

# A Look Back...

## LOCKHEED C-141 STARLIFTER



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PHOTOGRAPH LAYOUT BY: HQ AFMC HISTORY OFFICE

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## LOCKHEED C-141 STARLIFTER

Developing the C-141 *Starlifter* was the vision of Lt. Gen. William Tunner, who had commanded American units flying the “Hump” in World War II and the “Berlin Airlift” in 1948-1949. In the 1950s, he and other members of the Military Air Transport Service lobbied for a jet cargo-transport, capable of “flexible response to limited conflagration.” To that end, Lockheed-Georgia (now Lockheed-Martin), Marietta, Georgia built the *Starlifter*. This aircraft became the workhorse of the Military Airlift Command, later, the Air Mobility Command (AMC). On 1 July 1960, Congress appropriated \$200 million for the Air Force to buy or modify existing airlift aircraft. On 15 November, a final version of Specific Operational Requirement (SOR) #182 emerged, calling for a long-range jet designed principally to haul cargo. On 21 December, requests for proposal were sent to Boeing, Douglas, Convair, and Lockheed-Georgia. Lockheed had the advantage because of its experience producing the C-130 tactical transport.

On 13 March 1961, President John F. Kennedy announced that Lockheed Aircraft Corp. had won the competition. Determined to change the United States’ “all-or-nothing” defense policy, Kennedy ordered the development of the C-141A all-jet transport to expand the nation’s ability to conduct “limited wars.” Lockheed designed the new aircraft for easy maintenance, efficient loading, and relatively short landing and takeoff. Powered by four Pratt and Whitney TF33-P-7 turbofan engines, the C-141A, with an empty weight of 134,200 pounds, could carry 70,000 pounds of cargo or 154 troops traveling at 500 miles per hour. It could haul 63,000 pounds of cargo nearly 4,000 miles without refueling. The C-141 handled more than 30 different missions, having an adjustable cargo compartment that could transition from floor rollers for palletized cargo to a smooth floor for wheeled vehicles. It could be arranged with aft facing or sidewall canvas seats for passengers. It could even store a palletized lavatory and galley. In its aeromedical evacuation role, the *Starlifter* carried 103 patient-litters, 113 ambulatory patients or a combination of the two. The “T-tail empennage” offered significant aerodynamic advantages over conventional designs and the relatively high location of the horizontal tail provided undisturbed airflow at normal cruise conditions, thereby maximizing stability and control.



The first production aircraft rolled out of the Lockheed factory on 22 August 1963 with the Air Force accepting it six days later. Flight testing began on 17 December 1963. The last production models rolled out on 27 February 1968. By early 1970 there were a total of 276 C-141As in operations for the Air Force, four with the National Aeronautical and Space Administration and four with the National Weather Service. The first Air Force C-141As arrived at Tinker AFB, Oklahoma in October 1964 and began operations in April 1965. They made almost daily flights to Vietnam, carrying troops, equipment and supplies, and returning patients to U.S. hospitals. In 1968 alone, 256 C-141As carried 82.3-percent of the 2,724,473,575 tons of military cargo flown. The C-141A was the first jet transport from which U.S. Army paratroopers jumped, and the first to land in the Antarctic. It also established the world record for a heavy cargo drop of 70,195 pounds.

In October 1973, the aircraft’s one shortcoming nearly cost America her most important Middle Eastern ally – Israel. As the U.S. prepared to

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send supplies to Israeli troops fighting the Yom Kippur War, her European allies, fearing a cessation of their oil supplies from Arab nations, refused to allow C-141s to land and refuel. While Portugal eventually did allow the *Starlifters* to land in the Azores, saving Israel, the incident demonstrated the need for an aerial refueling capability. In April 1977, Air Force officials at the Warner Robins Air Logistics Center (WR-ALC), Robins AFB, Georgia turned again to Lockheed to modify the fleet. Congress provided \$641 million for the project but the two parties concluded an incentive-laden contract totaling \$458 million, far below projection. The agreement called for the conversion of 270 A models into “stretch” B models. Since the C-141A engines were more powerful than the fuselage required, adding size and weight would not affect engine performance or speed.

After building and testing the YC-141B prototype for two years, production began in early 1979. The B models rolled off the assembly lines from 4 December 1979 to 29 June 1982, coming in \$20 million under the \$458 million budget. Lockheed housed the production line in their Marietta, Georgia factory where employees separated the aircraft fore and aft of the wing and added a 160-inch plug forward and 120-inch plug aft, lengthening the plane by 23 feet, 4 inches. This increased its cargo capacity from 7,019 cubic feet to 9,190 cubic feet which was the equivalent of building 90 new “A” models at a fraction of the price. Lockheed also added a universal air refueling receptacle, which facilitated long non-stop airlift missions. The C-141 fleet flew seven million reliable flying hours from 1982 to 2006. From the day the first *Starlifter* rolled out until the last one (Serial No. 65-0248) completed Programmed Depot Maintenance (PDM) on 16 October 2003, the WR-ALC sustained the C-141s.

In its new configuration, the *Starlifter* continued to perform low-altitude delivery of personnel and equipment, and high-altitude delivery of paratroops, retaining the ability to airdrop equipment and supplies using the container delivery system. It was the first aircraft designed to be compatible with the 463L Material Handling System, which permitted off-loading 68,000 pounds of cargo, as well as refueling and fully reloading in less than an hour.

In the fall of 1990, at the outset of Operation *Desert Shield/Desert Storm*, a C-141B from the 437th Military Airlift Wing, Charleston AFB, South Carolina, was the first American aircraft to arrive in Saudi Arabia. During the war, C-141s flew the most airlift missions – 7,047 out of 15,800. They carried more than 41,400 passengers and 139,600 tons of cargo. After the war, Air National Guard (ANG) and Air Force Reserve (AFRC) units received C-141s. The Air Force Reserve, through its associate units, provided 50-percent of the *Starlifter’s* crews, 84-percent of its maintenance capability, and more than 30-percent of AMC’s peacetime missions.

In the 1990s, Aircraft Structural Integrity Program specialists at Robins AFB realized that cracks in the lower wing surface panels caused by the stretching process might cause catastrophic failure. In 1979, engineers had decided not to replace the Center Wing Box that held the



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wings to the fuselage since the C-141 was scheduled to be replaced by the C-17 in the mid-1990s. Delays in the C-17 program caused increasing safety concerns among Lockheed and Air Force leaders. They used Nondestructive Inspections to detect smaller cracks while repair personnel performed Home Station Checks at the using Commands, inspecting wing panels every 120 days at AMC, ANG, and AFRC units, and every 30 days at Air Education and Training Command units. This extended aircraft down time since they were repaired using a kit consisting of 74 structural parts and fasteners.

In January 1995, WR-ALC officials began refurbishing the fleet during PDM at Robins AFB and at the contract facility. Since wear was greater than

expected, sustainment personnel replaced all potentially defective parts including the Center Wing Box, which pushed scheduled program completion to the end of 1999. This meant the task could not be done during PDM and, thus, they created a speed line which returned all the C-141 to service ahead of schedule.

In May 2006, the Air Force retired the last C-141s. In 43 years of service, they performed a myriad of airlift missions from deploying combat forces and their equipment over long distances to extracting Prisoners of War on the “Hanoi Taxi.”

### Further Reading

Head, William P. *Reworking the Workhorse: C-141B Stretch Modification Program*. Robins AFB, Georgia: WR-ALC History Office, September 1984.

Kraus, Walter L., Jose M. Matheson, Joy Gustin, & Isobel M. Bryant. *C-141 Starlifter (January 1959-June 1971): Narrative*. Scott AFB, Illinois: MAC History Office, 15 January 1973.

WR-ALC Office of History. *Warner Robins Air Logistics Center Annual Histories, FY 1982-2003*. Specifically chapters entitled “Aircraft Management” and “High Technology.”

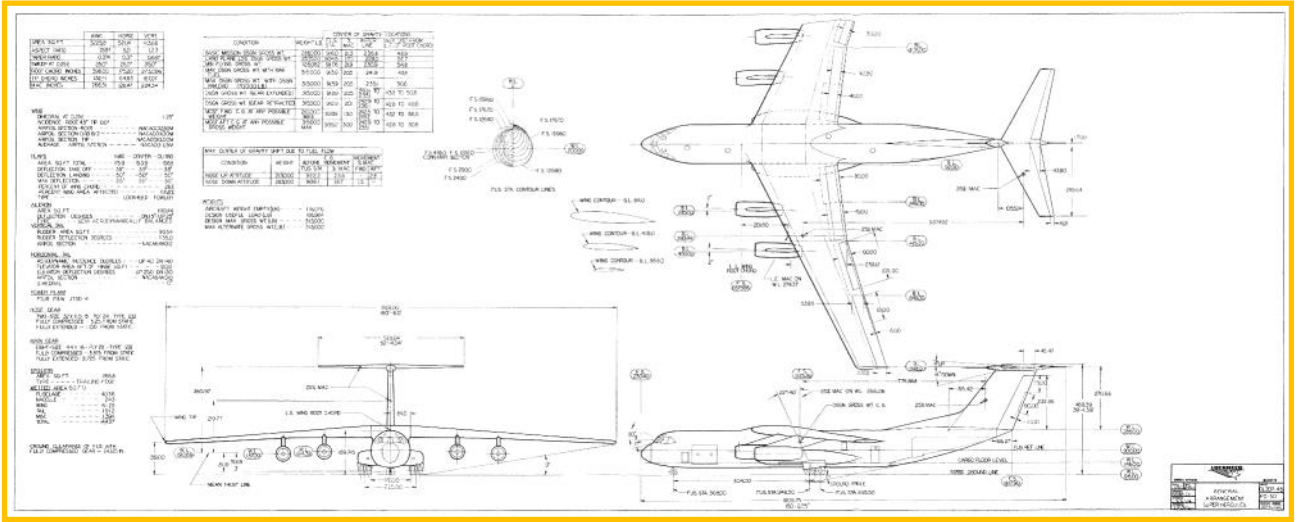
## LOCKHEED C-141 STARLIFTER

The Douglas C-47 Skytrain, first flown on December 23, 1941, became the workhorse for the Army Air Corps and U.S. Air Force throughout World War II, Korea and Vietnam wars. Developed from the Douglas DC-3 airliner, over 10,000 'Gooney Birds' were ultimately built, serving in a variety of rolls including cargo and troop transport, glider tow vehicle, and aerial gunship. The U.S. Air Force retired the last C-47's from the 6th Special Operations Squadron in 2008.

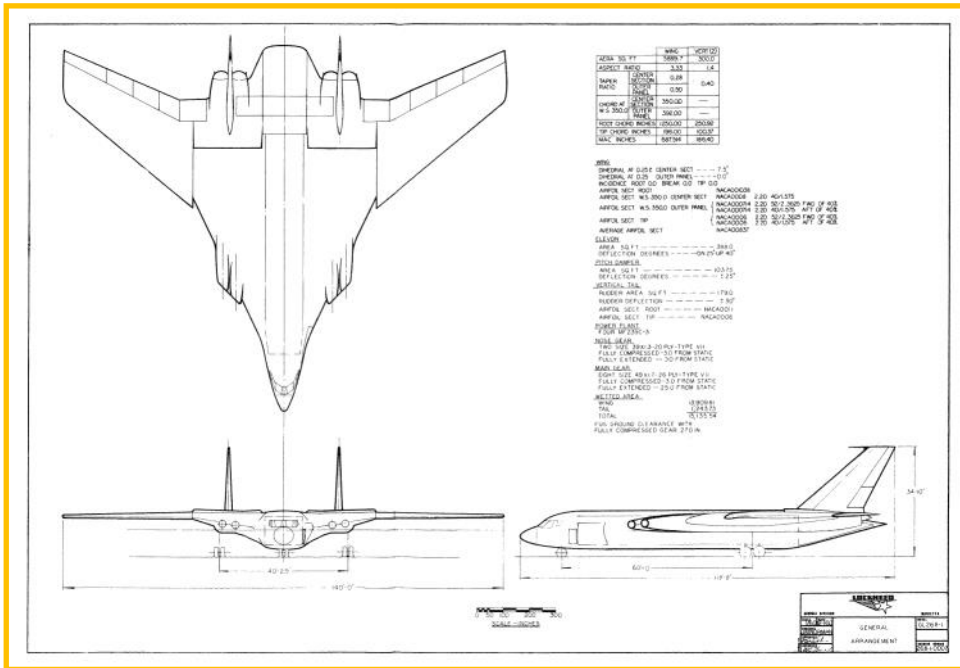


A mainstay of cargo delivery for the USAF, the Lockheed C-130 has been in continuous production since its first flight on August 23, 1954. Serving a variety of functions with many services worldwide, the Hercules has proven to be one of the most versatile aircraft built.

# LOCKHEED C-141 STARLIFTER



When the government issued Special Operational Requirement (SOR) #182, Lockheed-Georgia competed against Boeing, Douglas and Convair for the Logistics Transport Support System 476L contract. Lockheed's winning proposal, known internally as GL-207-45 Super Hercules, received the Air Force designation C-141 Starlifter. (Scott Lowther Collection)



One of the most unique designs proposed by Lockheed-Georgia under SOR-182 was this 4-engine layout designated GL-268-1. Propulsion was provided from 4 experimental MF-239C-3 jet engines. (Craig Kaston Collection)

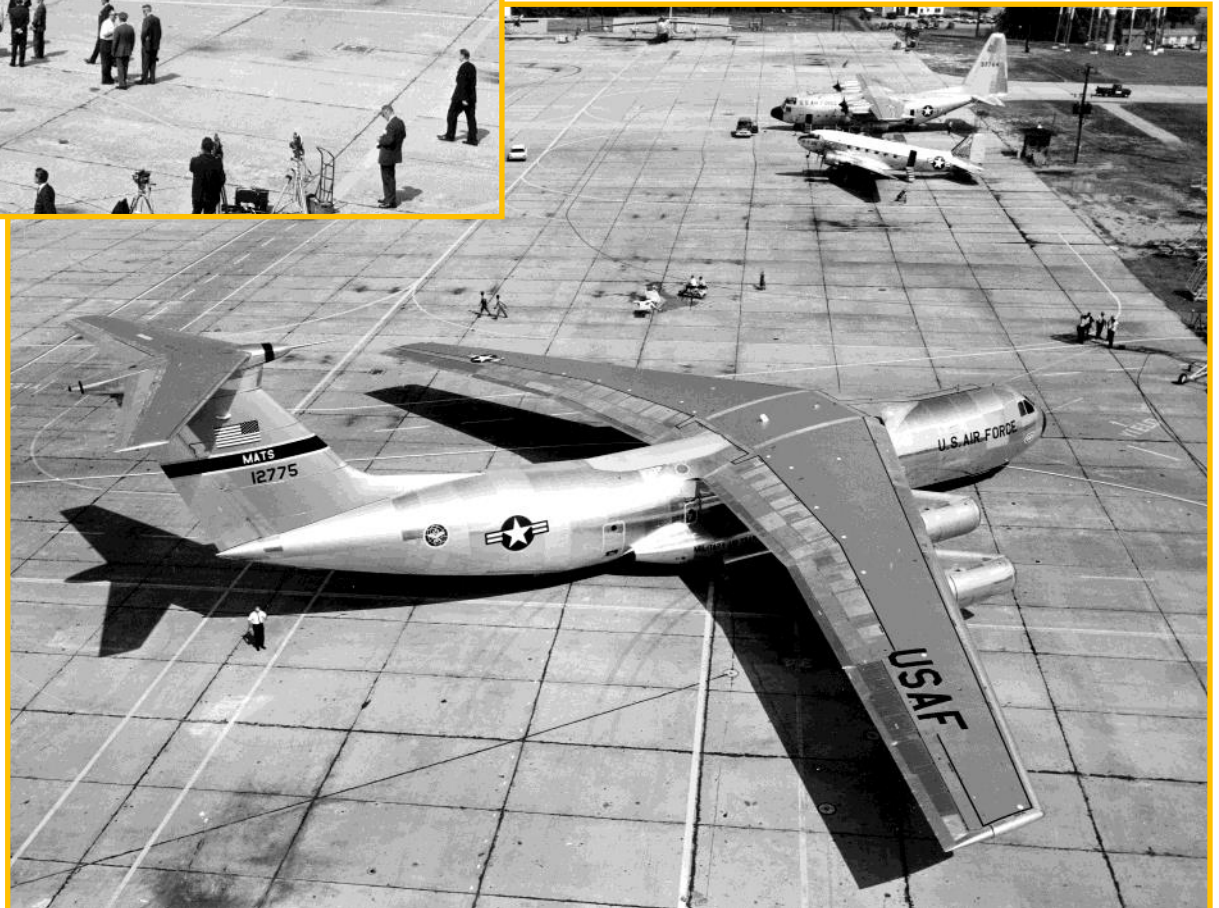
A full-scale C-141 mockup, constructed at Lockheed, allowed engineers to see any potential issues prior to construction of the first airframe.



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Rollout of the first YC-141A took place at the Lockheed-Georgia facility in Marietta on August 22, 1963. VIP's that attended the event included senators, congressmen, high-ranking officials from all services and included remarks made by President John F. Kennedy who spoke from the Fish Room at the White House. Note the C-47 and C-130 in the background of the photo at right.



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Initial flights of the Lockheed YC-141A flew with a large flight test boom with a YAPS (Yaw-And-Pitch-Sensor) head installed. Making its first flight from Marietta, GA on December 17, 1963, the YC-141 then transferred to Edwards AFB, CA on June 15, 1964 for Category II Systems Evaluation testing.



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C-141A serial number 63-8077 flies near the California coastline during a check flight out of Edwards AFB. The aircraft was initially assigned to Edwards AFB in late 1964 before ending its career after 14,372 flight hours in a fatal accident while flying with the 18th MAS (Military Airlift Squadron) out of Torrejon, Spain on August 28, 1973.

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While at Edwards AFB for Category II testing, the YC-141A was in good company with other test aircraft including the XB-70 Valkyrie and YF-12A Blackbird.



A Lockheed family portrait on the ramp at Edwards AFB. Posing with the first YF-12A (60-6934) are from front to back, F-104A Starfighter (56-0766), U-2D Dragon Lady (56-6954), T-33A Shooting Star (56-3675), the Fulton Recovery System testbed HC-130H Hercules (64-14855) and the fifth C-141A Starlifter (61-2779). (Lockheed Photo)

## LOCKHEED C-141 STARLIFTER

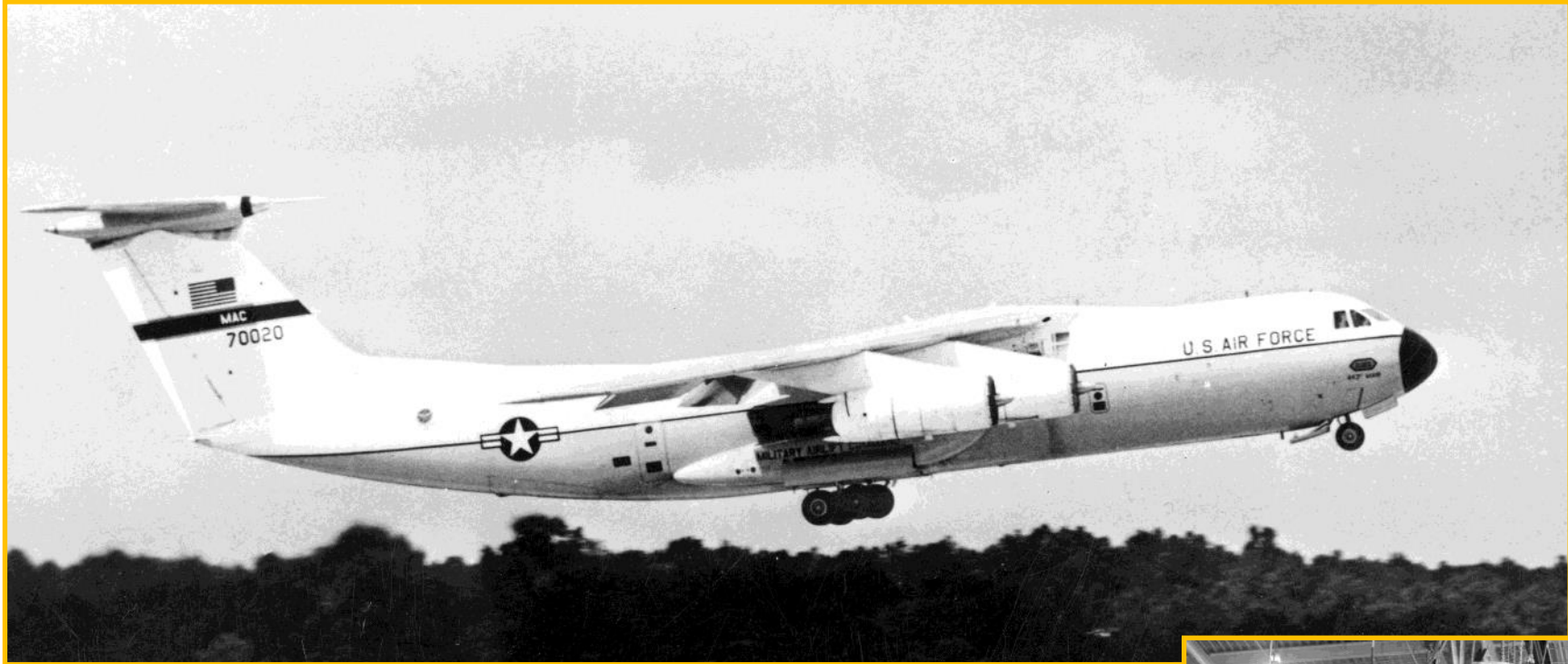


The U.S. Air Force's primary cargo transport fleet consisting of all Lockheed-built aircraft, the C-5A Galaxy, C-141 Starlifter and C-130 Hercules pose together .



The third C-141A built, serial #61-2777 was redesignated as NC-141 after a permanent modification for the testing of numerous defensive avionics systems throughout its life-time. The aircraft was assigned to the 4950th Test Wing, Wright-Patterson AFB, OH, until 1993, then transferred to Edwards AFB, CA. It ended its days being scrapped at Davis-Monthan AFB, AZ in 2003.

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*In the early 1970's, the C-141 and C-5 fleet received a new paint scheme of white on gray with blue cheat line. Though adding additional weight, the distinctive scheme assisted in corrosion prevention on the airframe.*



*The Pratt & Whitney TF33-P-7 jet engine provided 20,250 pounds of thrust each. Four of these are used to power the C-141 Starlifter.*

*A Lockheed U-2R is off-loaded at Edwards AFB North Base after a short delivery flight from their Skunk Works facility in Burbank, CA.*



## LOCKHEED C-141 STARLIFTER

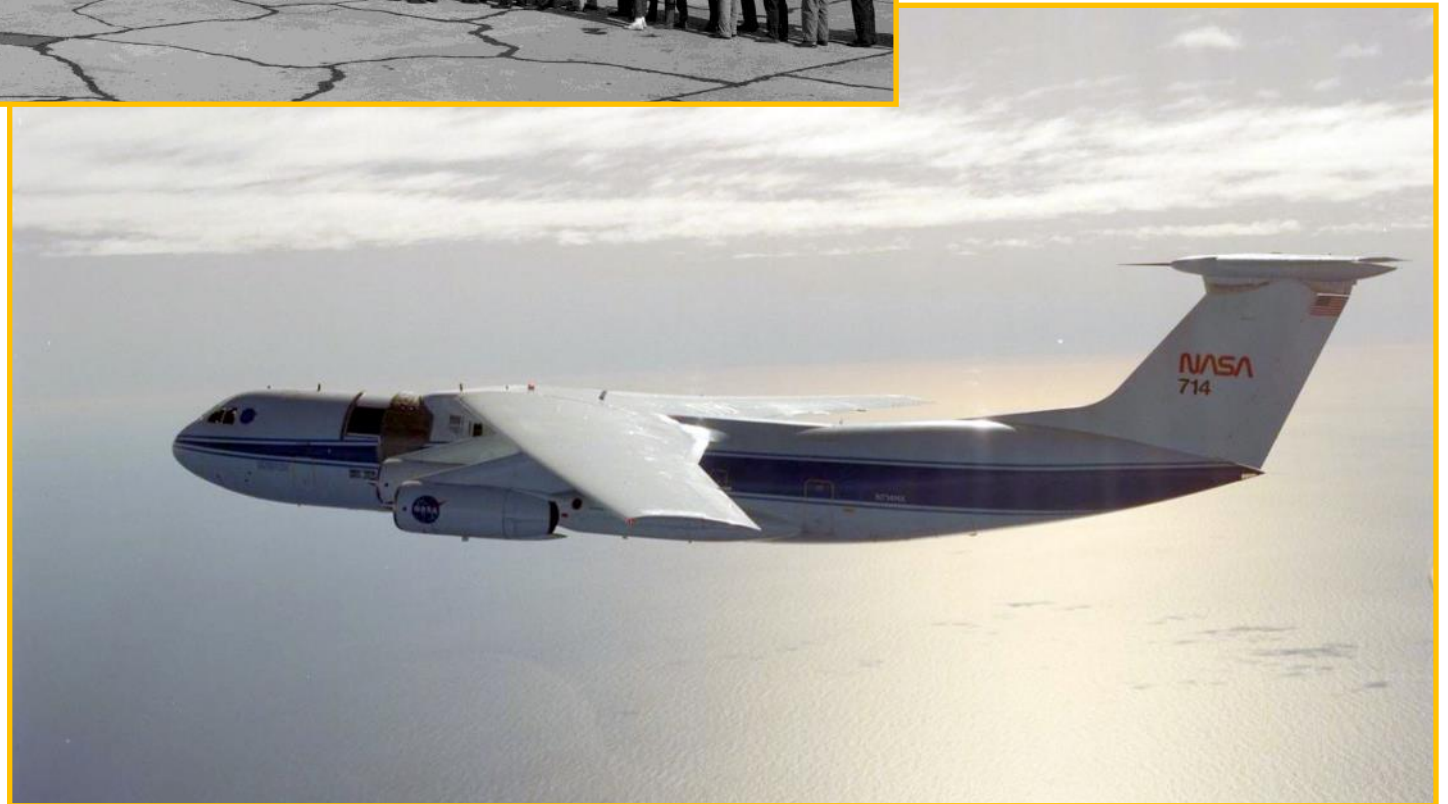


A beautiful view of a C-141A off the San Francisco Bay, California coastline. This Starlifter was assigned to the 710th Military Airlift Squadron (AFRES), 60th Military Airlift Wing and was enroute to Travis AFB, CA.

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Lockheed made numerous attempts to sell a civil variant of the Starlifter, designated L-300. Though interest was high, Lockheed failed to find any takers and the prototype was sold to NASA.



NASA modified the Lockheed L-300 with the Kuiper space telescope system. The modification included a large rotating door assembly in the forward fuselage that could open up in flight.

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### Lockheed C-141 Starlifter



A single C-141A received modifications to extend range and increase capacity. Two years after this YC-141B began testing, a production line was set up to modify the rest of the fleet. Modifications included the addition of a 160-inch plug in the forward fuselage and 120-inch plug in the aft, extending the fuselage a total of 23 feet, 4 inches. The mods also included the addition of a universal air refueling receptacle giving the C-141B unlimited range.

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The first upgraded YC-141B rolls out at Dobbins AFB, GA in March 1977.



A good comparison of the C-141A (background) and C-141B Starlifter. Cargo space of the B model increased by 240 square feet.



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*A rare snowfall in the San Bernardino mountains provides a serene backdrop for a C-141B from the 63rd MAW at Norton AFB in California.*

*The addition of the air refueling capability to the Starlifter gave it worldwide delivery capability. This image from 1979 shows the C-141B taking on fuel from a KC-135E during refueling tests out of Edwards AFB.*

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C-141B serial number 66-0128 of the 63rd MAW out of Norton AFB, CA flies over the rugged mountain area near the base.

A left side view of a Military Airlift Command (MAC) C-141 Starlifter aircraft in use during invasion of Grenada's 'Operation Urgent Fury' on November 4, 1982.



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The USAF Thunderbirds Aerial Demonstration Team could not perform worldwide without the support of the Starlifter. The C-141 carries ground support personnel and equipment to each display location.

This KC-135A Stratotanker from the 97th Aerial refueling Squadron, Biggs AFB, TX refuels two C-141B Starlifters from the 437th MAW, Charleston AFB, SC on February 1, 1983.



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A KC-135A Startotanker #62-3575 provides fuel to C-141B Starlifter #66-0181 during Air Force exercise OCEAN VENTURE '81 on August 8, 1981.

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Lockheed C-141B serial number 66-0128 flies over Norton AFB in San Bernardino, CA. Norton AFB was home to the 63rd Military Airlift Wing.

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C-141B serial number 63-8085 was the first Starlifter delivered to Tinker AFB, OK in 1964 and went on to serve with the 63rd MAW at Norton AFB where it was named "Spirit of the Inland Empire". Beginning life as a C-141A, it received the B model modification in 1980 and upgraded to C-141C in 2000. It later served with the 452nd Air Mobility Wing at March AFB, CA prior to being retired to the bone-yard at Davis-Monthan AFB, Az.



This undated photo of C-141B #67-0166 shows the Starlifter flying over the Atlantic Ocean while assigned to the 438th Airlift Wing at McGuire AFB, NJ. This C-141 was the last one off the assembly line and used for VIP transport, flew the Bob Hope tour to Vietnam & the first Gulf War and was CINMAC's transport as well. This aircraft made the final C-141 flight when it departed Wright-Patterson AFB, OH and landed at Scott AFB, IL on April 7, 2006.

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Beginning in the early 1980's, US military aircraft began receiving new low visibility paint scheme, known as 'Euro One'. The two-tone green over gray paint, also known as a 'Lizard scheme', was thought to assist in making the aircraft less visible to enemy forces in a European Theater conflict. All transports and many fighter and attack received this scheme until the decision was made to change to overall gray in the 1990's.

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Formation flight training with Starlifter's from the 63rd MAW at Norton AFB, CA. Five-ship formations were a common sight over Southern California for many years.



During routine exercises at most transport bases, the flightline became a very active place with large aircraft coming and going for several days. Parking ramps could become quite crowded at times.

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Each transport aircraft had its specialty; the C-130 being superb for unimproved fields and an economical transport, the C-141 could carry a larger payload over a longer distance much faster than its turboprop partner. The even larger cousin, the C-5 Galaxy as the largest production US military transport, can carry huge payloads anywhere around the globe.



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An air-to-air front view of a C-141B Starlifter aircraft in camouflage paint scheme, flying over the Cooper River Bridge in South Carolina. The aircraft is assigned to the 437th Military Airlift Wing, Charleston AFB, SC.

A C-141B Starlifter performs a low-altitude pallet drop.



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Two C-141B aircraft, one painted in 'Euro One' green/gray scheme and the other in overall gray, are parked under a rainbow after a Spring shower at McChord AFB, WA on April 18, 1996.

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The right side view of a 438th Airlift Wing, C-141B Starlifter flying over the autumn colored trees and waterways near McGuire AFB. The C-141, tail #40616 provided long range airlift capability for Air Mobility Command.

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Tanker airlift control element personnel use a K-loader to unload equipment from a C-141B Starlifter during Exercise 'Hungarian Response 2002' at Keszketem Air Base, Hungary on May 14, 2002.



C-141B Starlifters of the 6th Airlift Squadron taxi down the runway at McGuire AFB, NJ on June 29, 2000.



Paratroopers drop from multiple C-141B aircraft during paratrooper exercises.

## LOCKHEED C-141 STARLIFTER



A C-141C Starlifter from the 452nd Air Mobility Wing at March Air Reserve Base, CA., arrives at McMurdo Station, Antarctica, bringing with it supplies and personnel to re-supply the station during Operation Deep Freeze on Jan. 29, 2002.

## LOCKHEED C-141 STARLIFTER



The Lockheed Starlifter's had an amazing safety record over their 43 year lifetime with only 21 airframes being written off. This C-141B, #65-0253 was lost during fuel tank maintenance. The maintenance crew used non-standard procedures causing the right wing to explode, and the aircraft was destroyed by fire on October 7, 1993 at Travis AFB, CA.

The last C-141 airframe to be lost was this C-141C, #61-2778. Originally, the C-141 was scheduled to depart Memphis on 20 December 2001. As the aircraft was being refueled, upon reaching approximately 120,000 pounds of jet fuel, the interior left wing fuel tank pressure exceeded wing structural tolerances, as pressure was unable to vent due to a forgotten fuel vent plug. Over-pressurization resulted in catastrophic failure of the left wing structure at the wing root.



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A 438th Airlift Wing C-141B Starlifter flying over the flight line and main base at McGuire AFB, NJ. The C-141, tail #40616 entered service in 1965 as a C-141A and converted to B model in 2001. It continued to serve until flown to the boneyard at Davis-Monthan AFB, AZ on September 5, 2000.

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In addition to the KC-135 Stratotanker, the C-141 fleet could perform aerial refueling from the KC-10 Extender. Both aircraft are painted in the low-visibility gray paint scheme.



A row of USAF C-141B Starlifter aircraft from the 305th and 514th Air Mobility Squadrons, McGuire AFB, New Jersey sit parked on the tarmac. The lone C-141B in the foreground still carried the 'Euro One' paint scheme when this photo was taken on September 20, 1997.

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A Special Operations Low Level II (SOLL II) C-141B Starlifter, operated by the 16th Airlift Squadron, Charleston AFB, SC, performs a flare release for the cameraman.

Cargo is being moved to the C-141B Starlifter. A team member drives the K-loader into position for transfer of its cargo, a Land Rover One Ten (4x4) light vehicle, onto the aircraft at RAF Mildenhall, UK on April 3, 1998.



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This C-141 Starlifter aircraft, known as the "Hanoi Taxi," flies over its new home at the National Museum of the United States Air Force adjacent to Wright-Patterson Air Force Base, Ohio, on Tuesday, Dec. 13, 2005. This particular aircraft gained fame when it was used to return American prisoners of war back home at the end of the Vietnam War.

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The end of the line for most of the Lockheed C-141 fleet. Except for a handful of aircraft flown to museums around the globe, most airframes were lost to the scrappers around Davis-Monthan AFB, AZ. (Photos courtesy of Dennis Jenkins)



***C-141 STARLIFTER***

***1963 - 2006***



## AFMC History & Heritage Program

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