

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

Vol. 7 Issue 2

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June 2021

General Electric CT58 Turboshaft Engine *Now On Display at the Museum*



The General Electric T58 is an American turboshaft engine developed for helicopter use

A turboshaft engine is a form of gas turbine that is optimized to produce shaft-power rather than jet thrust. Turboshaft engines are commonly used in applications that require a sustained high power output, high reliability, small size, and light weight.

The mighty T58 was instrumental in the evolution and popularity of one of the 20th century's key innovations, the helicopter. First run in 1955, it remained in production until 1984, by which time some 6,300 units had been built. First flight was on a modified Sikorsky

Continued on Page 2

James Webb Space Telescope *Set to Launch October 31, 2021*



Mirror array and sun shield assembly for the James Webb Space Telescope

One million miles from mother Earth is where NASA plans to park the next evolution in space astronomy, the **James Webb Space Telescope**. This ten billion-dollar project is the culmination of decades of planning, design, construction, and execution that is scheduled to be launched on Halloween day this year. This is no ordinary set of lenses that are designed to eavesdrop on the stars. Instead, it is literally the most complex set of systems ever designed by man to deploy, erect itself, and operate autonomously

Continued on Page 3



From the Cockpit

For those who grew up in Massachusetts, summer and Cape Cod are synonymous. Last year the pandemic preempted both. We at MASM had just taken off on a VFR flight plan in February, when we came face to face with the storm clouds of Covid 19. However, our operations people led by Keith Young and our Curator, Barbara Jagla refiled flight plan after flight plan in compliance with everchanging mandated course corrections, managing to regain altitude in July. Since then, all aspects of the museum, have exceeded expectations.

Hundreds of visitors have given rave reviews. One of them called the museum a fantastic boutique museum, a description we have incorporated in describing our pride and joy. Enhanced experiences were made possible by freeing up promised exhibits that were tied up in pandemic lockdowns. We were able to give a home to a full-size astronaut, bring to life a replica of the Goddard rocket and manage to work with staff at GE Lynn to move a jet engine from their storage to a place of honor in Hyannis. Julie Summers Walker of AOPA visited the museum during the summer. She has honored the museum in a two-page complimentary, article in the May issue of "AOPA Pilot."

Massachusetts Air and Space Museum is in the process of filing new and exciting flight plans. Stay tuned to future issues of Horizons to view our countdown and blast off with us to a future you are certain to enjoy.

Joe Dini, Chairman of the Board



Chairman of the Board Joe Dini jdini@massairspace.org
President Bob Segal rsegal@massairspace.org
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Operations Manager Bryan Mckay bmckay@massairspace.org

Museum located at:

**The Landing (formerly Capetown Mall) 790 Iyannough Road
Hyannis, MA 02601**

Museum Hours:

**Tuesday 10:00 AM to 4:00 PM [starting July 6]
 Wednesday, Friday & Saturday 10:00 AM to 4:00 PM
 Thursday, 12:00 PM to 7:00 PM**

Admission:

**Adults \$8.00 Children (ages 5-11) \$5.00
 Active Military with ID: Free**

MASM Mailing Address:

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Continued from Page 1

HSS-1 in 1957, and civil certification for the CT58-100 variant was obtained two years later.

On July 1, 1959, it became the first turbine engine to gain FAA certification for civil helicopter use. The "C" in CT58 indicated "Civilian". The engine General Electric built weighed only 250 lb (110 kg) and deliv-



Sikorsky HSS-1 Helicopter

ered 1,050 horsepower (780 kW). The T58 was GE's first small turbine engine and, by the early 1960s, it



Continued on Page 3

Click here for your museum tickets:

Tickets


Continued from Page 2

had evolved into one of the bread-and-butter production engine programs for the Lynn, Massachusetts plant.

Ongoing T58 and CT58-powered aircraft missions worldwide include troop transport, anti-submarine and anti-surface warfare, civil heavy lift (logging, fire-fighting, utility/construction), search and rescue, off-shore oil platform service and passenger transport.

GE Aviation, an operating unit of General Electric Company, is one of the world's leading manufacturers of helicopter and jet engines for civil and military aircraft. GE is also a global provider of maintenance and support services for operators of GE engines.

The CT58 on display at the museum came from GE Aviation in Lynn, Massachusetts.

In 1892, Edison General Electric – based in Schenectady, N.Y. and owned by the famed inventor Thomas Edison – and the Thomson-Houston company of Lynn merged and became the General Electric Co. Thus began the company's continuous presence in Lynn, Massachusetts that lasts to this day. 

considered as the gold standard for looking at the heavens and back toward the origins of the universe. Despite several initial miscalculations in the original



James E. Webb ran NASA from February 1961 to October 1968. He believed that NASA had to strike a balance between human space flight and science

design, and after several repair missions to remedy those problems, Hubble has given astronomers an abundance of information that was both expected and unanticipated. It confirmed the presence of black holes in space. Up until Hubble, these were only theo-

ried. It also discovered tens of thousands of galaxies that were previously seemingly just dark voids in an otherwise black sky.

As revealing as the visual images from Hubble were compared to looking at the stars through Earth's atmosphere, *JWST* promises to be one hundred times more powerful at star gazing than Hubble has been. Being parked in space some 750,000 miles beyond our moon, and shielded by a giant series of tents that will block our sun's light and heat from both the reflective mirrors and the sophisticated electronics that interpret and relay the images it captures, it is estimated that the *JWST* will be able to reach backward in time to discover the very beginnings of the universe. It will look at stars that no longer exist, but whose light was generated so long ago that it is just now becoming visible to us on Earth. It will examine the universe employing every known spectrum of light to ascertain what planets are out there and of what they are composed. It will exam-

Continued from Page 1

from any external input from man. With a deployment so distant from Earth, there is no present capability for man to be able to make a house-call to correct any miscalculation, or repair any damage it may incur along the way. Therefore, every system and subsystem must perform as designed and built in order for the mission to be a success

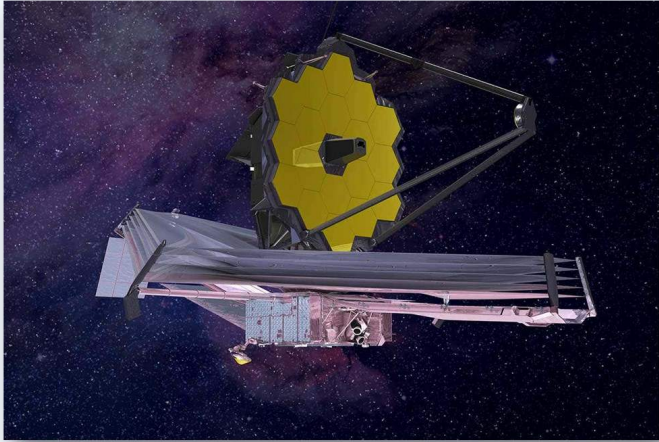
Named in honor of James E. Webb, the man who lead NASA through the days of the manned space missions known as *Mercury*, *Gemini*, and the beginning of *Apollo*, this high-tech stargazer is known to those working on the project simply as *JWST*.

Up until now, the *Hubble Space Telescope* has been

Continued on Page 4

Continued from Page 3

ine the solids, the liquids, and the gases that make up the cosmos and, most importantly, evaluate whether or not any of those celestial bodies can support any form of life as we know it on Earth.



James Webb Space Telescope shown deployed in space

After launch of the Ariane 5 rocket that will transport *JWST* out of our atmosphere, the vehicle carrying the package will allow the deployment to begin. Since the telescope is far too large to fit into any existing rocket for ascent, it has been folded neatly into a smaller package. The 18-segment mirror that is over six times larger than the Hubble Space Telescope mirror sits upon a metal framework that allows controllers on the ground to fine-tune the angles and pitch of each segment. This collection array is focused onto a 0.9 square meter secondary mirror that allows a myriad of instruments to interpret the images and send them back to Earth for analysis and evaluation.

It will take three weeks from launch to fully deploy all of the systems aboard and to chill it down to the optimum operating temperature of 50°K [-369.67°F]. At that point, *JWST* will become fully operational and start a new chapter in man's book of exploration. What that new chapter will reveal is anyone's guess. But it will certainly provide a glimpse at the universe that man has never before seen, prompt many new questions about the origin of matter, and may even answer questions that have stumped mankind since the beginning of recorded time. 🌍

Member of the Moon Landing Team, Michael Collins Dies at 90



While Neil Armstrong and Buzz Aldrin were the first two humans to walk on the moon during the Apollo 11 mission, their trusty command module pilot remained aboard the spacecraft that would eventually ferry all three of them back home. Michael Collins flew alone in lunar orbit aboard *Columbia* for almost a full day while his comrades below made history.

"I have been places and done things you simply would not believe. I feel like saying: I have dangled from a cord a hundred miles up; I have seen the earth eclipsed by the moon, and enjoyed it. I have seen the sun's true light, unfiltered by any planet's atmosphere. I have seen the ultimate black of infinity in a stillness undisturbed by any living thing." 🚀




***Michael Collins command module pilot Apollo 11,
Director of the National Air and Space Museum
1971 to 1978***

Plum Island Aerodrome Hosts Jet Aircraft Rally June 16th to 20th



You wouldn't think that an asphalt runway that is only 2,105 feet long would be able to accommodate some of the heaviest and most modern turbine jet aircraft of today, but Plum Island Aerodrome comes alive each summer for four days during its annual radio controlled jet engine rally. While these jets may not be as big and as heavy as their real-life counterparts, they are every bit as sophisticated and demanding to fly. Pilots of radio controlled aircraft don't get to feel the movements of the airplane from within it and must base all their flying decisions solely upon what they see from the ground. In the case of these jets, that could be a considerable distance away.

Plum Island Aerodrome was first used by W. Starling Burgess back in 1910 where he tested the aircraft he built in his Marblehead factory. Now this privately-owned strip of land is leased by [Historic New England](#)

and the hangar there has become a museum. 



[Click here for the complete Aircraft Rally schedule](#)

Massachusetts Air and Space Museum Making News!

The Massachusetts Air and Space Museum has been making news on a grand scale. A Cape Cod newspaper recently printed a story of how the museum staff helped a local Cub Scout Pack deal with the problems associated with home-schooling during a

pandemic by delivering a NASA activity booklet that stimulated their creative juices. The scouts became familiar with the James Webb Space Telescope that is scheduled to be launched in October.



Space suit and life-support backpack used by astronauts during moon landings

The MASM museum on Cape Cod was also the subject of a recent extensive [AOPA Pilot](#) article that included some great photos of key exhibits. Click on the link to read the arti-



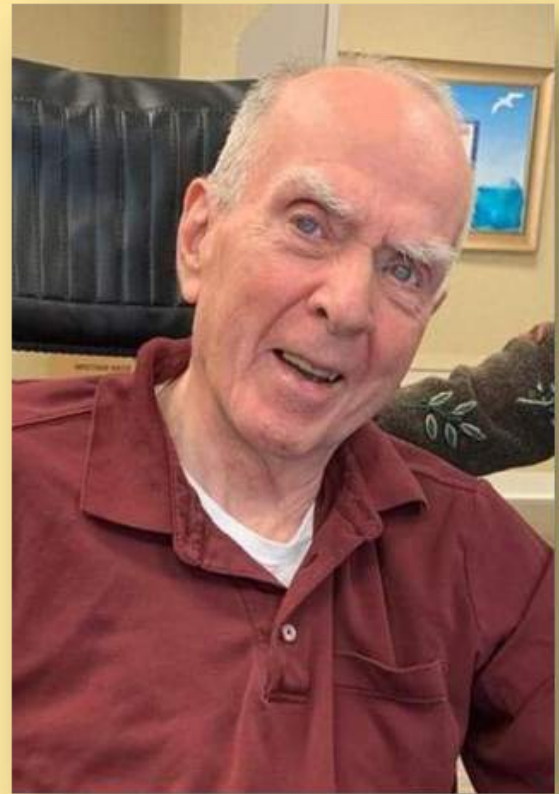
Congratulations to Scout Pack 54 Centerville Cape & Island Council as they celebrated their Blue and Gold Banquet with a "space theme". MASM was pleased to print and provide James Webb Space Telescope activity booklets for all the scouts. The scouts were thrilled to have activities and dove right into the material! The scouts also made head band antennae, tinfoil rockets and devoured cupcakes. The Webb Telescope will be the largest, most powerful and complex space telescope ever built and launched into space. It will fundamentally alter our understanding of the universe! Launch date: October 31, 2021

Newspaper Article about MASM helping scout pack

Pathfinding Member of MASM Recognized

William J. Deane

The creation of an institution such as the Massachusetts Air and Space Museum requires the contributions of many people. Some contribute time and effort, others furnish the much needed funding that pays the bills and keeps the lights burning. And there are those who do all that and who also ignite the original idea of the institution and then continue adding fuel to kindle the fires within. These people remain at the heart of the institution, and William J. Deane is such a person when it comes to MASM.



Bill was recently recognized by the MASM Board of Directors as a true Pathfinder of the museum. His inspiration and enthusiasm for the preservation of the Commonwealth's aviation and space history were acknowledged and applauded at a recent presentation ceremony on April 18th by past MASM Chairman of the Board and current advisor, Al Mundo.

William Deane was one of the founding members of a fledgling organization that has finally taken wing with last year's opening of the museum on Cape Cod. His ongoing belief of what could be has become a reality and now serves the people of Massachusetts. Without his support and diligence, it is likely the museum would still remain just a concept rather than the reality it is today.

We applaud Bill for all he has contributed to the development of MASM and to the eventual opening of the museum. Without pathfinders like him, where would we be?



Airships, Then and Now



Seven years before the infamous Zeppelin *The Hindenburg* took to the skies over Germany in 1936, ***His Majesty's Airship R-100*** was launched. Designed by Barnes Wallace of Dam Busters fame, the airship boasted luxury accommodations for 100 passengers and was designed to connect all the dominions of the British Empire by air.

Built in Yorkshire by a subsidiary of Vickers, Ltd. called the Airship Guarantee Company, the R-100 came to life in a giant double-bay structure called an air shed. The 700-foot airframe rose up in one bay, while her sister airship, the R-101, was constructed next door. Both airships had a rigid steel framework that was covered in canvas from nose to tail. Inside the frame were giant gas bags that filled the upper three-quarters of the ship. Inside the lower portion of the framework in the forward third there were four separate decks for passengers and crew, with a control pod suspended below the airframe where the coxswain steered the giant airship.

The passenger quarters were Spartan compared to other forms of transit of the day, but minimalization of weight was the key objective. Unlike the sprawling suites aboard ocean liners, the R-100 had small cabin spaces separated by curtains rather than doors and filled only with bunk beds. The cabins were basically for sleeping and little else. Passengers spent their leisure time in the dining room, the lounge areas, or on the two level verandas that allowed viewing out the spacious windows that looked down on the earth or ocean below.

The kitchen was electric, offering a level of cuisine that competed with ocean travel and far surpassed that aboard commercial airplanes. The dining room was central to the passenger area with a grand staircase reminiscent of those aboard luxury liners. It allowed guests to sit on two levels and whittle away the hours as they traversed the Atlantic Ocean in less than half the time of the ocean liners below.

Airships of the day relied upon hydrogen for 100% of their lift. The motors and control surfaces could help elevate the ship above the ground, but the giant volume of gas was essential for the aerodynamic lift. As was evidenced by the *Hindenburg* dis-

aster at Naval Air Station Lakehurst, New Jersey in 1937, hydrogen was a deadly choice for lighter-than-air ships like the R-100. The highly publicized *Hindenburg* episode spelled the demise of airships worldwide, the end of an era, and the dissolution of an entire industry.

Today, airships are enjoying a rebirth thanks to modern materials, electronic, advanced engineering, and bold new thinking. Heavy lift capabilities coupled with the capacity to get into tight places that have no developed landing facilities has changed how the aviation industry has regarded the development of airships. The availability of helium as an alternative to hydrogen offers a safer solution for lift in lighter-than-air ships. The former interior framework that held giant gasbags has been eliminated and the inflated gasbag itself becomes the structure. Propulsion accounts for a significant portion of the lift [upwards of 40%] as opposed to relying upon the internal lifting gas alone. Motors are now electric rather than internal combustion engines making them lighter and more powerful. They also eliminate the need for large stores of heavy fuel to run them, and require less maintenance. Many of these airships have solar cell arrays on



the upper surfaces of the craft allowing battery recharging in flight.

But the real revolution with modern airships is the lift ratio and the reduced fuel consumption when compared to conventional aircraft. Lockheed Martin has a hybrid airship in development that promises to burn only one tenth of the fuel of a helicopter carrying a similar load. When these giants come to life, the delivery of heavy cargoes to remote places will then be possible, and this new generation of airship will fill the skies. Lockheed Martin is not alone. Both foreign and domestic companies have drawing board concepts and working prototypes, all aimed toward creating a new market for their technology. While most are focused toward commercial enterprises, military variations could emerge fairly soon, and a civil aviation version might even be possible in the not-too-distant future. ☺

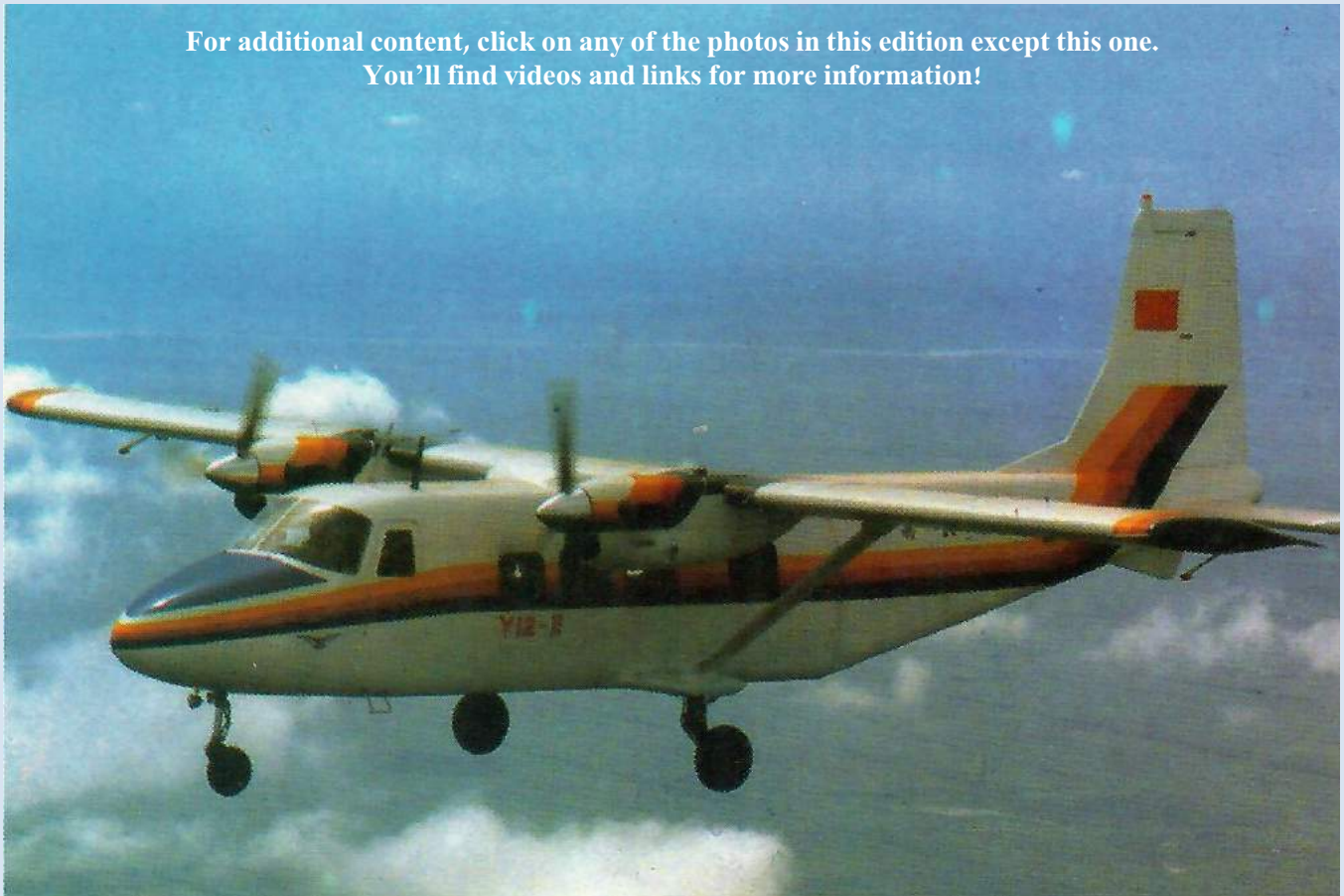


CAVU

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 any of the photos in this edition except this one.
You'll find videos and links for more information!



March 2021 Edition's Answer:

Polikarpov Po-2 USSR

Two to three-seat trainer (estimated 41,000 produced between 1927 & 1953—possibly the largest production of a single airplane design in history)

Max. speed: 97 MPH (156 km/h)

Ceiling: 13,125ft (4,000 m) **Radius:** 249 miles (400 km)

Dry weight: 1,400 lb (635 kg) **Max. take-off weight:** 1,962 lb (890 kg)

Dimension: Wing span: 37 ft 4.75 in (11.4 m); length 26 ft 9.75 in (8.17 m); height 10 ft 2 in (3.10 m); wing area 356.86 sq ft (33.15 m)

Powered: one 100-hp (75 kW) radial piston engine

Armament: one 7.62-mm (0.3-in) machine gun and up to 551 lb (250 kg) of bombs

Correct Answer: No one ventured a guess on this entry.

