



"We bring people to space — We bring space to people"

Marshall Center marks 40th anniversary



Courtesy of U.S. Army

U. S. Army Maj. Gen. August Schomburg, commander of the Army Ordnance Missile Command, speaks during the official ceremony held July 1, 1960, at Redstone Arsenal that transferred the Army Missile Ballistics Agency to NASA. The new field center was dedicated the George C. Marshall Space Flight Center on Sept. 8, 1960. Dr. Wernher von Braun, Marshall's first director, seated, looks on.

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Anniversary a time to celebrate past, look toward future

It is an honor for me to join you in marking the 40th anniversary of the Marshall Space Flight Center. The Center opened for business on July 1, 1960, and was dedicated by President Eisenhower on Sept. 8, 1960. This anniversary period, from now until Sept. 8, represents a tremendous opportunity for us to reflect on our past, assess where we are today and look toward the future of the Marshall Center. This anniversary period will culminate in a final celebration for which planning is now in progress.

— *Center Director Art Stephenson*

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"Safety — Be Cautious — Be Sound"
— *Safety slogan submitted by Johnney Mason, HEI*

NASA forms team to review Space Shuttle Main Engine test incident

Robert Sackheim, assistant director and chief engineer for propulsion at Marshall, will lead a team to review the automatic shutdown of a recent Space Shuttle Main Engine test at Stennis Space Center, Miss.

At about five seconds into the planned 200-second test of a new high pressure fuel turbopump configuration, higher than expected test temperatures caused the Space Shuttle Main Engine to shut itself



Sackheim

down using its own internal safety mechanisms.

The engine being tested was not flight configuration. It is a development unit used to validate the engine's capability to operate at higher-than-normal temperature levels. The test used a main combustion chamber smaller than those currently

flown on the Shuttle, which increases temperatures in the pumps to test for different temperature limits.

Crumbly appointed to Science, Tech Council

Marshall engineer Chris Crumbly was recently appointed NASA's representative on the National Science and Technology Council in Washington, D.C.



Crumbly

During the one-year assignment from NASA Headquarters, Crumbly also will serve as the senior policy analyst in the Technology Division of the White House Office of Science and Technology Policy. His responsibilities include counseling the President's Science Adviser and his staff on matters involving NASA and civilian space policy.

Crumbly recently returned to the Marshall Center after serving as the International Space Station

congressional affairs officer in the Office of Space Flight at NASA Headquarters, during 1999. He began his NASA career at Marshall in 1989 as a structural engineer, and served as an analyst and manager for a variety of Spacelab projects before joining the Space Station office.

Crumbly earned both his bachelor's and master's degrees in aerospace engineering from Auburn University.

He, his wife Lynn and son Preston reside in Alexandria, Va. They will return to their permanent home in Lacey's Spring early next year.

The National Science and Technology Council, established by President Clinton in 1993, is chaired by the president. The Cabinet-level council was created to establish clear national goals for federal science and technology investments, and is part of the Office of Science and Technology Policy.

Key Personnel Announcement

Christopher (Chris) E. Singer has been appointed to the senior executive service position as chief engineer in Marshall's Space Transportation Directorate.

Singer joined Marshall in 1983 immediately after graduating Magna Cum Laude from Christian Brothers University in Memphis, Tenn., with a bachelor of science degree in mechanical engineering.

He is recognized throughout NASA and the nation as an expert in propulsion technology. He has championed many enhancements to the Space Shuttle Main Engine (SSME) that significantly increases payload capacity and improves operational efficiency of the Shuttle.

Prior to his assignment as chief engineer, Singer served in a variety of important positions including assistant to the SSME program manager; technical expert and consultant for propulsion flight operations; SSME senior scientist and engineer; chief, Interface for Requirements and Integration; and SSME Propulsion Systems Team Lead.

As senior manager on detail to the Space Shuttle Support Office at NASA Headquarters in Washington, D.C., he served as executive secretary for a congressionally mandated committee of experts responsible for SSME improvements and safety.



Singer

Countdown to Safety Bowl

Marshall's Safety Bowl begins Aug. 30 and culminates with the championship on Safety Day, Oct. 18. Teams from each directorate will compete. For more information, call Irene Taylor at 544-2051.

Sample questions:

1. In terms of safety, what is "safety halt or stop work authority?"
2. What is the recommended method for protection against harmful rays from the

sun for children under 6 months of age?

- a) Use sunscreen
- b) Don't let them outside
- c) Protect them with clothing and shade
- d) No protection is needed

3. Who should be contacted for a permit if you bring a heater, coffee maker or microwave to work?

4. When driving or riding in a car, your seatbelt should....
 - a) Be unbuckled.

b) Be buckled and fit snug across your hips and across your collar bone.

c) Be buckled and tucked behind your back.

d) Be unbuckled if your car has airbags.

5. What PPE should be used when using a power mower to cut your lawn?

- a) Appropriate footwear
- b) Safety glasses or goggles
- c) Hearing protection
- d) All of the above

See Answers on page 11

Skeleton on display in Chicago

Marshall engineers first to 'see' bones of T-rex

by Debra Valine

Most of the time, it's business as usual for Marshall's Nondestructive Evaluation Team. The team uses a computed tomography (CT) system to check NASA hardware both before and after test or flight to determine extent of damage, if any.

But sometimes the team, led by Dr. Ron Beshears, is asked to do something a little unusual.

Such was the case in 1992, when Peter L. Larson of the Black Hills Institute of Geological Research Inc., in Hill City, S.D, contacted Marshall's Technology Transfer Department asking for help imaging the fossils of the largest tyrannosaurus rex dinosaur found to date. Marshall had one of few CT systems in the country capable of imaging the skull of the dinosaur, which was more than 5 feet long and



Photo by Terry Leibold, NASA/Marshall Space Flight Center

Beshears looks at image from a CT scan.

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packed in sandstone.

"Sue," the 41-foot T-rex named for paleontologist Sue Hendrickson, who found the giant fossil, went on display last month at the Field Museum of Natural History in Chicago. Hendrickson found the 65-million-year-old fossils in 1990, while walking on a Cheyenne River Reservation ranch in South Dakota, owned by Maurice and Darlene Williams.

Marshall engineers Beshears and Lisa Hediger and Lockheed Martin contractors David Myers and Bob Stowell were the first humans to "see" a section of four vertebrae from the T-rex.

The bones were sent to Marshall by the Black Hills Institute to determine if the equipment on hand could record images — through packing materials and sandstone — clearly showing the differences in sandstone and bone. If that was successful, the institute planned to ship the skull.

"It came up in the context of writing a journal article," Beshears said. "We agreed to take a look at a test article for them," Beshears said. "In May 1992, they sent a small set of fossils — four vertebrae — to see if it was possible to get enough radiation through the sandstone surrounding the fossils to make the images. Based on that test, we would decide whether or not to go ahead with the skull."

The Institute was particularly interested in examining the skull because the paleontologists believed doing it would unlock some of the mysteries of T-rex.

The first images were crystal clear, but the Marshall team never got the opportunity to examine the skull. The day before the Institute was to ship the skull, the FBI seized control of the remaining fossils, and legal action was initiated to determine who really owned them.

Federal agents seized the bones, claiming the fossil hunters failed to get a federal permit to dig for them on the rancher's land. The investigation turned up no evidence of a crime associated with the discovery.

In the end, the court declared the fossils belonged to the Williamses, and they were sold at auction for \$8.36 million to the Field Museum in 1997. The museum sent the complete set of fossils to the Boeing Co. in California to be scanned.

Then, Marshall's Nondestructive Evaluation Team went back to business as usual.

The writer, employed by ASRI, is the Marshall Star editor.

Marshall Center established July 1, 1960

This is the first in a series of historical articles the Marshall Star will published this summer on the history of the Marshall Center.

by Mike Wright

Forty years ago this summer — on July 1, 1960 — the George C. Marshall Space Flight Center in Huntsville, Ala., opened for business.

The opening followed the creation of NASA two years earlier. But the events that culminated in the establishment of the space agency and the location of one of its key field centers in Huntsville began unfolding long before that.

At its immediate founding in 1958, NASA drew most of its expertise from an institutional ancestor known as the National Advisory Committee for Aeronautics (NACA). NACA was created just a dozen years after the Wright brothers first achieved practical human flight in 1903 at Kitty Hawk, N.C. NACA was created to study the problems of flight and recommend practical solutions to basic aircraft design and construction.

Although some of the most visible activities during the early history of aviation involved stunt flyers and barnstormers, the country still seemed to view the development of the airplane as a worthy aim. For most Americans, however, rocketry fit only in the realm of science fiction.

Robert Goddard launched the world's first liquid-fueled rocket in 1926 at Auburn, Mass. Goddard's rocket traveled 184 feet. Goddard, however, shunned the spotlight and worked in relative isolation absorbed in the "immediate problems of hardware development," wrote Space Historian Roger Bilstein.

Decades went by during which areas of rocketry and space exploration received little or no attention. But in 1957, American leadership went into shock when the Soviet Union launched Sputnik, the world's first orbiting satellite.

The United States was in second place in space, something Americans were loath to accept. Sputnik's audible "beep, beep,



Courtesy of U.S. Army

Two years after the creation of NASA in 1958, the space agency established the Marshall Space Flight Center in Huntsville. More than 4,000 U.S. Army employees working for the Development Operations Division of the Army Ballistic Missile Agency were transferred to the new NASA field center on July 1, 1960.

beep," in October 1957 served as a wake up call for America, where interest in rocketry had been primarily confined to building missiles to counterbalance the Soviet threat during the Cold War.

From 1957 on, however, the United States and Russia were in a race that went beyond building missiles. It included the race to explore space.

One of those interested in the race to space was Wernher von Braun whose famous German team, along with hundreds of U.S.-born scientists and engineers, would form the nucleus of the Marshall Center in 1960.

Born in Germany in 1912, von Braun built rockets for military purposes. But his dream since childhood had been to build rockets to explore space. He and the other initial members of his team developed the famous V-2 rocket during World War II for their native Germany.

But the V-2 was not enough to turn the tide for Germany and as World War II ended, von Braun and his colleagues contemplated their fate and the possibility that their technical expertise might serve

either the post-war aims of the Allies or, undesirably, the Soviet Union.

Eventually, von Braun and his group sought out U.S. forces and surrendered. They signed contracts with the U.S. Army and moved from Germany to Fort Bliss, Texas, and was later transferred to Redstone Arsenal in Huntsville.

There the team expanded to include hundreds of U.S.-born engineers and scientists, as well as those who had worked with von Braun in Germany. Their first major success was building the Redstone ballistic missile. But von Braun's real desire was to explore space, not build weapons, and he made a proposal as early as 1954 to use a modified Redstone to launch an American satellite.

That proposal was at first rebuffed by U.S. President Dwight D. Eisenhower, who did not want the Army to build America's first satellite launcher. But Sputnik and a failed satellite launch using a Navy Vanguard rocket moved von Braun and his team into the spotlight in late 1957. On

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Charter members recall Marshall careers, changes

Editor's note: There are 16 Marshall employees — charter members — whose careers date to pre-1960. The following vignettes reflect the early days and changes that have taken place at the Marshall Center.

Robert E. "Gene" Austin

Robert E. "Gene" Austin was a member of his high school science club caught up in the space program from the day Sputnik went up. He wrote his senior paper on Wernher von Braun's dream of going to Mars.



Austin

Austin attended Auburn University and worked as a cooperative education student with the Army Ballistic Missile Agency.

He earned his degree in aerospace engineering, but his initial entry-level status didn't mean much interaction with von Braun. "It was considerably later when I saw von Braun in a

meeting. I had studied about von Braun. I had written about him. It was a thrill to work with him. He was a visionary."

Austin began his career at Marshall in the former Propulsion and Vehicle Engineering Laboratory. He recalls many high points in his career. "I think all of my career has been a high point." One, in particular, he says, was helping von Braun prepare a Mars briefing for U.S. Vice President Spiro Agnew in 1969. He believes another is his current assignment to "initiate and implement the X-33 technology demonstrator."

Throughout his career Austin has tried to "see every challenge as an opportunity" and encourages others to do the same.

Harold Bencaz

Harold Bencaz, senior project engineer in the External Tank Resident Office at Michoud Assembly Facility in New Orleans, started his career with Western Electric in the late 1950s.

Later he went to work for the U.S. Army, and eventually transferred to Marshall. "Sitting at my same desk, I went from Army to NASA," Bencaz said. He worked in Huntsville for more than 5 years before transferring to Michoud to be closer to family.

"I started as a junior engineer in the Guidance and Control Lab designing the flight control system for the Jupiter Missile." His most memorable accomplishment was the design of the flight control system for the first flight of the Saturn vehicle, a project that involved Wernher von Braun.

According to Bencaz, the most significant change at the



Bencaz

Marshall Center has been in the work force composition. "In the 1960s, leadership primarily rested with the von Braun team. Today it is diversified," he said.

He believes the 1999 reorganization focused the Center on future space transportation and that Marshall will continue to be the main Center for propulsion for the Agency.

His advice to new Marshall employees regarding the space program: "It's a rewarding career, and they will love it."

Richard Beckham

Richard Beckham joined the Army Ballistic Missile Agency in Huntsville in September 1958. He also was among those who joined Marshall when it was formed in 1960.

He received his bachelor's and master's degrees in electrical engineering from the University of Tennessee and worked first at ARO Inc., an Air Force contractor at the Arnold Engineering and Development Center at Tullahoma, Tenn., in 1956 and 1957.

His initial interest in rockets and missiles was sparked by his personal interest in computers and the exciting early stages of the space program. "I didn't even have any courses in computers in school because they were very new then," said Beckham who works in the Avionics Department in Marshall's Engineering Directorate.

Beckham remembers the differences in the computers then and now. "They were great big vacuum tube computers. They had a drum memory."

Beckham recalls Sept. 8, 1960, when President Eisenhower came to Huntsville to dedicate the new NASA field installation. He also remembers the Apollo era as the Marshall Center peaked at 7,500 civil service employees. Beckham worked on requirements for the huge Saturn Instrument Unit.

He said the major difference in then and now is that his work is more structured. "We make sure the software requirements are met for engine tests and flights."

James Blanche

James F. Blanche started working in Huntsville March 1958, in Bldg. 4487, exactly where he works today. He transferred to NASA from the Army Ballistic Missile Agency.

Blanche, an electrical engineer, is the group leader of the EEE Parts and Packaging Group.



Beckham



Blanche

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He calls his career “an adventure.” He has been a participant and witness to some of the greatest achievements in space flight. He especially remembers witnessing Alan Shepherd’s first flight from an unusual viewpoint “on the floor under a table.” There was only one television in the building, he said. “I think everybody was there to watch, and that’s the only place I could find.”

Blanche remembers the thrill of a Saturn V launch. “Actually being there and seeing that Saturn V take off is something that defies description,” Blanche said. “You could ‘see’ the sound coming across the water, and it was so loud you felt like it might lift you off the ground.”

By 1972, Blanche had technical responsibility for the integrated electronic assembly on the solid rocket booster. “It’s the brains of the solid rocket booster.”

Today Blanche believes that space transportation is without question, where Marshall’s role lies in this decade. Blanche tells anyone looking for a job with NASA to “go for it.”

Salvadore Caruso

Indirectly, at least, Salvadore (Sal) Caruso, a native of New Orleans, went to work for the Army in Huntsville in 1959 because of Fidel Castro.

Caruso had worked for a metals processing plant in New Orleans prior to coming to Huntsville. His future changed, however, when Castro seized the mine that the New Orleans company had relied on in Cuba. “That meant I was out of a job. I didn’t know much about the aerospace industry. I just needed a job as a chemist,” Caruso said.

He was hired to work in the Army’s Materials Branch, currently Marshall’s Materials Processes and Manufacturing Department.

Today, Caruso is still a supervising chemist for the U.S. government. Instead of working for the Army, however, he works for Marshall in the

same corner of Bldg. 4612 where he started in 1959. For about 20 intervening years, he worked in the Astrionics Lab at Marshall performing microelectronic processing and materials research.

Caruso remembers the 1959 newspaper headline, “Congress Approves Saturn Program.” He also remembers walking across Martin Road to the Army transfer ceremony that marked the opening of the Marshall Center. He left his office in Bldg. 4612 on July 1, 1960, as a U.S. Army employee, and came back the same day as a NASA employee.

Caruso has enjoyed his NASA career. “It has passed fast,” he said.



Caruso

Werner Dahm

“It was more like yesterday,” said Werner Dahm, reflecting on his 40 years at the Marshall Center. Dahm, a Marshall charter member, began his U.S. career in rocketry in 1947 when he joined the Wernher von Braun rocket team at Fort Bliss, Texas.

Dahm originally worked with von Braun in Germany during World II. Von Braun came to the United States in 1945, and in 1946 an American officer in Europe offered Dahm a contract to join other members of the von Braun team then at Fort Bliss.

He moved with the team to Huntsville in 1950 and joined the Marshall Center in 1960. Dahm, Marshall’s chief aerodynamicist, said he still works at Marshall “so I can help the younger people get a better start.”

Dahm, respected as a mentor for young generations of engineers in fluid dynamics, maintains his sense of humor about his longevity and about his role at the Center.

Over the years, Dahm has had several inventions, earning patents for devices including a Wind Measurement System, Focused Laser Doppler Velocimeter and Clean Air Turbulence Detector.

Many look to him as a living library for technical information on rocketry.

Uwe Hueter

“There was never any doubt in my mind that I would pursue a career in the space program,” said Uwe Hueter who joined the Marshall Center in 1960.

“It kind of intrigued me,” he said. “I lived through all of it growing up since my dad was an original member of the von Braun team that came to the United States in 1945.”

Hueter’s most vivid memories of Huntsville in the 1950s focus on the extreme shortage of housing needed to support the growing population.

As a kid growing up, he mowed von Braun’s lawn. Early on, he was amazed at von Braun’s ability to communicate.

“Communication was his greatest skill, followed by his vision, leadership and scientific grasp of things.”

Hueter graduated from the University of Alabama with a degree in mechanical engineering. One of his first Marshall assignments was a sound suppression system for Saturn V testing. Later he worked on the Skylab Apollo Telescope Mount, Spacelab — an opportunity that meant traveling to Europe where he reunited with some of his family — and Space Station.



Dahm



Hueter

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Hueter believes the greatest difference in the 1960s and Marshall today was the sense of urgency. "People were very focused on the lunar landing."

John Key

John Key started working for the Army Ballistic Missile Agency in Huntsville on Sept. 3, 1958.



Key

Like many other Marshall charter members, he began work as a cooperative education student. Key was among those who transferred from the Army to the newly formed Marshall Center 40 years ago this month.

"I started out in industrial engineering and kept up with a lot of manpower statistics," Key recalled.

Today, Key has a different perspective on the history of Marshall than other charter members. He has viewed

the Center for more than 20 years from the Marshall resident office at the Kennedy Space Center, where he is a lead for the Solid Rocket Booster Project Office.

He calls working on solid rocket boosters "the biggest part of my career." He believes one of the most significant changes at Marshall over the last 40 years relates to communications.

"Communication is much better than it was in the early days," Key said. "Basically I have been in the field for the last 22 years and I have had to do a lot of communicating."

Key has enjoyed his career with Marshall. "It is a good place to work. It is exciting."

Alex McCool

Alex McCool began his professional career in 1948 with the Corps of Engineers in Mississippi. He came to Huntsville in 1954 to join the rocket research and development team at Redstone Arsenal.

When word spread in the late 1950s that many Army employees in Huntsville might have the opportunity to join NASA, McCool made his decision.

"That looked like where Wernher von Braun was going, and we had all been working very closely with him."

In 1960, he transferred to NASA when the Development Operations Division of the Army Ballistic Missile Agency became the nucleus for establishing the Marshall Center. Today, he is manager of the Space Shuttle Projects Office.

McCool began his career in space and rockets by analyzing rocket propulsion systems. "We didn't have all the analytical



McCool

tools we have today. You had to know the math." McCool later served as chief of Astronautics Laboratory Projects Office; acting director of the Astronautics Laboratory; director of the Structures and Propulsion Laboratory; and director of Marshall's Safety and Mission Office.

But he said his greatest satisfaction doesn't stem from working with space hardware. The most rewarding part of his career has been working with people. "People are what makes it go."

Ron McIntosh

Ron McIntosh went to work for the Army Ballistic Missile Agency in Huntsville in December 1959 before transferring to the Marshall Center in 1960.

"I had been in the library at college and heard a buddy talking about the rockets they were building in Huntsville." As a result, McIntosh enrolled in a cooperative education program and spent his first quarter calibrating and testing gyros for the Redstone rocket.

The Saturn V era was his most memorable experience at the Marshall Center. His team was responsible for guidance and navigation on the Saturn V. "Everybody was focused on that one system. It was totally different.

McIntosh remembers how Wernher von Braun would read about an issue in the weekly notes, "just get in his car, come down to the laboratory and find the person who was responsible." He recalls his first such experience. "I had just taken a drag on a cigarette, turned around and there he was. I didn't exhale for a few seconds. Then he said, 'It's okay go ahead.'"

McIntosh believes that young people interested in the space program should carefully gauge their interest in a particular discipline and then go for it if they feel it is right.

Ann McNair

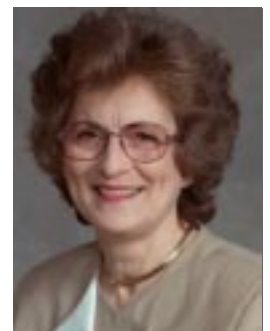
Ann McNair received her degree in mathematics and physics in 1958 from the University of Alabama. She worked at Redstone Arsenal with the Army Ballistic Missile Agency as a summer student during college.

She transferred to Marshall in 1960 and by 1963 was head of Marshall's Mission Studies Section in the Aero-Astronautics Laboratory.

Her initial work involved Saturn orbital trajectory studies and determining how long satellites might remain in orbit. Early on, she



McIntosh



McNair

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authored papers on the lifetime of satellites and on comparing onboard and ground tracking for lunar missions.

McNair remembers the Saturn/Apollo era and the leadership of Dr. Wernher von Braun. She seldom interacted directly with von Braun, but remembers the shadow he cast. "I was just in awe. I can remember how all of us worked so hard to generate the flip charts that would go up to his office."

Today, McNair is manager of the Ground Systems Department in Marshall's Flight Projects Directorate and talks with enthusiasm about her career. "I have always loved the work in which I have been involved."

She also has a positive attitude regarding the many changes she has seen. "If everything stayed the same, what would it be like! I have found it very exciting to see things change."

Kenneth Reed

"I started at Marshall in 1960 as a co-op student from Georgia Tech," said Kenneth L. Reed, an electrical engineer in the Avionics Systems Group. After graduating in 1962, Reed joined full-time.

"Just like the 'Rocket Boys', I was interested in coming to work for a state-of-the-art space-related company."

Reed started his career by designing circuits, packaging them and getting them through qualifications for flight. Some of his circuits flew on the first Saturns.

Working Skylab mission support was a high point for Reed. "We had three, eight-hour shifts that provided around-the-clock mission support. We operated six days on, and three days off from May 1973 through 1974.

Reed also worked on the Chandra X-ray Observatory project in the chief engineer's office from 1984-1999. "It was a project that should provide a wealth of scientific data for many years to come."

In the next decade, Reed feels a mission to Mars is a must. "I think a Mars mission would revive public interest in space exploration."

Reed said his time at Marshall — on the cutting edge of technology — has been exciting and challenging, and that is what he wants to pass along to those interested in working at NASA.

Axel Roth

Axel Roth, who graduated from Auburn University in 1959, has seen Marshall change in several ways since he joined the Center in 1960.

In those days, Roth and a buddy sometimes raced each other



Roth

to do shear and bending moment analysis using the old style Marchant and Frieden electro-mechanical calculators. Roth's calculations were for Alan Shepard's Redstone rocket, as well as for several forerunners to the Saturn V.

Roth is a second-generation member of the Marshall team. His father, Ludwig Roth, was a member of the original Wernher von Braun rocket team.

He says the biggest change in Marshall is that the Center had one major mission in the 1960s. He also says communication has gotten more informal.

"We were focused on one project, the Saturn V," Roth said. "Communication was not as open as it is now. In those days even your division chief was a high and mighty figure — lab directors were almost like gods."

Roth says his own career has been filled with exciting and challenging opportunities. One of the best, he said, was Spacelab. "We were working on real hardware which meant that in a year or so you could see the results of your work. "In reality, I've enjoyed every assignment I've had at the Marshall Center," he said.

Jerry Smelser

Jerry Smelser earned his degree in mechanical engineering from Auburn University and joined the Marshall Center when it was established in 1960.

"As a young engineer in the 1960s, space exploration was the place to be," he said. Saturn was one of Smelser's initial assignments. "Nothing compares to Apollo 11 and July 1969," he said extending credit to Wernher von Braun who "had all the squares filled."

Skylab brought new challenges for Smelser. "I was project engineer for the first manufacturing in space experiments that the United States had ever performed," he said.

In 1975, Smelser moved to the Shuttle Projects Office. The first Shuttle flight and the Shuttle's return to flight in 1988 are etched in his mind. For 25 years, Smelser has devoted most of his career to the Space Shuttle External Tank and Main Engine Projects.

He recalls the huge full-size drawing of the tank that lined the wall of the Michoud Assembly Facility in New Orleans where the tank was built. His work over the years involved tooling, structures, production, logistics and project management.

He sums up his career by adding, "For a young engineer who came out of college in the late 1950s, I couldn't have found a



Smelser



Reed

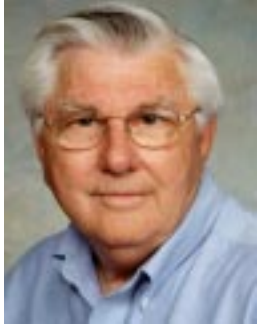
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place more rewarding than Marshall Space Flight Center.”

Bill White

Bill White, a specialist in testing, measuring instrumentation and sensor development in Marshall’s Avionics Department, began his career in May 1956 in rockets and space working for the Army.



White

The first test stand he worked on with the Army Ballistic Missile Agency was the Historic Redstone Test Facility. He was part of the team that put the first U.S. satellite in orbit, which paved the way for the Mercury Program and initial space flights for Alan Shepard and John Glenn. White also is proud of his contributions to

other programs including the Apollo, Skylab and Shuttle.

According to White, Marshall’s most significant changes have been in the utilization of computers, design and testing philosophy. Years ago the process was to build a system, test it and then correct design deficiencies, he said. He also supports today’s emphasis on keeping safety at the forefront of all programs.

White remembers Wernher von Braun. “I never worked with anyone that did not have great respect and admiration for von Braun.”

White said Marshall has a key role in developing propulsion systems that out-perform all others and in developing advanced avionics systems, smart sensors and health monitoring for vehicles and payloads.

Anniversary

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Jan. 31, 1958, the team used a modified Redstone Rocket called Jupiter-C to launch Explorer I, America’s first orbiting satellite.

For months following Explorer I, U.S. leadership debated whether the exploration of space should be administered by a military or civilian organization. The debate culminated with the creation of NASA, a civilian agency, on Oct. 1, 1958.

As stated earlier, a major portion of the new space agency, came from NACA, an organization primarily devoted to aeronautics. But what about the new agency’s role in astronautics in developing space launch vehicles?

“It seemed to me that we were starting [NASA] virtually from scratch and with little in the way of rocket propelled

launching systems,” said T. Keith Glennan, who served as NASA’s first administrator. “I had come to the conclusion that the nation’s space program would advance most rapidly if we had within our framework the so-called von Braun team in Huntsville.”

On Oct. 21, 1959, President Eisenhower signed an executive order indicating that personnel from the Development Operations Division of the Army Ballistic Missile Agency in Huntsville would be transferred to the new NASA field center in Huntsville, subject to the approval of Congress.

On March 15, 1960, a Presidential Executive Order announced that the space complex within the boundaries of Redstone Arsenal would become the George C. Marshall Space Flight Center. The Army

He said young people should find “work that you enjoy, and do it well.”

Ray Woods

Shortly before joining the Marshall Center in 1960, Ray Woods had finished four years in the U.S. Air Force and started a job working in the commissary on Redstone Arsenal.

Woods soon learned that NASA was forming a field center in Huntsville. “I decided that it would be a very interesting career. And it has been.”

Woods started work in the Purchasing and Contracting Office and is still working in procurement at Marshall. The major portion of his career involved the Space Shuttle. In 1997, he began work in the procurement policy and review area.

“My most memorable experience working here has been working with the Shuttle Projects. “Those were the best times I’ve spent here.”

Woods also remembers the Saturn/Apollo era. “There were several thousand people working here at the peak time in the mid-1960s. Then things slowed down. They picked up again with the Shuttle.”

He believes the greatest role ahead for Marshall is preparing for the next generation launch vehicle.

He sums up his years at Marshall: “I don’t know of any other place I would rather work. I think NASA is really a great place. It offers many challenges and opportunities.”



Woods

would continue its growing task of developing and providing military rockets and systems. Marshall would assume responsibility for providing launch vehicles for the civilian exploration of outer space.

On July 1, 1960, the new Center officially came into being as 4,670 civil servants previously associated with the Army became NASA personnel.

Formal dedication ceremonies were held on Sept. 8, 1960. At that ceremony, President Eisenhower said he was dedicating the new Center in honor of his war-time colleague and post-war statesman, Gen. George C. Marshall.

Both NASA and the Marshall Center stood at the threshold of America’s future in space.

The writer is the Marshall historian.

Marshall barbers here nearly as long as charter members

by Debra Valine

They are not official Marshall Charter members, but they may as well be. They've been here nearly as long — 37 years in March for Ron Saddler, a little longer for Arthur Hodge, his partner in the S&H Barber Shop in Bldg. 4203.

Through the years, the barbers have cut hair for all the Center directors except one.

And they have stories they will tell.

"One morning, Art was cutting Dr. von Braun's hair," Saddler said. Dr. Wernher von Braun was Marshall Center director from July 1960-February 1970. "This little German gentleman came into the shop and said to von Braun, 'There you are Wernher, I have finally caught you'. Von Braun replied, 'I am reading the newspaper and getting my hair cut. If you want to talk with me, call my secretary and she will make you an appointment.' The other gentleman said, 'I called your secretary and she won't make me an appointment!' And von Braun replied, 'Then apparently I don't want to talk to you, do I?'"

Hodge tells another story.

"I cut von Braun's hair most of the time," Hodge said. "He never knew the price of a hair cut, and he never had any money. One time he told me he would tell his secretary Bonnie Holmes to send the money for the haircut to me. That was on a Monday. By Friday, I still had not received payment for the haircut. I called Bonnie and explained this to her. She apologized and sent the money right down. After that, I just called Bonnie when he had a haircut."

One former Center director, Porter Bridwell, still gets his hair cut at S&H Barber Shop. Bridwell was Center director from January 1994 to February 1996. "I have been cutting Porter's hair for 35 years," Saddler said. Saddler also remembers that J.R. Thompson was a friendly, well-respected gentleman. Thompson was Center director September 1986 through July 1989.

Dr. William R. Lucas, Center director from June 1974-June 1986, regularly visited Hodge for his haircuts. "He always came in at 4:30 p.m.," Hodge said. "He preferred not to get his hair cut during regular work hours, but at quitting time it was OK. I guess he was setting the right example."

As with any long-term establishment, the S&H Barber Shop has a character all its own. Behind Saddler's chair, lined up on a wall shelf, is his collection of Southeast Conference football caps. Some



Photo by Dennis Olive, NASA/Marshall Space Flight Center

Saddler and Hodge have provided barber services at Marshall for more than 37 years.

of Saddler's customers, who graduated from schools represented in the collection, have signed caps from their alma maters.

"I have a Georgia Tech cap with Dr. Wayne Little's, autograph," Saddler said, "a Florida State cap signed by Center Deputy Director Carolyn Griner, and a Purdue University cap signed by Bridwell." Little was Center director from February 1996-January 1998.

Hodge has a collection lining his walls, too. He displays his own, original art. Hodge takes photographs in black and white and hand tints portions of the print for emphasis. "I have sold a number of pictures that have been on display in the shop," Hodge said.

"We formed the partnership in the barber shop in 1972," Saddler said. "You will never see two people work together as good as we do for all this time and not try to kill each other."

Art's son, Ashley Hodge, also works in the shop. Ashley usually cuts current Center Director Art Stephenson's hair. Saddler and Ashley Hodge are there every day, and Arthur Hodge works Wednesdays, Thursdays and Fridays. The shop accepts walk-ins or appointments from 8 a.m.-5 p.m. daily. Call 881-7932 to schedule an appointment.

The writer, employed by ASRI, is the Marshall Star editor.

Job Opportunity

Reassignment Bulletin 00-28-CP, AST, Aerospace Flight Systems, GS-861-13/14. Science Directorate, Microgravity Science & Applications Department, Systems Engineering Group. Closes July 12.

Obituary

Drost, Edward J., 73, of Huntsville, died June 11. He retired from Marshall in December 1980, where he worked as an electronics engineer.

Dixon, Robert L., 72, of Huntsville, died June 16. He retired from Marshall in January 1988, where he worked with solid propulsions systems.

Most days it's business as usual for Nondestructive Evaluation Team at Marshall

by Debra Valine

Marshall's Nondestructive Evaluation Team uses computed topography (CT) to check hardware and equipment to find flaws and wear so small they are invisible to the human eye.

Dr. Ron Beshears, a physicist on the team for the past eight years, works with Lockheed Martin contractors David Myers and Bob Stowell.

Lisa Hediger, who now works in the Safety and Mission Assurance Office, in 1987 worked with Bio-Imaging Research to design and construct the system.

Marshall uses the CT system to help qualify hardware by checking the parts both before and after use to determine the amounts of heat the part can withstand.

"Ordinarily we use the CT for Fastrac — MC-1 — engine nozzles, reusable solid rocket motor nozzles, aluminum castings for the Space Shuttle Main Engine and a lot of general composite hardware for all the projects," Beshears said.

"Basically CT slices give you a view like you would see if you cut the part open and looked at a cross section," Beshears said. His team also uses computer software to combine the slices and create a 3-D image. The 3-D images allow technicians to more closely examine the parts to detect cracks or other faults.

The original system cost \$4 million in 1987. An upgrade in 1997 cost \$250 million. The CT scanner averages 20-30 minutes to create a slice.

"In the first 10 years, the team generated about 13,000 slices," Beshears said. "Since the upgrade, we have run approximately 10 thousand slices. Our productivity has accelerated because of the upgrade. We now have full-time utilization of the system." The team has imaged 75 or 80 Fastrac nozzles since 1997.

Sometimes we get unusual little projects from the Technology Transfer Department — like the dinosaur fossils we scanned in 1992, but most of the time it's business as usual, Beshears said.

The writer, employed by ASRI, is the Marshall Star editor.

New images suggest present-day sources of liquid water on Mars

In what could turn out to be a landmark discovery in the history of Mars exploration, imaging scientists using data from NASA's Mars Global Surveyor spacecraft have recently observed features that suggest there may be current sources of liquid water at or near the surface of the red planet.

NASA scientists compare the features to those left by flash floods on Earth.

"We see features that look like gullies formed by flowing water and the deposits of soil and rocks transported by these flows. The features appear to be so young that they might be forming today. We think we are seeing evidence of a ground water supply, similar to an aquifer," said Dr. Michael Malin, principal investigator for the Mars Orbiter Camera on the Mars Global Surveyor spacecraft at Malin Space Science Systems (MSSS), in San Diego, Calif. "These are new landforms that have never been seen before on Mars."

The findings will be published in Friday's issue of Science magazine.

"Twenty-eight years ago the Mariner 9 spacecraft found evidence — in the form of channels and valleys — that billions of years ago the planet had water flowing across its surface," said Dr. Ken Edgett, staff scientist at MSSS and co-author of the paper in Science. "Ever since that time, Mars science has focused on the question, 'Where did the water go?' The new pictures from Global Surveyor tell us part of the answer — some of that water went under ground, and quite possibly it's still there."

"For two decades scientists have debated whether liquid water might have existed on the surface of Mars just a few billion years ago," said Dr. Ed Weiler, associate administrator for space science at NASA Headquarters. "With today's discovery, we're no longer talking about a distant time. The debate has moved to present-day Mars."

"I think one of the most interesting and significant aspects of this discovery is what it could mean if human explorers ever go to Mars," said Malin. "If water is available in substantial volumes in areas other than the poles, it would make it easier for human crews to access and use it — for drinking, to create breathable air, and to extract oxygen and hydrogen for rocket fuel or to be stored for use in portable energy sources."

Answers

Continued from page 2

1. The authority to stop an operation if an unsafe act or condition exists.
2. c) Protect them with clothing and shade
3. The Building Manager or their appointed assistant
4. b) Be buckled and fit snug across your hips and across your

collar bone.

5. d) All of the above

For more Safety Bowl questions, see "Inside Marshall," "Daily Planet," and ETV.

Employee Ads

Miscellaneous

- ★ John Deer riding mower, 12.5HP, 30", \$1,200. 852-6569
- ★ Schwinn bicycle, ladies lightweight, chestnut color, 27" tires, rack over rear wheel, \$60. 539-0094
- ★ Large wooden desk, \$75; large office chair, \$40; sofa sleeper, \$125; entertainment center, \$40. 534-0939
- ★ Springdale Lenox china, eight 5-piece settings, minus one replaceable saucer, \$450. 883-0683
- ★ Bookshelf, constructed as built-in, 96"hx35"w, lower cabinet, stained white w/four movable shelves, \$75. 772-1831
- ★ Sega Genesis III w/two games, Eternal Champion Fighting/Primetime football, \$50. 544-6393
- ★ Older 8HP Snapper riding lawn mower w/bagger, frozen engine, lots of new parts and tires, \$75. 461-8394
- ★ 1987 Stratos Bassboat, 19'3", 200 Mercury, 12/24 TM, two depth finders, garage kept, \$6,500. 233-5032
- ★ Bose full range stereo speakers, pair, \$70; Wireless headphones, pair, \$15; other items. 852-6952
- ★ Oak entertainment center, stereo, TV, storage area, 53"hx55"w, for 30" TV, \$100. 772-1831
- ★ Aquarium, new, 48-gallon, 4-foot long fish tank w/hood and lights, \$50. 461-1680
- ★ Baby bed w/mattress, used 1 year, \$100. 534-8176
- ★ Missionary-style queen-size bed w/matching nightstand, from Spiegel, white, \$150 obo. 880-0159
- ★ Camper shell for Nissan king-cab truck, sliding windows, pearl gray, \$700. 880-9025
- ★ Toca Limited Edition Series Conga, emerald green w/24 carat gold hardware, \$250 obo. 651-7144
- ★ Solar panels, 3'x8', two, complete w/accessories, heat exchanger, pumps, tubing, etc., make offer. 837-0722/Ray
- ★ Truck bedliner & tailgate, late model full-size Chevy, installed, 1-year old, \$80. 864-0465
- ★ Kenmore washer and dryer, \$75 each. 461-0393
- ★ Little Tikes Pooh Rumbly Race car, converts from push-car to foot-powered ride, \$30. 726-8848
- ★ San Juan 21' sail boat, 80 percent restored, new sails, etc., \$1,000 obo; baby items. 721-6572
- ★ Ibanez Stagestar electric guitar, Crate GX-15 amp, Quicktuner, beginner video/book &

accessories, black, \$300. 830-2806

Vehicles

- ★ 1995 Mazda Miata, red, convertible, AM/FM cassette, PW, 62K miles, \$9,000. 830-0254
- ★ 1991 Ford Econoline Conversion van, automatic, 7-passenger, 100K miles, \$4,900. 232-0797
- ★ 1989 GMC S-15 Jimmy, 4WD, 4.3L, black/blue, 208K miles, \$3,400 obo. 837-6517
- ★ 1987 Nissan Stanza GXE, all power, 4-door, a/c, 5-speed, Michelin tires, \$1,800. 837-3746
- ★ 1972 Chevy truck, SWB, orange/white, 350 engine, 350 transmission, a/c, many new parts, \$7,500 obo. 851-2929
- ★ 1977 Dodge club cab pickup truck, 3/4 ton, needs motor, \$300 obo. 852-0996
- ★ 1998 Ford Ranger XLT, sportside, 5-speed, air, CD, 23K miles, sliding rear window, \$10,500. 533-4504
- ★ 1990 Acura Legend, leather interior, 118K miles. 895-8385
- ★ 1986 Isuzu Trooper, 4WD, a/c, 5-speed, \$3,200 obo. 828-3169 after 5 p.m.
- ★ 1993 Chevrolet Lumina, APV van, white w/red stripe, \$3,900. 881-5809
- ★ 1982 Dodge conversion van, \$1,200. 883-2653
- ★ 1997 Dodge Grand Caravan LE, white, 61K miles, captains chairs, rear a/c, extended warranty, \$15,000. 880-9400
- ★ 1994 Buick Park Avenue, 91K miles. 931-433-6358
- ★ 1992 Escort LX wagon, cabernet red, 87K miles, one-owner, 5-speed, a/c, AM/FM cassette, \$3,800. 464-9910/730-7148
- ★ 1983 Chevy Scottsdale, full-size, automatic, a/c, new tires, \$2,700. 859-9744
- ★ 1989 Blazer S10, 165K miles, white, 2-door, V-6, air, automatic, moon-roof, \$2,450. 883-8947

Free

- ★ Electric kitchen stove, 40" size, works. 534-4968
- ★ Kittens, litter box trained. 379-4412
- ★ One-year old black mixed lab, all shots. 232-4338

Found

- ★ Watch in Bldg. 4200 parking lot. Call 544-4758 to identify

Lost

- ★ Pin, 1928 style w/teardrop pearl, Call 544-4541 if

found

- ★ File folder, Bldg. 4200 parking lot. Call 544-4758 if found

Carpool

- ★ Opening for one in established carpool from Guntersville, 7 a.m. - 3:30 p.m.. Call 544-8010

Wanted

- ★ Dorm-sized refrigerator in good condition. 880-6792
- ★ Good home for chocolate and white lady spaniel found near Gurley, smart, friendly. 776-9684
- ★ Roommate for 2-bedroom apartment in Madison. 971-0048

Center Announcements

- ☛ **Household Hazardous Waste Disposal** — Madison County and City of Huntsville households can dispose of old paint, lawn/garden poisons, automotive fluids, cleaners and other chemicals at the Handle With Care, Household Waste Collection Center. Household waste may be turned in typically on the first Saturday of the month from 8 a.m.-noon at 4100 Leeman Ferry Road. For more information, call 882-0155 or 880-6054.
- ☛ **Barbershop Closed** — S&H Barbershop in Bldg. 4203 will be closed July 3 and 4 for the holiday.
- ☛ **Charlie's Grill Closed** — Charlie's Grill in the basement of Bldg. 4200 will be closed July 3.
- ☛ **Photo Lab Retirees Meet** — Due to the July 4 holiday, the Photo Lab retirees will meet at 9:30 a.m. July 11 at Shoney's at the corner of University Drive and Memorial Parkway. Meetings normally are held the first Tuesday of each month. For more information, call Carl Dow at 461-8181.
- ☛ **Flags over Georgia Discount Tickets** — Tickets — at \$19.50 each — are available at the NASA Exchange Space Shop. The tickets are good for the entire 2000 season. For more information, call Candy Bailey at 544-2185.
- ☛ **'MoonDreams'** — "MoonDreams," an original Broadway-style musical written by Rhett Parrish in conjunction with the Von Braun Celebration of the Arts & Sciences, will be July 20-22 at the Von Braun Center Concert Hall. Performances are 7:30 p.m. nightly with a 2:30 p.m. matinee on July 22. Tickets are on sale at the Von Braun Center Box Office at 533-1953 and all Ticketmaster locations (800) 277/1700 or www.ticketmaster.com

MARSHALL STAR

Vol. 40/No. 42

Marshall Space Flight Center, Alabama 35812
(256) 544-0030
<http://www1.msfc.nasa.gov>

The Marshall Star is published every Thursday by the Internal Relations and Communications Department at the George C. Marshall Space Flight Center, National Aeronautics and Space Administration. Contributions should be submitted no later than Monday noon to the Marshall Internal Relations and Communications Department (CD40), Bldg. 4200, room 101. Submissions should be written legibly and include the originator's name. Send electronic mail submissions to: intercom@msfc.nasa.gov The Marshall Star does not publish commercial advertising of any kind.

Acting Manager of Internal Relations
and Communications — Tereasa Washington
Editor — Debra Valine

U.S. Government Printing Office 2000-533-127-20004

PRE-SORT STANDARD
Postage & Fees PAID
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