HORIZONS

A publication of the Massachusetts Air and Space Museum

The Massachusetts Air and Space Museum inspires new generations to explore, experience, and pursue interests and opportunities in science and technology

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From the Collection

By Barbara Jagla MASM Curator

In March 2022, Astronaut **Story Musgrave** donated his flight suit and flight helmet to the Massachusetts Air and Space Museum, In-



cluded on the flight suit are the STS 80 mission patch and the Mach 25 space shuttle patch. He is the only astronaut to fly on all five shuttles that entered space: *Columbia, Challenger, Discovery, Atlantis,* and *Endeavour. Enterprise* was actually the first of the six shuttles, but it was used only for testing within Earth's atmosphere and therefore isn't actually a "space craft." Perhaps the most dramatic of Story Musgrave's space missions was the fifth, on the Shuttle *Endeavour*. Musgrave commanded the mission to repair the damaged Hubble Space Telescope.

Franklin Story Musgrave was born in Boston and raised on his parents' farm near Stockbridge, Massa-chusetts. As a small child, he wandered alone in the neighboring woods, and by his teens he was operating and repairing tractors, trucks and combines. At 18, Story Musgrave joined the United States Marine Corps. In the Corps, he served as an aircraft electrician

Win an Airplane that can Land Anywhere! MASM Raffle On Now! By MASM Board Member Kevin Currie

The Massachusetts Air and Space Museum (MASM) is thrilled to announce its inaugural raffle fundraiser to support the Museum and its educational activities. In addition to supporting a wonderful cause, every ticket purchased will have the opportunity of winning one of the three prizes listed below. No more than 5,000 tickets will be sold, so act now. The drawing will be held on July 12, 2023 or earlier if all tickets are sold before then.



GRAND PRIZE

The grand prize is a classic 1970 Thurston Teal Airplane (N501ME). This is a 2/3 place all aluminum amphibious

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The Best is Yet to Come

By

MASM Board Member Keith Young

"Good things come to those who wait" is an old English proverb. I have always subscribed to the amalgamated version which is "Great things come to those who work." Sometimes, however, it doesn't matter how hard one works, waiting is still required. Such is the case with the present status of the project to get the museum renovated and reopened. I was hopeful that this article would be an invitation to visit the newly refurbished space on Main Street in Hyannis but as I write this on May 1st, we are still waiting to get the appropriate permits to begin the process of transforming the old classrooms into a space where the public can experience the history and activities that have contributed to the field



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Museum located at: 434 Main Street Hyannis, Mass.

Museum Hours:

Check our website for hours and admissions updates: www.massairspace.org

MASM Business Mailing Address: 200 Hanscom Drive Bedford, Massachusetts 01730

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of aviation and space exploration.

A number of factors have contributed to the delays including physical issues such as a broken window and roof leaks, finding people to do the work during the current post pandemic economy, supply chain issues and a myriad of other impedances that obstruct many projects.

I am pleased to share that I think we have smoothed the rough edges and are finally moving from stagnation to forward motion, albeit not as quickly as my enthusiasm had hoped. There have been a number of milestones reached, A contractor has been engaged to do the work in a reasonable timeframe. The architectural plans have been submitted to the town and upon your reading of this article, I anticipate that several weeks worth of demolition have been completed and the work has entered the reconstruction phase.

So when will the museum reopen? If there are no further setbacks, I anticipate a date of early July although I'm still optimistic that we can be ready to reopen before the end of spring on Jun 21st. For this to happen, however, a number of circumstances are required to fall into place, not the least of which is a fast track on the permitting process for both the demolition permit as well as the building permit.

I want to convey to you my frustration that the process has been so slow in making progress yet then I hear my mother's sage advice, "All good things..." but I can hardly wait! 🦄

Keith Young



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and mechanic, and learned to fly. After completing this service, he enrolled at Syracuse University where, in 1958, he received a bachelor of science degree in



Dr. Story Musgrave's Mach 25 patch—the number denotes reentry velocity [+/- 19,175 MPH]

mathematics and statistics.

Upon graduation from Syracuse, he went to work for the Eastman Kodak Company as a mathematician and operations analyst. In the years that followed, he earned an MBA in operations analysis and computer programming from UCLA. The following year he added a bachelor's degree in chemistry from Marietta College and, in 1964, received his Doctor of Medicine degree from Columbia University.

Leaving Kodak, he served a surgical internship at the University of Kentucky Medical Center in Lexington. He remained at Kentucky on post-doctoral fellow-



Dr. Story Musgrave's STS-80 mission patch

ships from the Air Force and the Heart Institute, earning an additional master's degree in physiology and biophysics. High-altitude flight and the then-new space program had created new areas of medicine, and Dr. Musgrave was in the forefront, pursuing research in cardiovascular and exercise physiology and in the medicine of aviation.

In August 1967, <u>Musgrave was selected by NASA</u> to be among the first cohort of astronaut-scientists. Until then, astronauts had been chosen from the ranks of military test pilots. After completing astronaut training, he worked on the design and development of the Skylab program and served as backup science pilot for the first Skylab mission. Dr. Musgrave helped design the spacesuits, life support systems, airlocks and manned maneuvering units that would be used for spacewalks and other extravehicular activity on the Space Shuttle missions.

From 1967 to 1989, while working for NASA, Musgrave served as a trauma surgeon at Denver General Hospital, and as a part-time professor of physiology and biophysics at the University of Kentucky Medical Center. He also trained as a pilot and parachutist,



Dr. Story Musgrave's flight suit



Dr. Story Musgrave's flight helmet Continued on Page 4

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STS-61 Mission, the first repair of the Hubble Space Telescope

earning his Air Force Wings and FAA ratings as flight instructor, instrument instructor, glider instructor, and airline transport pilot. He has flown 160 different types of civilian and military aircraft, and has made more than 800 free-falls, including 100 experimental freefalls designed to study human aerodynamics.

The first of Dr. Musgrave's six trips into outer space took place on the maiden voyage of the Space Shuttle Challenger in 1983. While on this mission, Musgrave and Don Peterson performed the first spacewalks off of the Shuttle. On his second Shuttle mission, he served as systems engineer during launch and reentry, and as a pilot during the orbital operations.

Perhaps the most dramatic of Story Musgrave's space missions was the fifth, on the Shuttle Endeavour. Musgrave commanded the mission to repair the damaged Hubble Space Telescope. During this 11-day mission, the telescope was restored to full functionality. The repairs required five spacewalks, three performed by Dr. Musgrave himself

Story Musgrave flew his last space mission in January 1996, on the Space Shuttle Columbia. On this mission, the crew deployed and retrieved reusable satellites for studying the origin and composition of the stars, and to experiment with super-vacuum conditions in which thin film wafers can be grown for use in the semiconductor industry.

A lifelong student, he has earned seven graduate degrees in all, including master's degrees in literature and psychology. His interests include poetry, chess, gardening, photography, computer, running, scuba diving, flying and soaring in gliders. Today, he conducts multiple enterprises, including a palm farm in Orlando, Florida, a production company in Sydney, Australia, and a sculpture company in Burbank, California. In addition to his business activities, he practices landscape architecture, serves as a consultant with Walt Disney Imagineering, and teaches at Art Center College of Design in Pasadena, California.

With express thanks to the <u>Academy of Achieve-</u> <u>ment</u> for the biography of Story Musgrave, M.D. Dean of American Astronauts.

Books by Story Musgrave:

Australia From Space: The beauty, the glory and the sacred

The Nasa Northrup T-38

Story: The Way of Water





Dr. Story Musgrave

World's Busiest Airport—ATL Atlanta International



Overhead view of the entire Hartsfield-Jackson Atlanta International Airport

Although Istanbul International Airport is the largest single-roof airport terminal, the Hartsfield-Jackson Atlanta International Airport in Georgia remains the busiest airport in the world. Working off five runways, employing seven one-mile-long terminal concourses that house over two hundred and twenty departure gates, ATL moves in excess of 104 million passengers each year.

Atlanta Airport employs over 63,000 people to handle an array of tasks that combine to make safe air travel a reality. Air traffic controllers handle as many as 250 flights per hour and 2,700 flights in and out per day. Ground crew members move some 95,000 pieces of luggage each day. The airport sits upon 4,700 acres of land roughly seven miles outside of the city center of Atlanta, Georgia. of the airport that was designed to handle up to six million passengers per year. The new facilities opened in 1961 and had nine and a half million people pass through it by year's end.

While the ramps bustle with vehicle traffic moving luggage and meal carts in and out of aircraft, there are no fuel trucks to be seen. Each gate is equipped with its own fuel outlet that is fed by an underground piping system that runs over twenty-three miles. This pipeline pumps almost three million gallons of fuel to hungry airplanes every day.

Getting passengers from Atlanta to other destinations actually begins not in the skies, but underground. Beneath this giant complex is an completely automated train system that runs along a three-mile long circular track. The autonomous rail cars run one apart from

In the late 1950s work began on a modernization

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each other keeping terminal lobbies free from congestion. If major backups occur below ground, the rippling caused by these backups can be felt throughout the end of both runways 8R/26L that is below the level of the runway. This taxiway allows planes to continue moving to and from their gates without imped-

the entire air transportation network.

Of equal importance to moving passengers is moving their luggage. Like the passengers themselves, baggage must be screened to insure that no prohibited items that could compromise the safety of travelers are contained within them. To accomplish this, checked



Typical Terminal Building at ATL

ing the takeoffs and landings on those runways. According to airport officials, *Taxiway Victor* saves roughly six hundred runway crossovers each day, which translates to fuel savings. Aircraft don't have to power down, then power back up again multiple times in order to get to and from their gates which saves enormous amounts

bags are transferred via computer-assisted conveyors within complex automated underground corridors that utilize laser scanning for security. Suspect baggage is bumped off the line and hand-checked by TSA security personnel to insure safety. The luggage conveyors cover some thirty-five linear miles.

One of the key innovations to maintaining aircraft ground traffic speed is called *"Taxiway Victor."* To reduce the number of runway crossings by taxiing aircraft, ATL has constructed a bypass pathway beyond

of fuel each day.

Homebase for Delta Airlines as well as a hub for other airlines, Hartsfield-Jackson Atlanta International Airport provides the aviation industry with a modern, innovative, and technically up-to-date facility for commercial air carriers as well as a comfortable and efficient flight experience for air travelers. ATL is constantly upgrading and looking to the future so that it can retain its title as busiest airport in the world.



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airplane with fewer than 1,350 hours of total time. The 150 HP Lycoming engine and Hartzell prop have ~130 hours since overhaul. The aircraft will include a new annual inspection and new tires. Also included are instruments and avionics as follows: ADS-B, a PJ2 COM Radio, Electronics International model R-1-4 digital RPM/TACH, model M- 1 digital manifold pressure gauge, King KLX 135 GPS/Moving Map/Com, KT 76A transponder, PS Engineering PM 1000 2-place intercom system. In addition, the winner will receive \$3,000 for his/her tail wheel rating and/or seaplane rating. The airplane value is estimated at \$58,500.

SECOND PRIZE

Second prize is a Bose A20 Aviation Headset that is valued at \$1,095.95.



THIRD PRIZE

Third prize is an iPad MINI with 256 GB and Wi-Fi, plus a one-year subscription to Fore-Flight Pro-Plus. This prize is valued at \$689.98 (cellular service is not included).



Tickets prices are \$65 for a single or \$150 for a block of three and may be purchased at the links listed below. Additional purchasing and raffle information may be found by visiting our website at www.massairspace.org.

The Thurston Teal was designed by David Thurston and manufactured in Sanford, Maine at the Thurston Aircraft Corporation. Mr. Thurston had a long and productive career in developing aircraft for water use. During World War II he worked for Grumman Aircraft and later on helped create the Lake Buccaneer, Colonial Skimmer, and the AeroMarine Seafire as well as the Thurston Teal.

Or visit: https://www.massairspace.org/airplane-raffle/

Something New!



- Cruise speed: 400 kn (460 mph, 740 km/h) estimated minimum.
- Range: 4,500 nmi (5,200 mi, 8,300 km)
- Service ceiling: 30,000 ft (9,100 m)
- Maximum glide ratio: 22:1.
- Fuel economy: 18–25 mpgpus (13.1–9.4 L/100 km)



MASM Board Member Keith Young being interviewed on Sun-and-Fun Radio in Lakeland, Florida on April 10, 2022 promoting the Mass Air and Space Museum.



Saturday, June 11th MASM will have a table there from 10:00 to 2:00—click link below for more info https://www.velocissima.com/2022-airport-day

C.A.V.U

Most people familiar with aviation know that the abbreviation "CAVU" stands for "Ceiling and visibility unrestricted." In this recurring feature of **Horizons**, your ability to see clearly into the history of aviation will be tested through identification of flying machines that once were. The first reader who submits the correct answer will be entitled to bragging rights and have their name and answer published in the subsequent edition of **Horizons**. Submit your name, the name of the aircraft, the type or version (if applicable), and the country where it was manufactured to the editor-in-chief of **Horizons** at: **horizons@massairspace.org**

Here is your challenge for this edition:

For additional content, click on many of the photos in this edition except this one. You'll find videos and links for more information!





March 2022 Edition's Answer:

Junkers G-38-E — Germany Passenger liner—Max. speed: 140 MPH (225 km/h) Range: 1,870 NM Dry weight: 26,000 lb (117,94 kg) Max. take-off weight: 46,826 lb (21,240 kg) Dimension: Wing span: 147.64 ft (45 m); length 75.45 ft (23 m); height 23 ft 7 in (7.2 m); wing area 3,121.53 sq ft (290 m²) Powered: four L-88 V-12 radial motors producing 3,154 Horsepower Payload: 1st model carried 13 passengers, later model carried up to 34 passengers.

Correct Answer: Bragging rights go to Roger McDowell