



# NATIONAL MUSEUM OF THE UNITED STATES AIR FORCE™



**Lt. General William H. Tunner**

## **Global Reach Gallery**

Teacher Resource Guide

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# Lt. General William H. Tunner Global Reach Gallery

## An Introduction

During World War II, the US Army Air Forces projected American military air power around the world, and much of its success came through the creation of an efficient airlift system. However, the introduction of jet aircraft, missiles, and other advanced technologies toward the end of the war changed everything. The postwar leaders of the newly created US Air Force recognized that any future conflicts or humanitarian efforts would require a rapid, global capability.

Since World War II, the USAF has created an unequalled global reach capability based on both airlift and air refueling. Airlift provides the most rapid way to deploy American military power around the world. Air refueling increases the range and payloads of airlift, combat, and combat support aircraft.

Rapid global mobility is one of the Air Force's enduring core missions. Air Force airlift moves passengers and cargo, performs aeromedical evacuation, and supports special operations. Air Force air refueling makes long-range nuclear operations, global strike missions, aircraft deployments, and special operations missions possible. Furthermore, air refueling supports the sustainment of "airbridges" between the continental United States and the rest of the world. Together, the US Air Force's airlift and air refueling capabilities play critical roles in providing *Global Vigilance, Global Reach, and Global Power for America*.

*American power can be projected quickly anywhere on the earth as a result of the Air Force's ability to fly air refueling tankers and cargo planes globally on short notice. It provides swift deployment, in-flight refueling, and the means of sustaining operations from major combat to humanitarian relief.*

Gen Mark A. Welsh III, USAF

Lieutenant General William H. Tunner, regarded by historians as the “Father of Modern Airlift,” commanded “The Hump” airlift over the Himalayas to China in World War II and the Berlin Airlift - the newly created US Air Force’s first major military humanitarian operation. He led critical airlift operations during the Korean War and directed major strategic airlift operations during the Lebanon and Taiwan Crises.



## Fairchild C-82A Packet

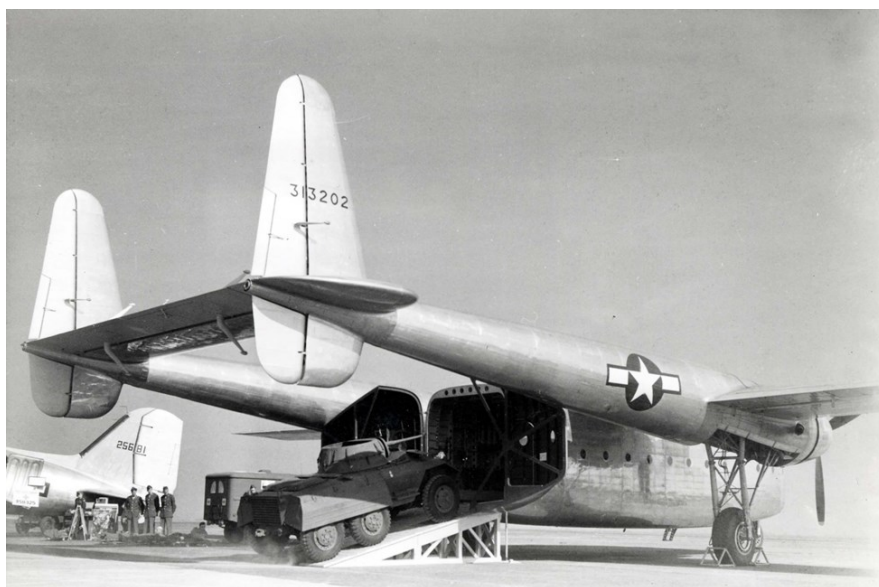
Airlift experience during World War II demonstrated the need for a large-capacity cargo aircraft that could be loaded from ground level, and Fairchild designed the C-82 Packet to meet the US Army Air Forces’ requirements. The prototype first flew in September 1944, and deliveries began in late 1945. By the time production ended in September 1948, Fairchild had built 223 Packets. All but four were C-82A models.

Named for the packet ships that hauled cargo between coastal seaports, the C-82 included design elements now seen on most modern cargo aircraft. The tricycle landing gear, high wings, and high tail booms allowed vehicles to approach the C-82 from any side, unlike the other USAAF transport aircraft that loaded only from the side. Its large rear doors opened like a clamshell, which made loading easier.

Used primarily for transporting cargo and troops, the C-82 could also carry 41 paratroops or 34 stretchers, and it could tow gliders. Beginning in 1946, some C-82s were assigned to Tactical Air Command troop carrier squadrons and others to the Military Air Transport Service. Several

Several C-82s took part in the Berlin Airlift.

The C-82A on display flew with the Alaskan Air Command in the 1950s, and it carries the red Arctic markings used for high visibility. It was flown to the Museum in 1988.



**TECHNICAL NOTES:**

**Crew:** Five

**Armament:** None

**Engines:** Two Pratt & Whitney R-2800-85s of 2,100 hp each

**Maximum speed:** 250 mph

**Range:** 2,140 miles

**Ceiling:** 27,000 ft.

**Wingspan:** 106 ft., 6 in

**Length:** 77 ft., 1 in

**Height:** 26 ft., 4 in

**Weight:** 54,000 lbs. loaded

**Serial number:** 48-581

With its rear, clamshell doors opened wide, the C-82 displays its ability to load heavy cargo easily and quickly during a demonstration in October 1944.

## Lockheed C-130E Hercules

Introduced in August 1962, the C-130E conducted critical USAF military missions during the Southeast Asia War through Afghanistan and Iraq. It has also supported countless USAF humanitarian efforts around the globe and in all climates.

Originally designed by Lockheed (now Lockheed Martin) as an assault transport able to operate from unpaved airstrips, the C-130 Hercules made its first flight in August 1954. Over the next half century, the US Air Force used various versions of this versatile aircraft for aeromedical evacuation, mid-air refueling of helicopters, mid-air space capsule recovery, search and rescue, reconnaissance, as a gunship, and for many other missions.

The C-130E (serial number 62-1787) on display had a long career, including a mission in the Southeast Asia War that earned two Airmen the Air Force Cross. This aircraft was flown to the Museum in August 2011.





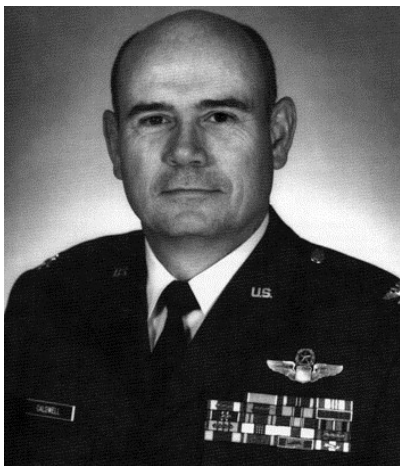
## *Spare 617*

This C-130E aircraft (serial number 62-1787) participated in one of the greatest feats of airmanship during the Southeast Asia War on April 15, 1972. Operating under the call sign *Spare 617*, the aircrew consisting of Capt William Caldwell, pilot; Lt John Hering, copilot; Lt Richard A. Lenz, navigator; TSgt Jon Sanders, flight engineer; and loadmasters TSgt Charlie Shaub and A1C Dave McAleece attempted to airdrop ammunition to surrounded South Vietnamese troops at An Loc.

While approaching the drop zone, *Spare 617* received heavy enemy ground fire that killed Sgt Sanders and wounded Lts Hering and Lenz, damaged two engines, ruptured a bleed air duct in the cargo compartment, and set the ammunition on fire. Sergeant Shaub jettisoned the cargo pallets, which exploded in midair. Despite receiving severe burns from the hot air escaping the damaged air bleed duct, Shaub extinguished a fire in the cargo compartment. Meanwhile, Capt Caldwell decided to head for Tan Son Nhut Air Base, which had the best medical facilities. Even though his engineer was dead and his co-pilot wounded, Caldwell closed the damaged bleed air duct, and he shut down the two damaged engines.



A1C Dave McAleece and SSgt Charlie Shaub



Col. William Caldwell

As Caldwell prepared to land with just two engines, the landing gear would not come down, and the wounded and badly burned Sgt Shaub directed A1C McAleece as he hand-cranked the landing gear down using the emergency extension system. Even though a third engine lost power, Caldwell managed to land *Spare 617* safely. For their efforts, Capt Caldwell and Sgt Shaub received the Air Force Cross, the US Air Force's second highest award for valor. Shaub also received the William H. Pitsenbarger award for heroism from the AF Sergeants Association.



#### TECHNICAL NOTES:

**Crew:** Five (two pilots, navigator, flight engineer and loadmaster); for Aeromedical Evacuation a basic crew of five (two flight nurses and three medical technicians) is added

**Engines:** Four Allison T56-A-7 turboprops of 4,200 hp each

**Maximum load:** Six pallets or 74 litters or 16 container delivery system bundles or 92 combat troops or 64 paratroopers, or any combination of these up to 42,000 lbs.

The C-130E SPARE 617 arrives at the National Museum of the U.S. Air Force after its final flight on Aug. 18, 2011.

## Lockheed C-141C Starlifter *Hanoi Taxi*

The C-141 Starlifter was the US Air Force's first major jet aircraft designed to meet military standards as a troop and cargo carrier. Lockheed (now Lockheed Martin) built a total of 285 C-141s, and for more than 40 years, C-141s performed numerous airlift missions for the USAF. With its great range and high speed, the Starlifter projected American military power and humanitarian efforts rapidly across the globe.

The Starlifter originated from a 1959 requirement for a fast, strategic transport aircraft that would serve as a "work horse" for moving US Army troops rapidly anywhere in the world. The C-141 made its maiden flight on December 17, 1963, and the C-141A became operational in April 1965 with the 1501st Air Transport Wing at Travis Air Force Base, California.

During its early operational service, the C-141A demonstrated that it had the potential to transport larger cargo loads, and the USAF lengthened the C-141A's fuselage by 23.3 feet and added aerial refueling capability. The first modified "stretch" C-141B arrived at Altus Air Force Base, Oklahoma, in December 1979, and Lockheed completed the modification program in 1982. The additional cargo capacity of the C-141Bs gave the USAF the equivalent of 90 additional C-141As. Later modifications included strengthening the wings which added extra service life to the Starlifter. From 1997 to 2001, C-141Bs were converted to C-141Cs by the addition of advanced avionics.

In July 1986, the USAF began transferring its C-141s to Air Force Reserve and Air National Guard units, and the last two Starlifters were retired from service in 2006. Over their four-decade



The C-141C Hanoi Taxi arrived at the Museum in May 2006.

#### TECHNICAL NOTES:

**Crew:** Two pilots, two flight engineers, and one loadmaster (one navigator added for airdrops); two flight nurses and three medical technicians added for aeromedical evacuation missions

**Armament:** None

**Engines:** Four Pratt & Whitney TF33-P-7 turbofan engines with 20,250 lbs. thrust each

**Load:** Either 200 troops, 155 para troops, 103 litters and 14 seats, or 68,725 lbs. of cargo

**Maximum speed:** 500 mph

career, Starlifters logged more than 10 million hours, including a record set in 1981 when a C-141 flew 67,000 pounds of cargo non-stop from New Jersey to Saudi Arabia, refueling three times in flight.

#### *Did you know?*

You can walk through these global reach aircraft at the National Museum of the USAF.

## Hanoi Taxi - *A Symbol for a War*

Although the C-141s had flown many military and humanitarian missions, none was more significant than the mission flown by the *Hanoi Taxi*, the aircraft on display. This C-141 (serial number 66-0177) airlifted the first American prisoners of war to freedom from Gia Lam Airport in Hanoi, North Vietnam, on February 12, 1973. The *Hanoi Taxi* flew two missions into Hanoi, carrying out 78 POWs and two civilian returnees to the Philippines, and four missions from the Philippines to the United States, carrying 76 ex-POWs.





**The just released American prisoners of war celebrated when they left the ground in the *Hanoi Taxi* and knew they were free in 1973.**

Afterward, the *Hanoi Taxi* continued flying missions around the world for three more decades and logged more than 40,000 flying hours. During its lifespan, the *Hanoi Taxi* underwent many changes. Originally built as a C-141A model, its fuselage was lengthened and aerial refueling capability was added in the early 1980s. The USAF redesignated it as a C-141B. Later, the aircraft had its wings strengthened and was converted to a C-141C by the

installation of advanced avionics. In 2002, the *Hanoi Taxi* received its final programmed depot maintenance. It was also repainted as it appeared when it went to Hanoi in 1973—except for the Red Cross which was used to show it was carrying hospital patients. The *Hanoi Taxi* flew in these markings for the next four years instead of the standard paint scheme in recognition of its important history.

In May 2004, the *Hanoi Taxi* again tapped the timelines of history when Maj Gen Edward J. Mechenbier, himself a POW repatriated from Vietnam, flew it back to Vietnam to repatriate the remains of two American service members killed in action. The *Hanoi Taxi* was flown to the Museum in May 2006.

**Lt. Col. (Ret.) Paul Kari, a former prisoner of war in Vietnam, poses with the Lockheed C-141C *Hanoi Taxi* in the fourth building at the National Museum of the U.S. Air Force on Dec. 16, 2015. Kari was flown to freedom on the *Hanoi Taxi* in 1973.**





# Learjet C-21A



The Learjet (now Bombardier Aerospace) C-21A twin turboprop-engine aircraft was the military version of the Learjet 35A business jet. It provided airlift for eight passengers and 3,153 pounds of cargo. During aeromedical evacuations, it could transport one litter patient or five ambulatory patients. The small size of the aircraft allowed quick and

cost effective travel. The turboprop engines are pod-mounted on the sides of the rear fuselage, and the wings have wingtip fuel tanks.

Delivery of the C-21 fleet to the US Air Force began in April 1984 and was completed in October 1985. The C-21A on display (serial number 84-0064) was one of the first three of more than 80 aircraft delivered. It deployed to Southwest Asia in support of OPERATIONS DESERT SHIELD, DESERT STORM, IRAQI FREEDOM, and ENDURING FREEDOM. During OPERATIONS DESERT SHIELD and DESERT STORM, C-21s delivered the Air Tasking Orders (ATOs) to units lacking the ability to receive these daily orders electronically. Last assigned operationally to the North Dakota Air National Guard (119th Wing, 177th Airlift Squadron), it was flight delivered to the Museum in August 2013.

### TECHNICAL NOTES:

**Crew:** Two pilots, two flight engineers, and one loadmaster (one navigator added for airdrops); two flight nurses and three medical technicians added for aeromedical evacuation missions

**Armament:** None

**Engines:** Four Pratt & Whitney TF33-P-7 turboprop engines with 20,250 lbs. thrust each

**Load:** Either 200 troops, 155 para troops, 103 litters and 14 seats, or 68,725 lbs. of cargo

**Maximum speed:** 500 mph

	Aircraft	Payload	Speed
	C-54	10 tons	265 mph
	C-130	19 tons	374 mph
	C-141	34 tons	500 mph
	C-5	145 tons	540 mph
	C-17	85 tons	540 mph

# *The Berlin Airlift*

*June 26, 1948 to September 30, 1949*

## *Berlin: A City Held Hostage*

It was 1948 and World War II was over. Germany, like most of Europe, lay in ruins. Its countryside was divided among the victorious Allies. Its capital, Berlin, was also divided among the victors but was situated entirely within the Soviet sector.

The West hoped to rebuild a strong, independent Germany that could stand against Communist expansion and aid in the economic recovery of Europe. The Soviet Union wanted a weakened pro-Communist Germany that would serve as a buffer along its western front.

In an effort to force the West to change policy and perhaps even abandon Germany, the Soviet Union embarked upon a blockade of the city of Berlin. The United States, Britain and France joined together to keep the 2.5 million West Berliners alive and free. It was—as still is—the largest humanitarian airlift in history.

By June 26, 1948, the Soviets had shut down all road, barge and rail traffic into the city. Electrical power had been cut. The city, still in ruins after the war, faced certain starvation. The Allies responded by trying to supply the city with all its needs through the only remaining open channel: three narrow air corridors across the Russian zone.



Nicknamed *Operation Vittles* by the American press and *Plainfare* by the British, the airlift lasted fifteen months and carried nearly 2.3 million tons of supplies in 277,000 flights. Seventy-seven men died in the effort, including 31 Americans. On May 12, 1949, the Soviets lifted the blockade. The airlift continued deliveries to Berlin until September 30.

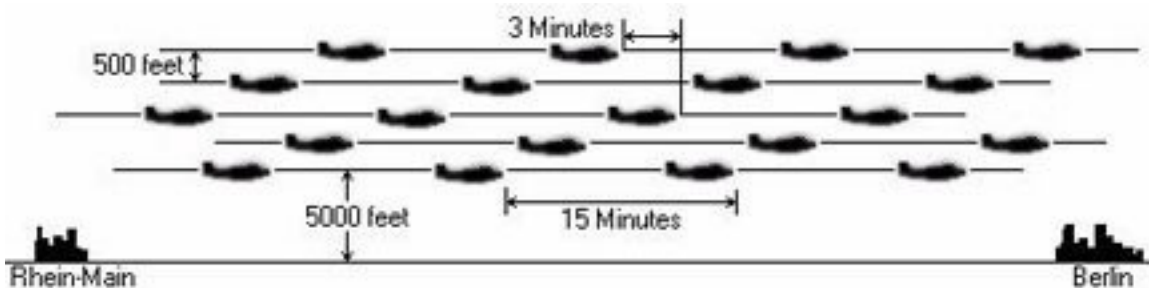
The airlift accomplished what the Soviets said couldn't be done. In the end, the Soviets capitulated. The Allies had won what became the first "battle" of the Cold War.

The Berlin Airlift saved a city. It showed the world what could be accomplished through resolve, ingenuity and cooperation. The course of history had been changed.

## *The Aircraft*

The initial aircraft of the Berlin Airlift was the C-47 “Gooney Bird.” These planes, with less than 3 ton capacity, were phased out by September 1948 and replaced by C-54 “Skymasters” - a plane with the capacity of transporting 10 tons of cargo. The C-54 became the workhorse of the airlift, although one C-74, one C-97 and five C-82s were also used. The Navy joined the effort with R5Ds (C-54 equivalent).

Air Traffic was so crowded going in and out of Berlin that aircraft had to be “stacked” in the landing pattern. Under the brilliant command of Major General William Tunner, the Airlift became so finely tuned that on one day—April 16, 1949—1,398 inbound flights brought 12,940 tons of cargo into Berlin. That was one aircraft landing or taking off every 30 seconds, day and night!



There were a total of 277,000 flights in and out of Berlin, covering enough mileage to travel to the moon and back 130 times.

## *The Cargo*

The two major supplies needed by the Berliners were food (mostly flour, sugar and dehydrated foods) and fuel. The harsh German winter necessitated abundant coal. Ultimately, 65% of the total tonnage into Berlin was coal. Unfortunately, coal is dirty, heavy and dusty – creating havoc for the aircraft and pilots. To help alleviate the problems, coal was packed into surplus duffel bags.

Salt was another necessity that was difficult to transport.. That problem was eventually solved by using seaplanes (equipped to handle the corrosive effects of salt) which landed on small lakes in downtown Berlin. Other cargo carried into the city included medicines, heavy machinery, newsprint, construction equipment, vehicles, and household effects. Almost 82,000 tons of Berlin manufactured goods were also delivered out of Berlin—helping to stimulate the Berlin economy and keeping thousands of Berliners employed.

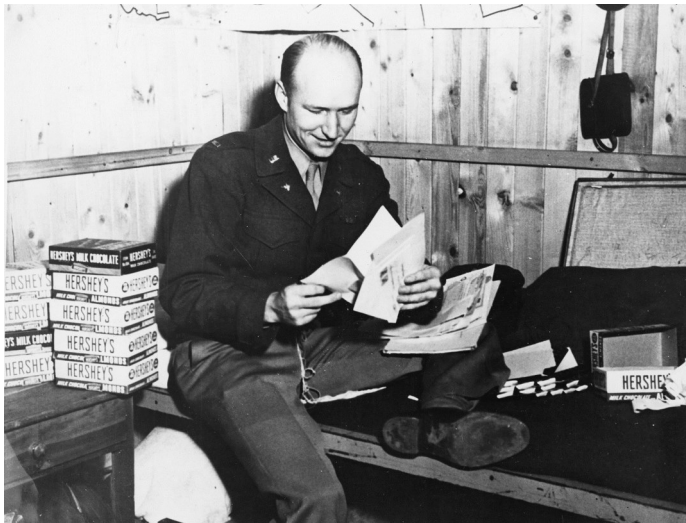




## *The Berlin Candy Bomber*

On a sight-seeing trip into Berlin while serving as an airlift pilot, Lt. Gail “Hal” Halvorsen shared his two sticks of gum with some children and forever changed the course of his life, winning the hearts of the children of Berlin and the admiration of the Free World.

Halvorsen was so impressed with the gratitude of the children and their dedication to the cause of freedom that he promised to bring them more candy. He began dropping candy with little parachutes from his C-54 to the children waiting below. Halvorsen became known as “Uncle Wiggly Wings” as he would wiggle his wings to let the children know it was him.



Other servicemen began donating their candy rations and soon other pilots joined him in his candy drops. Candy and handkerchiefs (for making parachutes) were sent from all over the world and “Operation Little Vittles” was underway.

## *The Legacy*

The Berlin Airlift demonstrated the crucial importance of air power—even in a peacetime situation. Since the Berlin Airlift, the United States has often used strategic airlift to protect and assist friendly nations, and airlift capabilities have grown substantially. Today's C-5 is able to carry thirteen times more than the C-54, the “workhorse” of the Berlin Airlift.



## Lesson Plans

### Airlift Mission - Grade Level 4-8

Students will learn about the history of airlift missions (both humanitarian and combat) as well as to learn about the mathematics related to these operations, such as scenarios involving the loading of cargo.

- ♦ Airlift Mathematics
- ♦ Basic Science of Flight
- ♦ Controlling Flight
- ♦ Center of Gravity
- ♦ Loadmasters and Cargo
- ♦ Engineering Design Teams
- ♦ Weight and Balance Forces
- ♦ Weight and Balance Formula
- ♦ The Amazing Berlin Airlift
- ♦ Mathematics II
- ♦ Airlift Mission Presentation

#### National Standards for Mathematics

Number and Operations

Problem Solving

Measurement

Geometry

#### National Science Standards

Science as Inquiry

Science and Technology

Science in Personal and Social Perspectives

#### National Standards for History

Chronological Thinking and Historical

Comprehension

## Suggested Readings

Cherny, Andrei. *The Candy Bombers*. New York: Berkley Caliber, 2008.

Halvorsen, Gail. *The Berlin Candy Bomber*. Springville, UT: Horizon Publishers, 2014.

Harvey, Richard D. *The C-4 Flying Workhorse of WWII*. Bloomington IN: Author House, 2005.

Haulman, Daniel L. *Humanitarian Airlift Operations*. Washington, DC: U.S. Printing Office, 1998.

Holder, Bill and Vadnais, Scott. *The "C" Planes: U.S. Cargo Aircraft 1925 to Present*. Atglen, PA: Schiffer Publishing Ltd., 1996.

Logan, Don. *The Boeing C-135 Series: Stratotanker, Stratolifter and other Variants* PA: Schiffer Publishing Ltd., 1998.

Miller, Roger. *To Save a City*. Washington, DC: U.S. Printing Office, 1998.

Stevenson, Ralph L. Jr *C-54-PLM Revisited*. Santa Fe, NM: Sunstone Press, 2010.

Smith, Peter C. *The Lockheed Martin C-130 Hercules*. Manchester, England: Crecy Publishing Ltd., 2010.

Westerfield, Scott. *The Berlin Airlift. Salt Lake City, UT: Silver Burdett Press, 1989.*



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