

The Life of Douglas DC-2-118B, S/N 1368

By Bruce Cunningham



Douglas DC-2 S/N 1368 is rolled out of Douglas Aircraft's building 41 after undergoing an extensive restoration to bring it back to flight status. (All photos and illustrations from the author's collection)

At age 72, the last flyable commercial DC-2, now located at the Museum of Flight in Seattle, Washington, may have made its last flight. Departing from Van Nuys airport in late June 2007, where it had undergone interior refurbishment and addition of a Transcontinental & Western paint scheme at Boeing Field. Having survived for many years as the sole flyable commercial DC-2 in the world, it will now rest among other historic airplanes for the public to enjoy. There is actually one other flyable DC-2 in Amsterdam, originally built for the U.S. Navy as the R2D-1 staff transport, but much later used as a civil aircraft transport and still later by a private owner until purchased by the Aviodrome Museum in The Netherlands.

DC-2 S/N 1368, the 77th off the production line, was originally delivered to Pan American Aviation Services on March 16, 1935, registered as NC14296. Title transfer to Pan American Airways, Inc., took place on April 9, 1935. Available records fail to disclose where the airplane spent its first two years but it is known that on October 26, 1937, it was transferred to Compania Mexicana de Aviacion, S.A., with the registration of XA-BJL. Juan Trippe, president of Pan

American Airways, who was rapidly expanding Pan American, had acquired 51 percent of the stock of Mexicana and sent several airplanes to Mexico to update the airlines' equipment, DC-2 S/N 1368 being one of them

As Pan American continued to expand southward, Trippe moved into Guatemala and on October 11, 1940, established the airline Aerovias de Guatemala. He then transferred two



A DC-2, XA-BKY, contemporary of DC-2 S/N 1368 during her service with Compania Mexicana de Aviacion in Mexico.

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TRANSCONTINENTAL & WESTERN AIR, INC.

10 RICHARDS ROAD
MUNICIPAL AIRPORT
KANSAS CITY, MISSOURI

August 2nd,
1932

Douglas Aircraft Corporation,
Clover Field,
Santa Monica, California.

Attention: Mr. Donald Douglas

Dear Mr. Douglas:

Transcontinental & Western Air is interested in purchasing ten or more trimotored transport planes. I am attaching our general performance specifications, covering this equipment and would appreciate your advising whether your Company is interested in this manufacturing job.

If so, approximately how long would it take to turn out the first plane for service tests?

Very truly yours,

Jack Frye

Jack Frye
Vice President
In Charge of Operations

JF/GS
Encl.

N.B. Please consider this information confidential and return specifications if you are not interested.

TRANSCONTINENTAL & WESTERN AIR, INC.

General Performance Specifications
Transport Plane

1. Type: All metal trimotored monoplane preferred but combination structure or biplane would be considered. Main internal structure must be metal.
2. Power: Three engines of 500 to 550 h.p. (Wasps with 10-1 supercharger; 6-1 compression O.K.).
3. Weight: Gross (maximum) 14,200 lbs.
4. Weight allowance for radio and wing mail bins 350 lbs.
5. Weight allowance must also be made for complete instruments, night flying equipment, fuel capacity for cruising range of 1080 miles at 150 m.p.h., crew of two, at least 12 passengers with comfortable seats and ample room, and the usual miscellaneous equipment carried on a passenger plane of this type. Payload should be at least 2,300 lbs. with full equipment and fuel for maximum range.
6. Performance

Top speed sea level (minimum)	185 m.p.h.
Cruising speed sea level - 79 % top speed	146 m.p.h. plus
Landing speed not more than	85 m.p.h.
Rate of climb sea level (minimum)	1200 ft. p.m.
Service ceiling (minimum)	21000 ft.
Service ceiling any two engines	10000 ft.

This plane, fully loaded, must make satisfactory take-offs under good control at any TWA airport on any combination of two engines.

Kansas City, Missouri.
August 2nd, 1932

The letter to Donald Douglas from Jack Frye that started the ball rolling that resulted in the development of one of the most successful commercial aircraft ever built. (From the author's collection)

DC-2s from Mexicana to the new airline. DC-2 S/N 1368 was one of the two and received the registration identification of LC-ACA.

Pan Am became disassociated with Aerovias on March 14, 1945, and the airline assumed a new name, Aviatega-Emprasa Guatemalteca de Aviacion, S.A. DC-2 S/N 1368 remained with the new airline with its registration changed to TG-ACA.

The DC-2 continued in service in Guatemala, hauling passengers, livestock and cargo for seven more years until the airplane was put up for sale at auction. On June 6, 1952, Mr. A.J. Levin, a member of Hosmer Industries, Inc., attended the auction in Guatemala City and purchased the airplane for \$12,000. For an additional \$1,000 he obtained spare equipment consisting of two tires, two ailerons, one flap actuating cylinder, one elevator and one propeller valve. At the time of purchase the airplane had accumulated a total of 15,363 hours of flight time.

Company pilots flew the airplane to Mexico City where Mr. Levin accepted it and then flew it to the United States where it was registered with the CAA as NC4867V. The Hosmer Company retained the airplane for just over a year and in August 1953 contacted Bob Johnson, owner of Johnson Flying Service at Missoula, Montana, advising him that he had a DC-2 for sale. In the letter Hosmer noted "I should like to

call your attention to modifications made in the field by TWA and Pan American. The propellers are full-feathering hydromatic. The hydraulic system is power driven so that the landing gear and flap actuation are automatic plus the hand pump for emergencies. The cabin interior is without upholstery. The floor is 5/8 plywood cargo stressed. The cockpit configuration is very much like that of a DC-3." Johnson liked the airplane and on September 15, 1953, he purchased it for \$25,500 and flew it to Missoula. (The airplane was never owned by TWA and existing records do not indicate that TWA actually made any of the modifications noted.)

When delivered to Pan American from Douglas, the airplane had been powered by two 710-hp Wright R-1820-F3 air-cooled radial engines driving Hamilton Standard two-position controllable pitch propellers. Johnson didn't like the underpowered R-1820-F3 engines and later found and purchased five R-1820-52 engines of 1,000 hp. His comment was, "I just couldn't wait to throw those -F3s over the river bank." Johnson made several modifications to the airplane, including replacing the existing engine mounts with B-18 units, installing the R-1820-52 engines, replacing the original engine oil coolers located in the engine accessory compartment with DC-3 types as installed below the cowlings on aircraft powered with P&W R-1830 engines, replacing the DC-2 brake



Some of the many uses that Johnson Flying Service found for DC-2 S/N 1368. Top left - Configured for aerial spraying with spray bars along the trailing edge of the wing. Top right - Hauling hay for snowbound animals in winter (note the "kicker" trying to stay warm?). Bottom left - Delivering a load of smoke jumpers to a fire. Bottom right - Making a parachute supply drop in mountainous terrain.

system with a DC-3 system although only the pilot had brake pedals on the rudder pedals, and enlarging the main entrance door for easier air dropping of cargo and for entrance and egress by fire jumpers loaded with fire fighting equipment.

The Johnson Flying Service used the airplane for parachuting smoke jumpers into inaccessible areas to combat forest fires, for dropping fire fighting equipment to the fire fighters, for dropping supplies to forest ranger stations, for dropping hay to livestock snowbound in inaccessible areas and for transporting people and equipment wherever needed throughout the area. Records indicate that several thousand jumps were made from this airplane by fire fighters on fire fighting missions. At one time Johnson even had a spray boom and spray tanks installed and used the airplane as a forestry sprayer to control insect infestation.

The airplane was operated out of all types of airports from long paved runways to short back country dirt strips and open fields. Pilots reported that the airplane was an excellent one for mountain flying missions with sufficient power, lift and maneuverability for relatively safe flight even when flying at slow speeds through mountain passes and steep canyons. The DC-2, with the R-1820-52 engines was seven knots faster than the Johnson DC-3 and for long cross-country flights it was the plane of choice by Johnson pilots.

When, in the early 1970s Bob Johnson died, the company was sold to Evergreen Airlines and the DC-2 and other historical aircraft and parts were to be disposed of, as Evergreen had no use for them. Stan Burnstein, a Tulsa, Oklahoma, aircraft dealer eventually acquired the DC-2. A year later Burnstein donated the DC-2 to the Donald Douglas



Mr. Donald Douglas, Sr., second from right, receiving the gift of the DC-2 from Stan Burnstein in January 1975.

Museum and Library and in January 1975 flew the airplane to the Santa Monica airport and presented it to Mr. Donald Douglas, Sr., and other dignitaries, for the museum.

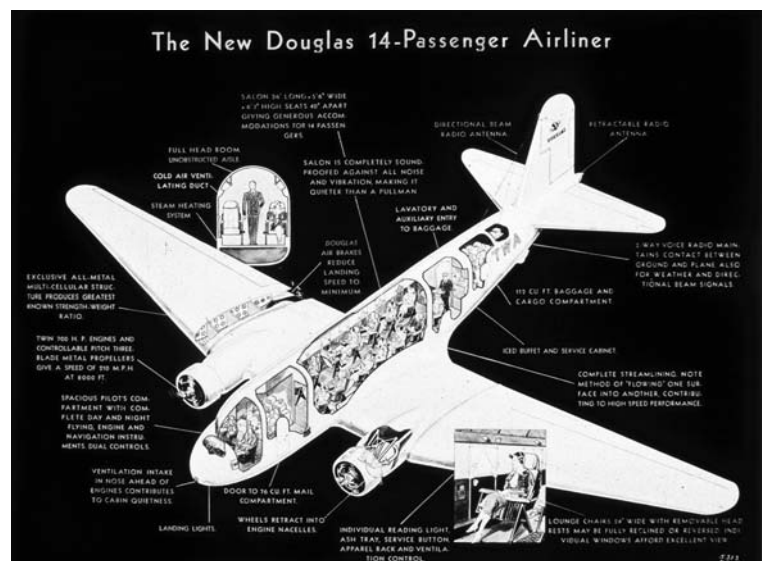
When the DC-2 arrived at Santa Monica, it was moved into a hangar where it remained for two years, after which it was moved outside into the elements, acid rain and LA smog. Unfortunately, it was not preserved for long-term outside storage and as the years passed the skin corroded, the control surfaces fabric began to deteriorate and rip away, windows crazed and the airplane took on a derelict appearance. Trans World Airlines employee volunteers from nearby Los Angeles International Airport had offered to clean the exterior of the airplane in return for which the museum would allow them to paint the old "Lindbergh Line" logo on the fuselage, including the original NC number of the first DC-2, NC13711. The airplane remained outside in the weather and continued to deteriorate.

In September 1981 the curator of the Donald Douglas Museum and Library sent a letter to the president of the McDonnell Douglas Long Beach Management Club proposing that the DC-2 be relocated from the Santa Monica airport to the McDonnell Douglas Long Beach plant where employees might be induced to maintain it and to protect it from further deterioration. In the letter it was suggested that the airplane be refurbished and put on public display on the Douglas Long Beach property.

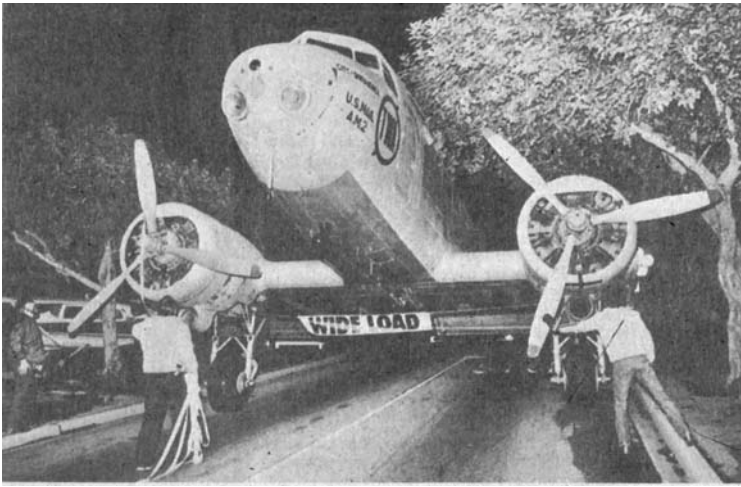
Three members of the Management Club Board of Directors journeyed to Santa Monica to inspect the airplane and to evaluate the proposal that the airplane be restored at Long Beach. In spite of the condition of the airplane exterior, the obvious need for complete engine overhaul, the non-standard condition of the cabin interior and seats and needed replacement or repair of all components throughout the airplane, the decision was made to take it to Long Beach, clean it up, refurbish the interior and polish the exterior skin and put

The Cost of a DC-2		
RAW MATERIALS		
Aluminum alloy sheet.....	\$3,517.92	
Other aluminum.....	1,598.57	
Brass, bronze, steel.....	417.75	
Stainless steel sheet.....	39.54	
Plymetal.....	283.14	
Soundproofing materials.....	331.68	
Upholstery, carpet, etc.....	315.01	
Miscellaneous.....	260.02	
<i>Total raw materials</i>		\$6,763.63
PURCHASED PARTS		
Shock struts (landing gear and tail wheel)	\$ 682.50	
Electrical equipment.....	398.04	
Wheels.....	475.00	
Tires and tubes.....	193.60	
Cabin equipment.....	652.60	
Lavatory and buffet.....	33.51	
Miscellaneous.....	1,506.19	
<i>Total purchased parts</i>		\$3,941.44
INSTRUMENTS		
As specified (without radio or automatic pilot)...	1,427.65	
POWER PLANT		
Wright Cyclone, propellers, starters, collector rings, etc.....	19,139.72	
<i>Cost of materials per ship</i>	31,272.44	
LABOR (estimated)	23,000.00	
<i>Yielding a manufacturing cost of approximately</i>	54,000.00	
<i>Selling price (in quantity)</i>	78,500.00	
BALANCE for shop and office overhead, and profit.	24,500.00	
<i>Note: the above figures (except selling price of ship) are based on prices during the last half of 1933 when the first twenty-five ships were being built.</i>		
COST OF DEVELOPMENT		
Engineering—1. Before completion of DC-1.....	\$63,284	
2. Testing and revision.....	19,614	
	82,898	
Labor—1. Before completion of DC-1.....	129,771	
2. Testing and revision.....	37,484	
	167,255	
Materials for DC-1.....	53,112	
Gasoline for testing (12,000 gallons).....	3,000	
Oil (513 gallons).....	513	
<i>Total cost of development</i>		\$306,778

Cost of the production model DC-2 in 1933, showing cost of development of the first airplane.



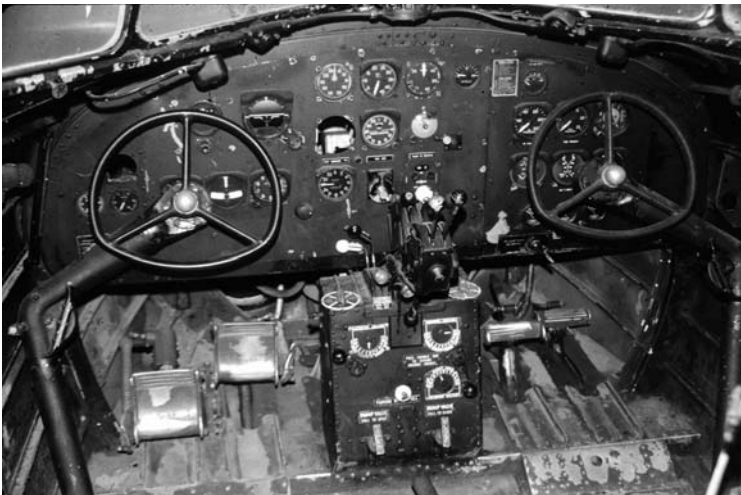
1934 advertisement drawing of the new Douglas 14-passenger DC-2.



LA Times news photograph showing the night move of the DC-2 from Santa Monica to McDonnell Douglas plant in Long Beach. (LA Times photo)



Starting the disassembly of the aircraft in preparation for complete restoration.



Cockpit as flown by Johnson Flying Service and prior to modification by Douglas volunteers to include modern radio and navigation equipment to allow flight into FAA controlled airspace.



Removing the vertical fin leading edge for reconditioning. This was an add-on to overcome the lack of directional control after losing one engine on takeoff.



Photo showing condition of a fuel tank prior to reconditioning and rebuilding.



Replacing fuselage exterior skin that had been severely dented skin that had been damaged by the parachute lanyards during jumps by fire fighters at low altitudes into fire areas.



Assembly and installation of reconditioned landing gear components.

it on display for all to see. It was hoped that the company would see fit to create a showroom for the DC-2 as well as other historic Douglas airplanes and artifacts. This was not to be but the DC-2 was on its way to restoration to its original splendor.

On March 4, 1982, a crew of McDonnell Douglas retiree volunteers went to Santa Monica to begin removing the wings in preparation for its move to Long Beach. With the outer wing panels removed, the center wing still spanned 25 feet, which precluded transportation over main thoroughfares and freeways. Fortunately, the Douglas Company had previously surveyed a less densely traveled route to be used for transporting large missile bodies from the Santa Monica plant to the harbor at San Pedro, Calif. On March 19, 1982, the DC-2 departed the Santa Monica airport at midnight and using the route previously determined, arrived at the McDonnell Douglas building 54 on the Long Beach airport in the early morning hours.

During preparations for the restoration of the airplane there was no shortage of volunteers who wanted to have a hand in restoring the airplane. Several meetings were held to develop a program for bringing the airplane up to acceptable standards for viewing by the public. During these meetings several of the retiree volunteers presented a strong proposal that a program be established by which the plane would be restored to flight-worthy condition, and then, if all conditions for flight were met, fly it. If for some reason at that point it was not permitted to fly, it would be ready for display and no time or labor would be lost.

All those present agreed that this was a reasonable plan, but would only if absolutely necessary, accept the alternate plan of just putting it on display. By the June 1, 1982, the volunteers had begun removal of panels, fairings, cowlings and doors in preparation for inspection to determine the condition of the internal structure.

On August 6, 1982, the Douglas Historical Foundation formed and incorporated as a non-profit, 501(c)3 corporation to lease the airplane for 15 years, to legalize the restoration program, to allow acceptance of donations from those who

were inclined to support the program with money, labor and services. A Board of Directors was elected and at the end of August things were starting to come together.

By the end of the year, when activity on the interior cleaning and removals of panels, assemblies and components was in full swing, the enormity of the project began to hit home. None of the dozen or so "hard core" retiree volunteers backed out but they did revise their estimate of a completion date from two years to at least four years. As expected by those who had worked on old relics previously, when the airplane was opened up, damage and corrosion was revealed. For example, when the four fuel tanks were removed and inspected, they were found to have extensive areas of corrosion on the inside. The tanks had to be sawed in half for access to remove the corrosion and to replace interior panels. They then had to be welded back together. The main landing gear needed a complete overhaul and both engines were well worn and in need of everything.

As information spread through the aircraft community, calls began coming in from those who wanted to help. The original manufacturer of the landing gear requested that we send the complete gear and brake assemblies to their factory for a complete refurbishment. One of the larger package delivery airlines offered to fly the landing gear to the company in the Midwest who had manufactured them over 48 years ago, and then return them when the job was completed.

Local companies rebuilt or replaced all electrical components such as starters, generators, solenoids, regulators, etc., and certified them as airworthy. A metal casting company made three sets of passenger seat components to replace those missing when the airplane arrived. A complete set of window seals was manufactured by the same company that had manufactured the original set in 1935 using the original tooling that had been stored for all those years. The list of companies and the functions they performed to help on the restoration is a long one and the function performed by each was one more step toward flight.

In the mean time working volunteers were replacing external skins aft of the main entrance door that the fire jumpers parachute lanyards had dented and scratched when bailing out. All control surfaces were removed, inspected and re-covered by volunteers.

In removing the vertical fin, more history was brought to light. Investigation disclosed that an early American Airlines DC-2 got into a spin when it lost an engine on takeoff. Only through rapid and correct reactions by the cockpit crew prevented a possible fatal crash. It developed that the width (chord) of the vertical fin was not sufficient to allow recovery from a spin under certain flight conditions. Douglas engineers designed a triangular "glove" to be installed by the airlines, if desired, over the leading edge of the fin. This "glove" added 24 inches to the chord of the lower section of the fin and six inches to the upper chord, thus increasing the area of the fin by approximately 25 percent. This modification resulted in a large increase in directional control and stability.

As the work of restoration continued, all cockpit instruments were removed, brought up to acceptable standards,

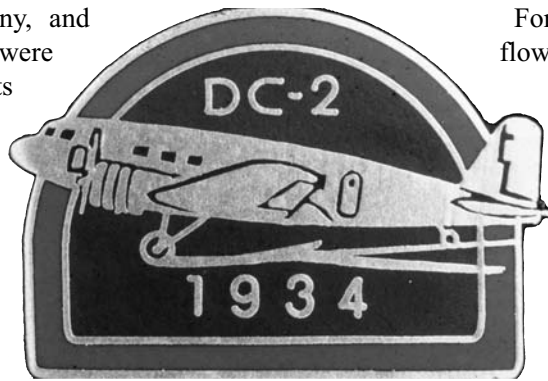
and certified by a volunteer company, and returned for installation. New radios were purchased and installed to allow flights into and out of controlled airports. All hydraulic components including the reservoir, pressure accumulator, pumps, actuating cylinders and selector valves, went to local companies that volunteered to help and where specialists put them through the overhaul process and certified them as airworthy.

Inspection of the aircraft structure was a continuing function. Knowing of the past history and locations flown into and out of, the crew assigned to the task of inspection of aircraft structure was pleasantly surprised at the almost total lack of corrosion in the wings and hard to get to sections of the belly compartment, which speaks well of the structural integrity designed into the airplane by the Douglas design team.

Throughout this period the airplane was indoors at the McDonnell Douglas plant in Long Beach. At various times, when lack of space became a problem, the airplane was moved about on the Douglas property and the Long Beach airport, to get out of the way of the plant production functions. By the time the airplane was completely restored and ready for flight, it had been in and out of three company buildings, a Butler hangar on airport property and in one private hangar, and as many as three different times in and out of one of the company buildings.

Finally, as the restoration activity and the rollout ceremonies were complete, the airplane was moved to the active flight ramp for system functions and engine runs where it would remain for its stay at Long Beach. The reason is that once the airplane was fueled, company insurance regulations forbade returning the DC-2 into any building except the main flight test hangar. At least the thought was that the airplane could be tied down on the flight ramp where it would not have to move so frequently. Wrong again. Someone seemed to always need the exact spot occupied by the DC-2, and another move was required.

At long last everyone was satisfied that the airplane, and the pilots, were ready to fly. The final papers were signed by the FAA and on April 25, 1987, the DC-2 made its first flight since January 1975 when it was flown into Santa Monica airport from Tulsa, Oklahoma. It lifted off the runway at Daugherty Field in Long Beach for a one-hour test flight. All checked OK until time to land the airplane and there was no visible indication on the landing gear indicator that the gear was down and locked. The pilot and copilot just opened the cockpit side windows and visually verified that the gear was indeed down.



DC-2 pin created to commemorate the aircraft's restoration.

For the next 10 years the airplane was flown to many air shows, both civilian and military, where it always was one of the main attractions. It was made available to the company, and was used frequently for marketing purposes. Several times it was repainted in Transcontinental and Western Airline colors and flown, at TWA expense, to St. Louis and Kansas City for display and flights at the TWA annual open house celebration where it was the center of attraction.

During the years when the DC-2 remained under lease, the Museum of Flying at the Santa Monica airport acquired the Donald Douglas Museum and Library and all its assets, including the DC-2. The airplane remained on Douglas property and in control of the DHF until 1987 when the original lease ran out. After the lease expired, the airplane still remained on the Douglas flight ramp due to limited ramp space at the Museum of Flying flight ramp at Santa Monica. In fact, due to this problem, it never returned to Santa Monica.

When the Museum of Flying was closed and all assets put up for sale, the DC-2 was purchased by a businessman and donated to the Museum of Flight at Seattle. Even then it remained at the Douglas flight ramp until it underwent a refurbishment at Van Nuys airport, and was then flown to Seattle in late June 2007, 20 years after its first flight from the Long Beach Airport.

At the Seattle Museum of Flight, it is scheduled to go on permanent, non-flying, display; hopefully adjacent to the last Boeing 247. A fitting tribute to two airplanes that did so much to bring profitable and safe commercial flight to the world.

It is hoped that it will receive the care, attention and respect it deserves after its long and colorful active life.



An R.G. Smith rendering of the DC-2 donated to the Douglas Historical Society.