

## A Blast from the Past

### Ed Ryan Jr.

When I was young lad, my father would often say that I had hydrazine in my blood. I really didn't know what he meant and I didn't have a clue what hydrazine was. All I did know was having hydrazine in my blood meant that I was something special because my dad told me so. Now, five and a half decades later, I stand poised to train my one-hundredth astronaut flight crew. Sometimes I wonder if people realize the difficult and sometimes almost comical roots of this industry. Oh, most of have heard about Robert Goddard launching his first liquid fuel rocket from his aunt Ellie's farm in Massachusetts in 1924, and they know about the captured German scientists' Werner Von Braun who led the way to ICBM development in the 50's, But what came in between?

In 1930, a group of young science fiction writers formed the American Rocket Society, originally called the American Interplanetary Society, in New York. From that Society came a small group of engineers, who constituted the experimentation committee (1934). John Shesta was a civil engineer and a part time instructor at Columbia University. James Hart Wyld was a Princeton educated engineer and was an accomplished design engineer. Hugh Franklin Pierce was a machinist and engineer on the NYC subway system. In early 1937 they were joined by Lovell (Lovey) Lawrence Jr., a brilliant inventor and undergraduate engineer from IBM. The focus of this group was not the development of rockets, but the refinement of various liquid rocket propellants and liquid rocket engine designs. The base of their operations was out of John Shesta's Garage in Pompton Lakes, N.J.



*Lovell Lawrence, Jr., first  
RMI president*



*Hugh Franklin Pierce*



*John Shesta*



*James Hart Wyld*

One late afternoon in mid-September 1937, Hugh Pierce and Lovey Lawrence, stopped into a local Chevrolet dealership in the Village of Ridgewood, N.J. and approached the only mechanic on duty. They needed to have some steel tubing fabricated. Little did they know that the mechanic had just completed one and a half years of engineering in college but had to quit short of a degree because the money ran out. The mechanic looked at their design, disappeared into the

garage and in ten minutes returned with the parts perfectly manufactured. So impressed were they at this young mechanic's skill, that they explained to him the part was to be used in an experimental engine, and invited him to join them on Sunday to see the engine test. He enthusiastically accepted their invitation. That young mechanic was Edward N. Ryan, my father.

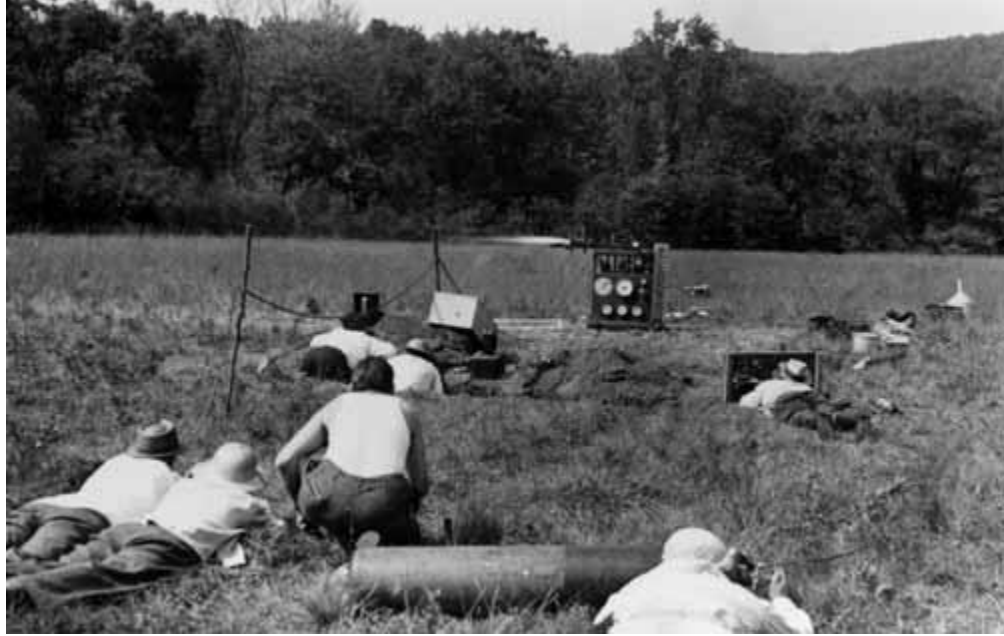
The experimental rockets engines built and tested by ARS members were small, and sometimes proved strikingly successful--and occasionally far less so. This roving band of tinkering rocket enthusiasts soon established a Sunday afternoon routine for testing their hobby. With no real budget, no machine shop, and no place to legally test their home-built rockets, they hardly seemed poised for greatness--yet they helped build the foundations for rocket science in America, and their early tests entered north Jersey folklore.

Their typical routine was to gather on a Sunday afternoon, load up the test rockets and gear in a car, and transport everything to an open field sufficiently removed from human habitation. They conducted "static" tests (where the engine is fastened to a stand before firing). Shesta had devised a portable test stand made of pipes, easily disassembled. When the test rocket was set up, gauges checked, and all had retreated a safe distance, the engine was ignited.

Experience soon taught the group to break down and clear out quickly--the loud noises, flashes of light, and occasional explosions of their rocket engines were often reported to the local authorities. Shesta recalled the sometimes comical maneuvering required to test their early rocket engines: "In those days, we would use a moving test stand at a temporary location, launch a rocket, then get out of there as fast as we could before the police came." Recalled former RMI engineer Harry W. Burdett, Jr., "You can bet we never went back to the same place twice."

A quick exit avoided uncomfortable questioning by police about mysterious roars, blasts, and strange lights and smells. Shesta's test stand, taken apart, looked like nothing more than an innocent pile of pipes in the trunk of a car. The ARS dubbed it their "Test Stand No. 2," and it is now on display in the National Air and Space Museum in Washington, D.C. Thus, various anonymous and now-forgotten cow pastures, hay fields, and abandoned meadows were the scenes of some of American's earliest liquid-propelled rocket testing.

My father confided in me that his first test, September 19, 1937, was far less than successful. The engine, fueled with gasoline and liquid oxygen, ran fine for about 5 seconds, and then erupted into ball of fire. He jokingly told me the test determined his fate. He was either going to become a rocket designer or a pyromaniac!



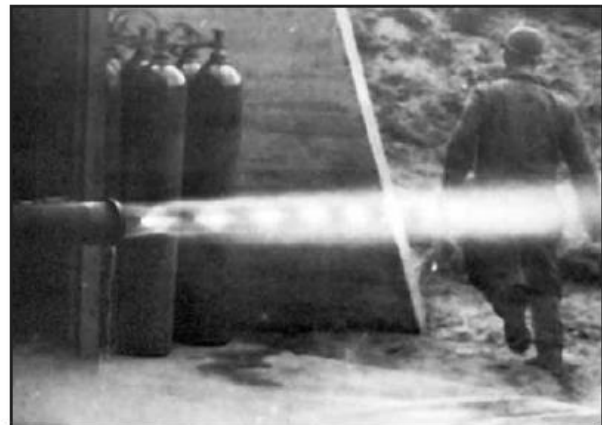
*ARS members testing the Wyld regenerative cooling engine, Franklin Lakes N.J., June 1938*

Over the next two years my father participated in more than a dozen test firings, of various engine designs. Just as importantly he assisted the group with the fabrication of engine components until he enlisted in the Army Air Corps, in April 1939.

The ARS team of Lawrence, Wyld, Pierce, and Shesta continued their experiments with greater success until December 1941. Just six days after the attack on Pearl Harbor, they established America's first rocket engine manufacturing company, Reaction Motors Inc. (RMI), With a single small Navy contract to build Jet Assist Take-Off motors and working out of a bicycle shop in Franklin Lakes N.J., the company slowly expanded and in 1946, after several temporary locations, moved its test unit to the former Naval Test Center at Picatinney Arsenal, Lake Denmark, N.J.



*RMI's 100-lb thrust rocket cylinder developed under the company's first contract with the U.S. Navy.*



*The risks of engine testing in the early days of RMI.*

Upon his release from the Army Air Corps in April 1944, my father immediately went to work for RMI in their test and development department.

RMI ultimately developed a four-chamber engine (the 6000C4, "Black Betsy") (My father affectionately called this engine the Belching Bas####d), fueled by a mixture of liquid oxygen and diluted ethyl alcohol, for a new aircraft. On October 14, 1947, a young Army Air Force veteran--Chuck Yeager--climbed into the X-1, with its RMI-designed and built rocket engine, and proceeded to break the sound barrier--the first time in human history an aircraft had done so. That aircraft, with its engine, now hangs in the main "Milestones of Flight" gallery of the National Air and Space Museum of the Smithsonian in Washington, D.C.



*The Bell X1 Glorious Glennius – October 1947*



*Test firing the Black Betsy*

In later years, RMI continued to provide engines for the X-series aircraft, including the X-1B, tested 1956-58, and the X-15, a research aircraft that was a developmental step toward the modern Space Shuttle. RMI's success at winning Navy contracts led to a huge expansion of facilities at Lake Denmark. By 1950, RMI provided the bulk of the test facilities at the new "Naval Air Rocket Test Station" (NARTS) at Lake Denmark, a \$7.5 million facility nestled on 650 remote acres adjacent to Picatinny Arsenal.

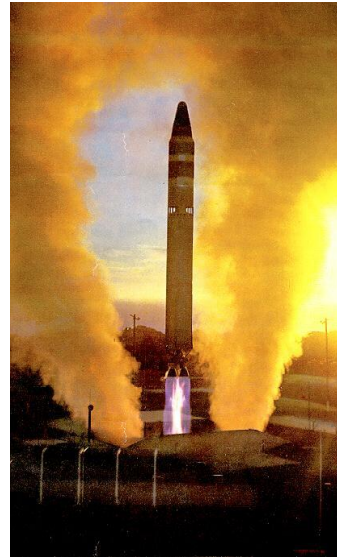
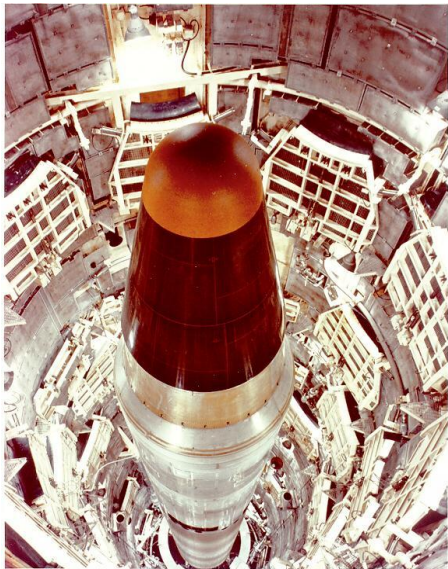
By 1957, RMI had twenty-one test stands in operation at the site. Eighteen could handle static testing of engines from eighteen to 20,000 pounds thrust. Three test stands could handle engines from 50,000 to 350,000 pounds thrust. One of these was the massive Test Stand R-2, built in 1957. One of the largest test stands on the East Coast when built, R-2 could (with modifications) test rocket engines of up to 1,000,000 pounds thrust. It was the largest test stand in America that could test engines at all attitudes (i.e. angles of fire). Engines for the X-15 were tested here.



*Initially flown in 1959, Three X-15 research aircraft were built and flown, flying faster and higher than any other airplane. A peak altitude of 354,200 feet (67 miles) and a speed of Mach 6.72 (4,534 mph) were obtained during its 199 research flights.*

To insure financial stability, the Rockefellers invested \$500,000 in RMI, for which they received a 21% interest in the company. In 1953, Mathieson Chemical Corporation (later Olin Mathieson) purchased a 49% interest in RMI, which became an Olin Mathieson affiliate. Olin Mathieson was a huge corporation with widely diversified interests in chemicals, metals, and explosives. These acts heralded a new age of growth and stability for RMI, but they would mark the era when control of the firm left the hands of its four founders. By the mid-1950s, all four--Lawrence, Shesta, Wyld, and Pierce--had left Reaction Motors, Inc. My Father left RMI in 1956, and worked for missile development contractors including Curtis Wright Corp, Kearfott Singer, and General Precision. He moved the family to Merritt Island Florida in 1964 when he went to work for Bendix as a safety engineer on LC-39A. My father left the space industry in November 1969, four months after Neil Armstrong walked on the moon, and more than 33 years after participating in his first rocket engine firing in the fields of N.J.

I picked up the gauntlet in October that same year when I enlisted in the U.S. Air Force (after a tour in the Army) and attended school at Sheppard AFB Texas to become a rocket engine mechanic. (The apple indeed does not fall far from the tree) I retired from my space career with the Air Force as a Master Sergeant in 1987, and was immediately pressed into service with EG&G Florida as a training instructor. Since that time I have supported 103 shuttle launches and trained 99 Flight Crews. STS 129 (scheduled for November 2009) will be my century crew.



*Left- Titan II ICBM in its silo at launch complex 395C, Vandenberg AFB, Ca. (1972)  
Right- Late afternoon launch of Titan II from 395C October 1973*

So what became of those early pioneers?

Lovell Lawrence, Jr. left RMI in 1951. Though a founder of the company, he found his role diminished as Rockefeller, and later Olin-Mathieson, became part owners of the company. He went on to be a key figure in the Army Redstone ballistic missile project, which played an important role in NASA satellite and manned launches in the late 1950s and early 1960s. Among these launches were the suborbital flights of Alan B. Shepard Jr. and Virgil I. Grissom. In 1950 Lawrence was awarded the Goddard Memorial Lecture Award for outstanding work in the development of rocket engines and propellants. Lawrence joined the Chrysler Corporation (a major army contractor) in 1953, where he was a chief research engineer. At Chrysler, he was manager of power plant design in their missile division, and was involved with work on a lunar rover. He died in 1971 at age 55.

James Hart Wyld died in 1953 at the age of forty-one. The primary technical genius at RMI, his picture today appears in the National Air and Space Museum of the Smithsonian Institution. The American Institute of Aeronautics and Astronautics (AIAA, formerly the American Rocket Society) annually gives the Wyld Propulsion Award in his honor, recognizing unique contributions to the field of rocket propulsion.

Hugh Franklin Pierce is said to have lost interest in rocketry, and left RMI in 1947. He reportedly purchased a citrus farm in California, which failed; he later worked for the Douglas Aircraft Co. His fate is currently unknown.

Only John Shesta lived to see RMI's role in early rocketry fully recognized. In 1948, he received the American Rocket Society's Goddard Memorial Award for his contributions to aerospace research. He left Reaction Motors in 1952. In 1978, the sole surviving founder of the firm, he delivered a paper, "Reaction Motors, Incorporated--First Large Scale American Rocket

Company: A Memoir," at the 29th Congress of the International Astronautical Society in Yugoslavia. He later purchased a ski resort in Vermont where he died in 1987 at the age of 76.



*Astronaut Tracy Caldwell and Ed Ryan  
Manned Spaceflight Honoree – April 2002*



*Astronaut Trainers - Under Atlantis tail section -2011*

My father, Edward N. Ryan, went on to become a lead safety engineer for Aetna Insurance at their Kansas City office. He retired and moved back to Florida in 1982. He died in 1993 at the age of 76.

Long before there was a NASA; When Cape Canaveral was just a dot on the map and Merritt Island was cattle pastures and orange groves: My family was in the space industry. I often joke with people and tell them, "This is *my* space program---and someday I'll tell you why." Well, now you know. I suppose, figuratively speaking, I do have a little hydrazine in my blood - and maybe that's not such a bad thing.

The original story was written in July 2009.

\*\*\*

Author update: Mr. Edward N. Ryan Jr. retired from the Kennedy Space Center as the Chief of Training, in November, 2012. During his combined 43 year legacy of service to the space industry, he materially participated in 110 manned space flight missions, and 610 unmanned missions. Mr. Ryan personally trained 103 Space Transportation System, flight crews and five Astronaut Candidate Classes. During his space industry career, he won numerous awards and citations, both military and civilian, including the Meritorious Service Medal (twice), the Trainer of the Year Award presented by the National Environmental Training Association, NASA's Manned Spaceflight Honoree award, and the US Astronaut Corps Personal Award – The Silver Snoopy. In retirement, Mr. Ryan still supports the space industry as a docent and a training consultant to NASA at the Kennedy Space Center.

Update current as of 5/26/2014

###