

Goodyear – civilian blimps

Peter Lobner, 24 August 2021

1. Introduction

Goodyear Tire & Rubber Company began their involvement with lighter-than-air (LTA) vehicles in 1912, when the company developed a fabric envelope suitable for use in airships and aerostats.

The first blimps manufactured by the Goodyear Tire & Rubber Company were B-Type blimps ordered by the US Navy in 1917 for convoy escort duty. Goodyear (envelope supplier) and Curtiss Aeroplane (gondola supplier) produced 9 of the 17 B-Type blimps ordered. Goodyear also supplied the envelopes for some of the Navy's 10 C-Type patrol blimps, which were delivered in 1918, after the end of WW I. Both the B- and C-Type blimps used hydrogen as the lift gas.

In 1923, Goodyear teamed with German firm Luftschiffbau Zeppelin and created a new subsidiary, Goodyear Zeppelin Corporation. In June 1925, their Type AD *Pilgrim* (NC-9A) made its first flight and became Goodyear's first blimp to use helium lift gas. *Pilgrim* was certified later in 1925, becoming the first US commercial airship.

Goodyear Zeppelin Corporation filed a patent application for a nonrigid airship in September 1929, describing the objectives of their invention as follows:

“This invention relates to non-rigid airships, and it has particular relation to the suspension of pilot cars or gondolas from the envelopes of non-rigid airships.

The principal object of the invention is to provide a non-rigid airship in which the envelope and the pilot car or engine car are so constructed as to offer the minimum air resistance. Another object of the invention is to provide connections between the envelope and pilot car that are not exposed to the airstream for sustaining the weight of the pilot car, as well as stabilizing it against lateral or longitudinal movement.”

In patent Figure 1, the pressurized lift gas envelope (10) contains an air ballonet (12, for adjusting airship buoyancy) and a load suspension system for carrying and distributing the weight of the gondola (11) affixed under the envelope and the thrust loads from the with attached engines. These loads are carried by multiple vertical cables (27) that pass through the ballonet and radiate (23, 24, 25, 26) to connect to longitudinal rows of catenary curtains (22) attached to the envelope's upper surface. The catenaries distribute the concentrated loads from the gondola and engines over a large area the envelope's upper surface.

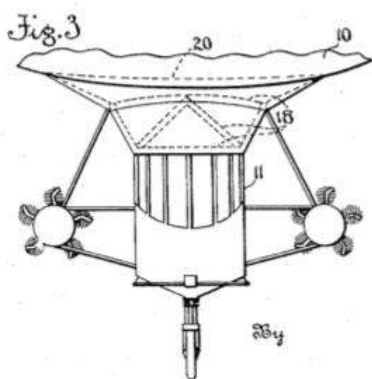
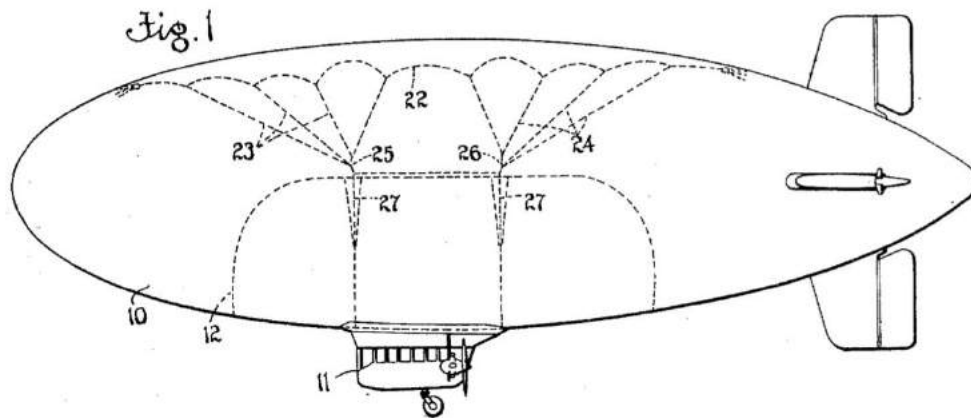
April 7, 1931.

K. BAUCH ET AL

1,800,174

NONRIGID AIRSHIP

Filed Sept. 26, 1929



Patent Figure 3 shows a framework at the top of the gondola (18, 20) that provides attachment points for the gondola structure and the engines. This framework connects to the vertical cables (27) and secures the gondola in place. An exterior streamlined surface provides an aerodynamically clean interface between the gondola and the envelope.

Patent US 1,800,174 was granted on 7 April 1931. The general features of nonrigid airships described in this patent have become common features used widely in many modern nonrigid airships.

With the threat of war with Germany looming, Goodyear discontinued their business relationship with Luftschiffbau Zeppelin in 1939 and reorganized their airship business as part of a new subsidiary known as Goodyear Aircraft Company. At the start of WW II, the Goodyear civilian blimp fleet was inducted into the Navy, primarily to help search for enemy submarines.

After WW II, Goodyear Aircraft Company reconstituted its small civilian fleet with a few former military blimps, including the large K-class Puritan and the smaller L-class Enterprise and Ranger, which operated from the late 1940s into the late 1950s. Puritan was the first airship to experiment with the “Trans-Lux” night sign that became commonplace on later Goodyear blimps. Puritan used its Trans-Lux sign to flash a special bulletin from the Akron Beacon Journal newsroom in 1947. Goodyear called the process “blimpcasting.” The letters were 18 feet high.



Source: Akron Beacon Journal via The LTA Society (2014)

Enterprise V, equipped with a camera and microwave transmitting equipment provided by TV network NBC, became the first airship to deliver live aerial coverage of the Pasadena Rose Parade on 1 January 1955.



L-class Ranger with 10 Trans-Lux panels below the Goodyear logo. Source: Goodyear, circa early 1950s

Goodyear entered the modern era with the new GZ-19 blimps in 1959, followed in 1963 by the GZ-19A. “GZ” stands for “Goodyear – Zeppelin.” Also in 1963, the firm was again re-branded, this time as Goodyear Aerospace Corporation (GAC), which provided a broad range of aerospace services.

The next generation of Goodyear blimps were the iconic GZ-20 and GZ-20A, which were introduced in 1969 and 1972, respectively. One last new blimp design, the one-of-a-kind GZ-22, was introduced in 1987. General characteristics of these blimps are summarized in the following table.

The last of the Goodyear-manufactured blimps was retired on 14 March 2017, completing Goodyear’s transition to a new generation of “Goodyear blimps” based on the Zeppelin NT model LZ N007-101 semi-rigid airship, which is manufactured by Zeppelin Luftschifftechnik GmbH (ZLT) in Friedrichshafen, Germany.

This article provides a brief overview of Goodyear’s post-WW II civilian blimps. You’ll find more details on Goodyear blimps on the excellent Goodyear website here: <https://www.goodyearblimp.com>

General characteristics of the “classic” Goodyear civilian blimps

	GZ-19	GZ-19A	GZ-20	GZ-20A	GZ-22
US type certificate	T.C.1 approved 16 Sep 1959	T.C.1 approved 8 August 1963	T.C.1 approved 6 July 1969	T.C.1 approved 19 April 1972	TC AS1GL approved 31 August 1989
Length	150 ft (45.7 m)	157 ft (47.8 m)	192 ft (58 m)	192 ft (58 m)	205.5 ft (62.6 m)
Diameter, envelope	41 ft (12.5 ft)	41 ft (12.5 ft)	45.9 ft (14.0 m)	45.9 ft (14.0 m)	47 ft (14.3 m)
Height, overall			59.5 ft (18 m)	59.5 ft (18 m)	60.1 ft (18.3 m)
Volume	132,500 ft ³ (3,752 m ³)	147,300 ft ³ (4,171 m ³)	202,700 ft ³ (5,740 m ³)	202,700 ft ³ (5,740 m ³)	247,900 ft ³ (7,020 m ³)
Max weight	8,336 lb (3,781 kg)	9,234 lb (4,188 kg)	12,320 lb (5,588 kg)	12,840 lb (5,824 kg)	16,500 lb (7,484 kg)
Propulsion	2 x fixed Continental G0-300-A @ 175 shp (130.5 kW) each, driving constant-speed reversing propellers	2 x fixed Continental G0-300A @ 175 shp (130.5 kW) each, driving constant-speed reversing propellers	2 x fixed Continental IO-360-D @ 210 shp (156.6 kW) each, driving constant speed (non-feathering) reversing propellers	2 x fixed Continental IO-360-D @ 210 shp (156.6 kW) each, driving constant speed (non-feathering) reversing propellers	2 x vectoring Allison Model 250-B17C turboprops @ 314 shp (234 kW) each, driving featherable, reversible ducted fan propellers
Cruise speed	40 mph (64 kph)	40 mph (64 kph)	35 mph (56 kph)	35 mph (56 kph)	
Max speed	61 mph (98 kph)	57 mph (92 kph)	50 mph (84 kph)	50 mph (84 kph)	62 mph (99 kph)
Accommodations	1 crew + 6 pax	1 crew + 6 pax	1 crew + 6 pax	1 crew + 6 pax	1 crew + 10 pax
Service ceiling			7,500 ft (2,285 m)	7,500 ft (2,285 m)	10,000 ft (3,050 m)

2. GZ-19 & -19A

The first post WW II new design Goodyear blimp was the GZ-19, which was introduced in 1959 as the *Mayflower V*. It was similar in size and layout to the WW II-vintage L-class blimps then in the Goodyear blimp fleet.

	L-class	GZ-19
Length	147.7 ft (45 m)	150 ft (45.7 m)
Volume	123,000 ft ³ (3,482 m ³)	132,500 ft ³ (3,752 m ³)

The GZ-19 featured an updated engine package, larger envelope and modern avionics. Envelope material was 2-ply polyester fabric coated with neoprene rubber. The gondola had a steel frame and a composite skin. The GZ-19A was introduced in 1963 with a larger envelope. The GZ-19 and GZ-19A blimps flew under the following names:

- Mayflower (V), (VI), (VII)
- Columbia (II), (III), (IV)



GZ-19 Mayflower with Trans-Lux night sign and 1961 Dodge Polara convertible. Source: GoodyearBlimp.com



GZ-19A Mayflower introduced the “Skytacular” night sign in 1966 with 1,540 colored incandescent lights per side. Source: Goodyear



GZ-19A Columbia. Source: Goodyear

In the late 1960s, Goodyear modified and tested the GZ-19A *Mayflower* with a quiet, low-speed stern propeller under an Advanced Projects Research Agency (ARPA, predecessor of DARPA) project called Silent Joe II. One possible application was for nearly silent, low altitude, night surveillance missions in Viet Nam. An infra-red spotlight was added at the nose of the blimp to supplement night-vision equipment.

The single, 3-bladed 20 foot (6.1 m) diameter tail propeller was mounted on support rings and fastened at the tail of the envelope. The propeller was driven at low speed by a geared hydraulic motor that could drive the propeller at speeds between 39 to 140 rpm, and could be pushed to 170 rpm. The hydraulic reservoir and pump were in the gondola and the hydraulic power system was completed with flexible hydraulic supply and return lines fastened to the outside of the envelope. The system was able to drive the *Mayflower* at speeds up to 10 mph (16 kph).

Mark Lutz reported, “Silent Joe II was tested for ground noise. My interpretation of the description of the results (in a 1969 report) is, it was inaudible flying 1,000 feet (305 m) up at 10 mph, but could be heard at 500 feet up (152 m).”



GZ-19A Mayflower with stern propeller for Silent Joe II. Source: NAA Noon Balloon, #111 (2016)

3. GZ-20 & GZ-20A

The GZ-20 class was introduced in 1969, with *America* and *Columbia* being the first two. These blimps had a larger envelope, more powerful engines, larger night sign, and longer endurance than the GZ-19A. *America* and *Columbia* introduced the larger “*Super Skytacular*” night sign with 3,780 incandescent lights on both sides. Power for the signs was provided by a small auxiliary gas turbine generator.

The first GZ-20A was *Europa*, which was introduced in 1972 and was based in Italy, making it the first Goodyear blimp operated outside of the US. The GZ-20A featured a larger volume, a stronger car structure, and a greater gross weight than the GZ-20.



GZ-20A Spirit of Innovation, circa 2007.
Source: *w:en:Hughs via Wikimedia Commons*

In 1996, blimp display technology was advanced again with the introduction on some of the Goodyear blimps of the daylight readable “*Super Skytacular 2*” display with 3,780 integrated LED panels capable of displaying animations and graphics.

The GZ-20 and GZ-20A blimps flew under the following names:

- *America*
- *Columbia* (V), (VI), (VII), (VIII)
- *Europa*
- *Enterprise* (VI)
- *Stars & Stripes* (I), (II), (III)
- *Eagle*
- *Spirit of Goodyear*
- *Spirit of America*
- *Spirit of Innovation*

The last three were built between 2000 and 2006 as the final renewal of Goodyear's fleet of GZ-20A blimps.

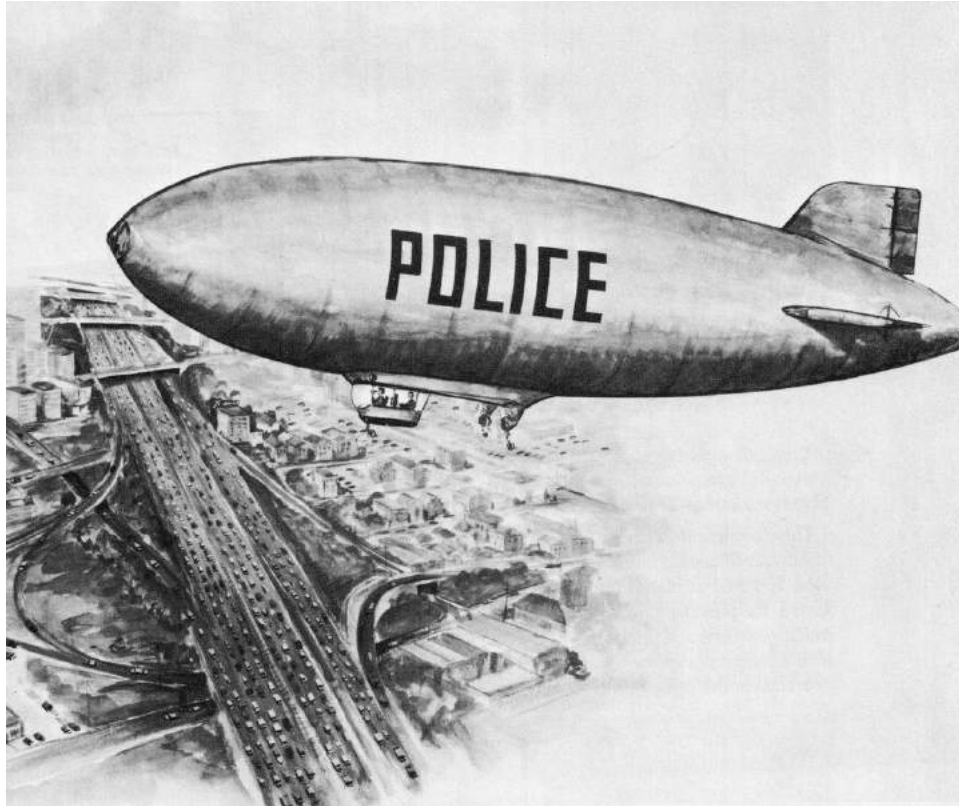


GZ-20A Spirit of Innovation visits Phoenix Goodyear Airport, 16 November 2015. Source: Amy B. Wang, The Republic

4. Police blimp proposal

In his 1976 book "Airships for the Future," author William J. White described a Goodyear proposal for a police blimp:

“In 1974, Goodyear Aerospace Corporation conducted a six-month study for the city of Tempe, Arizona, evaluating the feasibility of employing two-man blimps as silent crime fighters. The study concluded that non-rigids somewhat smaller than the Goodyear blimp could be built for as little as \$520,000 each to serve as aerial platforms for police surveillance and crime control. The blimps would fly as low as 500 ft (150 meters) off the ground, would require a one-man ground crew, and operating costs would compare favorably with the operating costs for police helicopters. The blimps would cruise at approximately 40 miles (64 kilometers) per hour, carry a pilot and an observer, binoculars, camera, spotlights, radios, loudspeakers, sirens guns and ammunition,”



Police Blimp concept. Source: Airships for the Future (1976)

5. The Twilight of Goodyear Aerospace Corp.

In 1987, Goodyear Tire & Rubber Company, after having built more than 300 airships since it entered the business in the 1920s, sold Goodyear Aerospace Corp. and its lighter-than-air operations to

electronics manufacturer Loral Corp. The former Goodyear airship business unit was reorganized as a defense systems business unit within Loral. Development of the GZ-22 blimp was completed in 1983 during the transition to Loral ownership.

6. GZ-22

According to Goodyear, the GZ-22 Spirit of Akron originally was designed to take advantage of new technologies applied to airships. It had greater in volume, mechanical horsepower, and electrical capacity than the GZ-20A. It had a neoprene-impregnated polyester 2-ply envelope. First flight was on 9 October 1987.

Goodyear operated one GZ-22 blimp, named the *Spirit of Akron*, from 1987 to 1999. It was a distinctive Goodyear blimp in several ways:

- Large ducted fan turboprop engines
- X-tail configuration
- One of the first airships in the world with a fly-by-wire flight control system



GZ-22. Source: Goodyear via Airship and Blimp Resources

Goodyear operated the *Spirit of Akron* for 12 years from Pompano Beach, Florida and from Goodyear's Wingfoot Lake facility in Suffield Township, Ohio, near Akron. On 28 October 1999, a mechanical failure in the flight control system caused the GZ-22 to crash in Suffield Township. The airship was not repaired. However, Goodyear donated the gondola and many parts to the MAPS Air Museum in North Canton, OH, where the restored gondola is on public display.



*GZ-22 gondola at MAPS Air Museum, North Canton, OH.
Source: Bill Maloney via Net-Maquettes*

7. The end of the Goodyear blimp business

In 1993, Loral Corp. sold its former Goodyear Aerospace business unit to Lockheed Martin along with the rights to the former Goodyear blimp and airship designs. The civilian blimp Type Certificates T.C.1 and AS1GL currently are assigned to Lockheed Martin Maritime Systems & Sensors.

The Goodyear Zeppelin Company and its successors, Goodyear Airplane Company and Goodyear Aerospace Corp., manufactured over three hundred airships between 1923 and 1993.

8. The new “Goodyear Blimps”

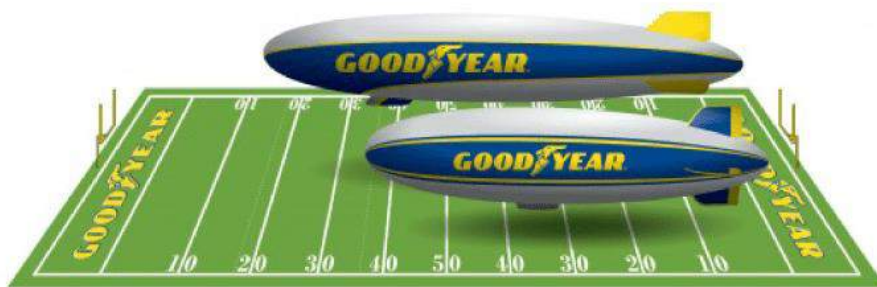
In 2011 the Goodyear Tire & Rubber Company decided to replace its aging fleet of Goodyear Aerospace Corp. non-rigid GZ-20A blimps with three modern Zeppelin NT model LZ N007-101 semi-rigid airships. However, the name “Goodyear blimp” would still be used. The first Zeppelin NT was introduced to the Goodyear fleet in 2014 and the third was delivered in 2018. The last of the GZ-20A blimps was retired on 14 March 2017.



*Goodyear’s new “blimp” – a semi-rigid Zeppelin LZ N007-101.
Source: Goodyear*

The new Zeppelin NT is considerably larger than the GZ-20A.

	GZ-20A	Zeppelin NT
Length	192 ft (58 m)	246 ft (75 m)
Volume	247,900 ft ³ (7,020 m ³)	290,500 ft ³ (8,225m ³)



Promotional Image from Goodyear

See my separate article on the Zeppelin NT for more information.



*Goodyear's LZ N007-101 and a B-1 bomber at the start of the Rose Parade, 1 January 2019.
Author's photo.*

9. For more information

- Goodyear Blimp history: <https://www.goodyearblimp.com/relive-history/blimp-history.html>
- “The Goodyear Blimp, Today and Yesterday,” Airships.Net: <https://www.airships.net/goodyear-blimp/>
- Roland Escher, “Goodyear Aerospace Corp.” Airship and Blimp Resources, 2003: <http://www.myairship.com/database/goodyear.html>
- Mark Lutz, “Four Airships With Stern Propulsion,” Noon Balloon, #111, p. 18, Naval Airship Association, Fall 2016: https://650a8e8c-0be3-466b-9728-1ece39a725e3.filesusr.com/ugd/fbd712_c3041c1eab9143d4a7da7b3160941522.pdf
- William J. White, “Airships for the Future,” p, 119, Sterling Publishing Co., Inc., New York, ISBN 0-8069-0090-3, 1976

Type certificates

- “Type Certificate is T.C.1,” Rev 4., TZ-123000, GZ-19, GZ-19A, GZ-20 & GZ-20A, assigned to Lockheed Martin Maritime Systems & Sensors - Akron, 22 March 2004, search on the FAA Type Certificate website here: https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgMakeModel.nsf/MainFrame?OpenFrameSet
- “Type Certificate is AS1GL,” Rev 5, GZ-22, assigned to Lockheed Martin Maritime Systems & Sensors - Akron, 22 March 2004, search on the FAA Type Certificate website here: https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgMakeModel.nsf/MainFrame?OpenFrameSet

Ancient history

- Patent US1800174A, “Nonrigid airship,” inventor: Kurt Bauch & Paul Helma, filed 26 September 1929, granted 7 April 1931, originally assigned to Goodyear Zeppelin Corp., application expired 7 April 1948: <https://patents.google.com/patent/US1800174A/en?q=patent+1800174>

- Dan Grossman, “The First “Goodyear Blimp” – Pilgrim of 1925,” Airships.Net: <https://www.airships.net/goodyear-blimp/goodyear-blimp-pilgrim/>
- “Local [Akron] history: Blimp innovation was a flash of brilliance,” The Lighter-Than-Air-Society, 10 March 2014: <https://www.blimpinfo.com/airships/local-akron-history-blimp-innovation-was-a-flash-of-brilliance/>

Related *Modern Airship* articles

- Zeppelin NT