



# THE CHINA LAKER

Vol. 10 No. 4

Newsletter of the China Lake Museum Foundation

Fall 2004

## Shrike's Forgotten Lessons

By Frank Knemeyer

*Shrike, America's first mass-produced anti-radiation missile, was China Lake's 2<sup>nd</sup> major missile development. The Shrike development by China Lake led to an RDT&E acquisition philosophy that was to be followed in subsequent program developments for many years. Though there were a number of alternative ways, the acquisition philosophy adopted and perfected during the Shrike program was one of the most effective processes for missile systems acquisition that has been developed within DoD.*

*The detailed story of the Shrike Missile System development would require a large book to relate all of the tactical, technical and political aspects that had to be addressed. This overview discusses only the processes and the lessons learned. For whatever reasons, these lessons have been overlooked within the Washington beltway.*

*Many dedicated people contributed to the successful development and deployment of Shrike. For fear of omitting the names of some, only LCDR Moran (now OADM, ret.), a U.S. Navy pilot, is mentioned by name. People involved in the 'glamorous' and the 'not so glamorous' aspects of the Shrike development were all critical team members in getting Shrike to operational use. No weapon system is 'completed' until the war fighter can accomplish his mission each time he is called upon and return home safely.*

*The Shrike missile system was the product of a dedicated team effort. The Shrike team demonstrated technical creativity in all areas of missile design*

*(guidance, control, S&A, TDD, warhead and motor) and significantly advanced the technologies of high-frequency strip-line electronic applications and receiver antenna design. While addressing the technical aspects of the system, they also defined an acquisition philosophy that was to be the template for numerous successful follow-on Navy developments at China Lake. Shrike*

*evolved through a level of creativity that often and in many ways exceeded that witnessed in Sidewinder. Moreover, it was accomplished in a shorter time period because of the pressing Vietnam situation.*

**Concept Formulation**  
*In the early 1950s, during the latter part of the Korean War, U.S. aircraft*

*were increasingly vulnerable to a new surface-based threat: radar-controlled anti-aircraft gunfire. The need for an airborne anti-radiation (radar) offensive capability to ensure survival of U.S. aircraft was becoming very apparent. LCDR Bill Moran, an experienced pilot who served in the Korean conflict, was assigned as the Experimental Officer at China Lake. Moran stressed the significance of this emerging radar-controlled threat and the need for an operational capability to counter it.*

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CHINA LAKE MUSEUM FOUNDATION  
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Leroy Doig III, NAWCWD Museum Curator

### President's Report, by Paul Homer

Fifty years have passed since the first serious anti-radar missile work was done at China Lake. Leroy Doig DDD found this statement in his archives: "During 1954, NOTS fabricated and tested a passive-radar seeker gyro for use with Sidewinder electronics and control system. The unit used crystal video detection and demonstrated tracking error of less than +/- 5 mils. The experiments demonstrated the feasibility of an extremely simple, broadband (K and X) passive antiradar missile. This is the genesis of what would be scaled up over the following three years to become "Cobra," the original name for the developmental Shrike, the first successful antiradar missile, developed by NOTS China Lake....." Ten years later in the fall of 1964, now forty years ago, Shrike completed the OPEDAL, and was then approved for full-scale production.

I came to China Lake on 6 June 1962, and checked in to the home code branch, Code 4022, which was headed by Wm. B. Porter. Jack Russell headed the adjacent engineering design branch, both branches devoted to the Shrike program, all housed in Hangar 1 at the Naval Air Field. AORLEURON-5 was then on the west side of the hangar. My first J.P. tour was

a task working on Shrike, and one year later I returned to the group and had a minor role in the completion of the ESE program. That was great experience for a kid from the plains of Texas and the arroyos of New Mexico! Such experience and challenge were typical for most of the J.P.s of the period.

This issue of the China Laker is primarily devoted to the Shrike project and the people who worked on the program, and the Shrike Event on 14 October 2004. The details of the event schedule are shown elsewhere in the newsletter, and all foundation members are encouraged to attend. We are making a set of polo-style shirts with a Shrike project logo to commemorate the event, and will have them for sale in the Museum Gift Shop. Readers wishing to order these shirts are encouraged to contact Frank St. George, (Email: [fbstg@ridgenet.net](mailto:fbstg@ridgenet.net)), and provide information on sizes, colors, with/without pockets. The expected cost is \$25 per shirt. We hope to get the orders in time for the Shrike Event, so call in your orders soon.

### Museum Happenings by Barry Lowry, Museum Manager

As summer subsides and we slip into fall, activity at the museum is picking up. This is not to say that the summer months are exactly slow, but they are a bit slower than other times during the year. The Shrike display is beginning to come together in the north exhibit area of the museum under the guidance of Eric Bengtson from the DDD Awards and Exhibits Branch. Many people have assisted him but his "hands on" support has come largely from volunteer Ronnie Porter pictured below hard at work with Eric. The Shrike documentary video is progressing nicely under the watchful eye of Mark Pahuta from Video Projects with story, scripting and narration by Leroy Doig DDD Command Historian and Curator of the museum.



Ronnie and Eric

You might remember that volunteer Erica Shaw ably staffed our museum store for the summer. Erica has returned to school now but continues to pop in now and then, most recently in the company of her mother, Lauren, to help with the physical inventory of the museum store. Jerry Saholt has returned to the ranks of museum volunteers after a near two-year absence for medical reasons. Jerry continues to be one of our most popular tour guides for group tours often being described by visitors as "quite a character!" It is rumored that Henry Blecha will be back on volunteer duty soon after his early August hip replacement surgery. Jerry keeps asking where Henry is as he wants to reconstitute the BS Tour Team (that's Blecha and Saholt in case you were wondering). Dotsy Cronin is continuing to do yeoman duty coordinating volunteer scheduling and recruiting. Dotsy has also immersed herself deeply in operation of the museum store and the vagaries of merchandise buying.

She's finding that store operations aren't exactly "rocket science" but the devil is certainly in the details! Another familiar face has returned to the fold by working one morning a week in the museum store. Denny Kline, once the VP for Public Relations on the museum foundation board, has returned to volunteer his time in the store on Thursday mornings. Denny is part of a group of volunteers that Dotsy Cronin is assembling to staff the museum store on a regular basis.

With the end of September comes the end of the foundation's fiscal year. We are again having our books audited by Neely Accountancy Corp. of Granada Hills, CA. This is done not only as a good management practice but is required by various funders such as United Way, Combined Federal Campaign and certain grant making organizations. It also allows us to produce an annual report with confidence in the financial numbers that are reported. An annual report is one of the very best ways of communicating the health and activity of the foundation to people with an interest in the museum and the foundation who may be considering supporting our endeavors.

Your museum manager continues to stay busy operating as a staff of "one" in the museum supported by many dedicated volunteers. I continue developing the museum's and the foundation's relationship with the local community through my work on the Ridgecrest Chamber of Commerce Board of Directors. The foundation board has helped to expand foundation outreach to the community recently by manning booths at the United Way Family Fun Day in August and at the 10<sup>th</sup> Annual Verizon Community Dinner in September. The foundation and the museum will be represented at the Kern County Air Show on 6 October through a booth shared with the Navy League of the Indian Wells Valley.

Do remember that the Volunteer Christmas Party will be coming up in early December. Rumor has it that Dotsy Cronin is planning the bash for her new home rather than our usual museum conference room event.

Well, once again I am out of space. I hope to see you all at the SHRIKE Anniversary, Memorial Rock dedication and Alumni Picnic 14-15 October 2004.

## China Lake Museum Foundation

Announces for the Annual Dinner an

# All New Auction & Dinner Program

5 March 2004

### Plan to Attend Now!

Start your Donations of Auction Items Now!  
The Dinner and Auction format is new for this Program!

The Foundation's desire for this year's Annual Foundation Dinner is to encourage more participation by Foundation members and the public. The new format will lower the price of the tickets from that of previous years and a very relaxed dress code will be suggested. If you come dressed in Desert Casual, you will be at the top of the Best Dressed List for the event.

The plan is have more auction items with a broader range of prices so everyone can participate in both the Live and Silent Auctions and be able to take home a new treasure. Dinner will be an exciting adventure of a variety of foods designed for a new dining experience and will allow you more time to enjoy the company of friends and guests as well as time to decide on your Auction choices.

Packaged deals at the Carriage Inn will be provided with a night's lodging, breakfast, Auction Dinner tickets, Petroglyph Tour and Museum Tour, all at

discount prices. Participation by out-of-town members and the public is being encouraged, so invite your friends and relatives to share in the fun.

The popular \$1,000 tables are being offered again this year with four Lucky tables winning prizes with a minimum value of \$1,000. They are Annual Business or Personal Life Foundation Membership, a framed "Sidewinder over Wild Horse Mesa" Giclee or a four-day stay at a Mammoth Mountain cabin. There will be special drawings throughout the evening along with raffles and surprise events for everyone present.

Bring donations to the Museum or we will pick them up. If you have ideas on making this more successful, or want to help with the event, please call: Wayne Doucette at 760-375-5962 or Lesta Hays at 760-375-5239

## Please Support Your Museum Foundation

Help preserve and display the irreplaceable legacy of technology and weaponry for Naval aviation's defense of our Nation. The rich record of China Lake's achievements, past and present, is a vital part of our Nation's heritage.

Membership Fees and Donations are the life blood of our Museum operations and growth. And remember: The China Lake Museum Foundation is

**Agency 5021**

in the 2004-05 IWV

**United Way and Combined Federal Campaigns**



## Former China Lake Technical Director Walt LaBerge Passes Away

By Liz Babcock, Director

Dr. Walter B. LaBerge, 80, former China Lake technical director, distinguished leader in the Department of Defense and crucial member of the Sidewinder missile development team, died Friday July 16, 2004, in Aptos, Calif. His family was by his side.

Remembering LaBerge as "a great manager, a great engineer and a great father," his son Philip added, "He helped design the Sidewinder missile, he helped put man on the moon and he helped us all by being such a great role model.

"We will miss him deeply."

"He had a wonderful life and did wonderful things," said Mim Cartwright of Ridgecrest. She and her husband Frank had shared a condominium in Cavalaire, France, with LaBerge and his wife Betty since 1993.

Although ill health forced LaBerge's absence from the big Sidewinder 50<sup>th</sup> Anniversary party in November 2002, he was there in spirit, with the crowd joining his televised image in singing "On the Road to Dnyokern," one of the best known of the many songs he composed for China Lake parties.

LaBerge was born in 1924 in Chicago, Ill., the eldest child of a Fuller Brush Co. salesman. He was NROTC cadet at Notre Dame University when World War II broke out.

He spent most of the war in the Pacific, where he was commanding officer of a minesweeper, *YMS 165*, that under his leadership set a record, sweeping the most mines of any ship of that type. He was promoted to the rank of captain in 1946.

Returning to Notre Dame after the war, he married Patricia Sammon of River Forest, Ill., and started a family.

His wartime experiences gave LaBerge an appreciation for the Navy that led him to the Naval Ordnance Test Station China Lake after he completed his Ph.D. in physics at Notre Dame.

The LaBerges moved to the desert in August 1950 and entered the China Lake social scene with enthusiasm. "It was a whole new life," LaBerge recalled, "and just a wonderful beginning of a marriage and of a career."

The tall, striking couple became instigators of costume parties and scavenger hunts calling for little money, but much expenditure of teamwork, imagination, and laughter. And LaBerge brought the same energy to the workplace, where he was a member of the original Sidewinder missile development team.

When Dr. Howard A. Wilcox became manager of the Sidewinder program in 1953, LaBerge was his second in command.

In 1956 LaBerge became the Sidewinder manager and head of the Missile Development Division of the Aviation Ordnance Development Department. That same year the California Chamber of Commerce voted him one of the Five Outstanding Young Men of California.

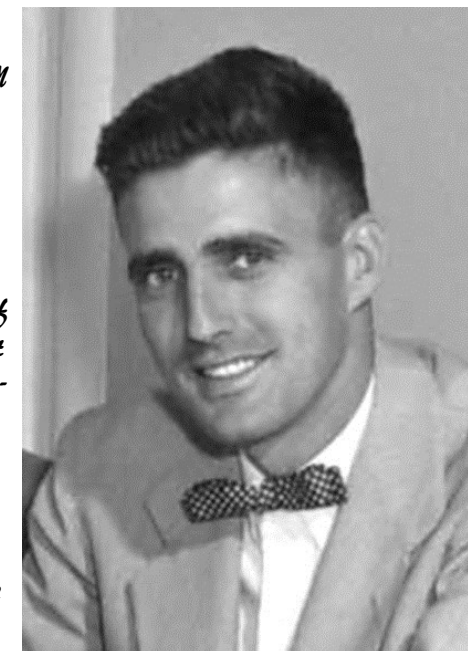
LaBerge left NOTS in 1957 to become Director of Engineering, Western Development Laboratories, Philco-Ford Corporation. There he headed the team that designed and installed the instrumentation at the Manned Spacecraft Center in Houston.

In that role, he worked closely with NASA management and became a close friend of several of the original U.S. astronauts.

He returned in 1970 to China Lake and the position of Deputy Technical Director. He became Technical Director of the Naval Weapons Center in June 1973, leaving three months later to accept the position of Deputy Secretary of the Air Force for Research and Development.

In 1976 LaBerge served as Assistant Secretary of NATO for Defense Support in Brussels, Belgium. Returning to the Pentagon in 1977, he served as Under Secretary of the Army. His last government appointment was as Under Secretary of Defense for Research and Engineering in 1980.

Joining the Lockheed Corporation in Sunnyvale in 1981, he retired in 1989 as vice



Dr. Walter B. LaBerge in 1953

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### A Family of Volunteers

What do you do when you are a fanatic about aviation history? Volunteer for an aviation museum, obviously! What do you do when you are a family man and want your family with you? Volunteer them for the museum also! What good fortune for the Naval Museum of Armament and Technology!

Bo Shaw, originally from Maryland, discovered California in his Air Force days while stationed at Mather Field near Sacramento and Castle AFB at Merced in the mid '70s. Then he transferred to Loring AFB in Maine. That is when he decided he wanted to get as far away from Loring as possible.

He saw an advertisement in Aviation Week and immediately applied for employment at China Lake. After receiving a quick response, he reported for work. Going through Onyokern almost changed his mind but he persevered and became an Acquisition Product Manager for the F-18.

Bo spends just about every flex Friday volunteering at the museum, doing whatever is needed - and something is always needed! On his spare time he is rebuilding a classic car, as well as experimenting with radio controlled and other airplane models. Bo built several of the models on display at the museum.

Laureen was born in Yuma but spent most of her life in Los Angeles, where she earned her Bachelor's degree in nursing and worked at her chosen profession.

She met Bo, a relative of an in-law, at a family Thanksgiving dinner. Everything clicked just right and they were married in 1983. Laureen came to China Lake and gave up nursing to be a full-time wife and soon-to-be mother of a baby girl.

The Shaws went to Florida briefly in 1985, the year daughter Erica was born. The humid Florida weather turned out to be too much and they returned to China Lake in 1986. They have been at China Lake ever since and plan to stay.

On addition to her hobby of quilting, Laureen kept busy home schooling Erica, starting with the third grade. The training continued through high school, supplemented with combined satellite/internet courses in mathematics, Spanish and science from Bob Jones Uni-

versity. Erica participated in sports at Immanuel Christian School where she received an award for best defensive player in volleyball.

Then the time came for Erica to think about college. While she does not know exactly what she wants to do with her life, she does have a strong interest in math and science and currently is aiming for an Associate of Science diploma with a specialty in Administration of Justice. At this point, subject to change, she plans a career in Forensics.

When asked why she volunteered for the museum, Erica looked at her father and said, "He made me!" Bo believes Erica needs some work experience and told her she had two options -- get a paying job or volunteer for the museum. Fortunately, Erica chose the museum.

Timing was perfect for the museum because the person who ran the museum store had just left leaving only one person to run the entire museum. Erica took over the museum store at a time of dire need. She works four hours every day the museum is open -- taking care of the store, answering the phone, deciding what items need to be ordered, and generally doing all sorts of useful activities. Laureen, who plans to continue her volunteering even after Erica goes back to school in the fall, often joins her in the museum store or volunteering at the reception desk.

When asked what the museum needs, the

Shaw family had several suggestions. The first was "Volunteers and more Volunteers." They stressed how much the museum needs a firm volunteer base. They added that there is a need for publicity and raising money. Most of all, they emphasize that the museum needs to move off base so it will be more accessible to the general public and the people of Ridgecrest.

(continued on page 5)



### China Lake Museum Foundation Memorial

(continued from page 6)

Cdr. William L. Reardon, USN 15 March, 1967 Aircraft Accident	CWO4 Charles D. Alderman, USN 21 May, 1976 Explosives Accident	William O. Brooks 3 March, 1981 Engine Accident (Contractor)	Lt. Bruce A. Williams, USN 18 February, 1998 Aircraft Accident
LCdr. Robert R. Kornegay, USN 15 March, 1967 Aircraft Accident	EM1 Ralph E. Loux, Jr., USN 21 May, 1976 Explosives Accident	Corinna Peterson 17 August, 1983 Travel Accident	Capt. Bernd Kugler, DFR (Ger.) 19 October, 1998 Aircraft Accident
AD1 Vernon Kent Whipkey, USN 15 March, 1967 Aircraft Accident	Joseph A. Holman 21 May, 1976 Explosives Accident	Maj. Harold Reeves, USMC 23 October, 1983 Aircraft Accident	Capt. Andreas Macha, DFR (Ger.) 19 October, 1998 Aircraft Accident
LCdr. Thomas H. Ewell, USN 1 August, 1967 Aircraft Accident	Larry D. Kreie 17 January, 1977 Driving Accident	Lt. Mark A. Prusinski, USN 28 March, 1990 Aircraft Accident	PRAN Misty D. Warren, USN 15 June, 1999 Parachute Accident
Richard L. Kiliz 1 December, 1967 Test Operation Accident	CWO Donald Monk, USA 5 April, 1979 Aircraft Accident	Lt. David W. Garnett, USN 18 May, 1992 Aircraft Accident	Col. Kevin Leffler, USMC 30 August, 1999 Aircraft Accident
Lt. Gerald L. Hall, USN 2 April, 1970 Aircraft Accident	CWO Michael Mooring, USA 5 April, 1979 Aircraft Accident	AEAN Lorenzo Rodriguez, USN 18 May, 1992 Aircraft Accident	LCdr. Jason Bayer, USN 28 March, 2002 Aircraft Accident
Walter LaDassor 13 December, 1972 Explosives Accident	LCdr. Theodore Faller, USN 13 August, 1979 Aircraft Accident	Lt. Daniel F. Mondon, USN 18 February, 1998 Aircraft Accident	AD2 Charles Clint King Chaco, USN 28 March, 2002 Aircraft Accident
Richard A. Plauson 13 December, 1972 Explosives Accident	LCdr. Peter L. Luem, USN 21 November, 1979 Aircraft Accident	AT3 Agustin Benitez-Rodriguez, USN 18 February, 1998 Aircraft Accident	
Lt. John P. Esposito, USN 25 June, 1974 Aircraft Accident	Ens. Steven D. Hering, USN 21 November, 1979 Aircraft Accident	AMS3 Michael S. Monaghan, USN 18 February, 1998 Aircraft Accident	
EOCN Michael Richard Glodo, USNR 14 September, 1975 Driving Accident	Cdr. Dennis E. Becker, USN 30 September, 1980 Aircraft Accident	ADAN Dalyn Wyatt, USN 18 February, 1998 Aircraft Accident	

This is the team of volunteers that found, moved and placed the large rock slab that will serve as the Memorial base. Taken from the China Lake ranges, it and the names of the people on it will always be part of our long history. Left to Right:



- EO1 Joe Freshour, USN, NCTU Detachment China Lake
- CM1 John Jackson, USN, NCTU Detachment China Lake
- Eric Bengtson, NAWCWD Exhibits
- David Boonden, B-MAR
- EO2 Cody Pauxtis, USN, NCTU Detachment China Lake
- EO1 David Berry, USNR, B-MAR
- CMC Jerry Morrison, USNR (Ret.), Museum volunteer
- Leroy Doig, NAWCWD Command Historian/Curator
- Eric Stoffel, B-MAR
- Bill Beaury, B-MAR
- (Not present but supporting: EOC Jones, USN, NCTU Detachment China Lake)
- NCTU is the Naval Construction Training Unit
- B-MAR is a contractor

**Shrike's Forgotten Lessons** (continued from page 11)

was in trouble. China Lake undertook the task of fixing the armament systems. In fact, some China Lake personnel went with the RAG aboard the carrier to Hawaii to finish the complete system so that the group would be ready for their ORD (deployment inspection).

During the service life of Shrike some 22,000 missile systems were manufactured. Over 9,000 units were fired in combat and approximately 1,000 were fired in development, testing and training.

**Next ARM Generation**

A Tactical Air Armament study chaired by Capt R. F. Doss of OPNAV, was completed in July 1969. It included a recommendation to "concentrate our development assets in a single high-speed ARM weapon, small enough to be used freely in saturation attacks against heavily defended targets". In April 1970 a HARM TSOR was issued. China Lake submitted a PTA to NAVADP in August.

NAVADP passed it to CNO in November 1970. DCP #93 was signed in May 1972, specifically directing HARM to be done like Shrike as an in-house development with competitive procurement.

In May 1974 the Navy—in violation of the DCP agreement—signed a contract with Texas Instruments for a total-package procurement of HARM. TI agreed to deliver all-up HARM missiles by 1978 for \$47,000 per unit. The missile concept was based on the one developed by China Lake. China Lake's role was reduced to serving as advisor to the PMA and carrying out the final testing.

And so again, political decisions overshadowed technical judgment and historic reality.

Special thanks to Mr. Phil Sprankle for his valuable information, insights and inputs to this article.

**Walt LaBerge Passes Away** (continued from page 3)

president for advanced planning.

Subsequently he served as chair of the Army Science Board and held various academic appointments. Recently he served as senior research scientist for the Institute of Advanced Technology at the University of Texas and as visiting professor of physics at the Naval Postgraduate School in Monterey.

He was a member of the National Academy of Engineering.

Throughout his life, LaBerge maintained an avid interest in military history. His children fondly remember many trips to Revolutionary War and Civil War battlefields.

In his government positions, he was able to fly in many types of military aircraft. His greatest thrill, however, was riding in the SR-71 Blackbird and getting to a speed of Mach 3.0 at 80,000 feet.

Predeceasing him were his first wife, Patricia

Ann Sammon LaBerge, and his second wife, Elizabeth Anne Deeley LaBerge.

He is survived by the children of his first wife, Peter LaBerge of Cochranville, Penn.; Steven LaBerge of Santa Cruz; Dr. Jeanne LaBerge, M.D., of San Francisco; Philip LaBerge of Coppell, Texas, and Jacqueline LaBerge Gunn of Yorktown, Va.

Also surviving him are the children of his second wife, Deborah Pharris of Pineville Ark.; Pamela Alexander of Droine; Richard Baughman of Lake Forest and Kurt Baughman of San Jose. His surviving siblings are Helene Holroyd of Columbia, Mo., Ed LaBerge of Rancho Santa Fe, and Pierre LaBerge of Santa Rosa.

A memorial service was held on Aug. 14 in Santa Cruz.

Visit our

China Lake Museum Foundation website!

[www.chinalakemuseum.org](http://www.chinalakemuseum.org)

**A Family of Volunteers** (continued from page 4)

Meanwhile, the museum is very lucky to have a volunteer family like the Shaws. Erica goes back to school in the fall and **she will be missed**.

Thanks to all our volunteers, who often serve quietly. The museum could not operate without them.

You, too, can be a member of this group of valuable people. The museum needs volunteers of all types. Whatever you like to do, there is a place for you in this collection of wonderful people who help their museum.

**Letter To The Editor**

Ed note: Joel Premselaar, a retired Navy test pilot, sent this letter as a comment to the article about LT John Darden in the spring issue of this newsletter.

29 June 2004

More than half a century ago, a superb Naval Aviator, John Darden, perished in an aircraft accident not of his making. The accident was caused by a pernicious aerodynamic characteristic of F2H-2 Banshees.

During that period, several other aviators and I had been flying Banshee-2s in total ignorance of the "nature of the beast." It was well after I encountered a harrowing experience while dropping an "Elsie" store on "K" Range that I become concerned about the aircraft's peculiarities.

During one of my several visits to the F2H-2's manufacturer, McDonnell, to discuss the ramifications of replacing the Banshee's wing tip fuel tanks with aircraft rocket launchers each housing nineteen 2.75" Folding Fin Aircraft Rockets (Mighty Mouse), I expressed my concern regarding the Banshee's characteristics.

It was then that I learned that in the higher sub-sonic flight regime (0.68 Mach), the center of pressure (lift) moved well forward (chordwise) on the wing. This twisted the wing, leading edge upward, along its elastic spanwise axis increasing its angle of attack. This, in turn, moved the center of pressure even farther forward. A thermally induced upward vertical gust, for which desert regions are noted, will impose and even greater increase in the angle of attack with the

consequence of twisting the wing beyond its structural limits. As the threshold of transonic speed (Mach 0.8) is approached, the center of pressure moves aft alleviating the threat. The Banshee-2 may then safely fly to its Mach limit of 0.85.

In summary, conservatively assuming the temperature to be 90 degrees Fahrenheit, the density altitude at which Darden was flying would have been 5,000 feet. At that altitude, Mach 1.0 would be at a true airspeed of about 650 Knots. Pulling out of his dive, Darden would very likely be some bit over 442 knots which, under the assumed conditions, would be Mach 0.68.

This phenomenon was shared by Northrop's F-89 Scorpion, affectionately called "Wagon Wheels." It too shed its wings for the same reason. While I was serving a tour of duty with VX-5, Hugh Tate was a squadron mate. Hugh was the only Aviator to safely bail out of a Banshee-2 after it lost its wings. Yes, he was in the described flight regime when it happened.

Note that dummy ordnance is used during demonstration firings. The dust observed during Darden's accident was caused by the store striking the ground and not by an explosion.

Joel Premselaar LCDR USN (Ret)

**"New Memberships" received since publishing the Summer 2004 Newsletter:****Contributor Members (\$100.00 Annually)**

Judge Catherine Purcell, Ridgecrest CA

**Regular Members (\$25.00 Annually)**

Charles & June Frederickson, Ridgecrest CA  
CAPT Randy & Sonja Jackson, APO AE  
Harriet Newman, Ridgecrest CA  
Linda Robinett, Ridgecrest CA

### China Lake Museum Foundation Memorial

By Robert Campbell, Director, U.S. Naval Museum of Armament and Technology

The China Lake Museum Foundation will hold a ceremony on Friday, 15 October dedicated to the memory of all those military and civilians who have died in the performance of their duties while stationed or working at China Lake. Starting at 11:30 a.m., the ceremony will be conducted at the Museum, just before the China Lake retiree reunion picnic. A large rock slab taken from the China Lake ranges will serve as the memorial. Located directly north of the Museum, it will feature a plaque listing the name of each individual, the date, and the nature of the incident which took his or her life.

The memorial will serve as a reminder that there was and continues to be risk associated with the develop-

ment and evaluation of weapons and technology to preserve freedom throughout the nation and the world. Each of the honored individuals paid the ultimate price in their pursuit of ensuring that our operational forces had the best capability possible.

The China Lake Museum Foundation initiated the effort to make this memorial possible and researched available documents to identify these individuals. The research revealed that seventy-three persons have lost their lives over the sixty-one years since the base at China Lake was established. A listing of the names inscribed on the plaque follows:

### CHINA LAKE MOLTARIA AND CDOLOAN ACCIDENTAL DEATHS WHILE ON DUTY

#### U. S. Naval Museum of Armament and Technology Memorial Wall

Lt. Donald A. Innis, USN 20 June, 1944 Aircraft Accident	James K. L. MacDonald, PhD 3 February, 1949 Aircraft Accident	Lt. Bennett W. Hooks, USN 5 October, 1956 Aircraft Accident	Capt. David L. Hess, USMC 28 April, 1961 Aircraft Accident
Lt. Douglas J. Walthall, USN 25 June, 1944 Aircraft Accident	John J. McKinley, PhD 3 February, 1949 Aircraft Accident	William Bowles 6 June, 1957 Operational Accident	Lt. Fred J. Wilson, USN 17 September, 1962 Aircraft Accident
ARM2c Wilson M. Keller, USN 25 June, 1944 Aircraft Accident	Myron G. Kellogg 3 February, 1949 Aircraft Accident	Pvt Jerald V. Roberts, USMC 25 March, 1958 Shooting Accident	Jonathan E. Rice 25 November, 1962 Processing Accident
Lt. John Armitage, USN 11 August, 1944 Aircraft Accident	Rodney E. Morrin 3 February, 1949 Aircraft Accident	LCdr. Richard M. Hopfinger, USN 24 June, 1958 Aircraft Accident	Maj. Thomas R. Brock, USAF 31 March, 1964 Aircraft Accident
Lt. Robert A. Dibb, USN 29 August, 1944 Aircraft Accident	Joseph Vargus 3 February, 1949 Aircraft Accident	Jesse Ariel Thomas 13 April, 1960 Track Accident	AN Hobart C. Hale, USN 31 March, 1964 Aircraft Accident
TMC Wilber K. Smith, USN 21 January, 1948 Compressor Accident	Capt. Robert M. Madison, USAF 4 February, 1949 Aircraft Accident	Capt. Howard C. Casada, Jr., USMC 22 September, 1960 Aircraft Accident	AN Edward L. Taylor, USN 31 March, 1964 Aircraft Accident
H. W. Baldwin 6 September, 1948 Parachute Accident	LCdr. John E. Darden, Jr., USN 10 July, 1952 Aircraft Accident	Lt. Jan M. Graves, USNR 21 October, 1960 Aircraft Accident	AN Clarence E. Yates, USN 31 March, 1964 Aircraft Accident
Cdr. Alphonse Minvielle, USN 3 February, 1949 Aircraft Accident	ABH Raymond J. Irons, USN 9 October, 1952 Catapult Accident	Hubert J. Stanfill 13 December, 1960 Operational Accident	AE3 Donald R. Baker, USN 16 May, 1964 Parachute Accident
Lt.(j.g.) Charles V. Matus, USNR 3 February, 1949 Aircraft Accident	Lt.(j.g.) Charles Arthur Duffy, USN 15 February, 1956 Aircraft Accident	Robert B. Hughes 13 December, 1960 Operational Accident	Lt. Douglas S. Mayfield, USN 11 June, 1965 Aircraft Accident

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### Shrike's Forgotten Lessons (continued from page 10)

BuWeps and the contractor as to the problems encountered. Only then did China Lake find out about the scores of changes the contractor had made—changes that should have been proposed during pilot production for possible incorporation into the package. However, this would have given away some of the prime contractor's semi-propriety ideas in the competitive bidding, since the package was to be used for second-source competition.

This resulted in a couple of actions. All deployed missiles were recalled from the Fleet. China Lake dug out the changes that had been introduced and re-authenticated the documentation package. BuWeps put China Lake back in the documentation control loop.

#### Second-Source Production

An interesting situation evolved as a result of the proposed second-source competitive bidding. To avert competition, TD offered a sole-source bid of \$19,500 for the first units, dropping to \$9,000 for the 4000<sup>th</sup> in a standard learning curve. This offer was rejected. TD then offered a bid of \$14,000, reducing to \$9,000 for the 4,000<sup>th</sup> unit. That offer was also rejected, and the competitive bidding proceeded. In the final bids, TD offered \$4,480 per unit (a reduction of some \$15,000), and the eventual winning competitor, Univac, bid \$3,850. The total saving realized through competitive production in the Shrike program easily exceeded \$200,000,000. (This procedure was used very effectively in the follow-on production of Sidewinder).

After competitive bidding was completed, Univac was selected. Because of the problems encountered with TD, China Lake undertook a unique approach by awarding a small R&D contract to Univac to build three units in their model shop according to China Lake's documentation package. Univac engineers came to China Lake and were provided with all the experience and information available. The intent was to ensure that Univac thoroughly understood the critical technical aspects—the same as the prime contractor. Those units, made in accordance with the China Lake document package, were delivered, and they performed as required. With China Lake support, Univac produced quality missile systems which essentially became the first successful deployment of the Shrike missile system. The first Univac-produced Shrike was fired in combat in January 1966. The weapon system made a significant impact on the tactical strike capability of both the Navy and Air Force in the Vietnam theater.

Over a period of time, as the characteristics of the SAM threat changed in Vietnam, additional Shrike modifications were developed in support of the

ever-changing tactical situation. China Lake also provided immediate on-site technical support to operators, both in hardware and tactical operations. For the Shrike to function properly, not only did the service personnel need to be trained, but the aircraft armament system had to function properly. A program is not satisfactorily completed until the system is successfully integrated with the platform and can be effectively used by the operator.

In one situation the Navy set up a replacement air group (RAG) with A-4s that were coming directly from an overhaul depot. The RAG came to China Lake for Shrike training. The depot had done a fine job on the mechanical aspects of the aircraft, but didn't seem to have the skills for armament avionics. Without proper functioning of the armament system, the Shrike system

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## Shrike's Forgotten Lessons (continued from page 9)

award fee contract. This proved to be a very effective process. It provided for the sharing of the engineering effort, but left China Lake with technical and financial control. This approach guaranteed the contractor his legitimate cost plus fee with an additional award fee for competent work. It also provided for continuous correlation of detailed technical milestones with related financial expenditures. This type of contract can be extremely effective, providing that the government has an in-house technical capability in partnership with the contractor. Through competitive bidding, the engineering support contract was awarded to Texas Instruments (TI) in October 1961.

Testing against multiple simultaneously radiating targets indicated the missile had problems selecting and homing on a single target. In June 1962 an angle gating capability was incorporated into the guidance system so that the missile would select a single radar out of a multiple-target scenario.

In August 1962 DDR&E, OSD held a review of the AR/M programs which, in effect, amounted to China Lake's Shrike vs. the Air Force GAM-83, Bull-pup AR/M. Based on the results of a rather confrontational review, a SecDef Decision Paper directed the Navy to proceed immediately with development of a dual-band guidance head for Shrike (S & C bands).

In May 1963, the Bureau of Weapons (BuWeps, formerly BuOrd) assigned an Emergency Shrike Effort (ESE) to China Lake in response to the evolving Cuban Missile crisis. The task requested the delivery of 50 all-up S-band missiles with 50 alternate C-band guidance sections within 9-10 months for an estimated cost of \$10,000,000. The ESE effort was enhanced with a brickbat national priority.

Development of the S-band guidance section was on schedule, but no concentrated effort had been done on the C-band. Now the stakes were very high and an all-out shared effort with TI was undertaken. For program control, a special 'war room' was established that included a detailed schedule of every part of the missile system. It was 'laid out' on a wall and went from floor to ceiling. One person was assigned the responsibility of keeping the technical schedule up to date through continuous communications with both China Lake and TI personnel. Each Saturday morning, the project group would gather in the room to review progress and resolve any problems. The group that could best solve a particular problem undertook the task. The team made extensive use of commercial air transportation for shipping components between China Lake and TI. The ESE program was completed in

January 1964. Fifty all-up missile and fifty alternate guidance sections were delivered to MCAS Cherry Point, North Carolina—ahead of schedule and within the cost estimate.

Engineering development of the S band unit was completed and ready for NTE and pilot production. Shrike was the first program at China Lake to have a formal reliability effort.

### Pilot Production

The Navy Technical Evaluation of Shrike was completed in March 1964. TI successfully completed pilot production of 120 units. During this period certain changes were made to the documentation package to enhance production. Based on a successful OT&E with those units, the Navy accepted the missile system for the first full production and deployment. As planned, TI conducted the first full production with the follow-on contracts to be completed. Because of the recent introduction of the Soviet SA-2 missile system in North Vietnam, the earliest possible deployment of the Shrike system was critical to the survival of U.S. aircraft. With one of the units left over from pilot production, the first Shrike was fired in combat on April 25, 1964.

On April 12, 1964, Dr. Harold Brown, DDR&E, assigned the Navy specific responsibility for the development of tactical anti-radar missiles.

### First Full Production

First-production Shrike missiles were scheduled for delivery in May 1965. BuWeps—in all their wisdom—decided it was not necessary for China Lake to maintain control of the documentation package. The result of that decision was that, for economical reasons, the prime contractor introduced scores of changes into the package during production. There was no verification that those changes would not affect form, fit or function. Those first-production missiles were deployed. However, in subsequent testing China Lake found those units did not perform satisfactorily and were rejected because of faulty workmanship. Emotional discussions were held with

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## The Beginnings

Compiled by Bertha Ryan from the Rocketeer Volume VIII, Number 29, dated July 16, 1952

It was the second year in the life of this organization we now familiarly call China Lake. The Naval Ordnance Test Station (NOTS) had set up shop at Harvey Field in Inyokern. During a three-month period in 1944, five men gave their lives in the fulfillment of the mission of the new organization.

The first pilot had a road named after him at the airport in Inyokern. Unfortunately, advancing time has lost that road. LT Donald A. Innis died in late May or early June. With the passage of time, even the exact date is lost.

Ed Note: The Rocketeer did not have an exact date of LT Innis' accident. Grand Experiment at Inyokern, Vol. 2, pp 102 & 104 gives the date as June 20, 1944.

The Station was so new that there was a shortage of aircraft range facilities, so LT Innis flew down to the Salton Sea to carry out his firing test. He put his F6F Hellcat fighter into a 15-degree dive. Without warning, the rocket body on his starboard wing exploded prematurely. The airplane went into a slow spin and crashed into the water.



F6F Hellcat

LT Douglas J. Walthall was a member of a torpedo bomber unit attached temporarily to the Air Facility for rocket training. On June 25, he and his radioman-gunner, Aviation Radioman Second Class Wilson M. Keller, were conducting



SB2C Curtiss Helldiver

a test over B-2 range. They fired the five-inch rocket. It exploded as it was fired, blowing off eight feet of the starboard wing. The results of the accident investigation showed that the rocket was improperly assembled. The propellant had ignited the head.

LT John Armitage was flying a Curtiss Helldiver on August 21. He fired an 11.75 Tiny Tim in a 20-degree dive at a range of 1500 yards. Immediately after firing, the airplane nosed over, passed through the rocket's blast cone, and crashed. The accident report later found that the firing had forced an outboard elevator tab up, keeping the airplane in the dive. Passing through the blast cone had intensified the effect. The airfield at China Lake has been named for LT Armitage.

You probably recognize the name of Dibb Road on base. Perhaps you lived there at one time, or knew someone who did. LT Robert A. Dibb was flying an F6F Hellcat on August 29. He fired a five-inch AR rocket with a dummy head for the purpose of rocket-sight calibration. The rocket ricocheted 500 feet into the air and tore off one wing of the Hellcat.

These five men served the Navy, our country and all of us. Time passes and dulls the memory, but their lives deserve to be remembered. They are enshrined on the Memorial at the U. S. Naval Museum of Armament and Technology here at China Lake.

"Never fly in the same cockpit with someone braver than you."  
— Paul F. Crickmore, test pilot



**Shrike Missile  
50th Commemorative Celebration**

On 14 October, China Lake celebrates 50 years of the Shrike missile – the world's first anti-radiation missile. The celebration gets underway on 14 October at 1300 hrs with the viewing of the 1-hour Shrike documentary film providing a short history of ARM developments from WWII until now. Immediately following at 1400 hrs will be a live Shrike legacy forum.

Shrike Day continues at 1630 hrs with an official ribbon-cutting ceremony at the US Naval Museum of Armament and Technology. This officially opens the new Shrike display. Several members of the original Shrike team will be in attendance.

The day concludes at the Museum with an "everyone welcome" reception, a chance to meet old friends and tell old war stories.

**Annual Retiree's Day**

The Shrike celebration coincides with the annual NOTS / NWC / NAWC retiree's week. Friday will be devoted to retiree briefings and events. At 0930 hrs, participants will receive an unclassified technical briefing on major efforts at NAWC.

At 1130 hrs there will be the dedication of a permanent memorial honoring those NOTS / NWC / NAWC employees who gave their lives in the line of duty. The dedication ceremony will occur at the Museum site. Immediately following the dedication, the annual Center Picnic will be held on the lanai at the Museum.

**Schedule of Events**

**Thursday, 14 October 2004**

**Center Theater**

- 1300. Shrike Documentary
- 1400. Shrike Legacy Forum

**Navy Museum**

- 1630. Display Ribbon Cutting
- 1700. Reception

**Friday, 15 October 2004**

**Michelson Lab**

- 0930. Technical Brief

**Museum**

- 1100. Memorial Dedication
- 1200. Center Picnic

**Contact Information**

**Pass Waiting:** You will need a Base pass to attend this event. If you do not currently have a pass, things will go a lot more quickly if you let us prepare one for you in advance. Please call (760) 939-0978 or send an e-mail message to [donald.cooper@navy.mil](mailto:donald.cooper@navy.mil). Be sure to provide your name and Social Security number. A pass will be waiting for you at the main gate on Thursday morning of the 14th. It will be valid through Sunday the 16th. Be sure to bring a photo identification when you pick up your pass.

**Pre-Paid Picnic:** If you plan to attend the tri-tip dinner picnic, the cost is \$8.95 each. A pre-paid check payable to MWR is required before the event. You can mail the check to the Retired Affairs Office, Code 75-H000D, Mail Stop 1323, NAWC, NAWC, China Lake, CA 93555-6100.

**Shrike's Forgotten Lessons** (continued from page 1)

China Lake had been experimenting with several projects that were, in part, related to this new threat. Of particular early interest was the technical effort accomplished on a semi-active radar guidance head for the SARAH version of Sidewinder. Washington, however, had approached the problem through other avenues and was banking heavily on the Corvus concept. The Navy believed Corvus would solve all of its anti-radiation problems.

Moran repeatedly expressed his opinion that Corvus would not solve the tactical problem because of its overall complexity and excessive unit cost. Moran found a sympathetic ear in Code 40, and the Shrike program was initiated. (This is one of many examples where Fleet-experienced officers assigned to R&D laboratories are a crucial part of the team, along with the civilian scientists and engineers, and industrial partners. This was the basic premise in the establishment of China Lake as a full-spectrum Navy laboratory in the early 40s.)

**Technical Feasibility**

In 1957 Moran assisted members of the Aeromechanics Division and the Attack Weapons Branch in developing the basic technical and operational concept of the Shrike system. China Lake was then able to convince RADM Ruckner, Head of Research at the Bureau of Ordnance (BuOrd), to support that concept. Ruckner contributed an initial \$150K to what eventually became a \$257K program, to demonstrate the technical feasibility of the concept.

With BuOrd support, the small China Lake team designed and assembled two experimental missiles with guidance, control and a 'cobbled-up' solid rocket motor. These were fired from an F3-D aircraft and validated the technical concept. On one of the units the fiberglass windscreen actually broke during flight, exposing the conical spiral antennas. The missile continued to fly and demonstrated the guidance homing capability. Those tests were completed in October 1959, and the real effort began just as Soviet SA-2 radar-directed SAM systems were being introduced in the Vietnam conflict.

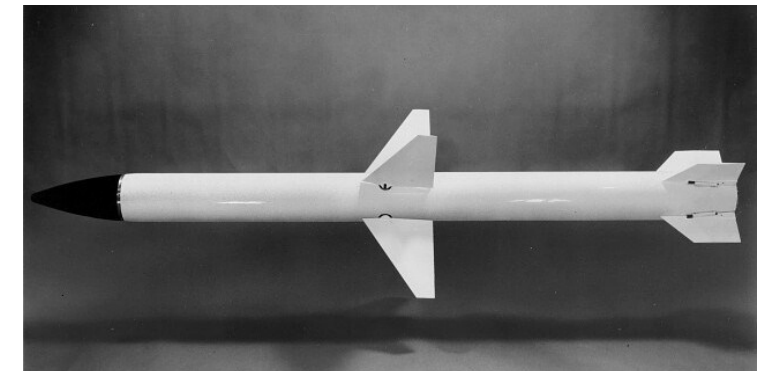
**Engineering Development**

The Shrike development program was formally initiated in October of 1959. The task assignment from BuOrd to China Lake was simple: "you are assigned the responsibility and delegated the authority to develop an air-to-surface missile to suppress radar-controlled surface-to-air threats in accordance with the current TDP". Though there was more verbiage, it was fairly simple to recognize what China Lake's limits

were, such as not going directly to Op/Nav, etc.

China Lake convinced BuOrd to assign responsibility for the complete system instead of generating a piece-meal task assignment for each separate component. (Previously, a separate task for each component was issued by the respective technical branches within BuOrd. China Lake was thus obliged to answer to each of those branches, making it difficult to integrate the total system.) The system manager at China Lake was designated as the DAPM (Deputy Assistant Program Manager). This caused a degree of concern within the technical branches of BuOrd. They now were only advisors to the PMA. By virtue of the DAPM Task assignment, China Lake answered only to the PMA.

In developing the engineering concept, tests indicated the need for a leading-edge tracking capability. With that modification, the design concept was finalized in November 1960. The next step was to bring in an engineering support contractor.



China Lake's philosophy was to partner with a qualified prime contractor for engineering support, for pilot production, and—importantly!—for the first full production. Only after first full production would competition for follow-on production begin. Upon full production, the program would have a validated documentation package that provided an operationally effective, reliable and producible weapon system. (Sidewinder ran into a serious problem by introducing competition for first full production.)

Competition was conducted. The contractor was awarded a cost plus fixed fee with a task (continued on page 10)