



Lockheed Martin Management Association Retirees Newsletter

Looking Forward Towards A Wonderful Retiree Future!

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MAY 2015

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_vaughan@yahoo.com.

Sunshine

If a member knows of anyone ill or grieving, please send an email to Karen Stayrook at:
karenstayrook@comcast.net

Son of Blackbird (from Wikipedia)

The SR-72, the proposed successor to the SR-71 Blackbird retired in 1999, is expected to fill what is considered a coverage gap between surveillance satellites, subsonic manned aircraft, and unmanned aerial vehicles for intelligence, surveillance and reconnaissance (ISR) and strike missions. With the growth of anti-satellite weapons, anti-access/area denial tactics, and counter-stealth technologies, a high-speed aircraft could penetrate protected airspace and observe or strike a target before enemies could detect or intercept it. The proposed reliance on extremely high speed to penetrate defended airspace is considered a significant conceptual departure from the emphasis on stealth in 5th generation fighter programs and projected drone



developments. There were unconfirmed reports about the SR-72 dating back to 2007, when various sources disclosed that Lockheed Martin was developing a Mach 6 plane for the United States Air Force. Skunk Works' development work on the SR-72 was first published by Aviation Week &

Space Technology on 1 November 2013. Public attention to the news was large enough to overwhelm the Aviation Week servers.

To attain such speeds, Lockheed Martin has been collaborating with Aerojet Rocketdyne since 2006 on an appropriate engine. The company is developing the system from the scramjet-powered HTV-3X, which was canceled in 2008. The SR-72 is envisioned with an air-breathing hypersonic propulsion system that has the ability to accelerate from standstill to Mach 6.0 using the same engine, making it about twice as fast as the SR-71. The challenge is to design an engine to encompass the flight regimes of subsonic, supersonic and hypersonic speeds. Using turbine compression, turbojet engines can work at zero speed and usually perform best up to Mach 2.2. Ramjets, using aerodynamic compression with subsonic combustion, perform poorly under Mach 0.5 and are most efficient around Mach 3, being able to go up to around Mach 6. The SR-71's specially designed engines converted to low-speed ramjets by redirecting the airflow around the core and into the afterburner for speeds greater than Mach 2.5. Finally, scramjets with supersonic combustion cover the range of high supersonic to hypersonic speeds.

The SR-72 is to use a turbine-based combined cycle (TBCC) system to use a turbine engine at low speeds and a scramjet engine at high speeds. The turbine and ramjet engines share com-

mon inlet and nozzle, with different airflow paths in between.

Construction of an optionally-piloted scaled demonstrator is planned to start in 2018. The demonstrator will be about 60 ft. (18 m) long, about the size of an Lockheed Martin F-22 Raptor, and powered by one full-scale engine to fly for several minutes at Mach 6.[1][2] Flights of the demonstrator are to be conducted starting in 2023. The SR-72 flight testing follows the planned timeline for the hypersonic High Speed Strike Weapon. The SR-72 is to be similar in size to the SR-71 at over 100 ft (30 m) long and have the same range, with entry into service by 2030. The SR-72 follows the US Air Force's hypersonic road map for developing a hypersonic strike weapon by 2020, and a penetrating ISR aircraft by 2030. At the time of the concept's unveiling, Lockheed Martin had engaged in talks with government officials, but has not secured funding for the demonstrator or engine.

On 13 November 2013, Air Force Chief of Staff General Mark Welsh revealed that the service was interested in the SR-72's hypersonic capabilities, but had not spoken with Lockheed about the aircraft. Its high speed appeals to the service to reduce the time an adversary would have to react to an operation. They are pursuing hypersonic technology, but don't yet have the material ability to construct a full-size plane like the unmanned SR-72. The SR-72 was unveiled in the midst of sequestration budget cuts that have forced the Air Force to prioritize acquisition projects and sacrifice mission

readiness. By the mid-2020s, it is believed that foreign countries will produce and export advanced aerial technologies that could end up in battlespaces against the United States. This drives the Air Force to further develop new systems, including hypersonic, to replace legacy systems that would be outclassed in those situations.

The SR-72 may face significant challenges to being accepted by the Air Force, as they are opting to develop the Northrop Grumman RQ-180 stealth UAV to perform the task of conducting ISR missions in contested airspace. Compared to the SR-72, the RQ-180 is less complex to design and manufacture, less prone to problems with acquisition, and can enter service as soon as 2015.

In December 2014 NASA awarded Lockheed Martin a contract to study the feasibility of building the SR-72's propulsion system using existing turbine engine technologies. The \$892,292 contract funds a design study to determine the viability of a TBCC propulsion system by combining one of several current turbine engines, with a very low Mach ignition Dual Mode Ramjet (DMRJ). NASA previously funded a Lockheed Martin study that found speeds up to Mach 7 could be achieved with a dual-mode engine combining turbine and ramjet technologies. The problem with hypersonic propulsion has always been the gap between the highest speed capabilities of a turbojet, from around Mach 2.2 to the lowest speed of a ramjet at Mach

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4. Typical turbine engines cannot achieve high enough speeds for a ramjet to take over and continue accelerating. The NASA-Lockheed study is looking at the possibility of a higher-speed turbine engine or a ramjet that can function in a turbine engine's slower flight envelope; the DARPA HTV-3X had demonstrated a low-speed ramjet that could operate below Mach 3. Existing turbofan engines powering jet fighters and other experimental designs are being considered for modification. If the study is successful, NASA will fund a demonstrator to test the DMRJ in a flight research vehicle.

Golden Arches in Russia

(Seen on *The Christian Science Monitor Website* 4/10)

Moscow — Two famous Russian film directors, the brothers Andrei Konchalovsky and Nikita Mikhalkov, say they will follow in the footsteps of many Hollywood celebrities by opening up their own chain of restaurants. But there's a twist.

The pro-Kremlin brothers say they aren't doing it as a hobby or to diversify their interests. Rather, they're trying to raise patriotic awareness about the dangers of Western fast-food, and drive popular chains like McDonald's out of the Russian market. And, oh yes, in the spirit of the times, they're asking their friend, Vladimir Putin, to invest about \$18 million in the project. The brothers themselves would put up about 30 percent of the startup costs.

The Moscow daily Kommersant report-

ed the story Friday, publishing excerpts of a letter by the two directors to Mr. Putin. It stresses the "social and political nature" of the venture, which would be a chain of "healthy" fast food eateries and coffee shops, starting in Moscow and Kaluga, to be named "Eating at Home."

Recommended: Sochi, Soviets, and tsars: How much do you know about Russia?

"The aim of the project is to facilitate import substitution and create an alternative to Western fast food chains," the letter said.

Experts say that hits several politically correct nails on the head. "Import substitution" is the current jargon for helping Russia develop its domestic economic potential in defiance of Western sanctions. The brothers stress that the restaurants would seek out and favor local food sources, and would also cater to local hospitals, schools, and orphanages.

In what also rings a patriotic bell, they explicitly target McDonald's, the hugely popular fast food chain that currently runs about 440 locations around the country. The US-owned, but totally Russian-run McDonald's has been a near perpetual red flag for Russian nationalists. Last year almost half of the chain's outlets were shut down by health inspectors amid an intense campaign against it waged by nationalist politicians.

The new patriotic chain, though state-funded, would apparently be a largely family affair. It would be run by the wife of Mr. Konchalovsky, actress

Yulia Vysotskaya, who already has a cooking show and line of food products, conveniently named "Eat at Home!"

Konchalovsky, who worked in Hollywood in the 1980s, is famous for his work on both sides of the Atlantic. Mr. Mikhalkov won the 1995 Oscar for Best Foreign Film for his searing portrayal of life during Stalin's 1930s purges, "Burnt by the Sun".

"This is a very contemporary kind of business project," says Nikolai Svanidze, a well-known Russian TV personality. "Mikhalkov has access to 'person number one' and can lobby effectively for support. His brother and his brother's wife will be managers. It's all being sold with lots of patriotism. Every project these days must be smothered in patriotic sauce."

Love and Friendship

Many of us have experienced loss of a cherished one. Here is an interesting (if somewhat depressing) quote attributed to Orson Welles:

"We're born alone, we live alone, we die alone. Only through our love and friendship can we create the illusion for the moment that we're not alone."

Cherish your friends and loved ones.

Project Lifesaver Drone

Thanks to a newly developed UAV from Lockheed Martin, finding people who have gone missing is set to become easier, quicker, and less expensive.

The defense contractor is teaming up with nonprofit Project Lifesaver to create a version of its quadcopter Indago

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UAV that will help locate people with cognitive disabilities or diseases that make them prone to wandering.



Project Lifesaver was established in 1999 to equip people with with autism, Alzheimer's, Down's syndrome, and other mental issues, with a personal transmitter worn on the ankle or wrist. If the person goes missing, emergency services can track the signal, using equipment and training provided by the nonprofit. This setup has helped find nearly 3,000 people, with an average time of 30 minutes per recovery.

The nonprofit's main shortcoming is that you have to be within a mile and a half of the signal to pick it up. That's where the Indago comes in: Packing a specialized antenna produced by Canadian firm Loen Engineering, it acts as an airborne relay and expands that range to seven miles. Since most "wanderers" are found within a few miles from wherever they left, that makes a big difference.

"Project Lifesaver, for a number of years, has been desiring and wishing and dreaming about having this type of capability," founder and CEO Gene Saunders says.

The UAV is remote controlled and can

be operated from up to three miles away. It can stay aloft for about 50 minutes, and while it usually flies at around 400 feet, it can reach as high as 18,000 feet, helpful in mountainous terrain. It weighs just five pounds, fits in a small backpack when folded, and can be deployed in about two minutes.

It's already being used in commercial and military applications, and can carry a camera to help locate people (who aren't wearing tracking devices) in natural disaster relief efforts. It's being tested to help locate wildfire, which can then be battled with Lockheed's autonomous K-Max helicopter. "It provides an eye in the sky," says Lockheed General Manager Dave Pringle.

Since partnering with Project Lifesaver in October 2014, Lockheed has finished integrating the special antenna into the quadcopter. It's aiming to have this version of the Indago ready by mid-summer, then get FAA approval and start sales by the end by Q3. It hasn't decided on pricing for this setup yet, but says it plans to offer the unit to the nonprofit at a reduced rate.

Once it's ready, the folks at the defense contractor will train Project Lifesaver on how to use the UAV, who will in turn train their clients, including first responders around the country. And if all goes according to plan, by the end of 2015 finding missing loved ones will be a way easier process.

LMMAR Bridge

Apr 2 - Pairs Duplicate - 1st Place – Roger Abegg & Jorge Rodriguez and 2nd Place – (tie) Gary Bea & Chuck

Schmidt and Dave Himmelblau & Dave Topka.

Apr 7 – Individual Duplicate – 1st Place – Bob Vigeant, 2nd Place – Gary Bea, 3rd Place – (tie) Roger Abegg and Angie Schynert,

Apr 9 – Pairs Duplicate - 1st Place – Gary Bea & Chuck Schmidt and 2nd Place - Dave Himmelblau & Dave Topka.

Apr 14 – Individual Duplicate - 1st Place – Gary Bea, 2nd Place - Dave Himmelblau, 3rd Place - Doug Gordon, and 4th Place - Bob Vigeant.

Apr 16 – Individual Duplicate - 1st Place – Gary Bea, 2nd Place - Bob Vigeant, and 3rd Place - Ted Hinshaw.

Apr 21 – Individual Duplicate – 1st Place – (tie) Dave Himmelblau and Dave Topka, 3rd Place - Roger Abegg, and 4th Place – (tie) Gary Bea and Ted Hinshaw.

Apr 23 – 1st Place – Roger Abegg & Doug Gordon and 2nd Place (tie) Ted Hinshaw & Bob Vigeant and Gary Bea & Chuck Schmidt.

Apr 28 – Pairs Duplicate – 1st Place – Doug Gordon & Roger Abegg and 2nd Place – Gary Bea & Chuck Schmidt.

Apr 30 – No Game.

Communications Satellites Contract

Riyadh, Saudi Arabia, April 28, 2015 – Arabsat and King Abdulaziz City for Science and Technology (KACST) today announced contracts for Lockheed Martin [NYSE: LMT] to manufacture two A2100 communications satellites. In conjunction with the award, Lock-

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Lockheed Martin, KACST and TAQNIA Space Company, a subsidiary of the Saudi Technology Investment and Development Company (TAQNIA), signed an agreement to explore future design, manufacture, assembly and integration of satellites in the Kingdom of Saudi Arabia.



Satellites will be based on the modernized A2100 and will serve the Middle East and Europe

The two satellites ordered by Arabsat will strengthen the Arabsat fleet to 10 in-orbit operational satellites. These new satellites will ensure and guarantee Arabsat expansion through the additional services that will provide advanced telecommunications capabilities, including television, internet, telephone and secure communications, to customers in the Middle East, Africa and Europe. The contracts were signed April 9, 2015. Construction of the satellites will commence immediately and will be completed for launch in 2018.

Under the agreement, Lockheed Mar-

tin and TAQNIA Space Company will pursue the creation of a Joint Venture, anticipated to be structured as a limited liability company, that would develop talent and infrastructure that will support space capabilities and services in the Kingdom of Saudi Arabia. KACST will serve as a technology partner, leading research and development efforts that will support new innovations for future Saudi Arabian space endeavors.

“Lockheed Martin’s proven record of developing and delivering state-of-the-art space communications capabilities will ensure the Kingdom’s critical telecommunications needs are met. KACST and Arabsat collectively selected the best and latest technology for their satellites and KACST will elevate local satellite technologies competency through the Joint Venture with Lockheed Martin and TAQNIA Space Company,” said Prince Dr. Turki bin Saud bin Mohammad Al Saud, President of KACST.

“Arabsat 6A and Hellas-Sat-4/SaudiGeoSat-1 will join a fleet of satellites that provides millions of people access to TV, radio and broadband services for mobile and landline communications,” said Khalid Balkheyour, CEO of Arabsat. “We selected Lockheed Martin to build these satellites due to the impressive technical capabilities and proven track record of the A2100 satellite.”

“We believe this partnership will serve as a platform for commercialization of innovations in future satellite systems in the Middle East and North Africa region,” said Abdullah Alosaimi, CEO of

TAQNIA Space Company.

“This is a great step forward to support both Arabsat and the Kingdom’s long-term strategy to provide consumers and commercial customers with robust communications resources,” said Mike Hamel, vice president and general manager of Commercial Space at Lockheed Martin. “The modernized A2100 satellite platform is ideally suited to their mission of connecting people and societies through reliable telecommunications services.”

The Lockheed Martin A2100 fleet has accumulated more than 450 years of in-orbit operation. The modernized version builds on that flight-proven design with advanced innovations including propulsion, solar arrays and electronics. Every satellite is tailored for the mission and customers it will serve through its communications payload and traffic both to and from the satellite.

Arabsat 6A will be located at 30.5 degrees East and Hellas-Sat-4/SaudiGeoSat-1 will be located at 39 degrees East. Both satellites will be designed for a 15-year service life, and will be manufactured in Denver, Colorado.

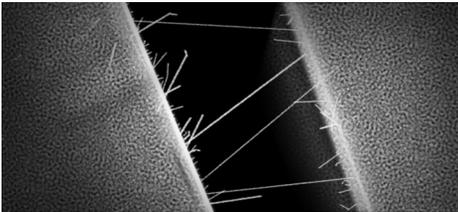
Tin Whiskers Problem Solved

In the manufacturing world, unintended consequences can impact cost, schedule and performance. For example, several years ago, manufacturers set out to rid electronics of hazardous materials by removing lead from solder. Unfortunately, the tin-based, lead-free solder became prone to a detri-

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mental phenomenon known as tin whiskers, microscopic metal growths on soldering points of a circuit board that often lead to short circuits.



In an era of growing electronics dependence, tiny tin whiskers pose a global problem. And, in a moment of innovation, Lockheed Martin materials scientist Dr. Alfred Zinn found a nanoscale solution.

It all began with a team at Lockheed Martin's Advanced Technology Center in Palo Alto, Calif., working on a project to reduce the processing temperature of rhenium metal – a material very desirable for its high melting point and temperature corrosion resistance, but difficult to process for the same reasons.

Innovation is more than a technical invention. Innovation can also be solving a challenge by thinking of new ways to apply existing technology. In this case, using the company's nanotechnology development efforts already under way, Dr. Zinn was able to create rhenium metal nanoparticles, which reduced its processing temperature by 80 percent.

It was then that he thought to answer the call for lead-free solder in what he calls QuantumFuse™, a printable nano-copper paste. Dr. Zinn found that he needed copper nanoparticles in the

sub-10 nanometer range to achieve a fusion or melting point temperature around 200 degrees Celsius, the desired processing temperature for electronic assembly.

This is an amazing feat considering that the melting point of a metal-like copper is a physical constant at 1,083.4 degrees Celsius. In other words, copper does not melt below this well established temperature.

Improving Performance and Reliability

"In a sense, we were able to trick Mother Nature without violating the laws of physics," said Dr. Zinn. "It is amazing that we can now employ nanotechnology and break fundamental boundaries that we previously thought to be 'physical constants.' Now, we are able to take a material with a given melting point and lower its processing temperature by 80 percent or more thereby accessing application space once thought to be impossible, such as using copper to replace solder."

Since solder is a low cost commodity item and can only be replaced by a competitive product, Lockheed Martin created a synthesis process that allows for fast and affordable production of QuantumFuse™. Replacing tin-based solder with pure copper solder offers several benefits: much greater thermal and electrical conductivity, the elimination of the danger from whiskers and improved product performance by an order of magnitude once fully developed.

"QuantumFuse™ is a true revolution that offers high reliability and a lead-free solution for a wide variety of commercial and government applications,"

said Dr. Ken Washington, vice president, Advanced Technology Center. "This innovative use of nanotechnology opens a breadth of opportunities in the automobile and medical industries, electronic cooling and others where long service life, reliability and robustness of components are critical."

Nanotechnology holds great promise. With nano-knowhow, we can improve the size, weight, power and performance of systems, while at the same time, reduce costs. These small materials will have a big impact on our future – and it's where we start our Innovation with Purpose technology series. Join us as we explore Innovation with Purpose and other emerging technologies that will help address some of our world's most pressing challenges today and well into the future.

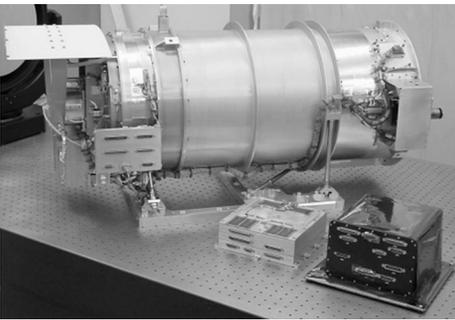
Earth Polychromatic Imaging Camera

Palo Alto, Calif., Feb. 11, 2015 – A new Lockheed Martin [NYSE: LMT] instrument is about to make a world of difference for climate scientists. Launched successfully today aboard the Deep Space Climate Observatory (DSCOVR) spacecraft, the Earth Polychromatic Imaging Camera (EPIC) will provide imaging of the entire sunlit side of Earth in one view, something that hasn't been done before from a satellite.

Today, real-time Earth images are patched together from various satellites. With the whole-disk image—one that shows the entire face of the planet in one shot—scientists will have a broad view of the planet's atmosphere at work. Using EPIC, scientists can monitor clouds and atmospheric parti-

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cles moving across hemispheres, which will improve models for storms, droughts, dust, pollution and global climate.



EPIC instrument views the entire sunlit face of the Earth from sunrise to sunset in 10 narrowband channels, from ultraviolet to near infrared. These measurements can be used to determine ozone, aerosols, cloud heights, dust, volcanic ash.

“Never before has one instrument been able to capture the entire face of the Earth, to see weather at work on a global scale,” said Joe Mobilia, EPIC program manager at Lockheed Martin. “Even though EPIC will operate over a million miles away, it will deliver data about our atmosphere and vegetation that scientists have been waiting for. Climate affects every person, so better knowledge of atmospheric processes is essential to understanding what’s happening in the world around us.”

The instrument measures and tracks ozone amounts, aerosol particulates, cloud height, vegetation properties and ultraviolet radiation.

EPIC is a NASA-supplied instrument installed on the National Oceanic and Atmospheric Administration (NOAA) DSCOVR spacecraft. While other parts of DSCOVR will focus on space weath-

er, this optical payload will gaze at Earth’s atmosphere to monitor weather events. It will be placed far into space, at a fixed orbiting position between the Earth and sun so it can capture the wide view of the planet in sunlight.

EPIC’s 30-centimeter (11.8 inch) telescope measures 10 channels of ultraviolet and visible areas of the spectrum. Despite its distance, EPIC images will have a resolution of between 25 and 35 kilometers (15.5 to 21.7 miles).

Lockheed Martin has helped NASA and NOAA reveal more about our planet through Earth science instruments developed, produced and tested by scientists and engineers at the Advanced Technology Center in Palo Alto, California. For example, the Global Lightning Mapper instrument aboard NOAA’s next weather satellite, GOES-R, will examine the atmosphere for earlier storm warning. The company continues to develop other climate-monitoring capabilities from space, such as observing and assessing greenhouse gases.

Nora Tyson to Lead Navy’s Third Fleet

Vice Adm. Nora W. Tyson is in line to be the first female commander of the Navy’s Third Fleet, based in San Diego and overseeing operations in the eastern and northern Pacific.

Secretary of Defense Ash Carter announced the president’s nomination, the Department of Defense said Tuesday.

Tyson, who will succeed retiring Vice Adm. Kenny Floyd, now serves as dep-

uty commander, U.S. Fleet Forces Command in Norfolk, Virginia.



A Navy spokesman said Tyson, if confirmed, would be one of three three-star admirals in San Diego — and the first woman to lead the Third Fleet, which covers 50 million square miles and dates back to World War II.

A native of Memphis, Tennessee, Nora Wingfield Tyson is in her late 50s and graduated from Vanderbilt University, online biographies say. She received her commission from Officer Candidate School in Newport, Rhode Island.

According to a Vanderbilt profile, Tyson in July 2010 became the first woman in U.S. Navy history to be named commander of a carrier strike group.

“She earned her wings as a naval flight officer in 1983 and reported to Fleet Air Reconnaissance Squadron, where she served three tours at Naval Air Station Patuxent River, Maryland, and Tinker Air Force Base, Oklahoma, including one as commanding officer,” her official Navy profile says.

Tyson also commanded the amphibious assault ship USS Bataan, leading the Navy’s part in Hurricane Katrina disaster relief, and deployed twice to the Persian Gulf in support of Operation Iraqi Freedom.

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MAY 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.** July- Barbeque in Central Park, Santa Clara – Friday, July 24, 2015
October – Halloween Luncheon at Michael's at Shoreline 10/30
December 11, Holiday Luncheon at Michael's at Shoreline 12/11
- **LMMAR Travel** Baseball Hall of Fame Induction — July 24-29, The Great Gatsby Getaway, - Sept. 12-17, Branson, Oct. 5-10, Scotsdale New Year's with Sedona — Dec.29-Jan 2, Princess Eastern Caribbean Cruise, Apr. 1-12, 2016.
Vern DeVincenzi 916 408-4852 verntrav@sbcglobal.net or
Talbot Tours 800 662-9933 info@talbottours.com

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

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