



### Missile Reentry Vehicles and Warheads



Mark 4 Rv on Atlas F

#### **The Pointy End** - *By Col (Ret) Charlie Simpson, AAFM Executive Director*

Most military missiles are weapons - the payload isn't a spacecraft, a satellite or a research package, it is a warhead, either conventional or nuclear. In the case of tactical and strategic missiles and air-launched missiles, the payload is the part that completes the mission. The booster, the engines, the propellant, the guidance system and the airframe are all there for one reason - to get the warhead to the right place at the right time.

Much of the information about warheads, especially the nuclear variety, was and still is highly classified. However, there is a significant amount of data now available about the part we have called the pointy end, the tip of the spear, or just "the bomb."

This article is a quick review of that unclassified information - it is far from inclusive, and merely touches the surface. But it should give you a good idea of the

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#### **California, Cuba and AAFM**

*- by Col (Ret) Charlie Simpson, AAFM Executive Director*

The Association of Air Force Missileers will gather for our fifth National Meeting 23-27 October 2002, at the historic Santa Maria Inn, in Santa Maria, California, near Vandenberg AFB. This date is especially significant for those of us who are missileers, because it marks the fortieth anniversary of the Cuban Missile Crisis, the first world situation where the presence of intercontinental ballistic missiles was a major factor.

Many of our members were crew members, maintainers, reentry vehicle specialists, communications specialists or were in other jobs directly in support of our new Atlas, Titan and Minuteman force. Others were serving in Mace, Thor, Jupiter, Bomarc or involved with one of the many airborne missiles the USAF had in 1962. Those of us serving in Atlas and Titan I were just bringing our new missiles into combat ready status, and the first Minuteman I (the Ace in the Hole) attained alert at Malmstrom during the crisis. It was a tense and an intense time for us all - and it paid off for the United States and the world.

Our meeting at Santa Maria will include special recognition of this significant time in history, but it will not be limited to a Cuban Missile Crisis anniversary event. As in our other national meetings, it will be a time to see old friends, tour historic and current missile and space facilities, get briefed on current and future missile and space programs and return to a location that was a key part of many members' lives. We will start on Wednesday, 23 October 2002, with registration and a welcome reception, and have a busy four days following the opening. Details of the event will be included in the AAFM newsletter

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#### **The Mission of the Association of Air Force Missileers -**

- Preserving the Heritage of USAF Missiles and the people involved with them
- Recognizing Outstanding Missileers
- Encouraging Meetings and Reunions
- Keeping Missileers Informed
- Providing a Central Point of Contact for Missileers

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## A Word from the Association

**Credit Cards** - AAFM can now accept credit cards for dues and donations. We are using an indirect method on the internet called Paypal. You can log onto our web page and renew your dues, join the association or make a donation and receive any of our logo or historic items. Check the label on your newsletter for dues expiration date and use Paypal to send in your donation for dues.

**New Mailer** - note that we have done away with the envelopes for the newsletter - it saves your executive director many hours - stuffing envelopes is not one of my favorite jobs. We can also get more articles in the newsletter, since the cover can be used for recurring items.

**Member Directory** - we decided three years ago to limit the directory to once every three years - the next issue will be out by mid-2001. We plan to offer a choice of a CD (cheaper and easier to access if you have a computer) or hard copy (expensive to print and mail). Watch for a note in the next newsletter on how to give us your preference.

**PRP and Records** - one of our members is looking for the statement some of are very familiar with - the one we agreed to when we were PRP certified. He is also trying to find out how to find old military records. Let me know if you can help.

*AAFMM* is a non-profit, tax-exempt organization under section 501 (c) 3 of the IRS Code. The Newsletter is published four times a year.

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**Taps for Missileers** - Dr George Christensen, former Minot Mayor and a supporter of the 91SW and ICBMs, a lifetime member.

MSgt (Ret) Andrew Fitzgerald, AAFM member, Lakeland, FL, was in 90SMW and 321SMW, Quail and Drones. SSgt (Ret) William Kidd, AAFM member, Detroit, was in the Mace school at Lowry

Lt Col (Ret) Anthony Thorne, a 1951 Naval Academy graduate involved in Atlas early launches.

## Letters to the Association

Address your letters to *AAFMM*, Box 5693, Breckenridge, CO 80424, or send by e-mail to [aafm@afmissileers.org](mailto:aafm@afmissileers.org). Letters may be edited to fit - content/meaning will not be changed.

**Nebraska Atlas Sites** - About a month ago, I drove by one of the Offutt Atlas sites. From what I could see from the road, the buildings were in good shape, probably because an occupied farm house is located less than a 1/4 mile away, and the surrounding fences are still erect. I would like to suggest that the site be evaluated, and the owner be contacted with the idea of making this a historical site and artifact of the history of the Cold War. I am aware that the Atlas Historical Group located at Abilene, Texas has plans to make a museum of one of the Atlas F sites. I have been told that there are no remaining structures at the Missouri Valley, Iowa site, and I have never found the right buildings that are on the University of Nebraska land at Mead, ( the old ordnance plant). One advantage to the location of this site as a historical place is its relative closeness to the SAC museum at Ashland, Nebraska. *Art Horn, mbr no A1167, Stephenville, TX*

*There are a number of ongoing projects to keep old sites as museums or historical landmarks, including efforts in South Dakota, North Dakota, Texas, Colorado and Arizona. What it takes is local action - folks in the area have to get involved with the appropriate organizations that have an interest in preserving our history.*

**North Dakota Missileer** - In 1998 I donated my old 447SMS/321SMW Combat Crew uniform with my 200 mission patch to the North Dakota Historical Society. They requested, and I delivered, photos and commentary of life as a "North Dakota Human Gopher". I also convinced my brother to donate his Air Crew uniform from Minot AFB. Being two North Dakota boys who left the service to stay in North Dakota, we found ourselves as the centerpiece of a traveling "Military Heritage in North Dakota" display which has criss-crossed the state to various museums. I've had several friends see the exhibit at various locations across the state. A consistent comment  
*(Continued on page 3)*

**Letters (cont)** - after they see my old blue uniform on the mannequin is, "How could you fit in that uniform? I never thought you were ever that skinny!" I always reply that the pace was so hectic and the stress so high, that getting too heavy wasn't a problem, until civilian life! If I can be of assistance getting the Grand Forks LCF Historical site going, please let me know. The North Dakota Historical Society collects and preserves current items and holds them in their vaults until they become historical. This will save effort in trying to obtain artifacts once they become rare. The LCF Historical Site fits their Modus Operandi. As a nearly life-long North Dakota resident, I believe this endeavor is important to preserve our local heritage. The 'artifact' may bother some 'peaceniks' in 2000, but in 2050 or 2100, these artifacts may be important historical "Military-Industrial Complex Era" sites not unlike our reconstructed frontier forts are today. *Cal Thorson Bismarck ND*

**New Member** - I just learned of AAFM - having been a 443X0 Missile Mechanic my complete Air Force career, fond memories are being relived. I started out my career in the Atlas D at the 549SMS at Offutt AFB until its deactivation 1964. I have a ton of WD-40 stories. From there I went to Vandenberg in the 4300th Support Squadron. That brings up a question. In reviewing your Thor data, nowhere were the 4300SS or the 4000th Support Group at Offutt mentioned. Though the vehicles we used were designated as Space Launch Vehicles (SLVs), they were just the old Thor boosters from the sites in England and modified by Douglas for the Burner program. I have a few pictures, copies of awards and orders, and an original 4300SS patch. I also have a program from our first 4300SS dining out, and a picture of LtCol Ritter, prior to his having to cut off his handlebar mustache, reenlisting me next to a SLV being prepared for launch. I also didn't see any references to the Bluescout 279 Program at the 32th Communications Squadron at Scribner AS, NE to which I was assigned after the overnight transfer of the 4300SS Burner program to 10th Air Defense Squadron in mid 1967. I was at Scribner from July 1967 through its deactivation in December of 1967. I think the Bluescout that is at the SAC Museum was one we had at Scribner. We laid it on sand bags on an unused taxiway near Building D at Offutt. I found many familiar names in the articles in the archives of your newsletter. A name that jumped out at me was LtCol

Cary Gray, VAFB Born with a Roar of Thor - 35th Anniversary Celebration - January 1994. I first worked with LtCol Gray at F.E. Warren when he was a 2nd Lt Combat Targeting Officer. I spent 11 1/2 years in the 90SMW. Later Col. Gray and I were both on the GLCM program at USAFE at Ramstein. I worked for Col Weideman and Maj Koller, both who were in your article Desert Storm - A Short Rebirth of the GLCM Force, during my tour from Aug 1981 - May 1985 at USAFE/LGB. I was the USAFE/LGB Logistics lead NCO for the fielding of the first GLCM Tactical Missile Wing at RAF Greenham Common. I retired in 1985 from Ramstein. GLCM was a great ending to a very memorable and exciting career in the Air Force. I know I have rattled on a bit, but the missile business is a serious business, is rich in history, and a story that needs to be saved to pass on to future generations. *Jim DeWulf, mbr no L219, Deltona, FL*

**We look forward to articles about the 4000SG, the 4300SG and Blue Scout - several former members of these organizations have promised to provide them.**

**Lincoln Reunion** - I recently attended the 98th Bomb Wing Reunion in Cherry Hill, NJ. About 300 plus people attended the affair and all comments were on the positive side. Ron Resh was there with the group for the entire reunion. At the start of the meeting the group welcomed the 551SMS into their organization. The 98th membership ranges from WW II to when the wing was shut down as a refueling unit with KC-135's after they were closed in Lincoln. The 307th organization only covers the Lincoln time period. We were welcomed with open arms and I even got a lead on a person who can make up our old patch. I found it interesting that their flag had the 551SMS already listed. Looking over an old Reunion book, our Squadron had been listed on the banner for a few years now. See we are not a forgotten unit! The 98th will be holding their next reunion at Tucson between Oct. 9 & 14, 2001, and in 2002, they will be at Dayton, Ohio. Each year they move into a different time zone. The 307 will have the next reunion in 2002 in Texas. Today, I received a data base that I helped to design for the 551SMS. This will enable me to keep track of our members, produce mailing labels, and various list. If you find anything about the 551SMS that might be helpful, keep me in mind. Slowly we are making progress and I will be able to start conducting additional searches. For those of you who had previously asked - Col. Denton

*(Continued on page 4)*

**Letters (Cont)** - attended a 98BW reunion a few years ago. *Ken Fisher, mbr no A1590, Bronx, NY*

**AIM-26** - When stationed in Germany from 1964 to 1967, when we checked out our nuclear air launched missiles (AIM26As), we had to convoy them from the nuclear storage site, to the 496FIS area, at the other end of Hahn AB. We used the road between the runway and taxi way. SSgts and above pulled "Convoy Commander" besides being armed with 45s, and later 38s, and a Security Police escort front and back, we checked out an AN/PDR27C, and monitored to see if anyone was trying to take X-rays of our missiles from the highway off the base. (checked radiation). I was the person that was chosen to do "SHOW AND TELL" when we had inspections from higher headquarters. (You remember, the "We are only here to help you", people). I always chose Sgt Lindsey and Airman Krueger. We had a team that really put on a great Dog and Pony show. We never did get a single ding. Other bases used all NCO's, we received good words for using the whole enlisted team. We three were the standardization team that trained other crews. Then higher headquarters said missile people can't handle the warheads - we had to train Explosive Ordnance Disposal people to remove the warheads and reinstall them after the missile was checked out. They had the training to go in and remove a warhead from a crashed aircraft, but not what we were doing. To inspect, remove, reinspect, install and reinspect - Call a Missile troop. We were glad to get the whole job back. *Lee Higley, mbr no A0531, Tacoma WA*

**New Test Unit** - I have moved to Colorado Springs to a new unit that is in the process of standing up. I am assigned to the 595th Test & Evaluation Group at Schriever AFB. You may remember the 6595th Test Group at Vandy that did all of the development work on Titan IV, PK and Small ICBM. We took over the heritage and the mission. We are assigned to the Space Warfare Center and have three subordinate units, kinda. The 576FLTS (missile test) and 17TS (space test) report to us directly, and the brand new 14TS, an AF Reserve associate unit to the 17TS also works for us. Our mission is to oversee the Test and Eval mission in AFSPC. Our commander is Col Paul Burnett and deputy is LtCol (Col select) Tom Cullen. There are seven T&E staffers, our superintendent, Chief Deb Shaffer, two admin folks, and our training guy Col (ret) Tom Boland. All in all a great organization. The staff

ers on the ICBM side are mostly former Top Handers, including the commander and myself. *Mike Cancellier, mbr no L155, Colorado Springs*

**Grand Forks History** - Request you publicize that I am building a website to cover the history of the Grand Forks AFB 321SMW/MW/MG and its associated units. This web site is expected to be a thorough review of 321 history from WWII through the official close on July 10, 1998 and the destruction of the missile facilities by the 791st Maintenance Squadron. I will also have information on the Safeguard ABM complex near Nekoma. Request anyone with information pertaining to the 321 SMW/MW/MG and the 448th, 447th, 446th Missile Squadrons please contact me. Am looking for historical information, photographs, patches, personal anecdotes, etc. Original photos, patches, etc. (unless donated) will be returned, copies of text preferred. *Paul H. Whitmore, mbr no L186, 5840-B Eagle Eagle Cir, Montgomery, AL 36116, phone 334-244-2181, e-mail GFafb321MG@aol.com*

## AAFM Funds MPT Move

Earlier this year, Major Alex Cantu, who is at Offutt AFB in Strategic Command, asked if we could fund the move of one of the two Missile Procedures Trainers at Grand Forks to the SAC Museum outside Omaha. The AAFM board unanimously approved the support, and we provided \$5,880 for the move. Many of us, including your executive director and some of our board members spent many hours in this green box - we are glad it has a new home. We gave Alex and Gary Hawthorne one year memberships and Michael Fredell, a life member, an AAFM hat as a small thanks for their efforts.

From Alex Cantu - Gary, Michael and I went to Grand Forks this week to observe teardown of the trainer destined for the SAC Museum. It went well - not only did we get some good information on how to set up the trainer, but we were also able to find some other items of possible historical interest to ship down as well - tech data on the trainer and other systems, maps, photos and paintings. We ensured all the trainer parts were collected at one point to ship. Also, we found out that when we got there transportation was still not guaranteed. Denny Haun at the Museum told us that he had arranged for a Grand Forks company to haul the trainer south. Unfortunately, I understand the price for the truck was higher than originally quoted. The truck was loaded on the 12th of October for delivery to the Museum on the 16th.

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**MPT (Cont)** - From Michael Fredell, mbr no L142 - I just received the AAFM hat. Thank you. It was a sad and memorable time for me; I was crewed in the 321st. At times while I was there, I felt nostalgic watching the trainer being disassembled, but I knew it would have a good home at the SAC Museum. I spent many a day in both LE004 and LE005 giving and receiving rides and evals. I am glad to be part of it all. One notable memory was when I first arrived. I saw a Keyboard/Printer in the MPTO's office, already removed from the MPT. The last "check by" signature was still hanging from it. When I looked at it, the tape was signed by Joe Kays, my first student I taught at Vandenberg. I knew then it would be a long three days documenting the disassembly. I have just received the last set of photos on CD from Major Alex Cantu. I shall now consolidate all the photos taken and place them on one CD and mail it off to you. Thank you again for the hat, but more importantly, thank you for the support allowing the MPT to be moved to the SAC Museum.

## 2000 Missile Heritage Grants

A committee of three AAFM board members recently reviewed applications for grants and determined that, in addition to the \$5,880 emergency grant that was approved to transport the Grand Forks Missile Procedures Trainer to the SAC Museum in October, we should fund three other projects.

The Titan Missile Museum in Green Valley, Arizona, got \$2,500 to preserve and maintain the site utility poles to keep the site in its original configuration. The National Atomic Museum at Kirtland AFB, New Mexico, got \$1237.25 to purchase equipment to help preserve historical missile documents, and the Octave Chanute Aerospace Museum at Rantoul, Illinois, was provided \$1,000 to help restore a Hound Dog missile. AAFM has now provided almost \$70,000 to museums.

As in the past, AAFM donated the grants in memory of members who passed away in the last year. Those memorialized were: LtCol (Ret) Ray Bennington, Maj (Ret) David Chagnon, Dr George Christensen, MSgt (Ret) Andrew Fitzgerald, LtCol (Ret) John Gilmore, SSgt (Ret) William Kidd, Col (Ret) Jack Leathers, Chaplain, Col (Ret) Chris Martin, Col (Ret) Julius Pickoff, LtCol (Ret) Dennis Piper, MSgt (Ret) Billy Quinton, LtCol (Ret) Harry Robb, Col (Ret) John Shults, LtCol (Ret) George Timberlake and LtCol (Ret) Riley Vance.

## 90th Space Wing and the South Dakota Missile Sites - by CMSgt Dave Cook,

90th Logistics Group

On 12 April 2001 maintenance technicians from the 90th Logistics Group (LG) will emplace a Minuteman II training missile, guidance set and reentry vehicle in Launch Facility (LF) D09 near Ellsworth AFB, South Dakota. LF D09 and Missile Alert Facility (MAF) D01 were left after the closure of the 44th Missile Wing and will be turned over to the National Park Service.

The Minuteman Missile National Historic Site was established by Congress in 1999 and includes deactivated LF D09 and MAF D01. The LF is being converted to a static display in accordance with the Strategic Arms Reduction Treaty by emplacing an inert booster, guidance section, reentry vehicle and constructing a permanent viewing enclosure over a partially open launcher closure. Completion of this project will mark the official retirement of the Minuteman II weapon system. These sites will be preserved by the National Park Service to interpret the history and significance of the cold war and the role of the Minuteman missile in our nation's defense.

The request for this project was proudly accepted by the 90LG from the 28th Bomb Wing who currently have caretaker responsibility for the sites. The project will require approximately 25 technicians, nine special purpose vehicles and numerous unique equipment items to be transported to Ellsworth. Depot technicians preparing the inert booster at Ogden Air Logistics Center for shipment to Ellsworth. 90LG technicians will transfer the booster to a transporter erector, transport it to D09, emplace the booster, guidance set and reentry vehicle in same fashion as Minuteman III missiles are maintained at the 90SW.

## 2002 National Meeting (cont) - early in 2001.

The fifth national meeting will also be reunions for several individual units. The 556SMS, which was the Plattsburgh AFB Atlas F unit, will meet with us. At least three other units are talking about joining us, conducting their reunions concurrently with the AAFM meeting. We have been encouraging this for several years - it is beneficial to both the individual units and our association, and makes the organization of a reunion much simpler for the units.

Mark you calendar now, and join us in October 2002 for a great event.

**Pointy** (*cont*) - development and advancement in the part of the missile that arrives at the target. In many cases, those who maintained the most critical part of a missile weapon system weren't considered to be missileers by some who served in the systems. They often were part of another organization - not even assigned to the missile unit that operated the system. But they were, and are, in fact, as much missileers as any launch officer or maintenance sergeant who served. They didn't always get the recognition they deserved, either because of the sensitive nature of their job or the fact that they were in "that other wing."

This was especially true in the earlier days of the intercontinental ballistic missile. While the operators and maintainers were part of the missile squadron or wing, the nuclear weapons technicians were usually part of Munitions Maintenance Squadrons (MMS) that belonged to a B-47 or B-52 wing on the same base. Of course, the same was true of many others who were an essential part of the missile system - the communications experts, the civil engineers or facility technicians, the security forces, the cooks and many others who helped ensure the success of our systems. The MMS folks did, at least in most cases, qualify for missile badges, and in some systems, were directly involved in placement of the reentry vehicle (RV) on the missile - but they still were, unfortunately, outsiders to many of us. On the plus side, many of these folks are strong supporters of our association - we have more than 60 members who were or are warhead or reentry specialists.

Most of the air-launched missiles throughout the history of the USAF employed conventional explosives for warheads. With the exception of two varieties of air-launched cruise missiles, all current air-to-air and air-to-surface missiles have conventional warheads.



Sidewinder Air-to-air missile



The ACM, AGM-129

## Air-to-Air Missiles

Falcon, the GAR-1, 2, 3, 4 and 11 or the AIM-4, AIM-26 and AIM-47, was an air-to-air missile primarily equipped with conventional warheads. The AIM-26A was a nuclear version with a half kiloton W-54 warhead.

Genie, the MB-1 or AIR-2, was the first nuclear air-to-air missile and was carried by the F-89, F-101 and F-106. It had a 1.5 kiloton W-25 warhead.

The Sidewinder, Sparrow and AMRAAM all use only conventional explosives.

## Air-to-Surface Missiles

Rascal, the GAM-63, which had a single megaton class warhead, was designed to be carried as an early standoff weapon by the B-47.

Hound Dog, the GAM-77 or AGM-28, an early cruise missile, was carried by the B-52 and had a W-28 warhead that ranged from 550 kilotons to 4 megatons. Initially maintained by Airborne Missile Maintenance Squadrons at bomber bases, the Hound Dog was operational from 1962 to 1975.

Bullpup, the GAM-83 or AGM-12, was a ground attack missile originally developed by the Navy and was delivered by tactical aircraft. The A, B, C and E versions used a variety of conventional warheads up to 1000 pounds, and the D model had a 1 to 15 kiloton W-45 nuclear warhead.

Skybolt, the GAM-87, was an air-launched ballistic missile designed to be carried by the B-52 and the British Vulcan bomber. The missile, canceled during the test phase, was the only air-to-surface missile with a true reentry vehicle, since it had the same ballistic flight characteristics that the ICBMs employ.

**Pointy (Cont)** - SRAM, the AGM-69, or the short range attack missile had the W-69 200 kiloton warhead. The B-52G/H could carry 20 SRAMs, the FB-111 six.

ALCM, the AGM-86, or the air launched cruise missile is currently deployed on the B-52H. The B version has the W-80-1, 200 kiloton warhead. The C version, or the Conventional ALCM (CALCM) uses a conventional blast fragmentation warhead and the D version has the AUP-3(M) conventional hard target penetrating warhead.

ACM, the AGM-129A, is a stealthy cruise missile carried by the B-52H, with the same warhead as the ALCM.

Other air-to-surface missiles all use conventional explosives for warheads and include the Shrike, Maverick, Shrike, Standard, Harm, Harpoon, Have Nap and AGM-130.

### Surface-to-air Missiles

Only one Air Force missile has been fielded in this category, the IM-99 or CIM-10, and was an air defense interceptor missile deployed around the perimeter of the US and in Canada. The missile had either a conventional or W-40 7-10 kiloton warhead.

### Cruise Missiles

Navaho, the XSM-64, was a rocket boosted, ramjet powered supersonic intercontinental cruise missile designed initially to carry a fission warhead, then a fusion XW-15 warhead or other newer fusion devices. The missile flew at speeds up to Mach 3 and was designed to dive into the target area. The program ran from 1945 until 1957, when it was canceled in favor of ICBMs.

Snark, the SM-62, was an intercontinental cruise



Snark Warhead Sections being Destroyed at Phase-out



Matador and Mace

missile that was briefly operational at Presque Isle AFB, Maine, in the 702SMW. Initially designed to dive in to the target like the Navaho, the final design called for release of the warhead to let the bomb fall ballistically to the target. The Snark carried the W-39, 4 megaton warhead.

Matador, the TM-61 or MGM-1, was a mobile, tactical range cruise missile deployed in Germany and Korea, and could carry either a conventional warhead or the W-5 40-50 kiloton fission warhead.

Mace, the TM-76 or MGM-13, was the followon to the Matador, and was fitted with either a conventional warhead or a 2 megaton W-28 nuclear warhead.

Gryphon, the BGM-109, was the Air Force version of the Tomahawk cruise missile, was a mobile system deployed in Europe in the 1980s at six locations. The very accurate missile carried an 80 kiloton W-84 warhead. The last GLCM was deactivated in 1991.

### Ballistic Missiles

The advent of the true ballistic missile presented new challenges for the designers - the warhead didn't just drop off at the target, nor could it be flown into the target by the booster. The designers were now dealing with a true space vehicle, since the warhead departed and reentered the atmosphere, with reentry involving high speeds and high temperatures.

Materials of the late 1940s couldn't withstand the heat generated by reentry, so initial designs used the blunt shaped heat sink principle, although other techniques, shapes and even liquid-cooling were considered. Both the Thor intermediate range ballistic missile deployed in England, the TM-75, and the first squadron of the Atlas D, SM-65 or PGM-16D and CGM-16D, initially used the Mark 2 blunt, copper heat sink RV, with the W-49, 4 megaton warhead.

(Continued on page 8)

**Pointy (Cont)** - However, rapid progress was being made in the study of ablative materials that solved the high temperature problem by actually burning away part of the RV during reentry. The aerodynamic shape was also much lighter and more accurate than the heavy, copper heat sink design. The Jupiter, the SM-78, which was deployed in Italy and Turkey, had a Goodyear developed ablative RV with the same W-49, 4 megaton warhead as the Thor and Atlas D. The other three Atlas D squadrons had missiles with the new Mark 3 ablative RV replacing the heat sink design, but using the same W49 warhead.

The later models of the Atlas, the E (SM-65 or CGM-16E) and the F (SM-65 or HGM-16F), along with the Titan I, the SM-68 or HGM-25A, used the newer Avco Mark 4 ablative RV with the 4 megaton W-38 warhead, or in some cases with the Titan I, the W-49 warhead. The Titan II, SM-68B or LGM-25C, had the very large Mark 6 RV with the nine megaton W-53 warhead.

The advent of Minuteman brought a smaller, more accurate RV. The Minuteman IA, SM-80 or LGM-30A, was deployed with the Mark 5 RV and the W-59 1 megaton warhead. The later models of the Minuteman I, the LGM-30B, used the new Mark 11 RV with the 1 to 2 megaton W-56 warhead. This same RV topped all of the Minuteman II, LGM-30F missiles.

In the early 1970s, the Minuteman III came on the scene, with the first multiple independently targeted RV (MIRV) for the Air Force. Some new terms came



Mark 12 Reentry on the Test Range

into being - now there was a reentry system, since the Minuteman III could carry up to 3 Mark 12 RVs with the W-62, 170 kiloton warhead. The system included the post boost propulsion system, which placed each of the three RVs into a separate trajectory to its own target. Reentry speeds and accuracy increased dramatically with the Mark 12. The Mark 12A was added to the inventory in the late 1970s, with a 340 kiloton W-78 warhead. Because of limitations of the strategic arms treaties, Minuteman III missiles are being retrofitted to carry only a single RV.

The newest Air Force ICBM, the Peacekeeper, or LGM-118A, is deployed in a single squadron at Warren AFB. Each Peacekeeper has up to ten Mark 21 RVs, each with the W-87 300 kiloton warhead. These Mark 21s may eventually be placed on the remaining 500 Minuteman III missiles if Peacekeeper is deactivated.

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Early AVCO RV ad

## Air Force News Release Stories

### AFSPC Honors Early Space Pioneers - *by*

*Lynn Gonzales AFSPC Public Affairs*

Air Force Space Command will recognize three men who played prominent roles in Air Force early space and missile programs during a ceremony September 21.

Col. Joseph Kittinger Jr., Col. Thomas O'Regan Haig and Dr. Ruben "Rube" Mettler were presented with the Air Force Space and Missile Pioneers Award, which includes induction into the Air Force Space and Missile Pioneers Hall of Fame. Kittinger, Haig and Mettler made significant contributions to many of the Air Force's and the nation's advances in space and missile technology during the 1950s and 1960s.

Mettler managed the development program for Thor, the first Air Force missile to use inertial guidance. Following the program's success in 1956, he oversaw system engineering and technical direction for the Minuteman intercontinental ballistic missile program for three years.

The Air Force Space and Missile Pioneers Award Program began in 1989 with the National Space Club's selection of 10 space pioneers. The program formalized in 1997 as the Air Force Space and Missile Pioneers Award during the Air Force's 50th Anniversary celebrations. With the induction of Kittinger, Haig and Mettler, the Hall of Fame will include 21 members.

### Missileers Turn Keys to Test America's Defenses - *by Staff Sgt. Melissa Phillips, 90SW Public Affairs*

Warren AFB, Wyoming - Gliding back and forth on two B-52 Stratofortress bomber chairs affixed to metal tracks, two missileers vigilantly watch over equipment monitoring the status of 10 Peacekeeper missiles during normal operations. However, Sept 12 and 13 three missileer crews, each comprised of a commanding officer and a deputy, deviated from their normal schedules and performed a Simulated Electronic Launch Peacekeeper, or SELP, exercise on three of the intercontinental ballistic missiles.

SELP tests the Peacekeeper missile in its day-to-day environment for reliability analysis at AF Space Command, which directs one SELP every two fiscal years. In simpler terms, officials said SELP ensures that when the president directs the launch of a Peacekeeper, the missiles will fire because the dedicated missileers here

have guaranteed it will launch and strike the specified target. The SELP process is a cooperative team effort between operators of the 400th Missile Squadron and maintainers of the 90th Maintenance Squadron here. They put the Peacekeeper through an actual launch sequence, but don't allow it to launch.

Maintenance kicked off the first part of the SELP process by posturing three launch facilities, or LFs. Posturing is a two-part process that stops the missile from launching during the test, and brings equipment on site that measures the effectiveness of the entire process. SELP maintenance officer-in-charge, 1Lt David Miller, 90MXS, oversaw posturing and worked with the operators to gain a better understanding of their job and vice versa. "Allowing maintainers to see what the operators do is a great opportunity," Miller said. "This way the maintenance technicians have a better idea of what the operators see when maintenance is being performed on the site. The more the technicians know about what the operators can and can't see in the capsule, the more they can understand why communication with the capsule, also called the launch facility, is so important."

On the reverse side, the operators watched the maintainers posture a missile. Fostering a strong teamwork environment and providing continuous quality training to operators, support personnel and maintainers is forefront in everyone's mind in the missile community. Both of these elements combine to provide top quality missile effectiveness and safety, according to Capt Jennifer Schutzenhofer, SELP lead operations crew Instructor. "All missileers in the 400MS, not just the primary SELP crews, are needed to make the SELP test successful," Schutzenhofer said. "Almost everyone in the squadron is affected by the SELP test, in some fashion, making it a true team effort. There is a lot of extra work in monitoring the status of the missiles, during SELP posturing that takes place weeks before the actual test. More than 100 hours were spent devising training products and participating in realistic scenarios to ensure every crew was properly prepared for the test."

This teamwork ethic was evident during last line isolation. Last line isolation essentially cuts the communication lines between the two SELP test launch control centers, or LCCs, and three SELP test LFs from the other operational LCCs and the remaining 47 operational alert missiles.

*(Continued on page 10)*

**SELP (Cont)** - After last line isolation, the missileers performed several tests on the missiles culminating in the final SELP test, the key turning sequence. The key turn would launch the missile in an actual situation, but for SELP purposes it tests the circuitry without the cost of actually firing the missile. "SELP is just one of the many ways we test our weapon system to ensure its reliability, for nuclear surety and positive control purposes," Schutzenhofer said. "The data gathered from the SELP is analyzed to take positive measures towards improving the PK missile system. It guarantees to our country and its people both collectively and individually, the missiles will launch when necessary, and only when necessary."

**First Live Fire AGM-142** - by *Ann. David Jackson*  
*2BW Public Affairs*

A B-52 crew from the 2nd Bomb Wing, Barksdale AFB, conducted a unique live-fire missile test at White Sands Missile Range, recently as part of a weapon system evaluation program. The crew launched an AGM-142 Have Nap missile, which struck its target on the range. This missile was the first American-built AGM-142 to undergo a live-fire test. "(This launch) shows the capability of the missile," said Capt. Mark Mount, aircraft commander.

The missile is a camera-guided weapon directed by the radar navigator. A monitor inside the aircraft displays the view as seen by the missile's camera. The radar navigator then uses a control stick inside the B-52 to adjust the weapon to keep the camera's crosshairs on the target. "It's kind of like a high-tech video game," said Capt. Rick Armstrong, B-52 radar navigator.

Part of the launch's success may be attributed to the Mission Rehearsal Training System, an AGM-142 simulator radar navigators use to practice missile launches and strikes. "It's the first time we have used the Mission Rehearsal Training System to help us prepare," Armstrong said. "The system makes me feel more confident that I will hit my target in real life." And he did. Called Combat Hammer, the live-fire test analyzed data and evaluated the entire weapon system: the aircraft, aircrew, weapon, weapon delivery system, maintenance and support forces, as well as support equipment.

The AGM-142 carries a 750-pound warhead and has a range of more than 57 miles. "It shows that we can strike a target, with accuracy, outside of most threat

ranges," Armstrong said. Because the missile is very accurate and expensive to produce, the Air Force only uses it for high-value targets such as power plants, refineries, communication complexes and command bunkers. "It's a precision weapon and it is the largest penetration missile in the inventory; and the B-52 is the only airplane in the U.S. Air Force able to launch it," said Capt. Patrick Spaulding, instructor radar navigator. After the seven-hour mission, the flight crew returned to Barksdale to celebrate the success.

### First Test Firing of New Maverick

The Air Armament Center at Eglin Air Force Base recently completed the first qualification test and evaluation launch of the latest Maverick air-to-ground missile. The AGM-65H/K missile, launched by a 46th Test Wing A-10A aircraft, destroyed the target tank, meeting all test objectives, according to officials from the Precision Strike Systems Program Office. "Last Friday's flight was perfect," said Frank Robbins, director of the Precision Strike SPO. "The A-10 aircrew acquired and locked on to the intended tank at a range not previously achievable. The results were a bull's eye and the tank was totally demolished."

The Maverick is a guided, air-to-ground missile used against small hard targets, armored vehicles and surface-to-air missile sites. The missile has launch-and-leave capability, enabling pilots to lock onto a target, launch the Maverick, and then take evasive action. "The new AGM-65H/K missile configuration doubles the standoff range of the AGM-65B to keep the warfighter out of harm's way," Robbins said. The first Maverick variant, the AGM-65A, was delivered to the Air Force in August 1972. Since then, the Air Force has employed three other models. Technological advances in sensor design and reliability and maintainability concerns with the older Maverick models resulted in an effort to replace the TV sensors [used in older models] with charge-coupled-device sensor technology to increase the missile's reliability and service life, and reduce production cost, said program officials. According to the Precision Strike SPO, the CCD sensor will also permit the AGM-65 to operate in lower light levels than the older TV sensor, further extending the operational utility of this weapon. The upgrade program has created two new versions of the missile: the AGM-65H and the AGM-65K, with two sizes of warheads designed to optimize its effectiveness against a variety of targets.

## Fire Destroys Minot Missile Alert Facility

*- USAF News Releases*

A fire broke out at a missile alert facility (MAF) near Minot AFB November 30, destroying the above-ground facility but injuring no one. The contained fire is expected to burn for an undetermined time, officials said. MAF Golf-01, located 60 miles south of the base, caught fire at approximately 5 am. All 13 people in the missile alert facility were safely evacuated and local fire crews from Plaza and Parshall responded.

The two-member missile crew, working approximately 65 feet below the MAF, became self-contained in the launch control center after they closed the blast doors due to the fire. The crewmembers continue to carry out their normal duties of monitoring the 10 Minuteman missiles under their direct control.

If required, the missileers can remain underground for several days using their own air, water, food and power supply. Control of the missiles can be transferred to another LCC if necessary. The ICBMs assigned to the facility are safe and secure. The fire posed no threat to the missiles, which are located several miles from the monitor facility. Also, the fire burned only on Air Force property and no civilian property was endangered.

The fire was discovered when occupants of the facility smelled smoke. Emergency response teams were immediately called. Both civilian and Air Force fire departments arrived on scene, but the fire rapidly spread throughout the facility. Fire officials made the determination that damage to the facility was too extensive and fighting the fire would only serve to endanger lives. The cause of the fire is unknown at this time. The Air Force will conduct an investigation to determine the cause.



The facility, constructed in the early 1960s and estimated to be worth between \$2.5 to \$3 million, is expected to be a total loss. The facility will be rebuilt, but how and when is still to be determined. This is the first major fire at a U.S. missile alert facility. Previous fires were small and were easily extinguished. All MAFs are equipped with fire extinguishers and heat and smoke detectors.

There are 15 Minuteman III missile alert facilities at Minot. Each MAF is a relatively small complex consisting of the underground LCC and an above-ground building that houses the equipment necessary for it to be self-sufficient and provide for the needs of the missile combat crew, security forces, facility chef and transient maintenance personnel.

## Fire at Missile Alert Facility Extinguished - Crew Safe

The two-person Air Force missile crew that remained on alert in the underground launch control center during and after a fire destroyed the ground-level missile alert facility, has accomplished a normal crew change. The departing crew relinquished control of the missiles to the relief crew and is reported in excellent condition. Base medical officials here, as a precaution, examined the missileers. Fire fighters from the Plaza fire department responded to the fire within minutes, but it was out of control when they arrived. Fire crews from Parshall, Stanley, Ryder-Makoti and Minot AFB also responded to the scene.

Positive control of the ICBMs was maintained throughout the incident because launch control officers train daily to work in contingency conditions such as



**Minot Fire (Cont)** - these. There has been no degradation to national security. "All weapons systems are safe and secure," said Col. Kim McKenzie, 91SW commander at Minot. "Due to the tremendous support of our North Dakota communities this situation was resolved quickly. And the outstanding men and women serving in our Air Force today continue with operations as normal."

No injuries occurred during the fire. Local fire officials have declared the area safe, and local and Air Force personnel will continue investigating the cause of the fire.

## Return to the Field - A Visit to

### Malmstrom - by Col (Ret) Charlie Simpson, AAFM

*Executive Director*

I try to get to each base with a missile activity every two or three years. In October, I returned to the 341st Space Wing and Malmstrom AFB, Montana, for a visit. Colonel Tom Deppe, a long time AAFM member and the commander of the 341SW, provided a superb welcome for our visit.

Lieutenant Colonel Dan Ciechanowski, commander of the 564th Missile Squadron, and Captain Scott Dutkus, one of his crewmembers, met Carol and I for dinner the night we arrived and the two of them spent the following day showing me Malmstrom and the wing. We started with a visit to squadron and wing predeparture briefings for the crews on their way to alert. Major General Tim McMahon, Commander, 20th Air Force, was at Malmstrom during my visit. He talked to the crew force at predeparture, discussing several issues important to the current missile crew force. One of the big differences between this predeparture and others I have attended in recent years was the uniform of the day - more than half the crew force was already attired in the green Nomex flight suit, a change that only recently was implemented. There were still a significant number of "blue bags", but the green bag has caught on fast.

After predeparture, we spent about an hour at the Malmstrom museum, where director Curt Shannon and his staff (volunteers) are doing a superb job. The museum, located just inside the front gate, has a mockup of an early Minuteman capsule, Minuteman II (the Deuce) consoles, reentry vehicles, guidance systems, uniforms and much more.

We drove to Missile Alert Facility (we called them

Launch Control Facilities) or MAF Sierra-0, one of the 564MS Deuce sites. The facility manager, chef and flight security controller reacquainted me with topside, and then we visited the launch control center. While the MAF, which has not been updated like some, was not much different than the first one I visited in 1965, the LCC had changed. From the door on the bathroom to the new REACT console, it was a different world than the old original LCCs where I pulled my alerts at Grand Forks.

For those who haven't seen the REACT console, the two old consoles for the commander and deputy are gone. In the spot where the deputy's console (we called it the Status Control Console) stood is the new dual screen, dual keyboard, two position REACT console. The same old red chairs are there, but they are now side by side, and the two crew members operate a much quieter and faster system than I was familiar with. For those who wonder how we let them be so close together, it takes four hands to turn keys - each crew member turns two switches, so one person still can't do it all.

Following the LCC visit, one of the security teams and the FSC demonstrated how a team would react to a duress situation in the LCC, initiated by the indication that the outside door to the elevator room had been opened without permission. The two young airmen were very proud to show how well they were trained while reacting to the exercise situation.

We returned to Malmstrom for a local area meeting at the club. I have conducted a number of such meetings over the last eight years, and have never had the response we had at the 341SW. More than 200 missileers, most active duty missileers but many others who live in the local area, attended our meeting, and we had some good discussions about past and current missile concerns, policies and events. We added a number of new members because of our visit and our meeting, and I got a good update on current missile operations.

### 564MS Heritage Dinner

On Saturday, October 7, the Deuce squadron, my hosts during my visit to Malmstrom, conducted a heritage dinner and reunion for the current and past members of the unit. A number of early members of the squadron, including AAFM members Walt Skrainy and Harry Strohecker, joined more than 200 people at the dinner. Major General Judd Blaisdell, who served as a commander of the 564MS, was the featured speaker at the dinner.