



Lockheed Martin Management Association Retirees Newsletter

Looking Forward Towards A Wonderful Retiree Future!

SEPTEMBER 2015

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Needed: Staff Help

LMMAR needs volunteers to help keep LMMAR going. We have several vacancies on the Board and we particularly need a newsletter editor. If you think you can help please contact:

Norm Dhom, Membership Chair – (408) 732-2742

Jerry Vaughan, Treasurer – (408) 985-2708

Your Story We need your input. Have you done anything exciting lately? Do you have any news that might be of interest



to our members? Your story and photo is welcome! Email it to: jerry.allan.vaughan@gmail.com.

Sunshine If a member knows of anyone ill or grieving, please send an email to Karen Stayrook at: karenstayrook@comcast.net or call (408) 622-5539

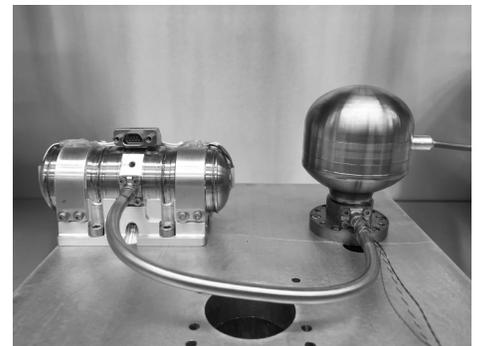
Satellite Cooling System

Palo Alto, Calif, Aug. 25, 2015 – Lockheed Martin (NYSE: LMT) scientists are packing three times the power density into a key satellite cooling system whose previous design is already the lightest in its class. This project continues the company's effort to reduce component size, enabling compact, higher-power spacecraft payloads and smaller sensor platforms back on Earth.

Highly sophisticated electronics like satellite sensors and cameras need to be cooled to detect what they're designed to capture, even to temperatures as low as -320 F (-195 C). Smaller cryocoolers mean more affordable satellites and launches, and they have applications on Earth, too. With higher power, this microcryocooler enables

larger, more sensitive IR sensors, which is especially useful for very high-resolution images. Despite its increased capability, the component's power efficiency rating is roughly the same as lower-power coolers.

"The High Power Microcryocooler is



making a large impact for small products," said Dr. Jeffrey Olson, a research scientist at Lockheed Martin's Advanced Technology Center. "Our previ-

ous design was a revolution in size, and now we're taking it further and packing it with increased power. This will make a difference for technology in space, on naval ships and aboard aircraft."

The new system cools optics and electronics to as low as -320 F (-195 C). The High Power Microcryocooler is a high-reliability system designed for continuous operation over a lifespan in excess of 10 years.

The High Power Microcryocooler is the industry's highest power density cryocooling system. It delivers more than 150 watts per kilogram, a significant advancement from the 30-60 watts per kilogram rating most space-rated cryocoolers deliver. It also weighs less than a pound, which is less than half the weight of similar cooling systems.

Fantastic Materials Science Principles

(From Lockheed Martin Website: <http://www.lockheedmartin.com/us/news/features/2015/080315-fantastic-four-materials.html>)

Materials science is at the core of many superhero powers, including those exhibited by Marvel Comics' Fantastic Four—elasticity, invisibility, super strength and thermodynamics.

ELASTICITY (MISTER FANTASTIC)

In materials design, elasticity could refer to materials that are self-healing or reconfigurable.

Without human intervention, self-healing materials can repair damage by naturally reforming chemical bonds

or using bacteria. In fact, such materials are already being used for applications like self-healing concrete or in the future, as anti-corrosive paint for Navy ships.

Reconfigurable materials, on the other hand, can change their properties under different conditions. At the microscopic scale, individual molecule bonds can reversibly change shape when absorbing and emitting energy. This translates to macroscopic shape change for polymer materials—for example, a polymer that curls or folds into itself when placed under light or electric charge.

"In the real world, we could imagine reconfigurable elements to be designed into planes or cars. Today, plane wing shapes are fixed, but the ideal wing shape is different during different phases of flight—taxi, takeoff, landing and so on," said materials scientist Anna Paulson. "If designed with reconfigurable materials, these shapes could be optimized during flight to improve fuel efficiency."

While a material that can turn a superhero into a parachute or trampoline is pretty farfetched, NASA is already exploring the use of flexible airplane wings, which could benefit from this type of research.

INVISIBILITY (INVISIBLE WOMAN)

Making an object appear invisible is really a matter of addressing patterns and light.

Invisible materials are patterned in a certain way, with conducting and insulating elements that can direct electromagnetic radiation around an object.

In rendering an object invisible, there are three big challenges: altering the size of these patterns, controlling light in three dimensions and designing a pattern for multiple wavelengths.

"Overcoming these challenges is physically possible, and already, patterns have been simulated with the necessary properties," said Paulson. "Today, researchers are developing technology to fabricate three-dimensional nanoscale patterns that enable us to control light in three dimensions."

While being an invisible superhero obviously has its appeal, invisibility would come in handy for aesthetic purposes in our everyday lives.

Imagine using building materials with invisible properties for power lines or as guardrails on top of the Empire State Building. Other applications for materials that bend light are in optical processors for faster computers and in antenna materials for higher power antennas.

SUPER STRENGTH (THE THING)

To achieve super strength, you have to take the science principles down to a molecular level.

Nanotechnology is the manipulation of matter at the nanoscale, which is between one and 100 nanometers, or one millionth of a millimeter. Here, you can alter individual atoms and molecules to change the physical, chemical, biological and optical properties.

As one of the best raw materials for nanotechnology, carbon provides a structure for graphene. In its purest

(Continued on page 3)

form, graphene is a single atomic layer of carbon atoms, bonded so tightly together that they are impermeable to nearly everything—making the material both unbelievably strong and highly tolerant of harsh chemicals and wide ranges of temperatures and pressures.

While the material is currently being researched for use in everything from consumer electronics displays to medical devices, the possibility of perforating a sheet of graphene could also lead to new solutions for major global challenges like clean drinking water and energy management.

Nanotechnology has also led to the development of carbon nanotubes, which are incredibly small and incredibly strong—100 times stronger than steel and 10,000 times smaller than a single human hair.

“What makes carbon nanotubes so strong is their carbon atoms, which are configured and bonded to one another with the strongest chemical bonds available to them,” said Mitchell Meinhold, Lockheed Martin materials scientist.

THERMODYNAMICS (HUMAN TORCH)

The ability for a material to withstand extremely high temperatures boils down to chemical bonds.

In general, stiffer and harder materials melt at higher temperatures. To serve as a protective barrier, the material must also be a poor conductor of heat.

For a vehicle (or superhero) to travel at hypersonic speeds—Mach 5 and above—it must be designed with

these extremely durable materials capable of withstanding temperatures in excess of 2,200 degrees Fahrenheit.

With such heat-resistant materials, we could design spacecraft to travel even deeper into space or explore extremely hot places—like the surface of the sun.

“Of course, the exploration of places with very high temperatures would still be challenging because they are also areas of high pressure and radiation,” said Mike Stock, Lockheed Martin thermodynamicist. “However, we can design and develop advanced propulsion systems to take a spacecraft to the stars while avoiding the hazardous areas in space.”

Though a superhero like the Human Torch can envelop their body in flames, for the everyday person, heat-resistant materials could be useful in the areas of safety and fire protection. Very high temperature materials could also enable the construction of extremely efficient engines that would cut fuel consumption in half.

Sad News

George D. Connell

George died August 10, 2015 at the age of 91. He served in the U.S. Navy for 21 years, including service during WWII and the Korean Conflict. After retiring from the Navy, he worked at Lockheed on satellite projects including the Corona Satellite and Hubble Space Telescope.

Orrin J. Defere

Orrin died January 15, 2015 from Acute Myeloid Leukemia. He was 73

years old. Orrin served in the U.S. Army. He worked in technical and management positions at LMSC for over 30 years in both MSD and SSD.

Ray Crozier

Raymond D. Crozier died peacefully at home on July 31, 2015, one week after attending the LMMAR barbecue. He was 85 years old. Ray was employed at Lockheed for 32 years before retiring in 1991. He worked for SSD Propulsion and later on the Hubble Telescope from the beginning to its completion. According to his wishes, a private family service has been held.

Ali Rashid

Ali Rashid passed away in late May at age 88. Ali was born in Bombay, India. He was raised in San Francisco. He served in the US Army achieving rank of First Lieutenant.

Ali earned bachelor and master degrees in business, as well as a law degree. He worked for a variety of notable companies, including 25 years at Lockheed Martin. Following his retirement, he served as a teacher in Foot-hill/DeAnza District until nearly the age of 80.

Aleta Smith

Aleta Marie Smith passed away July 21 at age 65. She was employed at Lockheed Martin in managerial positions in the Metal Finishing Facility and the Material Resource Planning Department.

Aleta retired from Lockheed Martin in 2013 after almost 40 years of dedicated service.

Paul Contos

Paul died May 19, 2015 at the age of 89. Paul served in the U.S. Army during WWII. He was the first member of his family to earn a college degree. He was an engineer in the aerospace industry for 32 years, retiring from Lockheed Martin.

Member Readers

What have you read lately that you would like to share with other LMMAR members? Tell us what book, the author, and why you liked it. Here is a sample of my reading.

BOYS in the BOAT by Daniel James Brown 2013

9 Americans & their epic quest for gold at 1936 Berlin Olympics. Rowing is perhaps toughest of sports. Once race starts, there are no time-outs, no substitutions. It requires synchronicity of all 8 rowers.

"It's a great art, is rowing. It's the finest art there is. It's a symphony of motion. And when you're rowing well, why it's nearing perfection. And when you near perfection, you're touching the Divine. It touches the you of you[s]. Which is your soul." - George Yeoman Pocock (was builder of crew boats)

This book touched me, because I could feel the heart that each rower gave in strength, synchronicity, and spirit to each other to reach their goal, the finish line. Norm Dhom

Hi Norm,
Well—finally—here is a little article about the reading group I'm in, along with a few book titles we've enjoyed.
Regards, Dennis Haas

-Apropos of the new book review feature in the LMMAR Newsletter:
A group of twelve guys, LM spacecraft engineering retirees plus a few select friends (with equally satisfying non-LM careers), have been meeting monthly since 2008. We are the Men's Discussion Group (MDG)! (So named as a counterpoint to our fearless leader's spouse's gathering known as the Women's Discussion Group.) Ostensibly, our modus operandi is to read non-fiction books and discuss those. This does happen, but our discussions really know no bounds and additionally cover current local, national, and world affairs, finances, travel, family, entertainment, the sciences, etc..
Here are the logistics: Our seasons (we've just started #8) span August to July. Members host MDG sessions at their homes—rotating through all members. Our meetings start in the early evening and run for two or three hours. Light (and sometimes full-dinner) refreshments are served (... food, and beverages that regularly include wine and beer—which, of course, help loosen the tongue). Originally, prior to an upcoming season, each member would submit four or five book titles, along with brief synopses (...Amazon is a good source...) and testimonials (personal or those of trusted allies), to be "thrown into the hopper". The titles in the hopper were sent out for vote...the twelve highest-vote-getting books were what we'd read during the season. Starting with season #7, however, the process changed such that each hosting member recommends a preferred title plus a couple of backups. The host ultimately

gets right-of-selection. This new process mitigates the issue with the old process whereby none of one or more member's hopper-inputs would be selected. Although we're a "non-fiction only—dammit!" reading group, one or two members occasionally, shamelessly, try to slip in a fiction book. That outcome has prevailed only twice (and those titles shall remain unnamed)!
Some of the books that I've enjoyed reading (and which, I believe, were member-consensus winners) are:
The Boys in the Boat: Nine Americans and Their Epic Quest for Gold at the 1936 Berlin Olympics by Daniel James Brown. (See previous Newsletter review.) Of local interest since, among other pleasures, it features the West Coast rivalry of the University of California and University of Washington crews. (And the movie will be out soon...)
A History of the World in Six Glasses by Tom Standage
The Sixth Extinction by Elizabeth Kolbert
Prague Winter by Madeleine Albright
The Making of the Bomb by Richard Rhodes
Undaunted Courage by Stephen Ambrose
A Brief History of Time by Stephen Hawking
The Guns of August by Barbara Tuchman
The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures by

Christine Kenneally

Fermat's Enigma by Simon Singh

John LynchFiddler in the Subway by Gene Weingarten

Civilization by Niall Ferguson1421 by Gavin Menzies

A People's History of the United States by Howard Zinn

Outliers by Malcolm Gladwell

Unequal Protection...How Corporations Became People by Thom Hartmann

Physics for Future Presidents by Richard A. Muller

Did Adam and Eve Have Navels? by Martin Gardner

The Big Short (Inside the Domsday Machine) by Michael Lewis

The Professor and the Madman by Simon Winchester

I'd highly recommend starting or joining a reading group. You may find, as I have, that you'll be enriched by the books and even more so by your companions.

Terrafugia Transition®



The Transition® brings a new level of freedom, flexibility, and fun to personal aviation by combining driving and flying in one state-of-the-art vehi-

cle. Glass cockpit avionics, carbon fiber construction, and innovative mechanisms make the Transition® easy and fun to fly, drive, and convert. A steering wheel and gas and brake pedals on the ground make it familiar to drive while a stick and rudder pedals provide responsive control in flight.

Being able to land and drive not only solves the "last mile problem" but inclement weather will no longer stop your trip. Running on premium unleaded automotive gasoline, the same engine powers the propeller in flight or the rear wheels on the ground. Converting between flight and drive modes is comparable to putting down the top on your convertible and you can keep the Transition® at home in the garage:



flying has never been so convenient!

The first six airframes have been reserved at a firm price of \$299,000. Subsequent pricing for the Transition® will be determined after our early production costs are determined. You can reserve a place in production with a \$10,000 refundable deposit .

On May 7, 2013, Terrafugia announced the successor of Transition, called the TF-X. TF-X is a plug-in hybrid tilt-rotor vehicle and would be the first fully autonomous flying car. It has a

range of 500 miles per flight and batteries are rechargeable by the engine. It is expected to hit the market at least six years after Transition (2021).

See more at: <http://www.terrafugia.com/aircraft/transition#sthash.kwNn2VnJ.dpuf>

Trivia (Not Verified)

In the 1400's a law was set forth in England that a man was allowed to beat his wife with a stick no thicker than his thumb. Hence we have 'the rule of thumb'.

Many years ago in Scotland, a new game was invented. It was ruled Gentlemen Only...Ladies Forbidden!...and thus, the word GOLF entered into the English language.

The first couple to be shown in bed together on prime time TV was Fred and Wilma Flintstone.

Every day more money is printed for Monopoly than the U.S. Treasury.

The State with the highest percentage of people who walk to work: Alaska

The cost of raising a medium-size dog to the age of eleven: \$ 16,400 .

The average number of people airborne over the U.S. in any given hour: 61,000 .

Q. If you were to spell out numbers, how far would you have to go until you would find the letter 'A'?

A. One thousand

The first novel ever written on a typewriter, Tom Sawyer.

It was the accepted practice in Babylon 4,000 years ago that for a month

(Continued from page 5)

after the wedding, the bride's father would supply his son-in-law with all the mead he could drink. Mead is a honey beer and because their calendar was lunar based, this period was called the honey month, which we know today as the honeymoon.

If a statue in the park of a person on a horse has both front legs in the air, the person died in battle. If the horse has one front leg in the air, the person died because of wounds received in battle. If the horse has all four legs on the ground, the person died of natural causes .

LMMAR Bridge

Aug 4 - Individual Duplicate - 1st Place - Bob Vigeant , 2nd Place - Doug Gordon, 3rd Place - Roger Abegg, and 4th Place (tie) Dave Himmelblau and Dave Topka.

Aug 6 - Pairs Duplicate - No Game.

Aug 11 - Individual Duplicate - 1st Place - Roger Abegg, 2nd Place - Dave Topka, and 3rd Place - (tie) Ted Hinshaw and Bob Vigeant.

Aug 13 - Pairs Duplicate - 1st Place - Chuck Schmidt & Ted Hinshaw and 2nd Place - (tie) Dave Himmelblau & Dave Topka and Angie Schynert & Bob Vigeant.

Aug 18 - Individual Duplicate - 1st Place - Doug Gordon, 2nd Place - Gary Bea, and 3rd Place - Dave Topka.

Aug 20 - Pairs Duplicate - 1st Place - Gary Bea & Chuck Schmidt and 2nd Place - Angie Schynert & Bob Vigeant.

Aug 25 - Pairs Duplicate - 1st Place -

(tie) Dave Himmelblau & Dave Topka, Gary Bea & Chuck Schmidt, and Ted Hinshaw & Bob Vigeant.

Aug 27 - Pairs Duplicate - 1st Place - Dave Himmelblau & Dave Topka and 2nd Place - Gary Bea & Chuck Schmidt

Orion Spacecraft

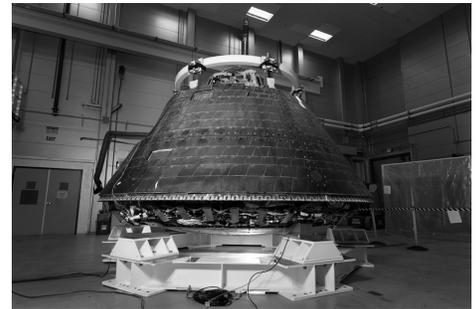
The Orion Multi-Purpose Crew Vehicle (Orion MPCV) is a spacecraft intended to carry a crew of up to four astronauts to destinations at or beyond low Earth orbit (LEO). Currently under development by NASA for launch on the Space Launch System, Orion is intended to facilitate human exploration of asteroids and of Mars, as well as to provide a means of delivering or retrieving crew or supplies from the ISS if needed.

The MPCV was announced by NASA on May 24, 2011. Its design is based on the Orion Crew Exploration Vehicle from the cancelled Constellation program. It has two main modules. The Orion command module is being built by Lockheed Martin at the Michoud Assembly Facility in New Orleans. The Orion Service Module, provided by the European Space Agency, is being built by Airbus Defence and Space.

The MPCV's first test flight (uncrewed), known as Exploration Flight Test 1 (EFT-1), was launched atop a Delta IV Heavy rocket on December 5, 2014 on a flight lasting 4 hours and 24 minutes, landing at its target in the Pacific Ocean at 10:29 Central (delayed from the previous day due to technical and weather problems). The first mission to carry astronauts is not expected to take place until 2021 at

the earliest.

The Orion crew module flown 3,600 miles into space during Exploration Flight Test-1 arrived 9/1 to the Lockheed Martin Space Systems Company headquarters in Littleton, Colorado.



While in Colorado, engineers will perform final decontamination on the crew module, will continue post-flight analysis of select components, and will evaluate a new acoustic technology called Direct Field Acoustic (DFA) testing. The evaluation of DFA testing will determine if the method can produce enough energy to simulate the acoustic loads Orion will experience during launch and ascent on the Space Launch System (SLS) rocket. The use of an additional Deep Space Habitat module will be required for long duration missions. The habitat module will provide additional space and supplies, as well as facilitate spacecraft maintenance, mission communications, exercise, training, and personal recreation. During such long term missions, the Orion capsule itself will normally only be fully occupied by the crew during launch, splash-down, and other crew-transfer operations. Some plans for DSH modules would provide approximately 70.0 m³ (2,472 cu ft) of living space per crew member.



LMMAR LUNCHEON
COSTUME CONTEST - BEST, SCARIEST, MOST ORIGINAL, ETC.

**A HALLOWEEN SCARE
 JOIN US IF YOU DARE!**



MICHAELS AT SHORELINE
 2960 N. SHORELINE BLVD.
 MOUNTAIN VIEW, CA 94043

OCTOBER 30, 2015

SPEAKER
 John Kowalchik, VP Mission Success
 LMMAR Executive Advisor

11:15 AM. SOCIAL - NO HOST BAR

12:00 P.M. LUNCH

Entrée Choices:

- (1) Ghoulish Pot Roast
- (2) Ghostly Chicken w/Jalapeno Peppered Jack Cheese
- (3) Ogre Style Salmon
- (4) Vegetarian dish upon request only

All Entrees Served With Bread,
 Mysterious Salad (Fresh Greens),
 Cauldron Brewed Regular or Decaf Coffee, Tea
 Jack o' Lantern Pumpkin Pie

12:45 P.M. Speaker
 Costume Contest to follow



Lockheed Martin Update
 Subject to Change



RSVP BY October 24, 2015
 Make check payable to LMMAR and mail to:
 P.O.BOX 2117
 SANTA CLARA, CA 95055-2117
\$25 PER PERSON



For information or refunds, call Lucille Wilson 408.225.9566 or Gay Morgan 408.243.2233
Cancellations not accepted after Monday prior to the Friday luncheon
 Please do not leave messages on answering machine.

Please count on the following to attend the Friday, 30th of October luncheon:

- 1. Pot Roast
- 2. Chicken w/Jalapeño Peppered Jack Cheese
- 3. Salmon

- 1. Pot Roast
- 2. Chicken w/Jalapeño Peppered Jack Cheese
- 3. Salmon

 Name

 Name

- 1. Pot Roast
- 2. Chicken w/Jalapeño Peppered Jack Cheese
- 3. Salmon

- 1. Pot Roast
- 2. Chicken w/Jalapeño Peppered Jack Cheese
- 3. Salmon

 Name

 Name



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SEPTEMBER 2015

Activity Calendar

- **LMMAR Executive Board Meeting.** First Monday of each month unless holiday conflict, then second Monday. 9:30 a.m. Bldg. 157-Satellite Room (off the cafeteria).
- **LMMAR Newsletter Mailing Session.** Volunteers needed. Second Thursday of each month. 9:30 a.m. Bldg. 157-Litrium. Contact Norm Dhom (408) 732-2742.
- **LMMAR Bridge Card Players.** Join the fun! Every Tuesday and Thursday, 11:30 a.m. at the Willow Park Condominiums located at the NE corner of Moffet Blvd. and Middlefield Road in Mountain View. Entrance is from Moffet Blvd. Contact Dave Himmelblau, 'phone No. 650 968-1121.
- **Lockheed Martin Blood Bank Drive.** Second Wednesday of each month. 8:00 a.m.- 3:00 p.m. Bldg. 163. LMMAR Contact Norm Dhom (408) 732-2742.
- **Lockheed Martin Retirees Investment Group (LMRIG).** Meets last Thursday of each month, 1:00-2:00 p.m. in B163 at the corner of J Street and 1st Ave. (Employee Connection Building). Dues are \$2. Contact Don Kinell (650) 948-1520 or Martin Abelow (408) 253-6924. Join us for lunch in the B-157 cafeteria prior to the meeting between 11:40-12:40.
- **LMMAR Luncheon Schedule for 2015.**
October - Halloween Luncheon at Michael's at Shoreline 10/30
December 11, Holiday Luncheon at Michael's at Shoreline 12/11

For your financial needs, please contact Star One Credit Union at www.starone.org or (866) 543-5202 toll free.

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