Missions for America
Semper vigilans!
Semper volans!

The Coastwatcher

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Senior/Sponsor/Cadet Program 1830
10-11 MAR-Squadron Leadership Course
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07 APR-CTWG TRAEX
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CADET MEETING

06 February, 2018

After the customary opening ceremonies, cadets broke down into groups for training and activities.

A team building exercise opened the meeting.

Lt Col Rocketto presented two aerospace lessons.

The first was a hands-on activity in which the cadets studied the relationships expressed in a formula for conservation of angular momentum. The relationships were made manifest as cadets experimented riding a rotating disk while varying the position of small dumbbells which they held. The concept was then applied to the speed of the earth as it moved in an elliptical orbit around the sun.

Cadets Martin and Donovan apply forces to Cadet Race to start him spinning.

With his arms holding the dumbbells at his side, Cadet Race spins rapidly.

By extending his arms which are holding the dumbbells, Cadet Race slows the spin.

Most readers will recognize this demonstration as an example of how a figure skaters changes the rate of rotation of a twirl.

C/2dLt Schantz brought up the "sling shot" method used to change the velocity of an artificial satellites.

The second part of the program was centered around a lesson discussing the similarities and differences between aircraft and submarines. The Socratic method was used and cadets and Rocketto interaction was supplemented by a set of 40 slides illustrating the similarities and differences.

SENIOR MEETING

06 February, 2018

Plans for the February 24th Wing Wide TRANEX were discussed.

Department heads and project directors reported the current status of their departments and projects.

ACHIEVEMENTS

Cadets Diaz, Owen Guilliams, and R. Guilliams and SM Jaqui Ramsey passed the ICUT practical test and have qualified for the rating.

MISSIONS

The Squadron flew an east sector ice patrol on Saturday, the third. Majs Noniewicz and Nielson flew as pilot and observer and Lt Schmidt handled the camera. Some ice was observed on the Connecticut but there was free passage to Hartford.

A rifle shooting friend of Lt Col Rocketto, Scott Dawly, is the Supervisor of the Eastern District, Connecticut Department of Energy and Environmental Protection. During the heaviest icing two weeks ago, he was surveying the conditions at park and boat launching sites. He reported that at Eagle Landing State Park just on the southwest side of the East Haadam bridge, the ice was piled three feet deep and large amounts of flotsam were embedded in the ice. He also reported that large numbers of spectators had flooded the area to gawk at the relatively rare sight. This is in accord with a report from our air crews who noted inordinate amounts of air traffic along the river.

TRAINING

Lt Schmidt received mission pilot training from Maj Noniewicz.

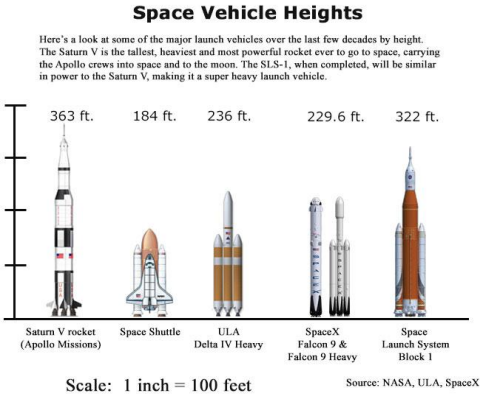
Maj Noniewicz also worked preparing Lt Trotochaud to assume mission scanner duties.

CURRENT EVENTS

SpaceX Successfully Launches Falcon Heavy
Tuesday, 7 February

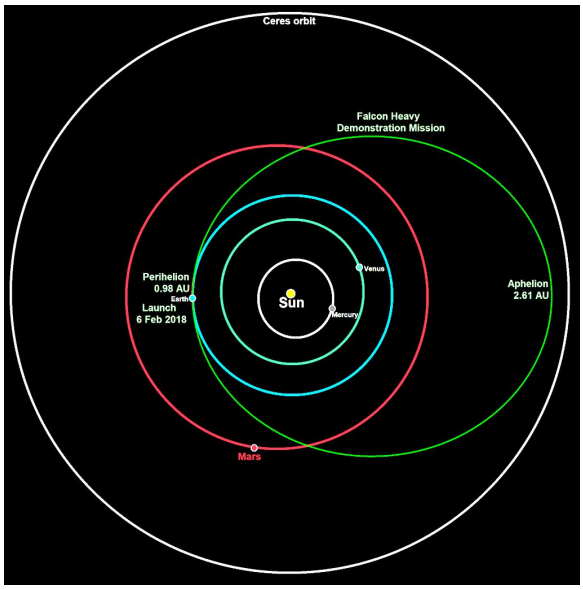
Elon Musk's SpaceX Corporation recorded a remarkable aerospace achievement when it not only launched a Falcon Heavy rocket but put its payload into orbit and successfully auto-landed its two strap-on boosters.

The Falcon Heavy is now at the top of the pyramid in the world of operational heavy lift spacecraft.



The Falcon Heavy can lift 64 tons into low-Earth orbit. In second place is the Delta IV Heavy with a 29 ton capacity.

The payload was Musk's cherry-red Tesla convertible, a product of another one of his companies, Tesla Motors. After achieving earth orbit, the automobile was transferred into a heliocentric orbit with an apogee between Mars and the asteroid belt.



An astronomical unit (AU) is the mean distance from the center of the Earth to the center of the sun, 93 million miles.

The Falcon Heavy is a reusable launch vehicle crafted from three smaller Falcon 9 rockets. The core, which carries the payload has two modified Falcon9s strapped to its sides. When the strap-ons burn out, they are released and return to their launch site and land automatically. Both strap-ons successfully completed their stage of the mission.

Strap-on boosters landing together at Cape Canaveral.

The core and payload continue climbing. At a predetermined point, a stage containing the payload is fired. The reusable core, unable to return to its launch site, guides itself to a pre-positioned landing platform and is recovered in an automatic landing.

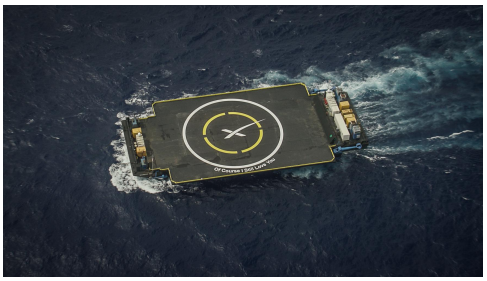
The final recovery of the core was not successful. Two of its engines failed and it crashed, narrowly missing the landing platform. Fragments from the destroyed core damaged the landing platform but the extent of the damage is unknown at this time.

One cannot help but enjoy this remarkable success, made more enjoyable by Mr. Musk's whimsical nature and cultural awareness. A space-suited driver was behind the wheel, left elbow on the window door and the top was down. A note on the dashboard said "Don't Panic," a reference to *A Hitchhiker's Guide to the Universe,* a copy of which is aboard. An inscribed crystal carries quote's from Isaac Asimov's *Foundations Series*.

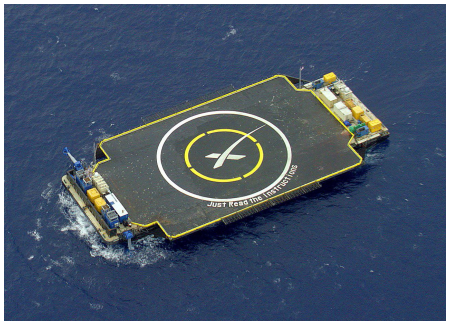
Spaceman to Ground Control: There's 243 million miles to aphelion, I got terminal velocity, Bowie music in the 8-track, it dark out, and I'm wearing sunglasses.
Ground Control to Spaceman: Hit it!

The radio was on playing David Bowie's song, *Space Oddity*. However, battery power limited the time during which Major Tom and Ground Control could stay in contact.

Two name of the two autonomous oceanic landing platforms are posthumous honors dedicated to science-fiction writer Iain M. Banks. The names of two of the autonomous spaceships in his novel, the *Player of Games:* "Just Read the Instructions" *and* "Of Course I Still Love You." The platforms are about the same configuration and size as a football field.



"Of Course I Still Love You" when on station is about 400 miles off the coast of Florida.



"Just Read the Instructions" is the Pacific landing platform for launches from Vandenburg Air Force Base.

Finally, Musk hopes to recover the recordings of the near miss landing and crash from "Of Course I Still Love You" and add them to his collection of films, *SpaceX's Greatest Blunders,* a cinematic collection of SpaceX rockets blowing up. The Greek sin of *hubris*, false pride, does not seem to be one of Elon Musk's failings.

CURRENT EVENTS & HISTORY

The Emergence of Business and Regional Airlines as Electronic Intelligence Platforms

Part I

Aircraft modified to perform special purposes can be traced back to the dawn of powered flight. Glenn Curtiss crafted floats and installed them on his Model D land-plane, converting it into a seaplane. Aircraft have evolved from simple wood, wire, and cloth beginnings to marvels of material and electronic technologies. But the development of a new aircraft can be so expensive that companies have bet their future survival on a new design as Boeing did when it elected to build the 747.

One way to reduce costs is to modify successful designs. Boeing's cash cow, the 737, started with a fuselage length of 94 feet capable of carrying 100 passengers to the latest iteration, the 737-MAX, 143 feet long and capable of squeezing 200 passengers into a single class configuration. Most of the initial development costs and the ability to reuse tooling and retain trained personnel are recoverable as a function of the quantity of aircraft produced. The development cost of the original 737-100s has at this time been spread over 19 variants comprising a 10,000 unit production run.

One of the most interesting modifications is when an aircraft designed for business or airline use is modified to perform an entirely different function for the military. Much of the cost of a modern military aircraft is devoted to the electronics, especially if it is dedicated to the electronic warfare missions called "intelligence, surveillance, target acquisition, and reconnaissance" (ISAR) or "airborne early-warning and control" (AEW&C).

The earliest ISAR aircraft date back to the first days of aviation. The balloons used for surveilling the opposition during the U.S. Civil War and World War One are clear-cut examples. Military commanders quickly saw that the heavier-than-air planes was an analogue of the horse-borne cavalry whose business was to scout out and bring back information about the deployment and movements of the enemy. The Duke of Wellington once stated that:

> *All the business of war, and indeed all the business of life, is to endeavor to find out what you don't know by what you do; that's what I called "guessing what was at the other side of the hill."*

Successfully guessing what is on the other side of the hill is the business of military, political, and business intelligence operatives. Once, the

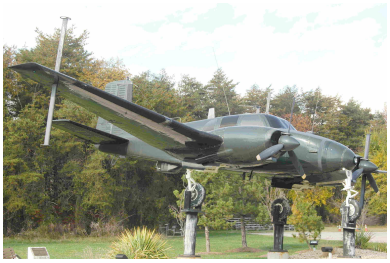
acquisition of information was limited to spies such as Nathan Hale and John Andre. Today, technology dominates the budgets which are allocated to collecting, processing, and analyzing information for military purposes. A wide range of instrumentation is employed and a vast array of computer power and trained analysts use communication intercepts, radars, sonars, camera systems, and a host of other types of specialized equipment.

One facet of the aviation segment of this black trade involves modifications of commercial aircraft for special missions. During the Cold War, the graceful Lockheed Constellation became the ungainly EC-121 Warning Star with a bloated belly and a ludicrous dorsal stove pipe. The blisters housed radars for determining the position and height of enemy bombers. They were employed in picket lines off the Atlantic and Pacific coasts to warn of a Soviet attack.

EC-121K

The Douglas DC-10 was turned into an aerial tanker, the KC-10 Extender, as has been the Boeing 757 (C-32) and the Airbus A330. The Lockheed Electra II became the P-3 Orion, a sub hunter and intelligence gatherer. Its replacement, the Boeing P-8 Poseidon is a derivative of the Boeing 737.

A more recent trend is to modify business aircraft for electronic warfare. Beech Aircraft's Twin Bonanza became the Army L-23D Seminole used for signal intelligence during the Vietnam War.



Beech Seminole metamorphosed into the RU-8D and on display at Vigilance Park, National Security Agency, Fort Meade, Maryland

Beech parleyed this experience into large sales of its King Air Series to all of the services. The basic designation is C-12 Huron and the electronic warfare models are prefixed with an “R” or a “U” and use a variety of names such as Guardrail and Liberty.

Beechcraft's MC-12 Liberty is a version of a Super King Air 350ER outfitted with visual and infrared sensors and a communications system including satellite and data link capabilities. The Army has about two dozen, primarily operating in southwest Asia.

MC-12 at Bagram Air Base, Afghanistan

The Cessna 208B Super Caravan has been outfitted for at least three countries, Afghanistan, Iraq and the Republic of the Philippines as an ISTAR aircraft with the “A” standing for “armed. Hard points allow for the carriage of two Hellfire missiles. FedEx operates a fleet of around 240 Caravans but the ISTAR version is equipped to not only find its customer but deliver a hell of a package.

This Super Caravan carries a civilian “N number” and is either a U.S. based test aircraft or bound for delivery to southwest Asia.

The Britten-Norman BN-2 Islander is commonly

used by air taxi and short haul commuter traffic. New England Airlines, operating out of Westerly utilizes three Islander to run its Block Island shuttle service. At least eight countries fly military versions of the Islander, the BN-2T Defender.

British Army Defender AL.2 Note the optics ball and the array of antennae
(Photo Credit: Jerrry Gunn)

The Defender has a stretched fuselage, bigger wings, and turboprops which replace the Islander's piston engines. Some versions are armed, carrying weaponry on wing mounted hard-points. The Federal bureau of Investigation used one to at Waco to surveil the besieged Branch Davidian compound.

Some examples of larger business jets and regional airliners which have been modified for intelligence duties will be discussed in the next issue.

AEROSPACE HISTORY & AEROSPACE CHRONOLOGY FOR THE WEEK

February 8, 1967 – First flight of the Saab 37 Viggen, the first modern canard design to enter production. Canards, used by the Wright Brothers, reduce wing loading and increase an aircraft's maneuverability, especially at high angles of attack.

(Photo Credit: Alan Wilson)

February 9, 2006 – Sir Frederick Alfred Laker Goes West.

Low cost Norwegian Air honored Sir Freddie by embellishing the tail of a long haul 737Max. This aircraft inaugurated non-stop service between Edinburgh and Hartford in July of last year,

A British airline entrepreneur, Laker had a long history of innovation in the industry. In 1947, he formed Aviation Traders which converted Halifax bombers to civilian use and participated in the Berlin Airlift. He also converted Douglas DC-4s into the ATL-98 Carvair which his Aviation Traders and Channel Air Bridge companies utilized to transport vehicles by air across the English Channel.

Loading an automobile onto an ATL-98.

In 1960 he assumed directorship of British United Airlines, Britain's largest privately owned airline and increased its fleet size and profitability.

Laker Airways and his Skytrain lines were his most well-known enterprises. He pioneered the "no frills" business model successfully used by Southwest Airlines, Ireland's Ryanair and a host

of imitators. His competitively priced services were not appreciated by the established airlines whose deep pockets and political influence were used to obstruct his aviation activities.

Skytrain DC-10

February 10, 1903 and February 10, 1977 mark the birth and death of Rear Admiral George Dufek, naval aviator and a leader in antarctic exploration. Dufek, who also wore the dolphins of the submarine service, first went south with Richard Byrd in 1939 as navigator of the expedition flagship, *USS Bear*.

During World War II, he held a number of combat and training commands and when the war ended, participated in Operation Highjump as a task force commander. Highjump's mission was to scientific and political. Scientific studies of geomagnetism, meteorology, and hydrology were conducted as were test of cold weather equipment and housing. Politically, Highjump exploration and studies of base sites could be used for future claims of sovereignty over vast regions of Antarctica.

In the mid 1950's Dufek commanded the U.S. Navy's logistics forces supporting Operation Deep Freeze, a collaboration of 40 nations celebrating the International Geophysical Year (1957-58). Nine of the nations concentrated on studying the meteorology, hydrography, and marine flora and fauna of Antarctica.

From left to right: Sir Edmund Hillary, first to summit Mount Everest, Sir Vivian Fuchs, led first overland crossing of Antarctica, and Rear Admiral George Dufek chat at the South Pole.
(Photo Credit: New Zealand Herald)

On October 31, 1956, the *Que Sera Sera*, a ski-equipped R4D became the first aircraft to land at the South Pole, proving the possibility of establishing a permanent station at 90 degrees south latitude.

Dufek, second from left at the pole.
(Photo Credit: US Navy)

February 11, 1945 – First flight of the Consolidated Vultee XP-81, the prototype of a long range escort fighter which had two engines, a turboprop and a turbojet.

(Photo Credit: Consolidated Vultee)

The jet age was beginning but the early engines were anemic, slow to spoolup to full power and fuel hogs. The composite design using two engines was a compromise tried by three manufacturers which produced five different models.

The Ryan FR-1 Fireball was first off the block in June of 1944. The project was instituted by Adm John S. McCain, Sr, father of the serving Senator from Arizona. Carrier operations demanded engines which could provide rapid accelerations and the turbo-jets could not do so. The answer: the composite powered airplane.

Fireball departing deck of USS Badoeng Strait, a Commencement Bay class escort carrier.
(Photo Credit: National Museum of Naval Aviation)

The Fireball was powered by a Wright radial (piston) and a General Electric turbojet. The Fireball was the only one of the five fighter types to achieve production status and fleet service. Two squadrons were operated off aircraft carriers but the Fireball proved to fragile for carrier service and all were retired

The XP-81 first flew in February of 1945 using a General Electric turboprop and turbojet. The turboprop has the same sluggish acceleration of any turbine but it could be maintained at full power and the acceleration could be adjusted by controlling the propeller pitch. Like others of its ilk, it was “a day late and a dollar short.” Turbojets rapidly improved and their higher thrusts negated the need for the piston engine.

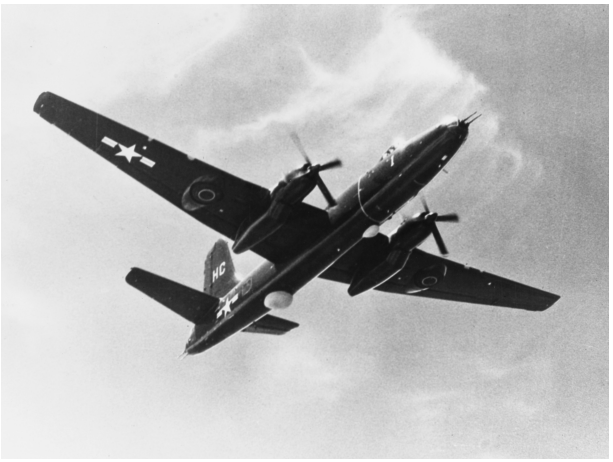
Two weeks after the first flight of the XP-81, the Ryan XF2R took flight using a General Electric combination similar to that employed by the XP-81. The aircraft, originally a Navy project awakened the interest of the Air Force who had Ryan modify the XF2R into the XF2R-1 which used a Westinghouse turbine. Only one Dark Star was built.

Dark Shark Parked

Last of the composites was the Curtiss XF-15. She used the classic Pratt and Whitney R2800 Double Wasp and an Allis Chalmers turbine. But the design suffered the same fate as the other composites and the project was abandoned.

Curtiss XF-15

The last of the U.S. composite powered aircraft of that era was Martin's four engine P4M Mercator. The aircraft was powered by Pratt & Whitney Wasp Majors and Allison jeet engines.



The jet exhausts are visible at the trailing edge of the nacelles.
(Photo Credit: US Navy)

The Mercator was a long range maritime patrol aircraft which served almost all of its fleet time as the P4M-1Q signal intelligence (SIGINT) monitor. Sixteen of the 21 produced performed dangerous SIGINT duties and two were shot down, one by the Chinese and one by the Soviets.

Feb 12, 1965 – Death of John Hays Hammond, Jr., American inventor known as "The Father of Radio Control." Hammond held over 800 patents. In 1914, he demonstrated a control system which sent a pilotless boat on an 120 mile round trip journey between Gloucester and Boston.

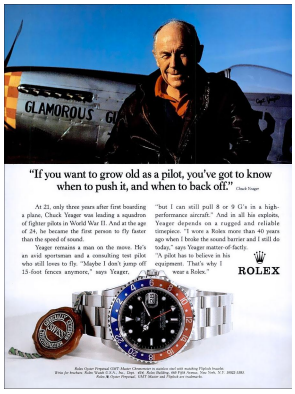
Hammond at Work

He also held patents on a remote controlled torpedo, a altimeter, a variable pitch propeller, and a wide range of devices with applications in electronics communications.

February 13, 1923– Chuck Yeager, American fighter & test pilot, and the first person to break the "sound barrier." is born.

It's good to be famous.

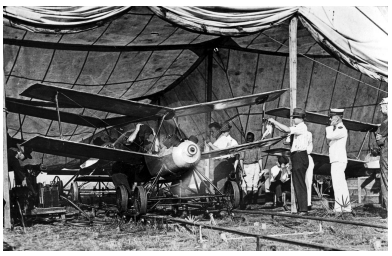
In the words of olympic gold medalist Mary Lou Retton "The endorsement game has been very good to me."



Yeager and the Northrop F-20 Tigershark

Delco Spark plug Ad

One of the founders of Delco was Charles Kettering who, among other achievements invented the automobile self-starter. One of these other achievements was the design and construction of the Kettering Bug, a 1918 WW I forerunner of today's cruise missile.



The Bug was guided by an onboard gyroscope. The range was determined by the number of engine revolutions needed to reach its destination. When the calculated destination was reach, the engine cut off, the wings dropped off, and a 180 pound payload was delivered. The missile was never used because authorities did not trust the guidance system and feared danger to our own troops.