



ASSOCIATES

Volume 32, Issue 2
April 2016

Sponsored by LOCKHEED MARTIN

MARS STAR

MARS Activities This Quarter:

Colorado Rockies Game

June 29, 2016

Senior Luncheon

July 13, 2016

MARS Associates: A Social Club for Retirees of Lockheed Martin & United Launch Alliance

OFFICERS

President	Robin Valore	303-941-6662
President-Elect	Stacey DiMercurio	303-877-0219
VP Activities	Jennifer Schmidt	817-709-1010
VP Business	David Boggy	303-470-9313
VP Communication	Bonnie Snodgress	303-660-8408
VP Membership	Barb Espinoza	303-338-0338
Treasurer	Larry Stearns	303-797-3557
Secretary	Linda Stearns	303-797-3557
Historian POC	Ray Ziehm	303-794-1413

MARS STAR

Editor	Kathy Campbell	303-870-4893
Editor	Bill Cossaboom	303-795-3226
Editor	Tom Pighetti	303-979-7933
Photographer	Theodore Bornhoeft	303-933-9730
Memorials	Beverly Baugher	303-978-0371
Webmaster	Jim Kummer	303-986-3966
Volunteers	Judy Nielsen	303-979-6772
<u>Reporting:</u>		
Baltimore	Dottie Ruth	410-665-3207
Cape Canaveral	Dick Olson	321-452-4015
Colo Springs	Doug Tomerlin	719-594-6392
ULA	TBD	
Vandenberg	Charlie Radaz	805-733-2051

CLUB CONTACTS

Bridge	Dave & Kathy Martz	303-683-9524
Dinner	Skip & Pam Hull	303-973-4717
Golf	Don Petermann	720-984-4975
Hiking	Sue Janssen	303-936-8339
Photography	John Chapter (Pres)	303-986-8277

REMINDER:

If you move, please give the membership VP a change of address. Also, if you are a snowbird, let us know when you are leaving and when you plan to return so your MARS STAR can be sent to you. It costs us 70 cents for each STAR package returned.

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DIRECTORS

Director	Dan Ellerhorst, Chairman	303-794-0750
Director	Duane Del Duca	303-904-9350
Director	Don Purkey	303-973-0059
Director	Bo Rodriguez	303-798-9157
Director	Allen Sanders	303-973-4135
Director	Dick Sosnay	303-972-9209
Director	Bill Wise	303-771-4887

IMPORTANT PHONE NUMBERS

LM Employee Service Center	1-866-562-2363
CitiStreet 401K Hotline	1-800-444-4015
Aetna Plans	1-888-562-8111
Anthem BlueAdvantage HMO	1-866-863-0484
CIGNA Point of Service (POS) (Hourly Only)	1-800-832-3211 1-800-244-6224
CIGNA Healthcare of Colorado for Seniors	303-782-9662
CitiStreet (PSP-SSP-CAP)	1-800-444-4015
Medicare Plus (Aetna)	1-888-562-8111
PacifiCare Secure Horizons	1-800-771-4347
CVS Caremark Prescription Drugs	1-888-562-3784
Vision Service Plan, Rancho Cordova, CA	1-800-877-7195
Kaiser Permanente	303-338-3800
United Dental Health	1-800-545-3260 303-425-1537
Delta Dental of Colorado	1-800-610-0201
Jeff Satterwhite	1-800-610-0201 x683
303-889-8683	jsatterwhite@ddpco.com
The Wright Group Services	
LTC/Vision/Dental	(303) 228-2209
Janet Saxon	jsaxon@twgservices.com
One Exchange	1-844-596-0460

**MARS Associates
P. O. Box 1128
Littleton, CO 80160-1128**

MARS Website: <http://www.marsretirees.org>

Cover: This picture was taken at the Annual Meeting of the MARS 2016 Officers and Board of Directors; Dave Boggy, Barb Espinoza, Dan Ellerhorst, Larry Stearns, Linda Stearns, Stacey DiMercurio, Jennifer Schmidt, Duane Del Duca, Robin Valore, Don Purkey, Bill Wise, Bo Rodriguez, and Dick Sosnay. Missing is Bonnie Snodgress whose picture you will find in the last pages of the newsletter.

From the Editor's Desk

Kathy Campbell (kjcampbell65@msn.com)
Bill Cossaboom (cwilliam28@comcast.net)
Tom Pighetti (tjpighetti@q.com)

Kathy Campbell was the editor for this issue of the STAR. Please send any comments, concerns or questions to me or Bonnie Snodgress, VP of Communications.

I would like to thank Tom Pighetti for his guidance and assistance as I worked my way through editing my first STAR. I couldn't have done this without all your help Tom. THANK YOU!!



President's Corner

By Robin Valore

(rvalore@gmail.com)

I want to start by expressing my gratitude to the MARS membership for your vote of confidence -- allowing me to assume the leadership of this organization. As I have said before, my goal is to ensure the organization continues to prosper and move forward on a continued path of doing the right thing for the organization and its membership.

We held our Annual Meeting on March 2nd at Pinehurst Country Club. Nearly 200 members attended the event and I want to thank each of you who were able to join us and once again enjoy the venue Pinehurst Country Club provides our organization. Our guest speaker this year was Michael Carroll, Deep Space Author and Lecturer. He delivered an absolutely fascinating presentation entitled "Living Among Giants." Some of you may recall he was a speaker at our Annual Meeting about five years ago and as anticipated, he conveyed a message beyond our expectations.

As stated in our Bylaws, the timeframe for our Officers and Board of Directors is limited to specific terms. It saddens me to say we replaced several Officer and Board of Director members this year. I want to thank all of them for their dedication and service in ensuring the needs of this organization were met. I will not bid them goodbye, because I am sure they will now be able to relax and enjoy our venues as opposed to being part of the planning.

This year we replaced three Officers. First, Duane Del Duca, who has served as your President for the last two years will be replaced by myself as former President Elect. I, in turn, will be replaced as President Elect by Stacey DiMercurio. Please read her article to learn much more about her. Bob Lines, who has served the organization exceptionally over the last four years as VP, Activities, will be replaced by Jennifer Schmidt. Again, you can read her article in this edition of the STAR to learn much more about her. My personal thanks go to Duane and Bob for their devoted and enthusiastic support to this organization.

As for the Board of Director replacements, we bid adieu and thank you to Larry Major who has served on the Board of Directors as the Chairman. He is being replaced with a unanimous vote by Dan Ellerhorst who has served on the Board of Directors for the last two years. Thank you Larry (for your hard work as our Chairman) and thank you Dan (for assuming this position). Also, Terrie Hamen's term as a member of the Board was fulfilled. Replacing both her and Dan on the Board of Directors will be Don Purkey and Bill Wise. I had the pleasure of working with both Don and Bill while at Lockheed Martin in our previous lives and am looking forward to reuniting with them in this new chapter. They participated in our first joint BOD/Officer's meeting on March 1st and both have some wonderful ideas that will continue to move this organization in a positive direction. Thank you Terrie (for your support to MARS over the years) and thanks to both Don and Bill for joining the cause.

I encourage you to take a look at page 2 of this STAR and review the names of those who contribute so much to this organization and give them a "mental" thank you. They are the folks that donate their time in order to keep everything "running" for the MARS organization.

At the Annual Meeting the organization awarded the Vernon B. Selby Memorial Volunteer of the Year Award to very deserving designee(s). This year the award was made to a husband and wife team – Larry and Linda Stearns. In addition to the countless hours each of them donate to the collective success of the MARS organization, there are many more countless hours they each spend volunteering outside of MARS. I won't go through the long list of their volunteer activities, but both of them have volunteered a substantial amount of time to the Denver Museum of Nature and Science over the last 10 to 12 years. Linda is also very active in "Learning Ally" (formerly known as Reading for the Blind and Dyslexic). Larry also volunteered at the Hudson Gardens & Event Center helping to maintain the community gardens. This is only a snippet of their collective volunteer activities. Larry and Linda you are so deserving of this award and I want to join our membership in thanking you for your efforts and congratulate you on this award.

Our next big event is the MARS Rockies picnic lunch and game on June 29 when the Rockies will face off against the Blue Jays. I hope to see you there. Also, word to the wise... if you haven't sent in your MARS membership renewal – DO IT NOW – you don't want to miss the fun!

In closing, I want to once again tell you how thrilled I am to assume the leadership of this organization. Your warm welcome and support means the world to me.



Next Up!!!

By Stacey DiMercurio
(staceydimercurio@gmail.com)

I am very pleased to assume Robin Valore's responsibilities as your President Elect as she becomes our new President. I will try to do her and all of the MARS membership proud!

I know some of you from working with you in the past and have enjoyed getting to know more members as I attend the MARS activities. For those of you that don't know me, here is a little background on myself... I retired from Lockheed Martin last February after 34 years. I held a variety of positions in Finance and Business Operations (F&BO), always in Space Systems Company. I was hired by Martin Marietta in an entry level position in Cost Management on the Peacekeeper program which was the beginning of my love for supporting programs (Control Account Managers, Program Management including the Customers' teams) in managing contract cost and schedule. Most of my career was spent on programs, balanced by occasional challenging assignments in "Central Finance." Early on I set a career goal of becoming responsible for all F&BO activities for a major Line of Business and feel fortunate and proud to have met that goal (with a lot of support from my team members, colleagues, mentors and management over the years!).

At this point I must thank my father, Bob Cooke, a long-time member of MARS, for encouraging me to apply to Martin Marietta after I graduated from college. My parents and I both think it's so fun (and kind of fun-ny) that we are all members now!

In addition to supporting Robin in her new role, one of my main responsibilities will revolve around supporting the other Officers, Board of Directors and the Club Presidents as we work together to plan and hold our milestone events over the course of the year. To that end, please be sure to check the back cover of this and all future MARS STARS for the Event Schedule. Let me know if you catch an error or have an update via my email address staceydimercurio@gmail.com.

I'm sure those of you that attended the annual meeting held March 2nd at Pinehurst Country Club would agree

that it was well worth attending. The agenda was a nice balance of annual reporting (I thought all MARS Officers did an outstanding job presenting "The News of Our Past Year - 2015"), entertainment (a fascinating guest speaker) and, last but certainly not least, a delicious luncheon.

April is full of opportunities to participate in one of your MARS clubs. For example, weekly Golf tournaments begin in April and run through October, so get in on those games from the beginning this year. They are held every Thursday at the Broken Tee golf course. Again, check out the MARS Event Schedule for all upcoming events.

In closing, I look forward to supporting you as your President-Elect so *please* feel free to contact me directly with any thoughts or improvement ideas. Meanwhile, nudge that Lockheed Martin retired friend of yours and encourage them to become a MARS member!



Activities Updates

By Jennifer Schmidt
(tomandjens@gmail.com)

Happy Spring MARS members and readers!! I'm excited to be your new VP of Activities. A huge thank-you to my predecessor, Bob Lines, I aspire to be as successful as he was in this position.

I am a new member of MARS, as of 2015, and a four year retiree of Lockheed Martin (LM). My career spanned 32 years in both Denver (27 yrs) and Fort Worth, TX (5 yrs). I was hired in 1979 and after a couple years nestled into the classified programs in various capacities. In 1986 I moved to the Defense Systems program.

In 1997 I became one of the LM Space Systems Company protocol officers, supporting the senior staff coordinating all executive visits, tours, conferences and events, a longtime goal of mine at LM! A huge workload both in and out of the state, but a dream job (for me) nonetheless.

In 2006 my husband and I were transferred to LM Aeronautics in Fort Worth, where I supported the

executive staff of the F-35 program in a similar capacity, which included customer and on/off site event support, as well as community service and F-35 employee events.

When we returned to Denver I retired and my husband, Tom, continued as VP of Contracts for another 2 years. He flunked retirement and is now VP of Corporate Contracts for FlightSafety International, Inc. - a flight simulator and pilot training corporation that does a great deal of military work. He loves it.....and I love retirement and being involved with my five grandchildren!

Now, to the business at hand, MARS events. Our annual meeting/luncheon was March 2, 2016, at Pinehurst Country Club and our guest speaker was Michael Carroll. The event was very well attended with nearly 200 members/guests, including vendors and our terrific guest speaker. Pinehurst did a great job, the lunch was tasty and everyone had a marvelous time. I'm sure pictures will be on the MARS website (www.marsretirees.org) thanks to Theodore Bornhoeft.

We hope to see you all at our upcoming 2016 MARS events; Colorado Rockies game (flyer in this STAR mailing), the senior luncheon in July (flyer to come separately in May), the September picnic and to cap off the year our Holiday Celebration in December. Information on all of these events, plus the flyer and sign-up is forthcoming!! Here's to a GREAT 2016, we all hope to see you at our events. Great meals, great friends, great stories!!

As always please contact any of us if have questions or concerns. Thanks, Jennifer



Senior Fare

By Dave Boggy
(davidboggy@comcast.net)

This year's Annual Meeting at Pinehurst Country Club was well attended and the lunch and presentations were excellent. Six vendor representatives were in attendance with special tables set up to answer questions and provide information: Sam's Club, The Wright Group Services (formerly Peliton), Kaiser Permanente, Hearing Rehab Center, Delta Dental, and

Red Rocks Credit Union. Updated point of contact information for Delta Dental Insurance and the Vision Service Plan became available following the Annual Meeting and has now been posted on the MARS Website Health Benefits page and in this issue of the STAR.

The volunteer of the year award was presented at the meeting. The winner of the 2016 Vernon B. Selby Memorial Volunteer of the Year award is Larry and Linda Stearns, a husband and wife team that have a long and impressive history of dedicated service to the community as well as to the MARS Associates organization. Both have done volunteer work at the Denver Museum of Nature and Science where Larry has spent much time supporting the Space Odyssey project and Linda has served as assistant to the Curator of Astrobiology, and currently works as an assistant to the Curator of Geology. Linda also volunteers for Learning Ally which produces audio copies of textbooks for use by students in need at all grade levels through college and graduate school. Please see the full text of the 2015 Volunteer of the Year presentation on the MARS Web site, Volunteer page.

The Annual Meeting was also an occasion where new MARS Associates Officers and Directors were introduced and outgoing officers were recognized and thanked for their services.

The new officers & directors for 2016 & 2017 are:

President: Robin Valore
President-Elect: Stacey DiMercurio
Vice President-Activities: Jennifer Schmidt
Director: Bill Wise
Director: Don Purkey
Director: Duane Del Duca

The outgoing officers and directors are:

President: Duane Del Duca
President-Elect: Robin Valore
Vice President - Activities: Bob Lines
Director: Larry Major
Director: Terrie Hamen



Membership

By Barb Espinoza
(barb.j.espinoza@comcast.net)

MEMBERSHIP STATISTICS

As of March 27, 2016, MARS Associates' active membership is 1,482 which includes 880 seniors. Forty members attained "senior" status this renewal period.

Please welcome the following new or reinstated (*) members:

Colorado

Aurora	James & Stacy Carter Steven & Deborah Delk
Broomfield	Michael & Marcia Searle Manuel & Jean Vigo-Torres
Cascade	William & Brigitte Gregg
Centennial	Paul & Lois Betthausen Charles & Glenda Haupt
Colorado Springs	Lyle & Lita Flick Leslie Roberts John & Sue Satagaj Samuel & Karen Walker
Golden	William Thomas & Mary Bloomstran
Highlands Ranch	Jacqueline Bowen Patrick & Susan Bremner
Littleton	Steve Axelson & Pawn Wille-Axelson Larry & Lis Campbell Allen & Deborah Cornell Thomas & Donna Hanson Terry & Sharla Hoffman Donald & Annalisa Johnson Alyce & Shawn O'Rourke Randall & Zenovia Whisenhunt
Lone Tree	Laurence Glesener & Barbara Jenkins
Morrison	Sherri Henderson Donna & Michael Winger

Other States

Albuquerque NM	Yvonne Cantey
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Membership Renewal

As of March 27th, 2016, we have received only 1,072 renewals. If you have not sent in your renewal form, please do so as soon as possible. Members who have not renewed their membership will receive "late dues" letters in April followed by "drop notices" shortly thereafter.

MARS Membership Unit

MARS membership is defined in the policy manual as a family unit consisting of the retiree and spouse (or significant other), although the membership card and mailing data are in the retiree's name. In the event the retiree dies, the spouse becomes the member in his/her own name and may remain a MARS member by continuing to pay the annual dues.

Senior membership status (age 75 and above) is based on the retiree's date of birth, even for the surviving spouse member.

Change of Address, email address or phone number?

Please remember to include the MARS membership team in your list of people to notify when you move. We are still experiencing a number of STAR packages being returned for incorrect addresses. The United States Post Office does not forward bulk mail and MARS is charged for all returned mail.

"Snow Bunnies" remember to let us know when you return home! Thanks.

In Memoriam Data

Please contact me or Bev Baugher (bevbaugher@earthlink.net) with any information regarding the passing of a member or their spouse. We want to make sure their passing is acknowledged in the ***In Memoriam*** section of the STAR.

Barb Espinoza,
VP, Membership, at: MARS Associates,
P.O. Box 1128, Littleton, CO, 80160-1128; Phone 303-338-0338; or email barb.j.espinoza@comcast.net.

MARS Associates In Memoriam

By Beverly Baugher
(bevbaugher@earthlink.net)

Members

Bush, Clinton K. (D: March 2016)
Greenwood Village, CO
<http://tinyurl.com/jqfbfg7>

Clair, Marlys A. (D: December 2015)
(Survived by Horace Clair)
Denver, CO
<http://tinyurl.com/jdtswtf>

Davis, Merna (D: January 2016)
Littleton, CO
No obituary published.

Dawson, Leona D. (D: January 2016)
(Survived by Edgar Dawson)
Denver, CO
<http://tinyurl.com/hahpv4t>

Facchinello, Raymond "Ray" A. (D: December 2015)
(Survived by Joan Facchinello)
Littleton, CO
<http://tinyurl.com/jx83b2q>

Handling, Joseph S. (D: February 2016)
Slidell, LA
No obituary published.

Hartel, Bruce (D: January 2016)
Cortez, CO
<http://tinyurl.com/gpj5m5p>

Highfill, Paul E. (D: October 2015)
Arroyo Grande, CA
<http://tinyurl.com/hvtqmnp>

Hotchkiss, Herbert (D: February 2016)
(Survived by Wanda Hotchkiss)
Centennial, CO
No obituary published.

Howard, John "Jack" B., Jr. (D: March 2016)
(Survived by Gladys Howard)
Lake Havasu City, AZ
<http://tinyurl.com/hup94ny>

Lovegrove, Phyllis H. (D: March 2016)
(Survived by William Lovegrove)
Littleton, CO
<http://tinyurl.com/zs8t55g>

Machann, John S. (D: February 2016)
(Survived by Barbara Machann)
Sedalia, CO
<http://tinyurl.com/ho76b66>

Presta, Dorothy M. (D: February 2016)
(Survived by Giuseppe "Joe" Presta)
Denver, CO
<http://tinyurl.com/jze8eko>

Scheirman, L. George (D: March 2016)
Highlands Ranch, CO
<http://tinyurl.com/z26596v>

Sides, Richard "Dick" J. (D: August 2015)
(Survived by Aldis Sides)
Highlands Ranch, CO
<http://tinyurl.com/zh7hrxn>
Get info at 303-503-2561

Sparhawk, Jane E. (D: December 2015)
(Survived by Ed Sparhawk)
Littleton, CO
<http://tinyurl.com/jo48nad>

Villines, William "Bill" F. (D: August 2015)
(Survived by Phyllis Villines)
Lincoln, CA
<http://tinyurl.com/zfce2z6>

Non-Members

Allen, David M. (D: January 2016)
(Survived by Anita Allen)
Littleton, CO
<http://tinyurl.com/jtjfszl>

Allen, Jerry (D: February 2016)
(Survived by Lou-Ann Allen)
Lake George, CO
<http://tinyurl.com/j7pdh3y>

Cope, Brian C. (D: February 2016)
(Survived by Marlys Cope)
Littleton, CO
<http://tinyurl.com/hjpfwyx>

Cortez, Edward "Ed" (D: December 2015)
Palm Springs, FL
No obituary published.

Dion, Gertrude "Trudy" (D: March 2016)
Centennial, CO
<http://tinyurl.com/huews3h>

Fleming, John (D: December 2015)
Byers, CO
<http://tinyurl.com/jhtma39>

Gavin, Bud (D: December 2015)
(Survived by Rita Gavin)

Lakewood, CO
<http://tinyurl.com/h46n7tf>

Gay, Gordon (D: February 2016)
Lakewood, CO
No obituary published.

Haney, Regina "Jeanne" (D: January 2016)
Littleton, CO
No obituary published.

Hollingshead, Edward W. (D: January 2016)
(Survived by Marian Hollingshead)
Littleton, CO
<http://tinyurl.com/jsoqga>

Lopez, Teresa M. (D: February 2016)
Denver, CO
<http://tinyurl.com/zmozoel>

Morton, Donald P. (D: November 2015)
(Survived by Susan Morton)
Littleton, CO
<http://tinyurl.com/h3oom5m>

Reese, Neil R., Jr. (D: December 2015)
(Survived by Phoebe Reese)
Golden, CO
<http://tinyurl.com/j6wzqr5>

Shanahan, Donald F. (D: February 2016)
(Survived by Beryl Shanahan)
Highlands Ranch, CO
<http://tinyurl.com/jef78xm>

Skiff, Lois L. (D: January 2016)
Littleton, CO
<http://tinyurl.com/h6d2h4q>

Towe, Ace (D: February 2016)
(Survived by Betty Towe)
Aurora, CO
<http://tinyurl.com/j36shy3>

Historian's Corner

Ray Ziehm (POC)
(rzandmm@comcast.net)

Recalling the Viking Mars Lander Mission

By Dr. Ben Clark and Ray Ziehm

It is very encouraging to see the renewed interest in solar system exploration that we are experiencing today. The recent New Horizons flyby mission to Pluto enjoyed

well deserved good publicity and was a topic of discussion for several weeks. However, one issue related to space exploration is that many of today's space enthusiasts are not familiar with the outstanding accomplishments of the two Viking orbiter/lander missions back in the 1976 time frame. Many of these interested folks were not born when these missions took place. The great success of the Viking program speaks loudly to the boldness of the project as well as the capability of the United States, NASA, JPL, and Martin Marietta to mount such an effort considering all the new challenges and uncertainties involved.

NASA's Langley Research Center had been studying a mission to Mars for some time, and had identified a complement of science objectives as well as many of the difficult technical areas that existed with such a mission. Viking was, of course, NASA's first attempt at landing on another planet in the solar system. Mars was the highest priority because it was the one place in our solar system that scientists thought there was the possibility that some form of life might exist or have previously existed.

The Soviet landing attempts had been failures in spite of some of their claims, and we knew it was going to be technically the most challenging place to land compared to the straightforward landings with rockets on the moon or simple parachutes when touching down on Earth. The thin atmosphere of Mars is just dense enough to make rockets tricky at high speeds, but not enough for parachutes to do the total job.

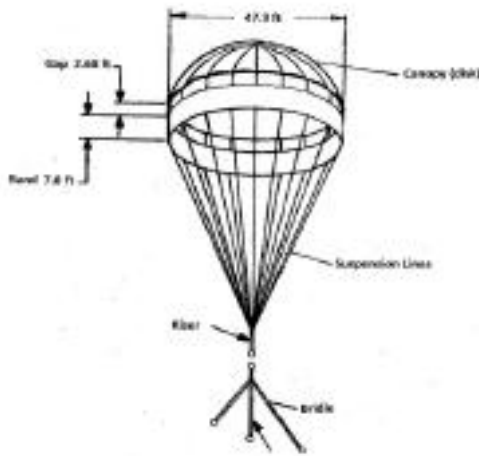
In late 1966, a program called the Planetary Entry Parachute Program (PEPP) was awarded to Martin Marietta by NASA Langley to continue a series of rocket launches and one balloon launch intended to select a Viking Lander parachute design from three candidates being considered. Rocket launched parachute tests were done at White Sands Missile Test Range, filming parachute deployment and inflation at an altitude where the Earth's atmospheric density was representative of that expected at Mars. We successfully conducted the last flights of the rocket launched program.

The next level of testing was to open and inflate a parachute in the wake of an aeroshell of the design planned for Viking. This part of the program was to include four launches of helium filled balloons to lift the aeroshell containing a separable payload from a launch site at Roswell, New Mexico, to one hundred and thirty thousand feet altitude as it arrived over the missile range. The aeroshell and payload were dropped from the balloon, eight rocket motors were fired to achieve a supersonic velocity, and the test parachute was mortared out to deploy and to extract the payload from the aeroshell as it slowed to the transonic velocity regime.



The balloon launched vehicle ready for launch

Three balloon launched tests were successfully conducted, one for each test candidate. Inflating a parachute in this low density atmosphere and in the turbulent airflow behind an aeroshell is no simple matter. A new chute design, called a disk-gap-band (DGB), the Langley team was considering appeared to perform the best of the three chute design concepts.



The disk-gap-band Parachute

The DGB was eventually selected as the Viking Lander chute design. Interestingly, this entry, landing, and parachute design has been used on all follow-on planetary atmospheric landings. NASA had originally scheduled four PEPP flights, assuming one failure might occur; however, all three were successful and the fourth flight was cancelled. A similar balloon launched program called BLDT was conducted during the Viking program to qualify the parachute system. (A subsequent Mars article will describe the PEPP program in more detail).

JPL was designated to build two vehicles to serve as lander busses during the cruise to Mars, and then go into Mars orbit and conduct their own science missions,

as well as relay lander mission data to earth. Following a competitive proposal activity, Martin Marietta was awarded the program to design and develop two Viking Mars lander spacecraft as well as to craft the mission operations. Martin Marietta was also selected to provide its Titan Launch Vehicles.

The planetary community had already defined the mission objectives and outlined the proposed experiments to satisfy them; they included study of surface characteristics, details of the atmosphere, the soil composition and its magnetic properties, as well as photos of the general terrain, and of course, the presence of indications of life.

Two Mars landers were designed, built, and flown (actually, a third was mostly built, and there were enough flight spares for four). The reasoning was that if there was only a 70/30 chance that any given spacecraft might land successfully, by flying two there would be a 91% probability that at least one would be successful. One huge concern was the multiple sets of technologies that had to be developed, especially within the new requirements for heat sterilization, under which the landers would be encapsulated, and then heated to a temperature above boiling water for 30 hours. No other spacecraft, before or since, have had to meet such stringent environmental conditions. Furthermore, this heat-resistant spacecraft also had to be cold tolerant and able to operate under external temperatures as low as -184 deg F on the cold, nighttime surface of Mars.



Carl Sagan, posing with the Viking Lander (not on Mars, of course)

During the cruise to Mars there were some technical issues, but no mission-stopping events. The insertions into Mars orbit went exactly as planned and achieved extremely accurate orbits. As everyone on the project and most of the free world watched breathlessly on live TV, the first lander performed a separation from its orbiter, then deorbit burns and entry into the atmosphere, followed further by deployment of the supersonic parachute, separation of the capsule to release the lander, and finally, the acquisition of altitude

and velocity information by the specialized radar system to guide the propulsion engines for a highly controlled vertical descent onto the surface of Mars. During all those activities, a relatively high data rate of 2,000 bps was continuously sending information back through the orbiters. Everything had to be preplanned and occur autonomously under computer control, back when computers were still in their infancy. To the somewhat startled surprise of almost everyone, the landings were virtually picture-perfect.

Whether Viking actually discovered life on Mars is still under some dispute, although most scientists suspect that the life-like chemical signals seen by one experiment were actually due to chemical peculiarities of the Martian soil, possibly having to do with perchlorates and their long-term exposure to cosmic rays.

Viking made a large variety of often surprising discoveries. Although Mars is a desert, the relative humidity can be high enough during nighttime to condense water, and the Viking-2 lander observed frost on the ground in wintertime because it was located at a higher latitude (48° N, higher than Fargo, ND). It is possible it could have discovered ice if it could have dug a few feet deeper into the ground. We also discovered that the argon content of the atmosphere is much lower than implied by a previous Soviet measurement, which has strong implications that Mars has not outgassed water and other volatiles nearly as much as our own planet. Nonetheless, orbital pictures revealed many examples of evidence of ancient rivers, tributaries, and floodplains, as well as today's water icecaps beneath the frozen carbon dioxide polar caps. Atmospheric pressure varied by about one-third during the year as the CO₂ caps sublimated. The atmosphere is more than a hundred times less than ours, but measurements of nitrogen isotopes showed that it must have been much more massive in the past.

At their peak, the global dust storms reduced visibility down to a few dozen feet. The source of the dust, the Martian soil, is very iron-rich (producing the red color), but enriched in sulfates, probably similar to Epsom salts. The soils at both Viking sites, on opposite sides of the planet, are virtually identical and apparently are part of a global unit that is homogenized by the giant global dust storms. More than 4,000 images were taken by the landers and over 50,000 by the orbiters (mapping 97% of the planet). The orbiters also mapped the surface temperatures across the entire planet for all four seasons and measured the spread of water vapor as it sublimated from the polar caps.

Close orbiter flybys of Mar's moons, Phobos and Deimos, revealed their dark, cratered surfaces and low densities, which may be due to organics and ice in their subsurface. The results are also consistent with them

being remnants of one original object, broken apart during the encounter and captured by Mars.

The plans for the Viking mission uncovered several technical issues that had not been encountered before, or at least not to the same levels. One of the most difficult of these was the sterilization process required to avoid contaminating the Mars environment with Earth bacteria. Even assembly in a laminar flow clean room, with white coveralls and booties, and repeatedly washing parts with disinfectants was not sufficient. Many components had to be redesigned using only materials compatible with the heat sterilization requirements. Recent Mars missions have avoided the heat sterilization because they have not carried instrumentation to detect life on Mars, and no strong evidence of live bacteria has been found to date.

This was our first use of nuclear electrical (RTG) power thought to be necessary because of the frequent dust storms. There were also many other new issues to be resolved here. The soil-sampler was a design that evolved slowly as many concepts were considered and tested.



InSight Mars lander being readied for shipment

Look familiar? It should. No, it is not Viking. It is a new vehicle called InSight developed for a new Mars mission. This is one of the daughters-of-Viking. It will study the interior of Mars by monitoring for Marsquakes. It was originally planned for launch in March 2016, but the French seismometer instrument was not ready in time, and the launch had to be delayed.

The first daughter-of-Viking, the Phoenix lander, already performed its mission in the polar regions of Mars (in 2008), making many far-reaching discoveries, including that a portion of the chlorine we detected in the soils with Viking are actually perchlorate salts, a super-duper ice melting salt much more powerful than what we put on our roadways or driveways in wintertime. Recently, this discovery was extended, as announced in a recent press conference about the confirmation of active gullies on Mars.

For those of us who were fortunate to be working as engineers, scientists or support staff at the time of the Viking landings, the thrill of those first images from the surface of Mars was the jewel in the crown that topped off the Apollo moon landings. Today, there are more than one thousand engineers and scientists whose part- or full-time job is operating the plethora of spacecraft at Mars (4 orbiters, 2 rovers, and 9 new missions in the development phase by NASA, Europe, Russia, Japan, China, and even the United Arab Emirates). Where Viking started as a revolution in exploration of the red planet, has now also become the official long-term goal of NASA's astronaut exploration program.

Mark your calendars for the time period on or near July 20th, 2016, for a reunion celebration being planned for everyone who touched the Viking project, or were inspired by it (follow the website of the Viking Preservation Project, at Vikingpreservationproject.org).

Bridge Club

By Dave & Kathy Martz
(martz20@comcast.net)

" Bridge is such a sensational game that I wouldn't mind being in jail if I had three cellmates who were decent players and who were willing to keep the game going 24 hours a day."

- Warren Buffett

Come join us at our monthly get together! All MARS members and their guests are welcome. We play on the **3rd Friday of each month at the Buck Community Recreation Center (Littleton) from 10 AM to 2 PM** (pack your lunch). The club provides the cards and all requirements for the games as well as coffee, tea, and hot water, for your enjoyment. There is a fee of \$2.00 per person to play which helps with supplies and the year-end party in December.

We have couples, as well as singles, playing. If you don't have a bridge partner, the club can assist in finding one for you, but you need to let us know in advance.

If you have any questions, please contact any of the following Bridge Club Officers:

Presidents:

Dave & Kathy Martz, 303-683-9524

Vice-President:

Bill Kacena, 303-973-2685

Secretary:

Theodore Bornhoeft, 303-933-9730

The 1st Quarter 2016 winners are as follows:

January 15 (2 ½ tables)

1st – Bill & Mavis Kacena

2nd – Paul & Marie Stanton

3rd – Ernie & Cecile Berliner

4th – Dave & Kathy Martz

February 19 (3 ½ tables)

1st – Joe Pohlen & Jerry Baab

2nd – Dave & Kathy Martz

3rd – Bart & Diane Wright

4th – Ernie & Cecile Berliner

March 18 (3 tables)

1st – Bart & Diane Wright

2nd – Theodore Bornhoeft & Joe Pohlen

3rd – Ernie & Cecile Berliner

4th – Dave & Kathy Martz

Dinner Club

By Skip and Pam Hull
(pamhull.7@msn.com)
303-973-4717

We have scheduled the next series of monthly outings for the members of MARS. Attendance has been steadily increasing so far this year, but we still have room for additional reservations for most venues. That said, please remember, venues that have attendance limits need your reservation sooner than later if you wish to attend.

The next set of restaurants scheduled, so far, in 2016 is as follows:

- May 17 - Inverness Garden Terrace
- Jun 14 - Cinzetti's Italian Restaurant
- July 12 - Hickory House Bar B Que
- Aug 3 - Mount Vernon Country Club
- Sept 20 - Sakura Hibachi Japanese Restaurant
- Oct 9 - Simms Steakhouse

If you have a suggestion for a new venue, please let us know, by email pamhull.7@msn.com or by phone 303-973-4717 (**please leave a message** if we are not home).

Please remember that it is helpful if you send a single check to simultaneously reserve spaces for multiple Dinner Club events. Also, **please remember to include the name(s) of guest(s) and a good phone number where you can be reached on the reservation slips in case of last minutes changes.** This will greatly simplify preparation for these wonderful events.

We hope to see more of you joining us for dinner or lunch this year. It is a great chance to rekindle friendships or make new friends who you may find you have something in common.

Finally, to quote a cooking channel chef, Alton Brown, we wish you "Good Eats."



Golf League

By Don Petermann
(donnarlen3@gmail.com)



**Can you come out and PLAY?.....
Golf that is!**

All are welcome!! You don't have to play like Phil Mickelson or Michelle Wie...in fact no one is even close in our league!! 🍷

The MARS Golf League is looking forward to another great season in 2016. We held our annual kickoff meeting March 3 and elected:

President - Don Petermann
Vice President - Bo Rodriguez
Tom Cooke - Secretary Treasurer
Tom Hall - Handicap Chair (Tom Ripper, in training)
Schedulers will be; B Bowe, D Del Duca, and J Flemming.

Thank you for volunteering!

We decided to simplify by playing all rounds at Broken Tee Golf Course, plus using "Gold tees" for all players.

We encourage everyone who likes to play golf, regardless of skill level, to join us for fun, good companionship and exercise. Play will be every Thursday starting April 7 through October 27th. You can play as often as you like, there is no commitment required to play every week of the season.

Please go to the MARS web site: <http://www.marsretirees.org/> and click on "Golf" for all the details on our league. Also please feel free to contact any one of the officers or schedulers for more information. Phone numbers and email addresses are on the web site.

Old member or new, young or not so young, please join us for some great fun!



Photography Club

by John Chapter
johnchapter@msn.com
303-986-8277

The goal of the *MARS Photography Club* is to provide a meeting place for like-minded people interested in photography and photographic arts. Our informal club goal is to have fun and provide an educational opportunity to help improve our photography. Club members vary from beginners to more advanced photographers. Today every person who travels and vacations carries some photographic equipment, perhaps a smart-phone or a digital camera to record the adventures they would like to share with family and friends. If this sounds like you please come to one of our meetings. We generally have between ten and twenty members and guests in attendance.

Our meeting programs and presentations often include travelogues presented by our club members or other guests. We strive for a program mix of educational, entertaining, and related subjects. We have a meeting competition at each meeting and the selected images are shown on the Photography Club section of the MARS Associates Web Page at <http://www.marsretirees.org/>. If this sounds interesting, please stop by for one of our meetings, there is no obligation and it is free.

The MARS Photography Club meets at the *Littleton Bemis Library*, located at 6014 S Datura Street, in Littleton Colorado, on the second Thursday of the month, from 1:00pm to 3:30pm. Please check the *marretirees.org* website for last minute updates. We meet in January, February, March, April, May, September, October, and November. *There are no meetings in June, July, and August.* In December, we have a holiday luncheon at a local restaurant.

Summary of Our 2016 January, February and March Meetings

January Program: John Chapter presented, "A Look Back, A Decade of Fifty of My Favorite Photographic Images." - One of John's images of a large sculpture is presented below.

This image is a detail of the sculpture that is located in front at the Denver Public Library. The Sculpture is by Lao Tzu. With its reddish-orange color, the soaring steel sculpture dominates the Acoma Plaza, located between the Denver Art Museum and the Denver Public Library.

There was no competition at the January 2016 meeting, because we did not have enough entries.

February Program- Roger Giellis presented a wonderful travelogue of his recent *Trip to Italy*. Roger had many great images; however, his image, "A View from Positano," was particularly attractive.

March Program- BJ Anthony presented a DVD that she made entitled, "Orchids, Yachts and Butterflies, California's Central Coast." We all enjoyed BJ's presentation.

Our upcoming April Program will be presented by **Sue Janssen**, and should not be missed. Sue made a DVD, with sound, of her recent trip to **Tanzania**.

Competition Winners

The 2016 first quarter Monthly Competition Winners are shown on the MARS Associates website, in the Photography Club Section. I am sure that you will enjoy the images.

An image that I particularly enjoyed was *Jim Kummer's image of a Snow Mastodon*, a recently installed sculpture at the *Denver Museum of Nature and Science*, by *Kent Ullberg*.

Become a part of the MARS Photography Club in 2016. You will have a great time, improve and share your own images with our photo club. If you have any questions, please contact *John Chapter*, johnchapter@msn.com

Hiking Club

By Sue Janssen
(susan.g.janssen@gmail.com)

The hiking club started 2016 with three excellent hikes. Seventeen members of the MARS Hiking Club took advantage of a beautiful January day and passed the morning of January 20, hiking a 4.8 mile loop at Apex Park in Jefferson County. The hike featured an ascent of over 1100 feet. The temperature was in the low forties and the sun was out for much of the hike. The hikers were well prepared for the icy spots on the trail with clamp-on ice traction devices. At the summit of the trail, we enjoyed a clear, unobstructed view of downtown Denver as well as a chance to observe a herd of deer lounging on the side of the mountain. We enjoyed lunch in Morrison at Beso de Arte at the end of the three-hour hike. It was a fabulous outing on a sunny January day. We are fortunate to live in Colorado where we can have days like this in the middle of winter.

Our hike in Apex Park attracted our largest group of hikers – ever! (Carrie & Bill Meersman, Lenny & Jill Demchak, Pat & Joe McDermott, Linda & Bob Berry, Al McKinney, Sam Dominick, Vicky Eberhardt, Sue & Lee Janssen, Sue & Tom Pawlowski, Ken Ruiz, Glenn Gibson)

The weather was bright and sunny for the February hike in the 876-acre Lincoln Mountain Open Space located along the upper reaches of West Cherry Creek. The meadows are backed by forested rocky cliffs and the mesa called Lincoln Mountain. It has great wildlife habitat and contains riparian habitat for the federally threatened Preble's Meadow Jumping Mouse. There were plans to put a housing development here, but the downturn in the economy provided the opportunity for Douglas County to acquire the land in 2009 and 2010 for open space. We are very happy they had the means to create this open space for hikers and horseback riders! We chose the Palmer Divide Ranch Trail which winds its way through meadows, scrub oak and rock outcroppings for 4.5 miles. Although sunny, there was a cold wind and lots of snow on the ground. After the hike, several of us stopped in Castle Rock for burgers, beer and conversation.

The MARS Hiking Club had Lincoln Mountain Open Space all to ourselves.

An alternate February excursion was also held. Ten members of the MARS Hiking Club spent the first two weeks in February in Central America exploring some of the Maya Sites in El Salvador (Joya de Cerén), Honduras (Copán, Las Sepulturas), Guatemala, (Tikal, Yaxha-Nakum-Naranjo) and Belize (Laminai). We had a great experience learning about the Maya civilization from ~2,000 BC through the 9th Century AD, as well as the Maya people today.

As a bonus the group was able to watch the Super Bowl in Antigua, Guatemala at the Mono Loco (Crazy Monkey), meeting many local Broncos fans.

Three large volcanoes dominate the horizon around Antigua. The most commanding, to the south of the city, is the Volcán de Agua or "Volcano of Water", some 12,356 ft. high. To the west of the city is a pair of peaks, Acatenango, which last erupted in 1972, some 13,045 ft. high, and the Volcán de Fuego or "Volcano of Fire", 12,346 ft. high. "Fuego" is famous for being almost constantly active at a low level. Steam and gas issue from its top daily, a larger eruption occurred in September 2012. Fuego had a significant uptick in activity, spewing lava, a few days after the group left Antigua.

Antigua Guatemala and the Water Volcano (Volcán de Agua) in the background. Left to Right: Bill & Mavis Kacena, Lenny & Jill Demchak, Tom & Sue Pawlowski, Bob & Linda Berry, Paul & Lonnie Jones

The MARS Hiking Club met on March 16th to snowshoe Three Mile Creek trail near Grant, Colorado. We had an unusually small group of three for this month's hike. March seems to be when Coloradans like to head for warmer climes. Those of us that braved the cold enjoyed a beautiful winter hike up a rocky canyon following an icy stream that wound through tall pines and stands of aspens. It was snowing lightly when the hike started but sunny at the finish. Ours were the first tracks through fresh snow which made for a particularly pleasant outing. We hiked for about two hours and covered about two and a half miles then retired to the Rustic Station restaurant in Bailey for lunch. The Denver area is a wonderful place to live for many reasons, but one of the most pleasant is the opportunity for quality outdoor experiences an hour from home.

Tom Pawlowski, Tara O'Brian and Dick Sosnay snowshoe along Three Mile Creek

The schedule of hikes is emailed to members and also posted on the MARS website (<http://www.marsretirees.org/>). Even if you have never gone snowshoeing or hiking you are welcome to join in the fun. If you wish to be added to the MARS Hiking Club, contact Sue Janssen at susan.g.janssen@gmail.com and she will add you to the club distribution list (mars_hiking@googlegroups.com). Please provide your email address, home phone and cell phone. Happy trails!

The MARS Associates Website

By Jim Kummer
(jkummer@comcast.net)

The website committee strives to keep the MARS website relatively uncomplicated. We do this to make it easy to view by members, and simpler for us to maintain. That said, the website is fairly complex. It consists of more than 110 pages, not counting the 70-89 pictures each that comprise the two event slide shows. Some of the pages are relatively static, while others get updated on a regular basis.

The MARS Moments page includes over 40 pages presenting members' work memories and historian's STAR articles. Once posted, these pages do not change. In contrast, the Golf Club page changes weekly during the spring through fall golf season, presenting the previous week's winners and scores. The email pages (27) are updated typically twice a year. The Events

page, Dinner Club, In Memoriam and New Member pages are updated quarterly, in keeping with the STAR publication schedule. The Hiking Club, Photography Club and Bridge Club pages are updated monthly.

There are 15 Benefits pages. These are updated annually. Also reposted annually are the Officers / Directors page, Volunteer page, Bylaws, Policy Manual and Annual Report. The event slide shows are updated with new pictures after each annual event.

The committee receives most of the information used to update pages from the MARS officers, club officials, volunteers and members. The committee is responsible for the website's organization, cosmetics and functionality and also jointly selects the website of the month from the suggestions of the committee. We also welcome suggestions from the MARS membership.

You should visit the MARS website often. There you will find an excellent source of information for MARS members. Topical and timely information is available for your perusal. Here are the monthly websites of the month from the last quarter.

- January – Check out your charitable options at www.charitynavigator.org/**
- February – See a Map of Neighborhood Crime Reports at www.crimereports.com**
- March – To determine USPS postal cost and delivery date, go to postcalc.usps.gov**

Your website committee members welcome your suggestions for improvement, and for proposed websites of the month. Email them to me at jkummer@comcast.net. Your website committee members are: Linda Stearns, Paul Bingham, Bob Knickerbocker, Duane "Smitty" Smetana, and Jim Kummer (Webmaster).

Colorado Springs Lockheed Martin Retiree Group News

By Doug Tomerlin
(douginc@aol.com)

Our retiree group name has changed to Colorado Springs Lockheed Martin Retiree Group. The IS&GS business area will no longer be located in Colorado Springs. The existing contracts and employees have been re-assigned to Mission Systems and Training (MST) and Space Systems. I understand they will remain in

the current facilities. Retirees from heritage companies are still included in the group.

We have not had any group activities since the last newsletter. Many retirees had a great holiday season with their family and friends. Our spring luncheon is tentatively planned for May 2016, at the Lockheed Martin Federal Drive Facility cafeteria in Colorado Springs. If you would like more information about the group or the luncheon, please contact Doug Tomerlin at douginc@aol.com.

We welcome the following retirees to the Colorado Springs Lockheed Martin Retiree Group and hope to see all of you at our spring luncheon:

- Dave Stewart
- Pam Dade
- John Cavanaugh
- Jim Hawkins
- Leslie Roberts
- Lyle Flick
- John M. Satagaj
- Rich Abromowicz
- Richard Chacon

We are all mindful and deeply saddened by the passing away of fellow retirees George Nichols, Gideon Damon and John Noonan, since the last newsletter.

RAMM – Baltimore News

By Dottie Ruth
(dotruth725@comcast.net)

No article this quarter.

Cape Canaveral News

By Dick Olson
(Olsons5145@aol.com)

Luncheons

January – We had a pretty good turnout this month. Billy Graham came down from Gainesville, Tom Savage made his first appearance as a retiree, and some folks we haven't seen for awhile, Jimmie Bryant, Roger Schmidt, Wes Hutchinson, Vince Alderman, and Mike and Roy Hunter. The regulars were well represented by Wendell McDaniels, Roger Wright, Bill Masterson, Jerry Moskovitz, Frank Indihar, Larry Gleason, Herb Pugh, Abe Smith, Jimmie Weddle, Ken Hawes, Hal Castleton, Hank

Ambrosh, Cal Moser, Bill Rhode, Dick Hinshaw, and Bob Matschner.

John Blair's retirement party was yesterday so maybe we will see him next month.

Rick Snedeker's wife has had a stroke and is in serious condition. Our prayers are with Rick and the family.

February - We had a pretty good turnout this month. Tom Savage made his second lunch since he retired and some people we haven't seen for a while, Lynn Johnson, Vince Alderman, Wes Hutchinson and Don Poston. Regulars attending were Wendell McDaniels, Roy and Mike Hunter, Abe Smith, Chris Hutchmacher, Roger Wright, Bob Rodamer, Jerry Moskovitz, Frank Indihar, Walt Starkey, Jimmy Weddle, Dave Kintigh, Hal Castleton, Dick Hinshaw, Larry Gleason and Herb Paugh. Jim Milby had planned to be here but came down with a kidney infection and couldn't make it. Get better Jim and we hope so see you next month maybe.

Super Bowl this weekend. Go Broncos.

March - We had a fair turnout this month, about twenty people. Herb Mathias and Jerry Teague –made- rare appearances and regulars Wendell McDaniels, Ken Hawes, Abe Smith, Hank Ambrosh, Bill Masterson, Tom Savage, Frank Indihar, Jerry Moskovitz, Walt Starkey, Jimmy Weddle, Bob Rodamer, Dave Kintigh, Dick Hinshaw, Larry Gleason, Chris Hutchmacher, Bob Matschner and Bob Anderson filled out the slate. Don Anderson showed up just as everyone was leaving. He's pretty good on dates but needs a little work on telling time. Some story about an appointment running long.:-)

Ran into Vern LaFave at the Moose. He was down from Denver and was working on taxes or some such thing. He mentioned that Dennis Viera just recently retired.

Don't forget to vote in the Primary on the 15th.

Martin Marietta Retiree's Club (Vandenberg News)

By Charlie Radaz
(fcmjradaz@aol.com)

We started 2016 with a meeting at Lompoc Embassy Suites on the 28th of January. Beverly Wilson, CPA presented a program on the latest from the IRS. We had 29 attendees including: April Hardy, John Nakata, Bud and Carol Gurney, Aubrey and Chrystal Collins, Bruce fall, Doug and Jean Gilman, Tom and Bert Heter, Elfride Hugen, Pat Nuremberg, Rodger and Polly Phillips, Ralph and Heather Quinn, Russell Sharer, Eunice

Souder, and Charlie Radaz. Eunice Souder won \$29.00 in the 50-50 drawing.

On February 29th we met in the Historic Santa Maria Inn with 29 persons in attendance. Carol Bryson won the 50-50 drawing of \$38.00! A very patriotic and touching program was presented by Ms. Cheryl Tolan on "Welcome Home Military Heroes," an organization founded recently by Ms. Tolan and her husband Robert. Their mission is to welcome home all of our local returning troops and thank each and every one of them for a job well done!

Since we had this program, one of our members/board member Don Buck, participated in an emotional Welcome Home at the San Luis Obispo Airport along with a crowd of volunteers. More info can be found on www.welcomemilitaryheroes.org.

We have been very pleased with the response to President April Hardy's January letter to club members describing our club expenses/programs/activities and asking that annual dues of \$15.00/family be paid. Even with the minimal dues amount we have been able to make some charitable contributions.

April Hardy, MMRC President with Cheryl Tolan, founder of "Welcome Home Military Heroes" at 29 February Meeting

In mid-March we were glad to have Denver retirees Bob and Vel Weston visit the Central Coast and recall many of the "early days" stories...they dined at their favorite restaurant, Shaw's Steakhouse in Santa Maria!

On 31 March, we will be meeting at the Village Country Club in Vandenberg Village. The guest speaker will be MMRC member Col. Bud Gurney, USAF Retired. Bud's presentation is entitled: "Corona: America's First Eyes in Space." Bud was involved in several key phases of this and some related programs that he can now talk about. He worked in the development of the recovery systems and flew recovery missions.

The club normally meets the last Thursday of each month at noon. We rotate between Santa Maria, Lompoc and Buellton. All former employees, their spouses and associate contractors are welcome to attend, visit and share informal stories.

Please call Aubrey Collins (805) 937-8299 for the location and reservations.

April Hardy, Club President with Eva Blaisdell, Founder and CEO California Space Center, at September 2015 meeting.

United Launch Alliance News

ULA and Blue Origin Partner with Air Force for All-American Rocket Engine

Centennial, Colo., (Feb. 29, 2016) – United Launch Alliance (ULA) and Blue Origin LLC, a privately-funded aerospace company owned by Amazon.com founder Jeff Bezos, entered into a public-private partnership with the U.S. Air Force to develop a new rocket propulsion system to power Vulcan -- ULA's next-generation launch system.

"While the RD-180 engine has been a remarkable success with more than 60 successful launches, we believe now is the right time for American investment in a domestic engine," said Tory Bruno, president and chief executive officer. "As America's ride to space, we continue to meet our goal of delivering the most reliable launch systems at the most affordable cost, while developing a new rocket which enables brand new opportunities for the nation's use of space."

ULA has been investing in the development of the Vulcan rocket for more than a year. This agreement will enhance the company's progress integrating the BE-4 engine with the Vulcan launch vehicle.

Development of the BE-4 engine is fully funded by Blue Origin, with investment by ULA, and offers the fastest path to a domestic alternative to the RD-180. Development is on schedule to achieve qualification for flight in 2017 to support the first Vulcan flight in 2019.

The BE-4 is a liquid oxygen, liquefied natural gas (LNG) rocket engine that delivers 550,000-lbf of thrust at sea level. Two BE-4s would power each ULA Vulcan booster, providing 1,100,000-lbf thrust at liftoff. Vulcan will launch from Space Launch Complex 41 at the Cape Canaveral Air Force Station in Florida and Space Launch Complex 3 at Vandenberg Air Force Base in California. ULA is teaming in the development of the BE-4 to enable availability for national security, civil, human and commercial missions. Development of the BE-4 engine has been underway for more than four years and testing of the BE-4 components is ongoing at Blue Origin's test facilities in West Texas.

The Air Force also awarded a separate development contract to an Aerojet Rocketdyne-ULA team for the AR1 engine.

"ULA continues to work with both Blue Origin and Aerojet Rocketdyne to pursue two options for a next-generation American engine and that is why we're teaming with two of the world's leading propulsion companies," said Bruno.

United Launch Alliance Names David Bourcier as Controller

Centennial, Colo., (Feb. 16, 2016) – United Launch Alliance (ULA) named David Bourcier as controller, replacing Jim Hardin who announced his retirement last year after serving in that role since the company began in 2006.

“David brings 30 years of financial background within the aerospace and defense industry to the ULA team,” said Tory Bruno, ULA president and CEO. “As ULA transforms to make space more affordable and accessible, strong leaders like David are critical to ensuring our success while we continue our laser focus on reliable launch.”

Before joining ULA, Bourcier served as the assistant controller for Lockheed Martin Space Systems Company where he led enterprise restructuring projects, implemented overhead cost reduction initiatives and served as the ULA consent order liaison.

He began his career with Martin Marietta in 1984 and held various positions of increasing responsibility within program and central finance, including leadership positions as director of Accounting, director of Government Compliance and director of Financial Planning and Analysis.

Bourcier holds a bachelor’s degree in business administration from Principia College and a master’s degree in business administration from the University of Colorado.

ULA Launches this quarter:

Cape Canaveral Air Force Station, Fla., (March 22, 2016) – A United Launch Alliance (ULA) Atlas V rocket carrying the OA-6 Cygnus resupply craft to the International Space Station (ISS) lifted off from Space Launch Complex-41 on March 22 at 11:05 p.m. EDT. The mission was flown for Orbital ATK under NASA’s Commercial Resupply Services contract, and, with a payload of more than 16,000 pounds, was the heaviest payload to launch on an Atlas V to date.

Vandenberg Air Force Base, Calif., (Feb. 10, 2016) – A United Launch Alliance (ULA) Delta IV rocket carrying a payload for the National Reconnaissance Office (NRO) lifted off from Space Launch Complex-6 on Feb. 10 at 3:40 a.m. PST. Designated NROL-45, the mission is in support of national defense. This is ULA’s second launch in 2016 and the 105th successful launch since the company was formed in December 2006.

Cape Canaveral Air Force Station, Fla., (Feb. 5, 2016) – United Launch Alliance (ULA) successfully launched its first mission of the year with an Atlas V rocket carrying the Global Positioning System (GPS) IIF-12 satellite for the U.S. Air Force. The rocket lifted off from Space Launch Complex-41 on Feb. 5 at 8:38 a.m. EST.

For more information on ULA, visit the ULA website at www.ulalaunch.com. Join the conversation at www.facebook.com/ulalaunch, twitter.com/ulalaunch, and [instagram.com/ulalaunch](https://www.instagram.com/ulalaunch).

