



# Ever Upward: January 2017

## New Award and Changes to Award Rules

A new award has been approved by the Council of the Aerospace Medical Association:

**ADMIRAL JOHN C. ADAMS AWARD:** Established in honor of Admiral John C. Adams. It is given annually for the most significant contributions to operational Aerospace Medicine, either during a single defined period (e.g., deployment), or over a career.

New rules apply to the Julian Ward award: **All nominations for this award are held for a 1-year award cycle. Only one nomination will be submitted from each Aerospace Medicine Residency training program.**

The Awards Committee of the Aerospace Medical Association, which selects the annual winners of special awards, has set a **January 15** deadline for receiving nominations for awards to be presented at the Annual Scientific Meeting. The names of prospective award winners should be submitted as far in advance of the deadline as possible.

To view a list of past recipients go to the AsMA website:

<http://www.asma.org/asma/media/asma/membership/awardwinners.pdf>.

Nominations can be made by any member of AsMA. Annual Awards descriptions and full rules are online in the Members Section of the AsMA website.

## AsMA Fellows Scholarship Winner Announced

The AsMA Fellows Scholarship Committee is pleased to announce their selection of the winner of the 2016 scholarship. Karina Marshall-Goebel, Ph.D., won the scholarship for her presentation and publication of a manuscript on "Intracranial and Intraocular Pressure During Various Degrees of Head-Down Tilt."



The \$2,000 AsMA Fellows Scholarship is funded by the AsMA Foundation and is presented annually to an AsMA member who is a student in an aerospace medicine residency program, graduate program in aerospace medicine (Master or Ph.D.), medical certificate or aerospace diploma course, or in a full time education/training program in the allied fields of nursing, physiology, human factors, psychology, ergonomics, and engineering. Selection criteria include delivering a slide or poster presentation as a first author at the AsMA Annual Scientific Meeting and then submitting a manuscript as first author for publication in AsMA's *Aerospace Medicine & Human Performance* (AMHP) Journal based on the same topic and/or material covered in the slide or poster presentation. The winner is selected by the AsMA Fellows Scholarship Committee based on the highest scientific value, originality, quality and relevance of the applicant's presentation and AMHP manuscript related to the field of aerospace

medicine (including allied scientific disciplines). Special consideration is given to those applicants who are at an early stage in their career development.

Melchor Antuñano, M.D., M.S.  
Chairman, AsMA Fellows Scholarship Committee

## New Members

AsMA welcomes 10 new members in January:

- Bofkin, Kelly; Surry Hills, New South Wales, Australia
- Davis, Harry; Olympia, WA
- Kumetz, Erik; San Diego, CA
- Miller, Jacqueline; Yuma, AZ
- Murray, Christian; Bozeman, MT
- Nugent, Nathan; Toronto, Ontario, Canada
- Preda, Angela; New York, NY
- Schneeman, Jack; Minneapolis, MN
- Synovitz, Carolyn; Altus, OK
- Weerts, Guillaume; Cologne, Germany

*We make every effort to ensure the accuracy of this list.*

*Please report corrections to [rtrigg@asma.org](mailto:rtrigg@asma.org).*

## In Memoriam: Don White

AsMA was deeply saddened to hear of the death of Col. Donald J. White, USAF (Ret.), FRAeS, FAsHFA, FAsMA. He retired June 2012 as Assistant for Aviation, Operational Safety and Human Performance, Office of the Deputy Under



Secretary of Defense, Installations and Environment, Environmental Readiness and Safety. He was employed as a Human Systems Integration Analyst, Aerospace and Operational Physiologist, for Decypher Technologies, Ltd., at the 711 Human Performance Wing, Human Systems Integration Directorate, Wright-Patterson AFB, Dayton, OH.

Col. White entered the Air Force by direct commission in 1984 and completed the USAF School of Aerospace Medicine Aerospace Physiology officer training course in 1984. He was a High Altitude Low Opening and Static Line Master Parachutist with over 4,500 parachute deployments. As a human factors and human performance consultant, he participated on 14 Class A Safety Investigation Boards, 2 Accident Investigation Boards, and 4 Medical Incident Investigation Boards. He was also selected as a human factors, crew survivability, and life science investigator for the Columbia Accident Investigation Board.

Col. White was inducted into the USAF Safety Hall of Fame in June 2012. He was a member of the Board of Directors of the Laurel Clark Crew Survival Foundation and had served as the Human Performance Integration, Human Factor Engineering and Crew Survivability Consultant for

*See 'Don White', p. N2*

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From 'Don White,' p. N1

Paragon Space Development Corporation's Independent Review Board for the StratEx mission. He was also a Human Factors and Human Performance Integration Consultant for the STRATOS Red Bull mission. He served 5 years as the BSC Associate Corps Chief for Aerospace and Operational Physiology and had served as President of AsMA's Life Science and Biomedical Engineering Branch; Chairman, Board of Directors, for the Society of Human Performance in Extreme Environments; Past Chair of the Aerospace Medical Association Associate Fellows Group; past President of the Aerospace Physiology Society; past Chair of the AsMA Human Factors Committee; and had been serving as the President of the Aerospace Human Factors Association. He was a Fellow of the Aerospace Human Factors Association, the Royal Aeronautical Society, London, and the Aerospace Medical Association.

Col. White's decorations and awards include the Walter and Sylvia Goldenrath Award in 2015, the John Ernsting Award in 2013, and the Harry G. Moseley Award in 2005 from the Aerospace Medical Association, the Fred A. Hitchcock Award for Excellence in Aerospace Physiology in 2008 and the Wiley Post Award for Operational Physiology in 1998 from the Aerospace Physiology Society, the NASA Group Achievement Award from the Columbia Accident Investigation Board in 2003, USAF Aerospace Physiologist of the Year and ACC Aerospace Physiologist of the Year in 1998, ACC Aerospace Physiologist of the Year in 1996, and AFMC Aerospace Physiologist of the Year in 1995. He was a member of the Interagency Institute for Federal Health Care Executives, and was an Adjunct Assistant Professor of Preventive Medicine/Biometrics at the Uniformed Services University of Health Sciences in Bethesda, MD, until his retirement in 2012.

### In Memoriam: Grover Yamane

AsMA was saddened to hear of the death of Grover K. Yamane, M.D., M.P.H., Col., USAF(Ret.), in early December. A native of Seattle, WA, he graduated from Yale University and New York Medical College. He served a Family Medicine Residency in Kingston, NY, and a General Surgery Internship in Buffalo, NY. He received his M.P.H. from the University of Texas Health Science Center and then completed the USAF Residency in Aerospace Medicine at Brooks City Base, TX. He served in the U.S. Air Force for 20 years, with assignments in Panama, Germany, England, Texas, and Florida. When he retired from the Air Force, he continued to practice medicine as an Occupational Health Physician at the San Antonio Military Medical Center in Texas.

### Read Current News Online!

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Dr. Yamane was board certified with the American Board of Family Medicine and the American Board of Preventive Medicine (Aerospace Medicine, Public Health, and General Preventive Medicine). He had been an active member of AsMA for nearly 25 years. An online obituary is available at <http://www.legacy.com/obituaries/sanantonio/obituary.aspx?n=grover-k-yamane&pid=183120248&fhid=8910>.

### Obituary Listing

AsMA recently learned of the death of **Laura V. Alvarado, Col., USAF(Ret.), NC**, in early December. She graduated from what is now the University of the Incarnate Word in 1978 and received a scholarship from the U.S. Public Health Service in 1977. She then served in the U.S. Air Force nursing corps for 28 years. After retirement from the Air Force, she served as Director of Life Long Learning, University of Texas Health Science Center at San Antonio (UTHSCSA) School of Nursing. An obituary is available at <http://porterloring.tributes.com/obituary/show/Laura-V.-Alvarado-104252760>.

### Scholarships to 2017 ICASM Offered

The 2017 International Congress of Aviation and Space Medicine (ICASM), will be held in Rome, Italy, in the Fall of 2017. The Italian Association of Aerospace Medicine and the National Association of Assistants and Controllers of Air Navigation have announced the VII edition of the scientific prize "I Guidoniani." The scholarship prize will be 2,000 Euro for the best original paper in the field of medicine, psychology, or engineering, regarding man in atmospheric/spatial flight, and 2,000 Euro for the best original paper in the field of medicine, psychology, or engineering concerning human factors in air traffic control. Scientists below the age of 35 with a degree in medicine, biology, psychology, or engineering are eligible.

Completed and signed applications should be submitted online to: [segreteria@aimas.it](mailto:segreteria@aimas.it) or faxed to: 06.99331577. **The deadline for applications is the 15th of June 2017.** The full application form can be downloaded from: [http://www.aimas.it/docs/premio\\_guidoniani\\_2017.pdf](http://www.aimas.it/docs/premio_guidoniani_2017.pdf).

### MEETINGS CALENDAR

**March 28-30, 2017;** 3rd Annual Singapore Aviation Safety Seminar; Singapore Aviation Academy, Singapore. For more information, please visit <http://flightsafety.org/aviation-safety-seminars/singapore-aviation-safety-seminar-2017>.

**April 4-6, 2017;** Arvind Chaturvedi Colloquium on Postmortem Forensic Toxicology in Aviation; Mike Monroney Aeronautical Center, CAMI, FAA, Oklahoma City, OK. For more information, please see the [Colloquium announcement](#).

**May 19-24, 2017;** ATS International Conference; Washington, DC. For more, please visit [http://conference.thoracic.org/program/call\\_for\\_abstracts/index.php](http://conference.thoracic.org/program/call_for_abstracts/index.php).

**May 23-26, 2017;** Preventive Medicine 2017; Portland, OR. For more information, please visit <https://www.eventscribe.com/2017/acpm-annual/>.

## NEWS OF CORPORATE MEMBERS

### SAA Extends TotalCare Service

South African Airways has signed a new TotalCare® service order for Trent 700 engines that power five Airbus A330 aircraft that are entering service. The order was announced as UK Chancellor of the Exchequer Philip Hammond visited the first of the new aircraft at Johannesburg Airport. The aircraft are in addition to six A330s the airline already operates – all powered by the Trent 700 with TotalCare. TotalCare service means that all maintenance that needs to be performed (scheduled or unscheduled), all material and manpower costs needed for such maintenance, are covered for the life of the engine under a rate per flight hour or flight cycle. TotalCare also provides spare engine support, warranties and guarantees, support during an aircraft emergency breakdown situation no matter where the aircraft is in the world, etc., and it will provide a smoothing of the costs across the years.

—Please visit <https://preview.flysaa.com/about-us/leading-carrier/media-center/media-releases/newsroom> to read more about this.

### ETC Announces Award of Three Chamber Projects

ETC's Environmental Testing and Simulation Systems business unit announced the award of three chamber projects for customers both in the United States and abroad. The equip-

ment to be delivered includes an extreme temperature environmental chamber with specialized test profile controls and data acquisition system, a full drive-in vehicle test chamber to conduct vehicle emissions testing for a Chinese automobile manufacturer, and various chamber conditioning packages for a Japanese automobile manufacturer. The chambers and conditioning equipment will be used to evaluate the vehicle air conditioning systems, engine performance, fuel economy, exhaust emissions, as well as many other aspects of vehicle design, all while on a chassis dynamometer.

—Please see <https://www.etcusa.com/etcs-environmental-testing-and-simulation-systems-announces-the-award-of-three-chamber-projects/> for more on this.

### NIOSH Releases Youth Safety Curriculum

The National Institute for Occupational Safety and Health (NIOSH) and the National Occupational Competency Testing Institute NOCTI are pleased to announce a collaboration to promote and advance occupational safety and health practices among young workers. The collaboration includes the development and delivery of the *Youth@Work—Talking Safety* assessment. The assessment will be available to all students completing the *Talking Safety* curriculum.

*Youth@Work—Talking Safety: A Safety & Health Curriculum for Young Workers* is a free curriculum designed to help edu-

See 'Corporate News', p. N4

## Welcome to the new wave of CME at the UHMS Online Continuing Education Portal



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From 'Corporate News', p. N3

cators teach young people the basics of job health and safety in a fun and interesting way. The curriculum includes information relevant to every occupation. The activities highlight hazards and prevention strategies from a wide variety of workplaces where young people are often employed. NIOSH and NOCTI's partnership will allow students to receive a digital badge for successfully meeting the passing benchmark for the assessment.

—Please visit <https://www.cdc.gov/niosh/updates/upd-11-30-16.html> to read more about this.

### ALPA Meets to Chart Future Safety Initiatives

More than two dozen ALPA Air Safety Organization (ASO) representatives assembled in Herndon, VA, in mid-December to review and discuss the ASO's activities and plans for 2017 at the biannual ASO Steering and Oversight Committee (SOC) meeting. In his opening remarks, ALPA President Tim Canoll spoke on the growth of the Association and the importance of the ASO's safety initiatives, while ALPA General Manager Lori Garver outlined the Association's 2016 Strategic Plan adopted by the ALPA Board of Directors. Capt. Joe DePete, ALPA first vice president and national safety coordinator, discussed recent successes in advancing safety, security, and pilot assistance initiatives. He also stressed the challenges of continued threats. Capt. Canoll, Capt. DePete, and many of the leaders in attendance also made it a point to recognize the significant safety advancements that have been achieved under the watchful eye

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#### Future AsMA Annual Scientific Meetings

April 29-May 4, 2017: Sheraton Denver Downtown; Denver, CO

May 6-10, 2018: Hilton Anatole Hotel; Dallas, TX

May 5-9, 2019: Rio All Suites Hotel; Las Vegas, NV

of Capt. Chuck Hogeman, who stepped down at the end of 2016, in his tenure as ALPA's Aviation Safety Chair. Presentations from ALPA's Engineering and Air Safety Department showcased its diverse range of expertise. Capt. Rich Hughey of the President's Committee for Cargo presented opportunities for advancing safety and security in cargo operations, and Capt. Peter Black discussed the unique challenges faced by pilots north of the 60th Parallel in the report of the President's Committee for Remote Operations.

—Please see <https://www.alpa.org/news-and-events/news-room/2016-12-15-air-safety-organization-leaders-gather-to-chart-future> for more on this.

### Corporate News Bites

**Essex:** Essex Industries now has a new 500-gal LOX Trailer which is a mobile liquid oxygen storage tank assembly. Designed for the transport and storage of LOX at airbases and military installations, the trailer provides a logistics solution for flight line LOX requirements. It can be used with all Essex LOX converters. For more on this, please visit <http://www.essexindustries.com/new-500-gallon-lox-trailer/>.

**Air Canada:** Air Canada announced the appointment of a new Chief Commercial Officer in late December. Lucie Guillemette, previously Senior Vice President, Revenue Optimization, will become Executive Vice President and Chief Commercial Officer. She is based at the airline's Montreal headquarters and will join the Executive Committee. To read more on this, please visit <http://aircanada.mediaroom.com/index.php?s=43&item=1093>.

### Upcoming FAA AME Seminars

<u>Dates</u>	<u>Location</u>	<u>Seminar Type</u>
Feb. 10-12, 2017	St. Petersburg, FL	Refresher
March 20-24, 2017	Oklahoma City, OK	Basic
May 1-4, 2017	Denver, CO	AsMA

For more, visit: [http://www.faa.gov/other\\_visit/aviation\\_industry/designees\\_delegations/designee\\_types/ame/seminar\\_schedule/](http://www.faa.gov/other_visit/aviation_industry/designees_delegations/designee_types/ame/seminar_schedule/).



## **President Message**

In Volume 9, May 2013, I wrote my “last Presidents Message”. Little did I know...I”mmm Baaaack. Over the past two years, an important change has taken place. The Corporate Sustaining Affiliate (CSA) has been reorganized into the Corporate Forum.

This year’s ACF theme is, “Advancing Aeromedical Excellence Through Active Involvement“. In considering this theme, ask yourself: How involved am I in AsMA? Do I regularly contribute? Am I identifying and solving today’s aeromedical issues? What more can I do? How can I become more involved in AsMA?

The corporate members of AsMA are very important contributors and with our support, AsMA has accomplished many things that have addressed life critical issues. Corporate members not only contribute financially, but also in the development and manufacture of equipment that allows researchers to conduct research, aeromedical trainers to train their students, and aeromedical practitioners to treat their patients. Our products are often the result of corporate-funded Research and Development. As a team, all AsMA members make contributions to the aeromedical field through addressing human factors issues in extreme environments. As described in the 2016 Exhibitor Prospectus, these members include: “Aerospace Medicine and Clinical, Physicians, Aerospace Nurses, Physiologists, Human Performance and Human Factors experts, Aerospace Medicine Physician Assistants, Public Health experts, Occupational Medicine physicians, Environmental Medicine experts, and a host of scientists engaged in aerospace medicine policies, operations, and research from around the world.”

Together AsMA professionals of all disciplines constitute the greatest areomedical brain-trust in the world. The one area that will never go away is optimizing human performance through addressing human factors. Today, the challenges are as numerous and exciting as ever before. Let’s rise to the occasion.

In 2015, the Corporate Sustaining Affiliate (CSA) was restructured to become the AsMA Corporate Forum (ACF).

### **Purpose**

The purpose of ACF is to enhance and promote the goals of the Aerospace Medical Association by attainment and retention of support from industry leaders in aerospace medicine, allied health, and aviation operations, through corporate membership.

### **Objectives**

ACF member organizations and individuals will:

1. Work toward improved safety in commercial, military, and general aviation, and in space missions.
2. Advance environmental health and medicine.
3. Facilitate the exchange of information about issues of aeromedical interest.
4. Reward outstanding achievements in the field.

## **Mission**

The Corporate forum's mission is to represent the corporate members' interests to the Aerospace Medical Association. The benefits of being a corporate member of AsMA remain the same and are summarized here as a reminder.

### ADVOCACY

Partnerships to address commercial challenges in the dynamic aerospace industry.

### MARKETING

Value through preferred rates for advertising in our publications and exhibiting at our scientific meetings.

### EDUCATION

Opportunities to promote currency with cutting-edge advances in the aeromedical and related technical sciences.

### NETWORKING

Connections to esteemed aeromedical experts to anticipate business trends, facilitate problem-solving, and support business growth.

### RESEARCH

Credibility through research development and sponsorship to promote health and safety for those involved in air, sea, and space activities.

### RECRUITMENT

Access to our talented aeromedical professionals with unique skill sets to strengthen your organization.

### LEADERSHIP

Visibility through representation of commercial interests within AsMA and to the global aeromedical community.

I encourage all corporate members to take advantage of these benefits.

I am interested in your comments and criticisms as a corporate member. Have a gripe? Send it to me. Have an idea to improve the corporate experience at the scientific meetings? Let me know. Send me your specific interests and I will present them to the ASMA council. Most importantly, please share your thoughts on what the Corporate Forum can do to benefit your business. I will present your inputs to the AsMA leadership.

Our initiatives for this year are:

1. Establish an AsMA award for a corporate member who has made significant contributions to the field of aerospace medicine
2. Revamp the former CSA Courier into a semi-annual publication that corporate members can contribute to and will be distributed electronically to the AsMA membership

I am looking forward to a productive year. Help us to be successful by sending me your inputs. I am honored to be your voice.

Richard A. (Dick) Leland, MA, FAsMA  
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President, NASTAR Center  
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## Corporate News

### MAYO CLINIC

#### Mayo Clinic ProPilot Program™ Merging Preventive Health with Flight Physicals



Targeting professional pilots with business aviation flight departments and aviators working for major airlines, Mayo Clinic's Section of Aerospace Medicine continues to grow its programs aimed at combining nationally-accepted preventive screening programs with a comprehensive and efficient flight physical in a seamless experience.

"We've seen generations of pilots bury their heads in the sand,

worried about losing their FAA medical certificate when the real fear should be in avoiding appropriate preventive screening," explained Dr. Clayton Cowl, Chair, Division of Preventive, Occupational & Aerospace Medicine. "Our team is shifting the culture of the past into a new paradigm where pilot trust for the flight physician takes center stage and a team here works toward maintaining that airman's health – much like a team that keeps the airframe maintained and flying."

Mayo Clinic team members recently returned from the National Business Aviation Association (NBAA) meeting in Orlando where an exhibit booth outlining the new program drew considerable interest. In the past six months, enrollment is for ProPilot up more than 30%.

With a nominal enrollment fee applied to each pilot, flight departments cover all or certain portions of preventive screening examinations as well as the flight physical itself. Chief pilots or flight department directors are provided an annual "dashboard" of flight department health parameters. Pilots get "front of the line" access at Mayo Clinic as well as transitional care for prescriptions and testing after which handoffs to local providers are coordinated once any medical condition is stable. And if a medical condition is identified, Mayo Clinic flight physicians help coordinate appropriate testing and consultations in an expedited fashion.

"The last thing a pilot needs is to be left to navigate the medical environment on their own without assistance," said Cowl. "We have created a program that reduces the hassle factor for pilots and, in the long run, lowers risk for catastrophic medical conditions that could effectively end an airman's career."

More information is available at: [www.mayoclinic.org/propilot](http://www.mayoclinic.org/propilot) or [propilot@mayo.edu](mailto:propilot@mayo.edu).

## ESSEX INDUSTRIES

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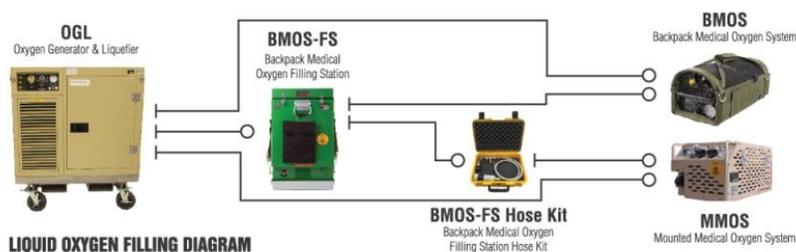
Essex Industries was founded in 1947 by Harold and Sidney Guller in the basement of their father's home in St. Louis, Missouri. Their first product, an F-214 Radio Noise Filter, established Essex as a supplier to the Aerospace and Defense market. Over the past seventy years, the company's product range has grown to include Platform Controls, Aircraft Components, Emergency Breathing Equipment and Liquid Oxygen (LOX) Equipment. As a result, Essex Industries has been a part of virtually every major military and commercial aerospace program since 1947.

Essex entered the cryogenics market in 1963 with a line of LOX converters designed to store gaseous oxygen as a liquid, and then expand it into clean, breathable oxygen as needed for pilots and crew of military fighter/transport aircraft. Essex has become the leader in liquid oxygen life support equipment, having delivered over 100,000 new LOX systems for military/commercial applications.

In the 1980s Essex took the attributes of LOX and designed a system that provided therapeutic oxygen for wounded soldiers transported via aircraft to military hospitals. Today, this product has developed into the NPTLOX – Next Generation Portable Oxygen System—with the capability for six patients to receive oxygen at the same time while in transport.

Recognizing that additional medical oxygen support was needed in combat, Essex coordinated with Special Operations Medics to design the Backpack Medical Oxygen System (BMOS). This lightweight unit can be carried or worn by parachutists and ground support personnel to provide immediate oxygen to the wounded.

In 2010, Essex assembled a complete Battlefield Oxygen Sustainment System (BOSS) as part of the USAF Guardian Angels Integrated Oxygen System. The BOSS provides a medevac team with equipment that works together to deliver oxygen to the patient both on the ground, using the BMOS, and during transport with the MMOS, Mounted Medical Oxygen System. The MMOS is a two patient high flow / high duration oxygen system that can be mounted in an aircraft, helicopter or ground vehicle. Essex also designed a special portable liquid oxygen storage device, the BMOS-FS, to fill multiple BMOS or MMOS units in the field.



The cornerstone of the BOSS is the Oxygen Generator and Liquefier (OGL) which is designed to liquefy, store and fill LOX equipment. This portable machine provides a solution to medical liquid oxygen logistics problems

experienced in field hospitals or remote locations.

Liquid oxygen systems provide several advantages over gaseous systems in military applications. Liquid oxygen increases in volume 860 times as it converts from a liquid to a gas. That means a smaller amount of LOX will produce a large volume of gas, eliminating heavy gas storage cylinders. This saves both weight and space on the aircraft and results in portable units that are easier to carry without sacrificing capability. LOX systems also have low operating pressures, less than 100 psi, which increase their safety factor especially in battlefield situations.

The technology developed for military LOX systems has led Essex to similar advancements in the commercial medevac marketplace. Essex LOX systems are currently on 80% of the winged and rotary platforms that provide aeromedical transport from an accident scene to the medical center. The reduced weight of a LOX system versus a high-pressure gas cylinder on the aircraft is a key benefit in these applications.

The result of Essex' design and engineering efforts provides for the extended and reliable availability of medical oxygen wherever it is needed.

For more information, visit [www.essexindustries.com](http://www.essexindustries.com)



## FYI: Rocket Science by Greg Kennedy ETC's NASTAR Center

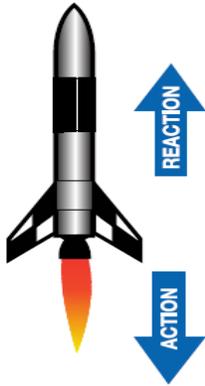
### Isaac Newton's Laws of Motion



Sir Isaac Newton, 1643—1727

For centuries, people had an intuitive sense about the laws of motion, but it wasn't until British scientist and philosopher Sir Isaac Newton published his *Philosophiæ Naturalis Principia Mathematica* in 1687 that these principles were defined and understood. Newton described three fundamental laws that govern the way objects move. Newton's Three Laws of Motion can be expressed as follows:

1. *An object at rest tends to stay at rest and an object in uniform motion tends to stay in uniform motion unless acted upon by a net external force.*
2. *The applied force on an object equals the rate of change of its momentum.*
3. *For every action there is an equal and opposite reaction.*  
*Action and reaction in a rocket (NASA illustration)*



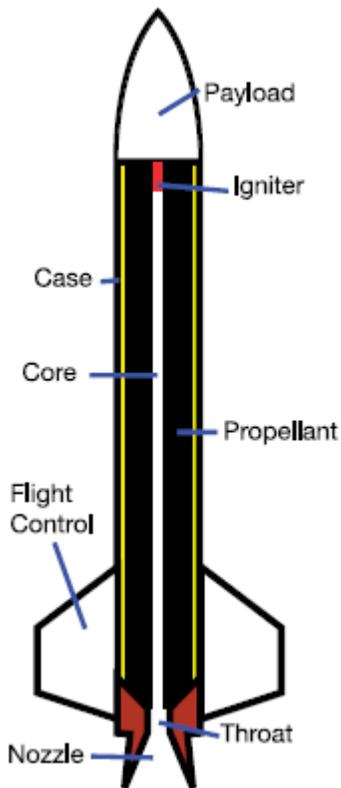
The Third Law of Motion — *for every action there is an equal and opposite reaction* — is the one most people are familiar with because it describes how rockets function. The action is the hot gases exiting at high speed from the rocket nozzle; the reaction is the push or thrust that propels the rocket.

*Action and reaction in a rocket (NASA illustration)*

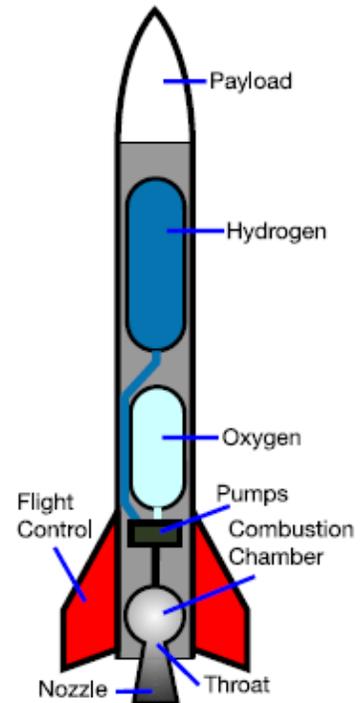
### Rocket Types

Traditionally, there are two primary types of rockets: solid propellant and liquid propellant. For combustion to occur, there must be a fuel and an oxidizer. Jet engines draw in air from the atmosphere to mix with fuel for combustion. Therefore, jet engines can only work in the atmosphere. Rockets carry their own oxidizer that is combined with fuel so they can function in the airless vacuum of space.

Rockets were invented nearly 1,000 years ago in China. The first rockets used black powder as a solid propellant.



*Solid propellant rocket (NASA illustration)*



*Liquid propellant rocket (NASA illustration)*

Solid propellant rockets contain both the fuel and oxidizer in a chemical mixture. The oxidizer is a high-oxygen content compound in solid form that, when heated, releases oxygen that burns with the fuel. These types of rockets are comparatively inexpensive and are inherently simple.



Liquid propellant rockets carry the fuel and oxidizer in liquid form. Super cold liquid oxygen is the most commonly used oxidizer for liquid propellant rockets. Common fuels include both liquid hydrogen and kerosene. Liquid hydrogen is a super cold liquid and must be kept at a temperature of  $-423^{\circ}$  F. Kerosene is much easier to handle because it may be used at ambient temperature. Liquid propellant rockets allow more efficient structures, but have complex pumps and plumbing arrangements.

Robert H. Goddard launched the world's first liquid propellant rocket on March 16, 1926, in Auburn, Massachusetts.

*Launch of the Zarya space station module atop a Russian Proton rocket. (NASA)*

Some liquid propellant rockets use *hypergolic* propellants that ignite spontaneously on contact. Examples of these types of rockets include the Russian *Proton*, which uses unsymmetrical dimethyl hydrazine (UDMH) and nitrogen tetroxide and the *Aerobee* sounding rocket, which consumed nitric acid and aniline. The Apollo Lunar Module also used hypergolic propellants.

Hybrid rockets combine a solid fuel with a liquid or gas oxidizer. Virgin Galactic's SpaceShipTwo uses a hybrid motor for commercial suborbital space flights.

Ion propulsion uses electrical energy to create thrust. Most ion thrusters ionize propellant by electron bombardment: a high-energy electron (negative charge) collides with a propellant atom (neutral charge), releasing electrons from the propellant atom and resulting in a positively charged ion. The gas produced consists of positive ions and negative electrons in proportions that result in no over-all electric charge. This is called a plasma. Plasma has some of the properties of a gas, but it is affected by electric and magnetic fields.



*The Dawn spacecraft used an ion thruster. (NASA/JPL-Caltech)*

The most common propellant used in ion propulsion is xenon, which is easily ionized and has a high atomic mass, Ion engines produce very low levels of thrust, but can operate for long periods of time. A spacecraft that uses an ion engine can reach a high velocity if the engine is left on long enough. The Dawn spacecraft that explored the dwarf planets Vesta and Ceres used an ion engine.

Nuclear thermal propulsion uses a reactor to heat a fuel (usually liquid hydrogen) to a high temperature then expel it through a nozzle to produce thrust. Several nuclear engines have been tested on the ground but none have ever flown.



*Kiwi A nuclear rocket engine test. (Los Alamos National Laboratory)*

## **Multi Stage Rocket Performance**



As rockets consume propellants, the tankage that originally held the fuel and oxidizer becomes dead weight. It soon becomes advantageous to discard as much of this weight as possible, which is why rockets are built with stages.

The Saturn V was a multi-stage liquid-fuel expendable rocket used for NASA's Apollo and Skylab programs – it launched astronauts to the moon and the first space station. It was the largest of the Saturn family of rockets and had three stages.

*The three-stage Apollo 11 Saturn V lifts off with US astronauts Neil Armstrong, Michael Collins and Buzz Aldrin on July 16, 1969. (NASA)*

The first stage, called the S-IC, weighed 303,000 pounds empty and 4.88 million pounds fully fueled. When all the liquid oxygen and RP-1 fuel were consumed, the 16-ton stage was discarded to splash down in the Atlantic Ocean. Retrorockets were fired to help the first stage back away from the continuing flight vehicle.

The second stage, called the S-II, weighed 95,000 pounds empty and 1.04 million pounds fully fueled. Its job was to accelerate the Saturn V through the upper atmosphere. When the second stage's propellants were depleted, it was also severed, discarded and decelerated away from the continuing flight vehicle.

The third stage, called the S-IVB, weighed 33,600 pounds empty and 265,600 pounds fully fueled. Its engine was used twice during each lunar mission, first for its insertion into orbit following the second stage cutoff, and later for the trans-lunar injection (TLI) that set its trajectory to reach the moon. Thirteen Saturn Vs carrying 24 astronauts (three of them twice) were launched from 1967 – 1973. It remains, to this day, the only launch vehicle able to lift spacecraft large enough to carry humans beyond low earth orbit (LEO).

## The Space Shuttle



The Space Shuttle was part rocket, part airplane and part spacecraft. For more than 30 years, NASA used the Space Shuttle to launch astronauts and satellites into space. The Space Shuttle comprised three major components: the Orbiter, External Tank (ET) and a pair of Solid Rocket Boosters (SRBs). The Orbiter and SRBs were reusable; the ET was discarded after each flight.

A combination of solid and liquid propellant engines propelled the Space Shuttle. The Orbiter housed three Space Shuttle Main Engines (SSMEs) that consumed liquid oxygen and liquid hydrogen from the ET. Each SSME produced a thrust of 418,000 pounds at launch. For final insertion into orbit, the Space Shuttle Orbiter had two Orbital Maneuvering System (OMS) engines, each with a thrust of 6,000 pounds. The OMS engines burned hypergolic propellants. Most of the thrust needed for liftoff and initial flight came from two SRBs, each of which generated 3.3 million pounds' thrust at launch. The Space Shuttle was retired in 2011 after 135 flights.

*The Space Launch System as it is expected to look on its first test flight, currently expected to occur in late 2018. (NASA)*

## Space Launch System

NASA's next large rocket will be the Space Launch System, or SLS. The SLS will use 4 or 5 liquid propellant engines in the core stage flanked by two solid propellant boosters. The SLS will propel the Orion spacecraft on deep space missions to the Moon and Mars.

## ACF Bylaws

### BYLAWS OF THE AEROSPACE MEDICAL ASSOCIATION CORPORATE FORUM 2016

**ARTICLE I: NAME** The name of this affiliated organization of the Aerospace Medical Association shall be the Aerospace Medical Association Corporate Forum herein known as ACF.

### **ARTICLE II. PURPOSE AND OBJECTIVES**

**A. PURPOSE:** The purpose of ACF is to enhance and promote the goals of the Aerospace Medical Association by attainment and retention of support from industry leaders in aerospace medicine, allied health, and aviation operations, through corporate membership.

**B. OBJECTIVES:** ACF member organizations and individuals will:

1. Work toward improved safety in commercial, military, and general aviation, and in space missions.
2. Advance environmental health and medicine.
3. Facilitate the exchange of information about issues of aeromedical interest.
4. Reward outstanding achievements in the field.

**ARTICLE III: MEMBERSHIP** Active members are those companies, associations, foundations, groups, or individuals who establish and retain their membership in good standing in the Aerospace Medical Association. An applicant for membership shall meet the following requirements:

- A. Demonstrate genuine interest in aerospace medicine and corporate and sustaining membership consistent with Article II.
- B. Meet approval of the ACF Board of Governors and the Executive Committee of the Aerospace Medical Association.
- C. Retain membership in good standing as specified in the Bylaws of the Aerospace Medical Association.
- D. Be current in payment of annual dues.

**ARTICLE IV: BOARD OF GOVERNORS**

**Section 1.** Members. The governing body of ACF shall be a Board of Governors consisting of eight (7) voting members: Four elected officers of ACF, the Immediate Past President, and two elected At-Large Members. The Executive Manager will be a nonvoting member of the Board.

**Section 2.** Authority. The Board of Governors shall be empowered to transact business in the name of ACF between Annual or Special Meetings of ACF. It shall not financially obligate ACF in any manner that will require increased financial obligations above approved annual budget levels. A 2/3<sup>rd</sup>s vote by the Board of Governors shall be required for the expenditure of more than twenty-five percent above projected annual funding levels in the ACF account. A quorum for the Board of Governors shall consist of five Board members.

**Section 3.** At-Large Members. The two At-Large Members shall hold office for two years. One At-Large Member should be elected each year. The duties of the At-Large Members shall be as specified by the Board of Governors to include attendance and participation in all meetings of ACF Governors as directed in Article VII.

**Section 4.** Meetings: The Board of Governors shall meet biannually. It shall formulate and make recommendations to ACF for consideration and action. Special Meetings of the Board of Governors may be called at the discretion of the President of ACF or by written request by four or more members of the Board of Governors.

**ARTICLE V: OFFICERS**

**Section 1.** The four officers of the Board are: The President, the Secretary- Treasurer, the President-Elect, and the Historian. The duties of the officers shall be in accordance with the accepted rules of order including those duties specified in this Article and by the Board of Governors.

**Section 2.** President: The President shall hold office for one year. The President shall develop the agenda and chair ACF meetings. The President shall chair the Board of Governors and is empowered to call Board of Governors special meetings. The President shall appoint chairpersons for all standing and special committees and members of the ACF Nominations Committee. In the event the President-Elect is unable to succeed the President, the President shall continue in the office for a second term.

**Section 3.** President-Elect: The President-elect shall hold office for one year. The President-Elect shall serve as President in the President's absence and complete the term of office of the President in the event that the President is unable to complete the term for which elected.

**Section 4.** Secretary-Treasurer: The Secretary-Treasurer shall hold office for two years and shall be eligible for reelection. The Secretary-Treasurer shall serve as the repository for ACF correspondence; prepare minutes of Annual ACF Meetings; collaborate with AsMA for financial

reporting requirements; maintain current membership records and act as authorized in Article VII of these Bylaws. The Secretary-Treasurer shall provide annual financial reports to the membership and make them available upon written request. At the conclusion of the elected term of office, the Secretary-Treasurer will transfer all past correspondence to the ACF Historian.

**Section 5.** Historian: The Historian shall hold the office for two years and shall be eligible for reelection. The Historian will maintain all ACF historical files in an accepted order. These files will be composed of ACF correspondence received from The ACF Secretary-Treasurer, all annual written ACF committee reports and copies of all published material pertinent to The ACF which appears in print e.g. *Aviation, Space, and Environmental Medicine, The ACF Courier* etc.

**Section 6.** Executive Manager: The Executive Manager is a non-voting officer that represents continuity and a repository of corporate knowledge for ACF operations and programs. The frequent turnover of ACF leadership and dynamic programmatic changes over the years necessitates this position. The Executive Manager shall be appointed by the Board of Governors for a minimum of eight (8) years that is renewable. The Executive Manager will assist and advise the current ACF President in performing the duties of the office as mutually agreed upon. This may include, but not limited to, ACF administration, meetings, forums, organizational development activities, and collaboration with internal and external stakeholders e.g. AsMA, Corporate leadership etc.

**Section 7.** The AsMA Home Office will establish a portal on the official website for payment of membership dues and processing of membership applications.

**ARTICLE VI: NOMINATION AND ELECTION OF OFFICERS AND AT-LARGE MEMBERS** A

Nominations Committee, shall be chaired by the presiding ACF President who shall appoint five (5) representatives of the general membership each year to nominate officers for ACF. Two names will be nominated for each vacant office. Officers shall be elected by ballot, mailed to members not later than 30 days prior to the Annual Meeting. Write-ins of members on the mail ballots by the general membership will be accepted in addition to those names presented by the Nominations Committee. The election of officers for the succeeding year shall be made by a plurality of those voting. The officers elected shall take office at the conclusion of the Annual Meeting. No candidate for office shall be nominated who has not first consented to serve if elected.

**ARTICLE VII: MEETINGS** ACF shall meet annually at the time and place of the Annual Scientific Meeting of the Aerospace Medical Association and at one additional time during the year. Special Meetings of ACF shall be convened upon submission of a written request signed by one-fourth of the active membership of ACF to the Board of Governors. Any Special Meeting of ACF shall require that all members be notified in writing as to the time and place of the meeting at least thirty (30) days prior to the scheduled date of the meeting. A quorum at any duly convened meeting of ACF shall consist of the members present at the meeting.

**ARTICLE VIII: VOTING** Each member shall have one vote via a Primary Representative. Members may designate a proxy in writing for purposes of voting if a Primary Representative and an Alternate Representative are not able to attend the Annual Meeting. Proxies must be designated by the Primary Representative at least 14 days prior to the meeting date.

**ARTICLE IX. DUES AND FINANCES** ACF membership dues shall be set as a "Tiered Sponsorship Model" by AsMA and paid through the AsMA website. The funds derived will be used for meeting normal ACF financial and administrative obligations and to support relevant core AsMA programs. ACF financial activities will be undergirded by a line item in the AsMA budget and implemented through the AsMA Expense Support Process. Any member who has not paid dues for two successive years shall be duly notified by the Secretary-Treasurer by mail

and may be expelled from ACF membership rolls after the next Annual Meeting as determined by the Chairman of the Membership Committee.

**ARTICLE X: COMMITTEES AND APPOINTMENTS** There shall be both Standing and Special Committees of ACF and individuals appointed to be Representatives of ACF to the AsMA Council and Committees.

**Section 1.** The four Standing Committees are the Nominations Committee with responsibility for election of Officers and elected Board Members, the Membership Committee, the Program Committee, and the Long Range Planning Committee whose Chairpersons are appointed by the President.

**Section 2.** Special Committees: Special (ad hoc) committees shall be appointed at the discretion of the ACF President.

**Section 3.** Representatives of ACF: An ACF Representative to the AsMA council shall be appointed by the incoming President at the appropriate annual meeting guided by the following principles: 1) Previous experience on the AsMA Council: 2) Previous experience on The ACF Board of Governors: and 3) Concurrence of the Immediate Past President and the incoming President-Elect. Council Representative shall be appointed for a two-year term and shall not hold the office more than twice. An ACF Representative to the AsMA Nominations Committee shall be similarly appointed by the incoming President as required.

**ARTICLE XI: RULES OF ORDER** Robert's Rules of Order shall govern ACF in all cases to which they are applicable and consistent with the Bylaws or special rules of order of ACF.

**ARTICLE XII: AMENDMENTS** These Bylaws may be amended at any Annual Meeting of ACF by a two-thirds vote of voting members present. The proposed amendment(s) must be mailed to all members at least 60 days prior to the Annual Meeting.

## Meet the ACF Officers

### Dick Leland –President

Richard “Dick” Leland, MA, FAsMA, is President, National AeroSpace Training and Research (NASTAR) Center, a wholly owned subsidiary of the Environmental Tectonics Corporation (ETC). He has been at ETC for 21 years and has held positions as Director, AeroMedical Training Institute and Vice President, Aircrew Training Systems prior to becoming President, NASTAR Center. Dick has over 30 years experience in the Life Support field including aircraft mishap investigation, over 25 years experience as an Aerospace Physiologist, and is an Aerospace Medical Association (AsMA) Fellow. His background also includes over 39 years progressive experience as a course developer, training manager, platform instructor, personnel and project manager, human resource specialist, and operations director. His diverse background includes experience and skills as an Aerospace Physiologist; Cockpit Resource Management Instructor; Life Support Officer; Aircraft Mishap Investigator; Course Director; Director of Flight Support Operations and Training; staff officer; Physiological Support Squadron Commander; and USAF Pilot, Aircraft Commander, and Instructor Pilot. He has been a Board certified Hyperbaric Technologist who has directed successful emergency treatment dives. He is a retired USAF pilot with a Command Pilot rating and has more than 3,100 hours experience in the T-37, T-38, and B-52H.

### Dr. Chuck Mathers–President-Elect

Dr. Charles Mathers received a Bachelor of Arts degree from Rice University in 2002 and his Medical Doctorate with Honors from the University of Texas Medical Branch School of Medicine

in 2007. He is a graduate of the UTMB/NASA Internal Medicine/Aerospace Medicine residency program and served as Chief Medical Resident from 2010-2011. Dr. Mathers is board-certified in Internal Medicine and Aerospace Medicine. He currently serves as Assistant Professor and Associate Program Director for the UTMB/NASA Aerospace Medicine Residency Program. His duties include working as an FAA Senior Aviation Medical Examiner and Medical Director for UTMB's Aerospace Medicine Center, a clinic that specializes in complex medical evaluations for pilots and the coordination of multi-day evaluations for commercial spaceflight participants undergoing certification for travel to the International Space Station. Dr. Mathers also serves as Assistant Chief Medical Officer for UTMB's Center for Polar Medical Operations which supports medical operations for the United States Antarctic Program. Dr. Mathers is active in clinical practice, teaching, and research, and also provides mentorship as Director of UTMB's Aerospace Medicine Track for medical students.

Sean Daigre –Treasurer

CV Not Available at Time of Publication

#### William Knight–Historian

William F. Knight currently holds the position of Director of Federal Markets at Carestream Health, innovators of digital capture for Radiology and industrial applications, headquartered in Rochester, New York ([www.carestream.com](http://www.carestream.com)).

Mr. Knight's healthcare career began with his postgraduate medical device background at Harvard Medical School and Massachusetts General Hospital and spans more than four decades of involvement with mission critical research and development combined with multiple senior level management responsibilities in a wide variety of healthcare industry applications including product development, marketing, sales and global OEM business initiatives. Mr. Knight has been a licensed Private Pilot since 1973.

Marian Sides –Executive Manager

CV Not Available at Time of Publication

Peter Lee–Chairman, AsMA Corporate and Sustaining Membership Committee

CV Not Available at Time of Publication

## ACF Members

- Adams Advanced Aero Technology
- AEROSPACE MEDICAL, PLC
- Aerospace Medicine Residency Program/UTMB
- AIR CANADA OHS
- AIR LINE PILOTS ASSOCIATION
- ARMED FORCES BENEFIT ASSOCIATION (AFBA)
- CDC / NIOSH
- DAVID CLARK CO., INC.
- Environics, Inc.
- ENVIRONMENTAL TECTONICS CORP
- Essex Industries
- GENTEX CORPORATION

- GO2 Altitude, BioMedTech Australia Pty. Ltd.
- HARVEY W. WATT & COMPANY
- INDONESIAN ASSOCIATION OF AEROSPACE MEDICINE
- InoMedic Health Applications Inc (IHA)
- International Medical Support Services
- Monash University, Aviation Medicine Unit
- NEUROSTAT ANALYTICAL SOLUTIONS, LLC
- Shoreland, Inc.
- SOUTH AFRICAN AIRWAYS
- U.S.R.A.-D.S.L.S.
- KBRwyle
- OxyHeal Medical Systems, Inc.



The Aerospace Medical Association, in an effort to optimize Corporate Member benefits and participation, has developed a Tiered Membership Structure. This structure allows Corporate Members to select the level of membership that best fits their needs and objectives while providing them the “best bang for the buck”.

Briefly, the Tiered Membership Structure

- Offers corporate membership options to best suit their objectives and needs
- Offers increasing discounts at each membership level
- Provides the opportunity for greater interaction with AsMA leadership
- Offers greater Return on Investment at each membership level

*Note: AsMA award sponsorship remains a separate activity and is not included in the Tiered Membership Structure.*

The three tables below detail membership options, benefits, and Return on Investment (ROI) for each membership level.

**Summary**

The Corporate membership is a critical membership component of AsMA. The Tiered Corporate Membership Level structure is being implemented in an effort by AsMA to better serve our Corporate Members. Please review this document and pick the best fit for your organization. As the charts below show, the ROI increases for each membership level. Also, the more active a Corporate member is, the greater the benefits will be received. As always, AsMA deeply appreciates your membership, sponsorship, and support.

**Table 1: Membership Levels**

Membership Levels	Standard	Bronze	Silver	Gold	Platinum
<b>Membership Dues</b>	\$400.00	\$800.00	\$1,200.00	\$1,750.00	\$2,500.00

**Table 2: Membership Benefits**

Membership Benefits	Standard	Bronze	Silver	Gold	Platinum
<b>Corporate Membership</b>	Yes	Yes	Yes	Yes	Yes
<b>Corporate Forum Participation</b>	Yes	Yes	Yes	Yes	Yes
<b>Corporate Forum Luncheon</b>	\$50.00	Free	Free	Free	Free
<b>AsMA Journal</b>	\$50.00	Free	Free	Free	Free
<b>Advertising Discount</b>	5%	10%	15%	20%	25%
<b>Registration Discount</b>	None	10%	15%	25%	50%
<b>Exhibit Discount</b>	5%	10%	15%	25%	50%
<b>Event Sponsorship</b> <i>(amount applied each year to sponsoring an event at the AsMA Annual Scientific Meeting)</i>	None	\$300.00	\$500.00	\$1,000.00	\$1,500.00
<b>Free Individual Membership(s)</b>	None	None	1	2	3

**Table 3: Membership Return on Investment**

Return on Investment	Standard	Bronze	Silver	Gold	Platinum
<b>Corporate Membership</b>	\$400.00	\$400.00	\$400.00	\$400.00	\$400.00
<b>Corporate Forum Participation</b>	Yes	Yes	Yes	Yes	Yes
<b>Corporate Forum Luncheon</b>	\$0.00	\$50.00	\$50.00	\$50.00	\$50.00
<b>AsMA Journal</b>	\$0.00	\$50.00	\$50.00	\$50.00	\$50.00
<b>Advertising Discount</b> <i>(based on 1 month of back cover ads with 4 colors valued at \$2,250)</i>	\$112.50	\$225.00	\$337.50	\$450.00	\$562.50
<b>Registration Discount</b> <i>(based on member registration fee without CME and MOC valued at \$450)</i>	None	\$45.00	\$67.50	\$112.50	\$225.00

<b>Exhibit Discount</b> ( <i>based on cost of in-line booth valued at \$1,900</i> )	\$95.00	\$190.00	\$285.00	\$475.00	\$950.00
<b>Event Sponsorship</b> ( <i>amount applied each year to sponsoring an event at the AsMA Annual Scientific Meeting</i> )	None	\$300.00	\$500.00	\$1,000.00	\$1,500.00
<b>Free Individual Membership(s)</b>	None	None	\$280.00	\$560.00	\$840.00
<b>Total Return On Investment</b>	\$607.50	\$1,260.00	\$1,970.00	\$3,097.50	\$4,577.50
<b>Membership Dues</b>	\$400.00	\$800.00	\$1,200.00	\$1,750.00	\$2,500.00
<b>% Above Membership Cost</b>	<b>52% ROI</b>	<b>58% ROI</b>	<b>64% ROI</b>	<b>77% ROI</b>	<b>83% ROI</b>

## Would You Like Your Organization Highlighted?

The ACF E-NEWS is published by AsMA in the Ever Upward AsMA newsletter. This allows the ACF E-NEWS to reach the whole AsMA membership. ACF E-NEWS is submitted for publication twice per year.

To submit an article you have two options for submissions:

1. You can submit a brief company profile or company announcement. Company profiles and announcements should be 250 words or less. Please do not submit pictures with the brief company profiles.
2. You can submit a one page article. These can include pictures. One page articles can be about company achievements or milestones, business perspectives, etc.