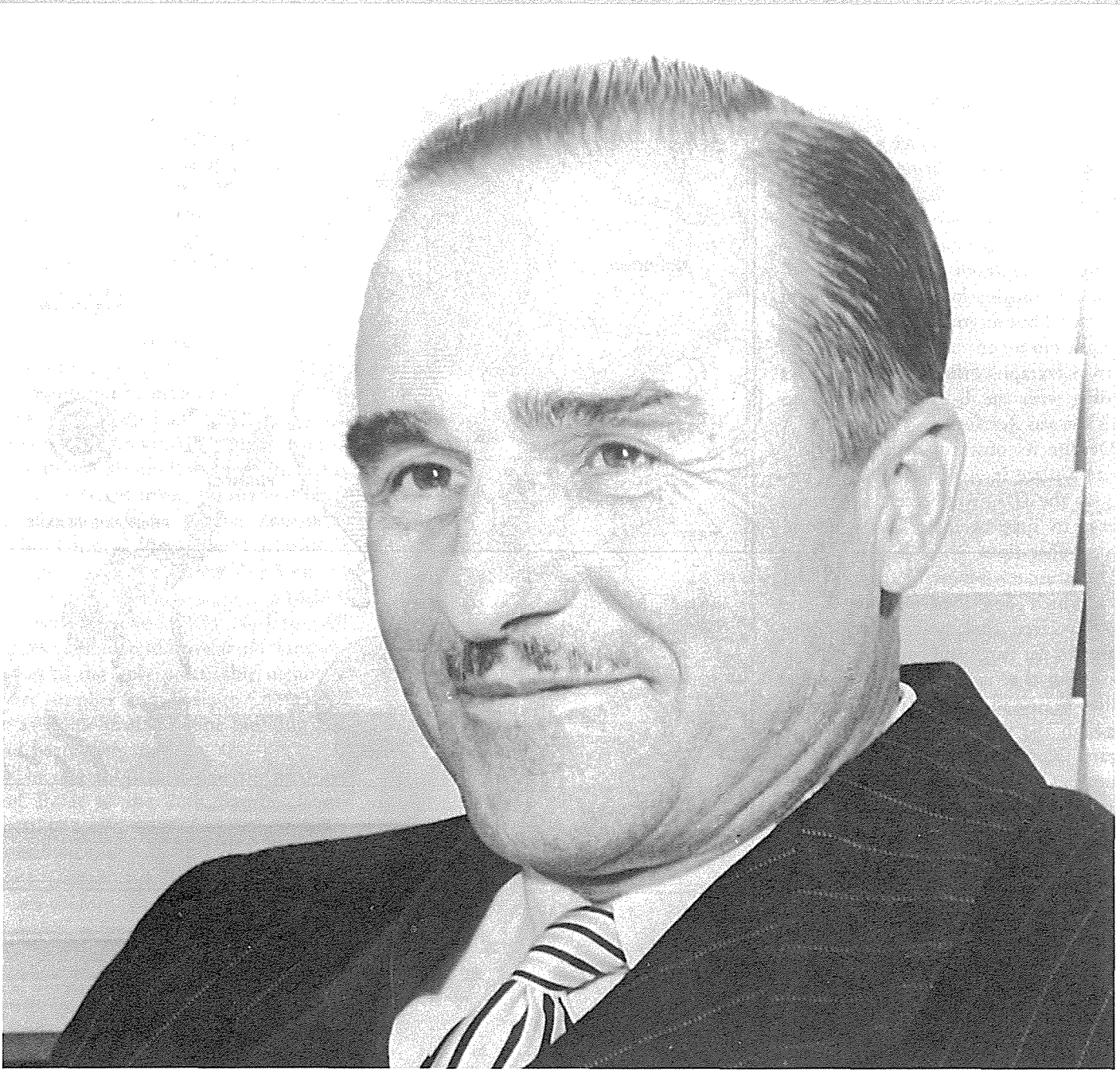


In Memoriam

W. D. "Billy" Parker

1899–1981

Mr. W. D. "Billy" Parker, age 82, passed away on October 8, 1981.

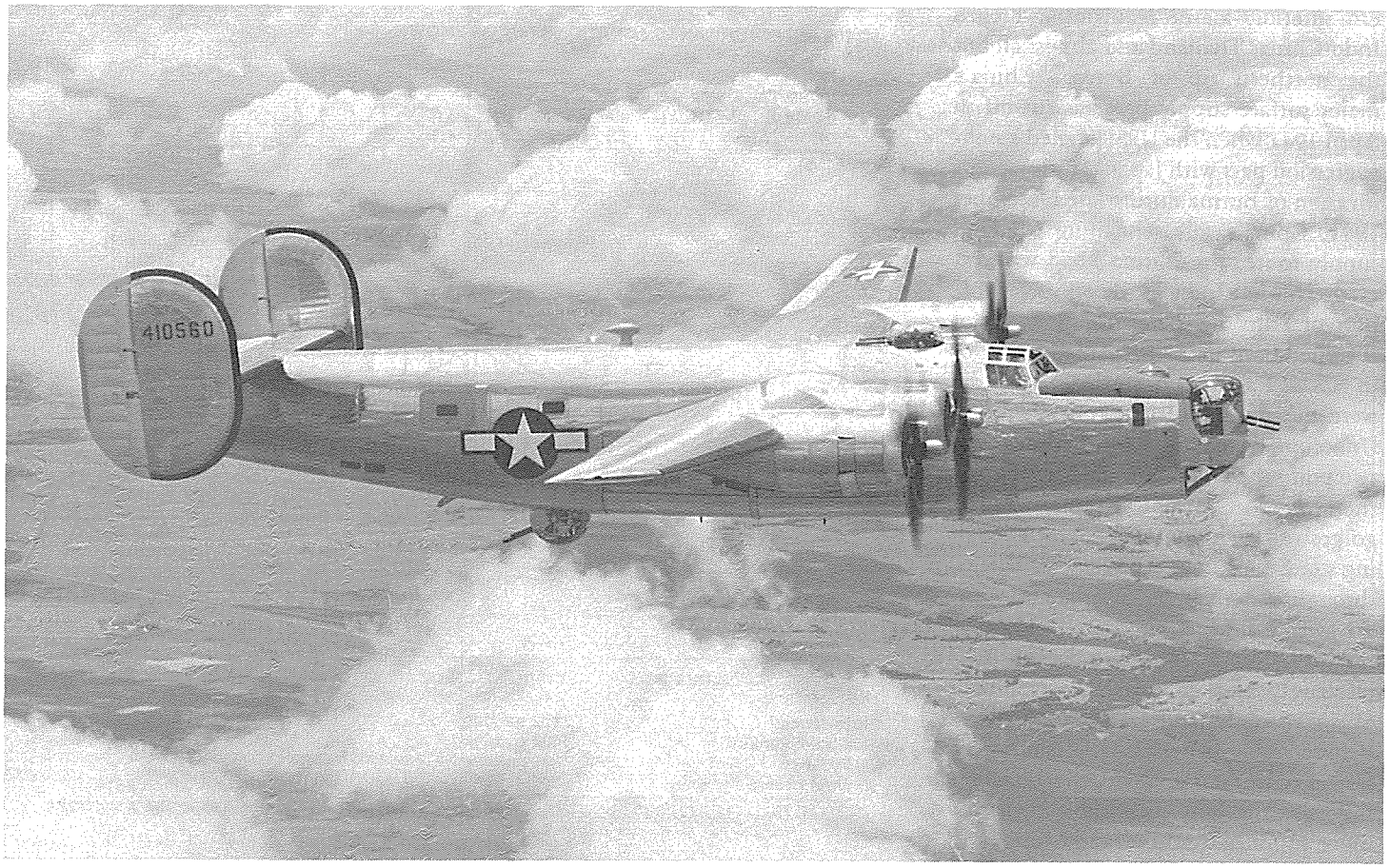
Mr. Parker was one of America's foremost aviation pioneers and innovators. He held pilot's license number 44 and before retiring from piloting in 1976 was the nation's oldest living pilot.

Billy Parker built and flew a 1912 model pusher-type airplane while still in his teens. A number of features of this and other pusher-type planes he built were incorporated in modern airplane design; examples are the three-wheel landing gear and pusher-type motor.

Mr. Parker assisted in developing the space suit and fuels for Wiley Post's 1935 stratosphere flights. During World War II he played a major role in developing high-octane gasoline for military planes, and in helping increase the range of B-24s and other bombers. Only Billy Parker and Charles Lindbergh were given government authorization to fly any plane from any Air Force base any time.

Mr. Parker was a test pilot and barnstormer for several years before joining Phillips Petroleum Company in 1926. He organized and was longtime head of the aviation sales and aviation transportation organizations of this film before retiring in 1964.

It has been said that Billy Parker made more *diverse* achievements in pioneering aviation than any other American.



Consolidated B-25J. (Convair photo via Al Hansen)

temporary installation of two non-metallic, 400-gallon tanks in the forward half of the bomb bay, if needed for ferrying or for long-range missions with reduced bomb loads.

In the XC-109, the fuel system was modified to accommodate a second pair of 400-gallon tanks in the rear half of the bomb bay. To save weight, all four bomb bay tanks were constructed of light metal alloy.[3] A standard, non-metallic, 102-gallon ferrying tank was installed in the bombardier's compartment in the nose.[4,5] Three specially contoured light metal tanks were fitted into the limited space on the deck above the bomb bay, just behind the wing.[3] The combined capacity of the three deck tanks was approximately 334 gallons.[5] The remainder of the "cargo fuel" to be off-loaded at the delivery destination would be the amount of fuel remaining in the wing tanks which was not needed for the return to the tanker's reloading base. At the time the XC-109 was tested, USAAF planners estimated that up to 2900 of the total of 4850 U.S. gallons of gasoline on board the aircraft could be delivered to the forward bases.[6]

The 2900-gallon cargo load was about one-and-a-half times that of the U.S. Army's large semi-trailer tank trucks of the period. It was estimated that two C-109 deliveries of gasoline would supply the fuel needed to "top-off" one B-29 in China for a raid on Japan.[3]

The XC-109's "refueler" (refueling/defueling) system was divided into two parts, each connected to one of the two refueler pumps. In its original layout, the forward system included the nose tank, the two front bomb bay tanks, the auxiliary wing tanks and the regular fuel manifold of the main wing tanks. The aft system included the two rear bomb bay tanks and the three deck tanks. The plumbing of the two refueler pumps was connected so as to allow each pump to provide pumping pressure to either of the two systems. Normally, only one of the pumps was to be operated, while the other was a standby in case of failure of the pump in use.[4]

In the original concept, the aircraft's standard internal auxiliary power unit (APU) was to provide the electrical current to operate the refueler pumps. However, during test operations, a moderate amount of gasoline fumes collected in the bomb bay and compartments near the APU, presenting a risk of explosion. Consequently, the APU in the XC-109 was rendered inoperative. The electrical power for the refueler pumps then was supplied by an external APU, located at some distance from the fuselage. If the cargo fuel was to be delivered to a location where ground power units were not available, a Type A-6 portable refueling unit could be stowed aboard the XC-109. At destination, this unit would be operated outside the aircraft after the unit's suction hose had been connected to the tanker's gravity fuel drain system. In the event of ground power unit failure, the C-109's fuel tanks could be drained by gravity.[4]

A 30-foot-long refueler hose was used in the fuel-discharging operations. The 1¼-inch I.D. hose had a built-in braided static wire with grounded hose coupling, shut-off nozzle with strainer, rigid spout and static protection to the discharge side of the refueler pump. This hose coupled to the outlet side of the refueler pumps' fire-hydrant type couplings in the side of the aircraft. Under ideal conditions, the 2900-gallon cargo fuel could be pumped overboard in a little more than one hour.[3]

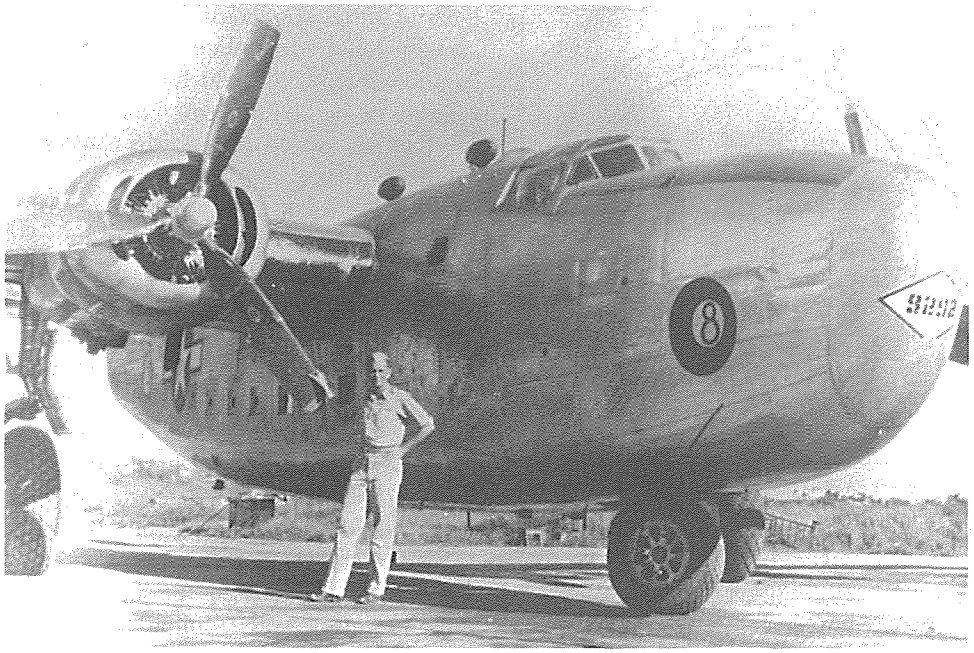
To enable the C-109 to carry the over 12,200 pounds of fuel in the eight fuselage tanks, yet still be within the 64,000-pound gross weight limit for the aircraft, it was necessary to eliminate most of the B-24 combat equipment. Guns, turrets, ammunition feeding systems, some armor and other items not essential to the tanker mission were removed. The turret positions were faired over with light sheet metal. In the case of the single XC-109, its glazed nose was left intact. Later model B-24s converted to the C-109 configuration acquired a simple fairing in the position of the removed nose turrets. In most of the latter cases, the flat bombardier's optical panel in the lower nose was replaced with sheet metal. Except for an access door to the refueler systems' hose coupling panel, no special doors or windows were added to the fuselage.

The production line C-109 conversions incorporated changes indicated by the test experiences with the XC-109, safety and practicality. A revision of the separate fuel systems put all four bomb bay tanks into the same system with the regular wing tanks. The nose and deck tanks were on the second system.[3] Non-metallic tanks were substituted for those which had been constructed of light metal in the XC-109. An automatic shut-off rendered the internal APU inoperative during fuel loading and unloading operations. To eliminate gasoline fumes from half-empty tanks, a system was installed which injected inert gases into the tanks as they were emptied, thus reducing chances of explosion from sparks or gunfire.[3]

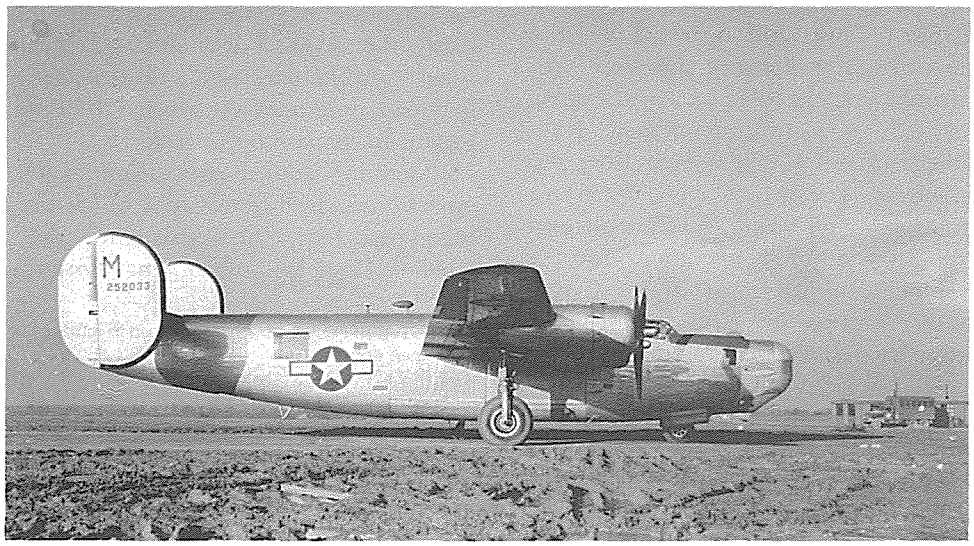
Over 200 B-24s were converted to the C-109 configuration.[7] With few exceptions, these were J, L and M models at the times of their modification. All but nine of these aircraft were built in the Ford Motor Company's Willow Run plant, according to Air Force records. A USAAF Technical Order, dated 10 October 1944 directed that the earlier Ford-built M models be redesignated as L's. All 37 B-24M/C-109 conversions were affected by that order.[8]

C-109'S ON THE JOB

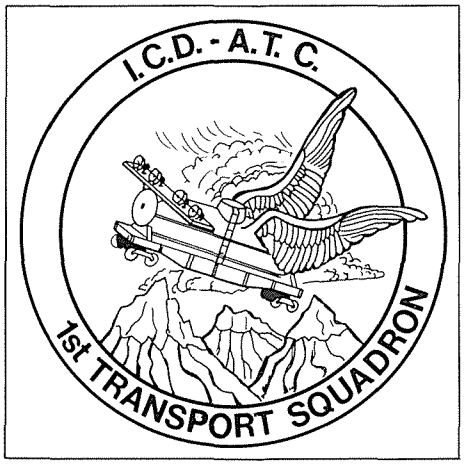
The *Liberator* tankers were used to some extent during the Allied invasion of Europe to haul fuel from England to forward airfields on the Continent before ground supply systems were established



A typical C-87. This other major cargo conversion of the B-24 is sometimes mistaken for a C-109. (U.S. Air Force Museum photo via Stephen Hudek)



These two photos of a IX Troop Carrier Command C-109 (B-24J-15-FO) were taken in England during December 1944. Note the 90-degree arc on the profile of upper portion of the nose fairing. This curvature is a recognition feature for production C-109s. The bottom portions of the four bomb bay tanks are clearly visible in the lower photo. The standard C-109 had two Automatic Direction Finder "football" antennas on the fuselage top while most B-24s had only one. (USAF)



This is not an official squadron insignia. However, the C-109 pilots in "Basha" (quarters) #73 at Tezgaon, Bengal, India, thought it would make a good one. Obviously, the pilots' thoughts about the aircraft, the "Hump" and the weather are revealed. (Author)

or rebuilt. However, the C-109's main area of operation was in the CBI (China–Burma–India). Originally, the 20th Bomber Command operated its own fleet of C-109s between their rear bases in India and the B-29's forward staging airfields at Hsinching, Kwang Han, Pengshan and Kiunglai, near Chengtu, Szechwan Province, China. When Air Transport Command (ATC) took over the cargo support operations for the bomber command, the 20th's C-109s were reassigned to ATC and operated from bases in Bengal and Assam provinces of India. Under ATC control, the tankers delivered gasoline to all airfields in unoccupied China which had runways capable of handling them. From these, the fuel was carried in drums by C-47s to smaller airfields.

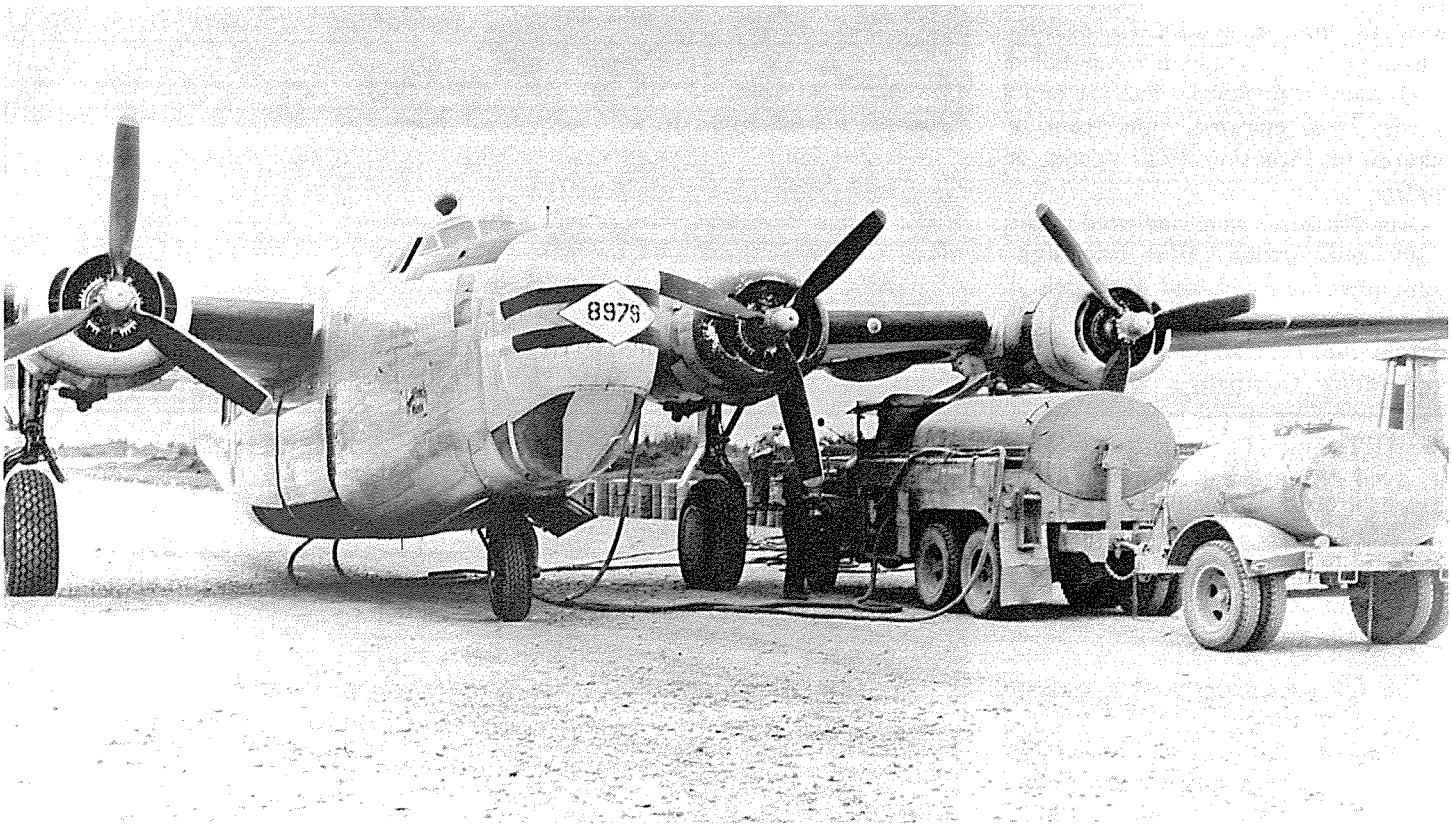
In operational use across the CBI "Hump," the C-109 was not quite as successful a load carrier as had been hoped. From the beginning, the aircraft suffered a higher than expected loss rate. While some losses occurred en route, most happened during the takeoff and landing phases. Fully loaded takeoffs in India were made from hard-surfaced runways, at least 6,000 feet long. These were considered adequate for combat-loaded B-24s. Yet, it was not unusual for fully loaded C-109s to use up almost every foot of runway. Some used all and more with resulting crashes.[9]

In the efforts to prevent more crashes, the cargo fuel load was decreased. Eventually, the nose and deck tanks were not filled.[10] By January 1945, the fuselage fuel load sometimes was reduced to 1200 gallons in the bomb bay tanks.[11]

When the 20th Bomber Command operations moved from China to Pacific island bases for the final onslaught to the Japanese Homeland, the original mission of the C-109s ceased to exist. However, their "Hump" operations continued to supply fuel to China through the end of WWII.

Despite the problems associated with the C-109, it made a significant contribution to the war effort in the Asiatic–Pacific theater. Although the B-29 raids from China did not cause as much damage to the enemy's industrial capacity as had been hoped, they demonstrated again that the Japanese home islands were vulnerable to attack. Consequently, civilian morale in Japan was lowered. The fuel carried across the Hump in C-109s and in the gas-in-drums cargo aircraft provided the life blood for troop movements which stemmed assaults which could have caused the collapse of Free China and for the harassing Allied bombing and strafing raids upon the Japanese-occupied areas. Keeping China in the war caused the Japanese to have to maintain more than a million troops in occupied China—over two-fifths of its total troop deployment—until the war's end. Had China fallen, the release of a considerable percentage of these Japanese troops and equipment could have had a major deterrent effect on Allied progress in the Pacific war.

C-109 (B-24J-20 FO, 44-48979) gassing up in India, prior to a trip across the Hump to China. Note the definitive C-109 nose contours. (U.S. Air Force Museum photo via Stephen J. Hudek)

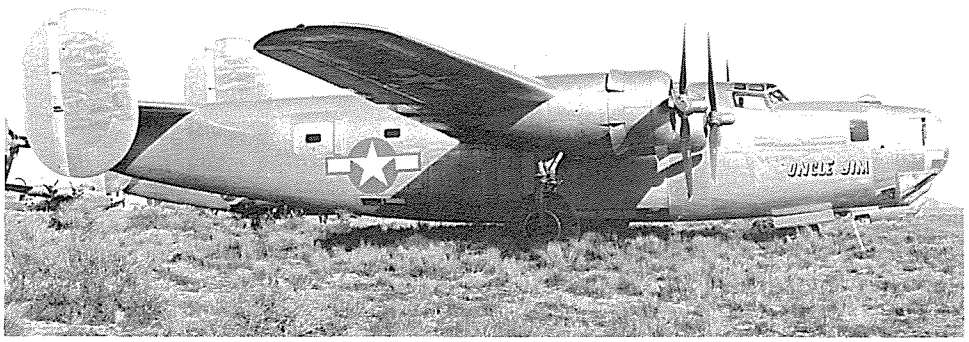


AUTHOR'S NOTES AND COMMENTS

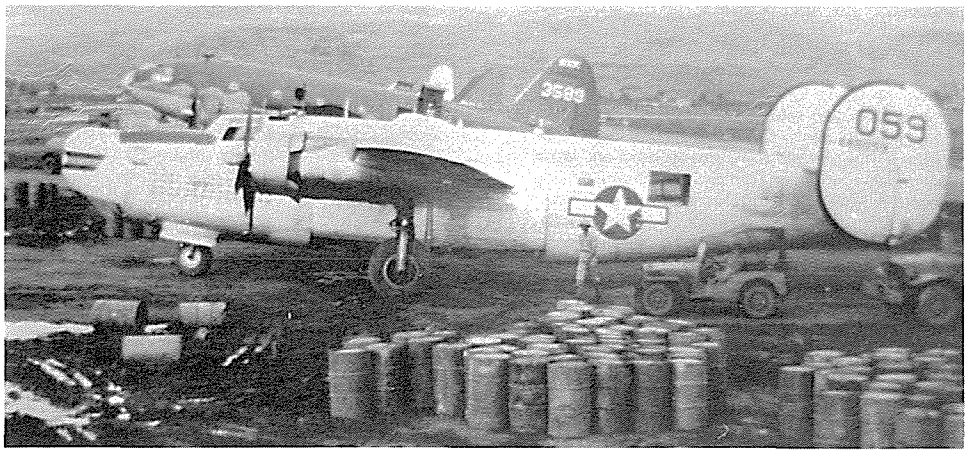
1. While we have not been able to find any evidence that a complete C-109 Technical Order was ever issued, it seems most reasonable to assume that supplements to appropriate B-24 Tech Orders, covering the tanker conversion's special systems, must have been issued. Certainly, a weight and balance form existed. To date, we have not been able to retrieve copies of these. In view of the author's experience in indoctrination training and three-and-a-half months of operational C-109 flying, it is very doubtful that a "Dash One" (Pilots Handbook) Tech. Order for the C-109 existed. The Dash Ones used were those for the converted B-24 models, without any special supplements, covering the C-109's cargo fuel systems. These systems were covered briefly in indoctrination classroom lectures for the pilots. However, the accent was on the normal B-24 fuel systems since refueling and defueling operations were carried out by ground personnel and flight engineers. The pilots' direct association with the cargo fuel usually was limited to checking manifests, weight and balance forms and visual inspections of the cargo fuel tanks for possible leaks. With hazy recollections of 36 years ago, brightened by information contained in two Air Force documents dealing with the XC-109/C-109, a Douglas Aircraft Company drawing and reviews of existing B-24 Dash Ones, it is possible to bring the C-109 tanker's fuel-carrying capacities and systems into better focus.
2. The "CBI Hump" was more than just a series of mountain ranges to be crossed. The area was the meeting place for three major air mass systems which produce one of the most active weather factories in the world. Strong winds with speeds sometimes exceeding 100 mph created mountain waves and vertical sheers which could overturn an aircraft, send it rocketing upwards for thousands of feet or plunge it downward into the mountains. According to season, thunderstorms, torrential rains, hail, sleet, snow and severe icing often held sway. Still, flights seldom were cancelled in 1944-45 because of en-route weather conditions. The forces of nature climbed more Hump cargo aircrew casualties and aircraft than the enemy's air forces. The ground environment under the air routes was essentially hostile, ranging from dense, tall jungles to craggy, snow-covered mountain peaks. For the most part, it was sparsely populated if not uninhabited. Some unfriendly tribes were known to exist in "friendly" territory. However, on quiet, clear days or on top of the clouds, the terrain of the "Rockpile" often presented an awe-inspiring beauty.
3. A short article, entitled "Flying Tankers," in the Technique section of the February 1945 issue of *Air Force* magazine appears to have been the most used reference for later published descriptions of the C-109. Its contents seem to reflect a combination of XC-109 features and standardized C-109 features which did not coexist in the production line conversions. For example, the article tells that the C-109's bomb bay tanks were constructed of light metal, as in the XC-109, while those tanks in the production tankers actually were non-metallic. However, the article describes the two separate fuel systems as the author recollects the installations in the standardized C-109 rather than the original XC-109 arrangement of the two systems. Perhaps the explanation of the apparent discrepancy lies in a revision of the XC-109's cargo fuel plumbing just before commencing production conversions.
4. Army Air Forces Materiel Command, Engineering Division's Memorandum Report #ENG-57-524-803, "Conversion of a B-24E Airplane to an Aeriel [sic] Tanker XC-109," dated 5 November 1943, provided the greater bulk of the technical information in this article. The report deals with the initial evaluation and observation of the prototype's fuel system modifications. However, its clear-cut statements of the total 4850 gallons (U.S.) on board the aircraft at its maximum gross weight of 64,000 pounds, reference to the standard B-24 fuel system and partial descriptions of the refueler tanks which were added to the fuselage fuel systems made it possible to extrapolate the total amount of fuel which could be carried in the tanker's nose and deck tanks although the individual capacities

At first glance, this turretless B-24M could be mistaken for a C-109. Note the airfoil-shaped member which is mounted under the belly, just ahead of the bomb bays. This is the long-span antenna of an Eagle bombing radar system. (William T. Larkins photo)

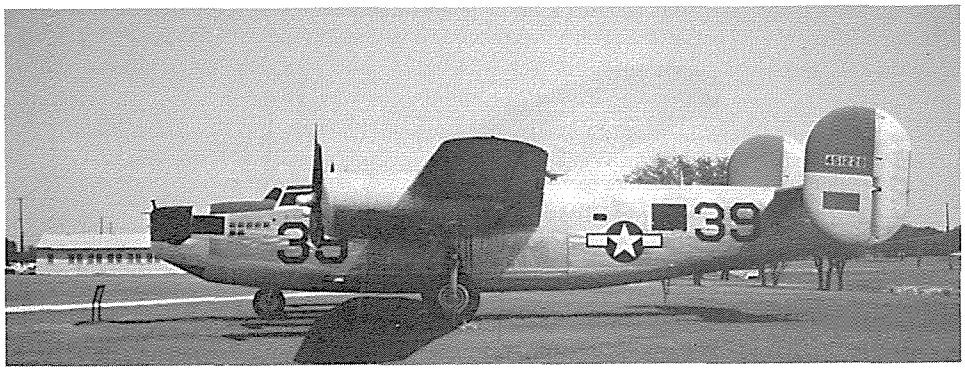
B-24J, 44-41331, appears to have been modified for cargo service. Its nose and tail fairings resemble those of an early C-87 conversion. However, the bomb bays have been altered visibly. Note the ferrying tanks in the forward bomb bays. (William T. Larkins photo)



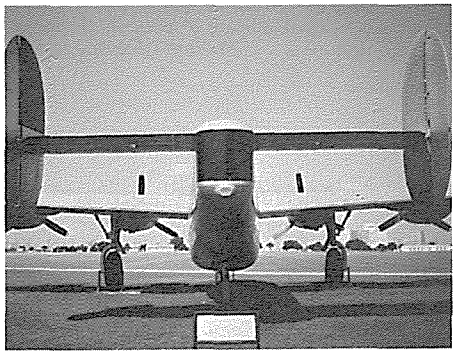
B-24J, 44-41315, bears a strong resemblance to a C-109 but was not a tanker. The open bomb bay door discloses a ferrying tank. (William T. Larkins photo)



C-109 (B-24L-1 FO, 44-49059, originally designated as a B-24M) in fuel unloading area at an airfield in China. (Allan G. Blue Collection)



This C-109 look-alike is a B-24M-20-FO which was used in an icing research project after WWII. While its nose fairing does not have the typical C-109 profile, its tail fairing is identical and all turrets were removed. (Author)



of the tanks were not mentioned in the text of the report.

5. The memorandum report does give references to the identification numbers of engineering drawings which depicted the refueler tanks. We were able to obtain one of these drawings, Douglas Aircraft Company #5162455, which shows the nose compartment tank. Descriptive information on the drawing states the calculated capacity of the 25-3/8" diameter x 50" long, cylindrical tank was approximately 102 gallons (U.S.). Further, it describes the tank as being a standard, nominal 100-gallon ferrying tank, U.S. Rubber Co. Drawing No. 6-001, and clearly states that the tank was non-metallic. This last statement appears to conflict with the implication in AAFMC's ENG-57-524-803 that the nose tank probably was constructed of metal. Using the Douglas drawing's statement of the nose tank's capacity, we were able to extrapolate the total capacity of the three deck tanks. To date, we have not been able to document the individual capacities of these three tanks.
6. With the total capacity of all eight fuselage tanks being approximately 2036 gallons (U.S.), the remaining 864 gallons of the 2900-gallon cargo fuel load which is mentioned in the Feb. '45 issue of *Air Force* magazine and the AAFMC memorandum report, had to be drained from the standard B-24 wing tanks in the aircraft.
7. Appendix I of Allan G. Blue's *The B-24 Liberator* lists the serial numbers of 208 B-24s which were converted to C-109 tankers. Peter M. Bowers provided us with a copy of the official Air Force machine listing for aircraft designated as C-109 types. The two listings are identical. The author has some doubts as to the completeness of the AF listing. Three of the C-109 serial numbers which were entered in the author's personal flight log book in November and December 1944 do not appear on the AF listing, although all three of the entries in question are confirmed as having been in C-109 aircraft by the author's official Air Force Form 5 records. It is possible that the three entries contain transcription errors in the last four digits of each of the serial numbers. However, in two of the three cases, the digit combinations make this seem rather unlikely. Other possibilities are: some field conversions to full C-109 standards may have been omitted from the official USAAF C-109 listing; the base to which the aircraft were assigned listed the aircraft as C-109 although some modifications did not meet the official criteria.
8. When the author departed Mitchel Field, New York, on October 15, 1944, for India in C-109, s/n 44-49037, the stenciling on its nose proclaimed it was a B-24M conversion. Upon arrival at the Tezgoan/Kurmitola airfield complex in Bengal (near Dacca in what is now called Bangladesh) on November 4th, he noted that a number of the C-109 aircraft on the base carried the B-24M designation. However, within a few weeks, the M models seemed to have disappeared from the base. After arriving in India, each subsequent flight was made in a different C-109 aircraft. Consequently, the redesignations were not noticed. The reason for the "disappearance" of the M models was not learned until Allen G. Blue's book was read in 1976.
9. Early in its operational use, as the result of some fiery and explosive crashes, some wag called the C-109 the "See One Oh Boom!" The nickname stuck, although it frequently was shortened to "Boom!" Between the crashes and the nickname, the C-109 soon had a reputation as being a "killer" aircraft. Considering the fact that many of the C-109 pilots had not flown loaded B-24s or C-109s before their first flight across the Hump, pilot inexperience may have been more of a factor than the aircraft's being intrinsically dangerous. Since the landing weight of a loaded C-109 was greater than that of most B-24 bombers, returning from a bombing mission, even a B-24 combat veteran could be surprised. The fact that a number of destination airfields in China were situated at approximately 6,000 feet MSL elevations could have compounded the problems which led to landing accidents. It appears that Air Transport Command's India-China Division recognized inexperience with loaded B-24s as, at least, part of the problem. It set up a loaded aircraft transition school for newly assigned first pilots near the end of 1944. After the school was established, that training became a prerequisite for flying loaded C-109s across the Hump.
10. Although the author does not know the official reasons for the decision to stop filling the nose and deck tanks, there was a strong feeling among the pilots in his unit, at the time, that the weight of the fuel in the locations of these tanks upset the longitudinal balance of the C-109.
11. Since the C-109 flew quite well with full wing tanks, 1600 gallons in the bomb bay tanks but empty nose and deck tanks, the reduction of the load in the bomb bays to 1200 gallons was baffling at the time. In the retrospect of experience and some indirect research findings, the reduced load decision may have been brought about as the result of some landing gear failures. Repeated landings at higher than normal B-24 landing weights (with 4850 gallons of fuel on board at the point of origin, the landing weights could have been over 58,000 pounds at destination) could have taken their toll on the C-109's main landing gears. With the 20th Bomber Command's impending move to the Pacific islands, the needs for stockpiling fuel in China was greatly reduced. The reduced loads on the C-109s could have reflected a shift to safety's taking a higher precedence when military demands slacked off.
13. It has been written that all of the C-109's 4850-gallon fuel load was usable in flight. This does not agree with the author's recollections that the fuel in the nose and deck tanks could not be transferred to the main fuel manifold. If these recollections are correct, the usable fuel was approximately 4414 gallons (U.S.). The 5 November '43 engineering report on the XC-109's original fuel and refueler systems does not indicate that the aft system fed into the main fuel manifold although it clearly states that the forward system did. If the fuel in the aft system could not be fed to the engines of the XC-109, its original usable fuel load would have been only 3716 gallons (U.S.).
13. Some B-24 aircraft were modified to carry four bomb bay tanks while retaining complete armament systems. Some photos of these aircraft have been captioned erroneously as showing a C-109.
14. A number of turretless B-24s which were used in various electronics and weather research projects have been mistaken for C-109s. Fuel tanks, visible in the bomb bays of some of these aircraft, tend to strengthen the illusion. The author was fooled, momentarily, in 1947 by a modified B-24M being used in an icing research project. Closer inspection of the aircraft and a check of its records disclosed that it was not and never had been a C-109.
15. At least one author has described the C-109 as being a development of the C-87, *Liberator Express*. Although the C-109 was developed later than the C-87, the relationship between the two aircraft is limited to their both being B-24 cargo conversions.

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Correspondence with: Allen G. Blue; Peter M. Bowers; Ford Archives, Henry Ford Museum; William Friend; William T. Larkins; San Diego Aero-Space Museum; U.S. Air Force Museum.

Correspondence from Dept. of Air Force, Hq. Aeronautical Systems Div. (AFSC) via William Friend.

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