to capture the *Ludendorff* railroad bridge at the little resort town of Remagen, a few miles to the southeast of Cologne, before it was blown up. In a full-scale assault they crossed the bridge in four minutes and then removed most of the demolition charges under heavy fire. Some went off, but not enough to destroy the bridge. This gave the Allies a small bridgehead across the Rhine, but much more was needed.

March 1945 was the first time the C-46 was first deployed in numbers to the European theatre. It augmented USAAF Troop Carrier Command in time to drop paratroopers in the major offensive to cross the Rhine (Operation Varsity). So many C-46s were lost in this paratroop drop that Army General Matthew Ridgway issued an edict forbidding the aircraft's use in future airborne operations.

Even though the war ended soon afterwards and no further airborne missions were flown, the C-46 may well have been unfairly demonised. The operation's paratroop drop phase was flown in daylight at low speeds and very low altitudes by an unarmed cargo aircraft without self-sealing fuel tanks.

They flew over heavy concentrations of German 20 mm, 37 mm, and larger calibre ant-aircraft (AA) cannon utilizing explosive, incendiary, and armour-piercing incendiary ammunition. By that stage of the war German AA crews had trained to a high state of readiness; many batteries had considerable combat experience in firing on and destroying high-speed, well-armed fighter and fighter-bomber aircraft while under fire themselves.

Many if not all of the C-47 Skytrains used in Operation Varsity had been retrofitted with self-sealing fuel tanks while the C-46s received no such modification. Although 19 of 72 C-46 aircraft were shot down during Operation Varsity, it is not as well known that losses of other aircraft types from AA fire during the same operation were similar.

Despite its obvious and valuable utility the C-46 remained a maintenance nightmare throughout its AAF career. The official history of the Army Air Forces summarized its shortcomings:

"But from first to last, the Commando remained a headache. It could be kept flying only at the cost of thousands of extra man-hours for maintenance and modification. Although Curtiss-Wright reported the accumulation by November



1943 of the astounding total of 721 required changes in production models the plane continued to be what maintenance crews around the world aptly described as a "plumber's nightmare."

*Worse still, the plane was a killer. In the experienced hands of **Eastern Air Lines** and along a route that provided more favourable flying conditions than were confronted by military crews in Africa and on the Hump route into China, the plane did well enough. Indeed, Eastern Air Lines lost only one C-46 in more than two years of operation. But among the ATC pilots the Commando was known, with good reason, as the 'flying coffin'.*

From May 1943 to March 1945, Air Transport Command received reports of thirty-one instances in which C-46s caught fire or exploded in the air. Still others were listed merely as "missing in flight," and it is a safe assumption that many of these exploded, went down in flames, or crashed as the result of vapour-lock, carburetor icing, or other defects."

The cause of the wartime explosions was eventually traced to pooled gasoline from small leaks in the tanks and fuel system, combined with a spark, usually originating from open-contact electrical components. Though many service aircraft suffered small fuel leaks in use the C-46's wings were unvented; if a leak occurred the gasoline had nowhere to drain but rather pooled at the wing root. Any spark or fire could set off an explosion. After the war, all C-46 aircraft received a wing vent modification to vent pooled gasoline, and an explosion-proof fuel booster pump was installed with shielded electrical selector switches in lieu of the open-contact type used originally.

Curtiss C-46 Commando - Post WWII

After the war, Curtiss proposed civilian developments of the C-46 and **Eastern Air Lines** ordered a number of CW-20Es late in 1945. The order was however cancelled and further C-46 developments were ceased by Curtiss. Overall, the C-46 had been successful in its primary role as a wartime cargo transport, and had benefited from a series of improvements. Like the C-47/DC-3, the C-46 seemed destined for a useful career as a post-war civilian passenger airliner, and was considered for that purpose by Eastern Airlines. However, the high operating costs of the C-46 (up to 50% greater than the C-47), soon caused most operators to change their minds. Consequently, most post-war C-46 operations were limited to commercial cargo transport, and then only for certain routes.

One of the C-46's major drawbacks was the prodigious fuel consumption of its powerful 2,200 hp engines, which used fuel at a much higher rate than the C-47/DC-3. Maintenance was also more intensive and costlier. Despite these disadvantages surplus C-46s were used by some air carriers, including Capitol, Flying Tigers, Civil Air Transport (CAT) and World Airways to both carry cargo and passengers.

Many other small carriers also eventually operated the type on both scheduled and non-scheduled routes. The C-46 became a common sight in South America, and was widely used in Bolivia, Peru, Brazil, Argentina and Chile, especially in mountainous areas (where a good climb rate and high service ceiling were required) or to over-fly deep jungle terrain where ground transport was impracticable.

C-46 Commandos also went back to war, serving in both Korea and Vietnam for various USAF operations, including re-supply missions, paratroop drops, and clandestine agent transportation. The C-46 was not officially retired from service with the U.S. Air Force until 1968.

The type also served under a U.S. civilian agency, the Central Intelligence Agency (CIA). The C-46 played a supporting role in many clandestine operations during the late 1940s and early 1950s. These included re-supply efforts to Chiang Kai-Shek's troops battling Mao's Communists in China as well as flying cargoes of military and medical supplies to French forces via Gialam Airfield in Hanoi and other bases in French Indochina.

The CIA operated its own "airline" for these operations, **Civil Air Transport (CAT)**, which was eventually renamed **Air America** in 1959. An Air America C-46 was the last fixed-wing aircraft flown out of Vietnam (Saigon) at the close of hostilities there. On 29 April 1975, Capt. E. G. Adams flew a 52-seat version, with 152 people on board, to Bangkok, Thailand. The C-46 was also employed in the abortive U.S.-supported Bay of Pigs invasion in 1961.

Although their numbers gradually began to dwindle, C-46s continued to operate in remote locations, and could be seen in service from Canada and Alaska to Africa and South America. For example:



In the late 1970s and early 1980s, the Canadian airline **Lamb Air** operated several C-46s from their bases in Thompson and Churchill, Manitoba. One of the largest C-46 operators was Air Manitoba, whose fleet of aircraft featured gaudy colour schemes for individual aircraft. In the 1990s, these aircraft were divested to other owner/operators.

Between 1993 and 1995, Relief Air Transport operated three Canadian registered C-46s on Operation Lifeline Sudan from Lokichoggio, Kenya.

These aircraft also transported humanitarian supplies to Goma, Zaire and Mogadishu, Somalia from their base in Nairobi, Kenya.

Buffalo Airways currently owns and operates three C-46s, primarily used in Canada's Arctic. Two C-46s, formerly owned and operated by Relief Air Transport in Africa, were operated as freighters for **First Nations Transportation** in Gimli, Manitoba, but the airline has now ceased operations with one aircraft sold to Buffalo Airways and the other tied up in receivership.

The **Japan Air Self-Defence Force** used the Commando until at least 1966, when they began development of the Kawasaki C-1.



Braniff Airways Curtiss Commando Purchased in 1955



A C-46 nicknamed "Salmon Ella," lands at the Kenai Municipal airport on Tuesday, Jan. 13, 2014 in Kenai, Alaska. **Everts Air Fuel** operates(/operated) several of the planes to deliver fuel and cargo around the state.

Photo by Rashah McChesney/Peninsula Clarion

THE END