



THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno

March-April 2018

This issue is dedicated to former CVA president Clarence Funk 1928-2017



Opportunity Rover Passes 5,000 Martian Sols

On February 17, the Mars Opportunity Rover celebrated its 5,000th operational Martian day since landing on the Red Planet in 2004. It is still going strong after almost 14 Earth years, has traveled more than 28 miles across the Martian surface, and sent back to Earth over 225,000 images, as well as priceless amounts of scientific data. Its sibling Spirit lasted almost 7 Earth years before falling silent in 2011. Not bad for a pair of machines that were launched with 90 day warranties. Image-NASA/JPL

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Central Valley Astronomers**Web address**www.cvaafresno.org**Webmaster-Scott Davis****Officers and Board- 2018****President-
Scott Davis****1st Vice-President-
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Lynn Kleiwer****Secretary/Treasurer-
Steve Harness****Star Party Coordinator-
Brian Bellis****Historian/Observer Editor-
Larry Parmeter****Director-
Warren Maguire****Director-
Clarence Noell****Director-
Joe Griffin****Number of exoplanets
found as of February,
2018-3,824****How many more are out
there?****Tens of thousands?
Hundreds of thousands?****Fellow astronomers,**

As we leave the season of winter and transition to spring, the likelihood of good weather for our star party events increases significantly. Sometimes, however, we get lucky: thanks to warm weather and clear skies, we had a wonderful night of observing at Eastman Lake for our February 17 star party. We had about a dozen scopes and a good number of visitors, including a couple families who heard about our star party on Facebook and were treated to a wonderful view of the dark night sky!

The members of the Central Valley Astronomers Board of Directors met during the month of January. Among other topics, we formed committees that aim to improve our club membership and community involvement as well as improve the sky conditions in the Fresno/Clovis area.

The Dark Sky Initiative Committee consists of Brian Bellis, Fred Lusk, and Shawn Clark. Their goal will be to research what other cities have done to improve and preserve their night skies, whether they are near a professional observatory or not. They will then take that research and begin the process of working with our local city and county supervisors to ensure that new developments make a smaller impact on light pollution, while simultaneously working with existing buildings to reduce their impact as well. It will likely take a lot of time and work, but perhaps someday it will be possible to do public-centered observing events from dark skies without the long drive!

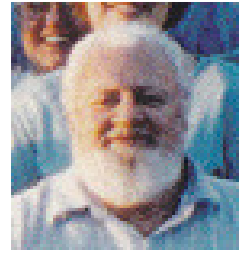
We have also formed the Young Astronomers Program Committee, comprising Lynn Kliever, Larry Parmeter, and myself. Together, we will be developing a rigorous program combining knowledge and skill elements. Participants in this program will need to remain active for at least a year to complete all of the required competencies, and completers will receive a brand-new Dobsonian telescope purchased by the club. Our main premise is, "if you invest in us, we'll invest in you." We hope this program will see several participants per year, and that the longer time requirement will result in more young members joining and staying engaged in the club.

I feel that these two programs have the potential to improve our club and increase its membership, as we continue to strive to "make astronomy cool again" – especially for others. I want to encourage all members to see how they can help us grow the club and make it better, so that our community continues to thrive for decades to come.

As always, may you have clear skies!**Scott J. Davis-President, Central Valley Astronomers**

In Memoriam-Clarence Funk

Clarence Funk, long time CVA member, and president for almost fifteen years, died on December 20, 2017, at age 89. He was a cabinetmaker by profession, and, along with astronomy, enjoyed leatherworking as a hobby. He was a member of CVA for over 40 years, and, besides president, held several other officer positions in the club. (Clarence was in his last year as president when I joined CVA in 1991. Although I did not know him well, he was always helpful and encouraging in my astronomical interests-the editor). Clarence was an enthusiastic amateur astronomer who built his own telescopes and helped others not only build theirs, but also better understand the stars and the heavens His valuable expertise, leadership, and friendship will be missed.



Profiles in Astronomy

Halton Arp 1927-2013

Arp was born and raised in New York City, and educated at Harvard. For graduate school, he moved to Caltech. After receiving his doctorate in 1953, he took a position with the Mount Wilson Observatory in Pasadena. In 1957, he also became a member of the Palomar Observatory.

Arp's career was highly controversial. He specialized in what were called peculiar galaxies, those that looked odd or distorted out of shape. He studied them for many years, and eventually compiled a catalogue of such objects. He concluded that each was the result of two or more galaxies that had collided or incompletely merged. In the 1970s, he made waves in the astronomical community by asserting that the Big Bang never happened, and that all the redshift studies supporting it were wrong. He also started studying possible connections between galaxies and quasars. He noticed that some quasars were next to galaxies, and, to him, seemed to be connected by bridges or ropes of gas and dust. Arp asserted that, contrary to most previous research, the quasars were not far away as their redshifts seemed to indicate, but the recently ejected cores of much closer galaxies. As a result of this, he claimed that redshifts were unreliable and misleading as distance indicators. Over the next several years, other astronomers who followed up on Arp's claims concluded that his supposed connections between galaxies and quasars were mostly optical illusions or mere coincidences. They also found, as had earlier researchers, that redshifts, when backed up with other methods of distance measurements, were accurate. As a result, Arp started having his research proposals for telescope time rejected. Eventually, by 1981, he received no telescope time at all. Shortly afterwards, he resigned from Mount Wilson and Palomar, and took a position at the Max Planck Institute for Astrophysics in Munich, (then) West Germany. He stayed there for the rest of his life, but never again did any research of consequence.



Some scientists feel that Arp was treated unjustly, and should have been given further chances to show his theories about quasars and redshifts. Others, though, say that he was too insistent on pushing ideas that had been discredited, and should have known when to quit. His catalogue on peculiar galaxies, however, remains a standard in the field, and is still used by astronomers today.

Stellar Stories

Mizar and Alcor

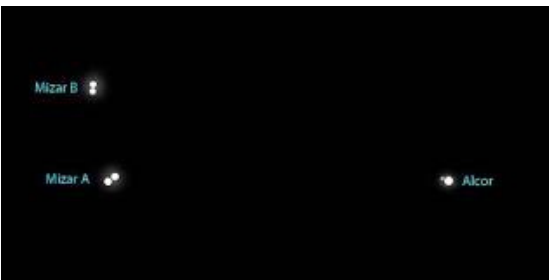
Mizar and Alcor are the “crook stars” of the handle of the Big Dipper. Mizar, designated Zeta Ursae Majoris, is actually a double binary system, and Alcor, known as 80 Ursae Majoris, is a binary system, so the entire system consists of six stars, and is about 85 light years from Earth.

The Mizar system is the brighter and larger of the two, with an absolute magnitude of .91. The main star, Mizar A, an A2 type star with a very faint companion, believed to be a dwarf star, circling it. The second star, known as Mizar B, is an A7 type with a very small companion, also believed to be an A type dwarf star. Mizar B has an absolute magnitude of 4. Both Mizar A and B are spectroscopic binaries. Alcor is classified as an A5 type star, and its small companion is believed to be a class M red dwarf. Alcor has an absolute magnitude of 2.1.

The name Mizar comes from Arabic, and means “cover” or “wrapping.” Alcor is also an Arabic name and translates to “the lesser one” or “the neglected one,” apparently a reference to its diminished status next to Mizar. To the Arab astronomers it was known as the “Horse and Rider.” The Arabs also saw the two as a mother and child, and it figured prominently in Arab stories. In Latin, the system was known as Equis Stella, the “Starry Horse.” In 1617, Mizar was the first binary to be seen with a telescope, and was later studied intensely by Galileo. In 1889, William Pickering at Harvard discovered that Mizar was a spectroscopic binary. Studies in the early 1900s showed that Mizar and Alcor have the same proper motion and are moving together, but it is not yet known if they are gravitationally bound.



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JWST Launch Now Scheduled for Spring 2019

The James Webb Space Telescope, which has had a history of cost overruns and delays, has been delayed once more, and is now expected to be launched in early 2019. The original launch date was 2008, then 2011, then 2015, and 2018. The telescope is currently undergoing final tests at the Goddard Space Flight Center outside Washington, D.C. It is now planned to be launched between March and June 2019 atop an Ariane 5 rocket from the French Guiana Space Center in South America.

The JWST was originally conceived in 1996 as a successor to the Hubble Space Telescope, with a projected cost of \$3.5 billion. However, due to one design change after another, debate on how and where to launch it, and additional costs in design and manufacturing, it quickly fell behind schedule and over budget. In 2011, Congress voted to cancel it, but it was eventually reinstated. When it is launched, it will be eleven years behind schedule and cost \$8.8 billion.

The JWST, which is actually being sponsored and funded by a consortium of over ten countries, will be put at one of the stable “L” points in the orbit of Jupiter. There, it will use its segmented mirror to study exoplanets and look at the universe in its very earliest incarnations. Its expected operational lifetime is fifteen to twenty years.



What's New in Space

Another Space Pioneer Passes On

John Young 1930-2018

John Young, one of the second group of astronauts chosen in 1962, and the ninth man to walk on the Moon, died on February 5, 2018, due to complications from pneumonia, NASA announced. He was 87 years old.



Young was born in San Francisco, California, but raised in Florida and Georgia, and attended the Georgia Institute of Technology. After graduation in 1952, he entered the Navy and became a pilot. In 1959, he became a certified test pilot, and in 1962, was chosen for the second group of astronauts, along with eight others, including Jim Lovell, Pete Conrad, and Ed White. Young was the first member of the second group to fly in space, aboard Gemini 3 in 1965, with Gus Grissom. A year later, he flew again as commander of Gemini 10 with Michael Collins, and then was assigned to the Apollo program. He was originally assigned to be a backup on what was then Apollo 1, but after the 1967 fire, was re-assigned to Apollo 10. In May 1969, he was the command module pilot while his colleagues Tom Stafford and Gene Cernan flew the lunar module to within 50,000 feet of the moon's surface. Young got his turn to walk on the Moon on Apollo 16 with Charles Duke in 1972. In 1974, Young became the head of the astronaut office, a position he would hold for 13 years. He oversaw the hiring of the first groups of space shuttle astronauts, and also supervised shuttle training. In April 1981, with Robert Crippin, Young commanded the first shuttle mission, STS-1, and in 1983, commanded STS-9, which carried the first Spacelab into orbit. He was scheduled to command the shuttle mission to deploy the Hubble Space Telescope, originally planned for 1987, but cancelled due to the Challenger tragedy. Following the Challenger explosion, Young created a controversy by writing a number of memos criticizing NASA for its lack of safety procedures and managerial weaknesses. At the same time, several other astronauts claimed that, as chief astronaut, he had built his own political empire within NASA, and also showed bias and favoritism in astronaut selections and shuttle crew assignments. As a result, Young was removed from his position in 1987 and made an associate administrator at the Manned Spacecraft Center in Houston. He was also replaced as commander of the Hubble deployment mission, which eventually flew in 1990. He kept up his training and active duty status in the astronaut corps, however, and always hoped for another space flight, but it was not to be. In 2004, he finally retired from NASA, but kept his office at the MSC and worked there 2-3 days a week as a consultant for several more years. Afterwards, he lived quietly in the Houston area with his second wife.

Young's passing leaves only five of the twelve men who walked on the Moon still alive. They are Edwin Aldrin, Alan Bean, Charles Duke, Harrison Schmitt, and David Scott. All are in their 80s.

Dragon Heavy Lift Rocket Successfully Launched

Space-X's Dragon Heavy Lift rocket was successfully launched on February 6 from LC-39 at the Kennedy Space Center. The highly publicized vehicle carried as its payload Space-X's owner Elon Musk's Tesla roadster with an astronaut mannequin in it. Although critics derided it as a publicity stunt, the launch emphasized that Space-X now has the world's most powerful rocket, and is ready to use it for business and exploration.

The Falcon HL was originally announced in 2010 and was scheduled to be first launched in 2013, but developmental delays kept setting it back. It is essentially a Falcon 9 rocket with two more Falcon boosters strapped to its sides, 27 rocket engines altogether, delivering more than five million pounds of thrust. It can put 140,000 pounds of payload into low Earth orbit, or send up to 50,000 pounds to the moon or beyond. Space-X's immediate goal is to capture the lucrative geostationary orbit satellite business, and also the U.S. government's classified military and intelligence heavy satellites.

After the launch, Musk did say that the rumored manned circumlunar mission to the Moon at the end of this year will not take place after all, but gave no details. He also announced that the widely publicized "Red Dragon" soft landing mission to Mars has been cancelled, at least for now. This may have more to do with the fact that the Dragon V-2 manned space capsule is behind schedule, and will probably not make its first flight until early 2019. Instead, Musk said that Space-X will work on its next major project, which he called "BFR" (for Big Falcon Rocket), which will be even more powerful than the Falcon HL, and will eventually be used for missions to the Moon and Mars. He said, though, that the BFR will not be ready until at least 2022 or 2023.

NASA cheered the Falcon's first launch, and, according to experts, sees it as a possible alternative to the oft-delayed and over budget SLS rocket, which is now not scheduled to be launched until at least 2022. It sounds like the initial Orion-MPCV missions may go into space atop the Falcon HL instead.



From Past Observer Issues

(Recently, I've been going over Observer issues dating back to 1976; these were given to me by several people, most notably Louis Mendoza and Clarence Funk. They are full of information and wisdom of how astronomy used to be, and how, in many ways, it still is. This will be a regular feature of The Observer from now on.)

"Last spring a challenge was offered to CVA members to see how many stars they could see in the Trapezium in Orion. Now we have another opportunity to test our telescopes and eyesight. This time we can search for faint components Epsilon 1 and 2. According to Jackson Carle, there is a zig-zag pattern of faint stars (mag. 13.5 to 15.0) in this area. Last year, I saw six of these stars through Jackson's 12.5 inch newtonian. I can regularly see two through a Celestron 5 in my backyard. How many can you see?"

By Clarence Funk-from *The Observer* August 31, 1976

From NASA's Space Place

Sixty Years of Observing Our Earth By Teagan Wall

Satellites are a part of our everyday life. We use global positioning system (GPS) satellites to help us find directions. Satellite television and telephones bring us entertainment, and they connect people all over the world. Weather satellites help us create forecasts, and if there's a disaster—such as a hurricane or a large fire—they can help track what's happening. Then, communication satellites can help us warn people in harm's way. There are many different types of satellites. Some are smaller than a shoebox, while others are bigger than a school bus. In all, there are more than 1,000 satellites orbiting Earth. With that many always around, it can be easy to take them for granted. However, we haven't always had these helpful eyes in the sky.

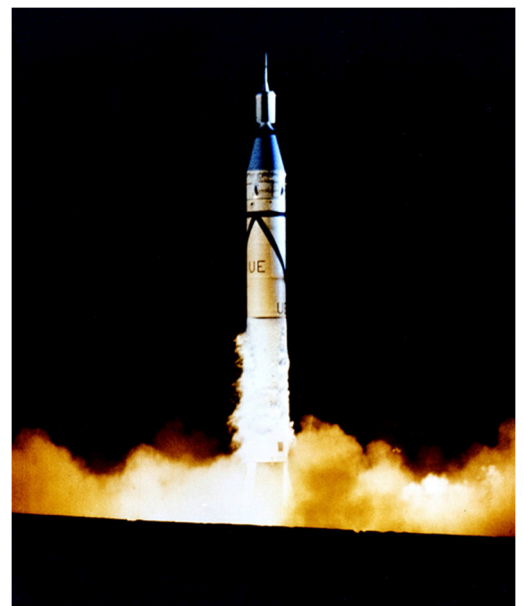
The United States launched its first satellite on Jan. 31, 1958. It was called Explorer 1, and it weighed in at only about 30 pounds. This little satellite carried America's first scientific instruments into space: temperature sensors, a microphone, radiation detectors and more. Explorer 1 sent back data for four months, but remained in orbit for more than 10 years. This small, relatively simple satellite kicked off the American space age. Now, just 60 years later, we depend on satellites every day. Through these satellites, scientists have learned all sorts of things about our planet.

For example, we can now use satellites to measure the height of the land and sea with instruments called altimeters. Altimeters bounce a microwave or laser pulse off Earth and measure how long it takes to come back. Since the speed of light is known very accurately, scientists can use that measurement to calculate the height of a mountain, for example, or the changing levels of Earth's seas.

Satellites also help us to study Earth's atmosphere. The atmosphere is made up of layers of gases that surround Earth. Before satellites, we had very little information about these layers. However, with satellites' view from space, NASA scientists can study how the atmosphere's layers interact with light. This tells us which gases are in the air and how much of each gas can be found in the atmosphere. Satellites also help us learn about the clouds and small particles in the atmosphere, too. When there's an earthquake, we can use radar in satellites to figure out how much Earth has moved during a quake. In fact, satellites allow NASA scientists to observe all kinds of changes in Earth over months, years or even decades.

Satellites have also allowed us—for the first time in civilization—to have pictures of our home planet from space. Earth is big, so to take a picture of the whole thing, you need to be far away. Apollo 17 astronauts took the first photo of the whole Earth in 1972. Today, we're able to capture new pictures of our planet many times every day.

Today, many satellites are buzzing around Earth, and each one plays an important part in how we understand our planet and live life here. These satellite explorers are possible because of what we learned from our first voyage into space with Explorer 1—and the decades of hard work and scientific advances since then.



Article and image courtesy of NASA's Space Place

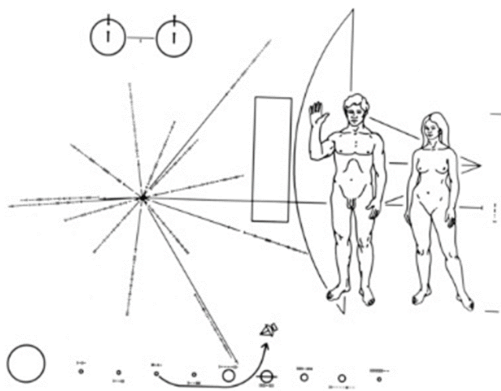
Another in a continuing series on lesser-known-but still important-astronomical observatories throughout the world

Mount John University Observatory in New Zealand

The Mount John University Observatory sits at 3,700 feet on the South Island of New Zealand. It was established in 1965 on Mount John by the University of Canterbury, which is the oldest university in New Zealand, and is still run by UC's physics and astronomy department. The observatory currently has five telescopes, four of which are available for scientific work, and one for the general public. A 1.8 m reflector known as the MOA is the largest telescope, and is operated in collaboration with Nagoya University in Japan; it also has a 1m reflector, the McLellan Telescope, which is used for spectrographic studies; and two .61m reflectors, both of which are used for photometry. A fifth telescope, a .4 Meade reflector, is for public use.



Since the late 1990s, the observatory has been a leader in exoplanet discoveries in the southern hemispheric skies, and in 2008, announced the finding of the smallest exoplanet known to date. It is known as MOA-2007-BLG-L192b, is only about three times the size of the Earth, and may have an atmosphere and a liquid ocean.



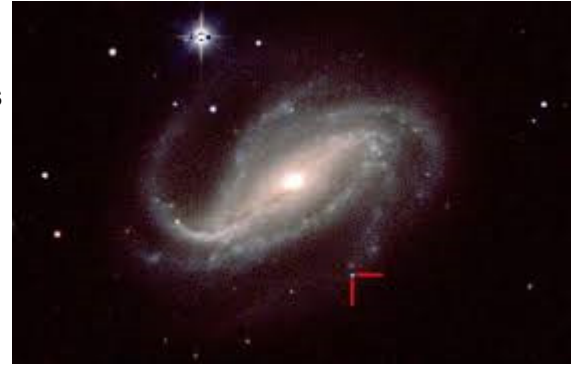
Astronomy Short-The Infamous Pioneer Plaque

When Pioneers 10 and 11 were launched to Jupiter in 1972 and 1973, they carried a plaque on their main bus to tell any alien civilizations about humanity. The plaque was conceived by Carl Sagan, who sketched out a rough draft of it, and then had an artist friend fill in the details. The bottom diagram

shows Earth's place in the solar system, the middle depiction shows the solar system's location relative to fourteen pulsar stars, and the top left represents hydrogen, the most abundant element in the universe. It was the right side, though, with the two figures, that created controversy. Religious groups complained about the nudity; minority organizations claimed that the two figures were white (in reality, they were composites of several different racial and ethnic groups); and feminists charged that the woman was drawn to be subservient to the man (the man is holding up his hand to show the opposable grasping thumb; the woman's leg is stretched out to demonstrate the movable hip). NASA was blasted from all directions for the plaque, but it was launched anyway, and is now in interstellar space, far from the cultural battles on Earth.

Amateur Astronomer Captures a Supernova at its Beginning

Talk about being in the right place at the right time. Victor Buso, an amateur astronomer in Santa Fe, Argentina, was trying out a new camera in September 2016, and happened to aim it at a galaxy known as NGC 613 just as a supernova in it exploded, which is the first time a supernova explosion has been seen at its inception. Astrophysicists throughout the world are intensely studying what is actually a video image running several minutes. In particular, they are looking at a shock wave forming from the initial explosion, which has never been seen before. This is probably the scientific event of the year, with many scientists are pointing out the importance of amateur astronomy.



An item for sale from Rich Lowe- rich_lowe@rapid-tec.com

I have a Meade LX 75 8 Inch SC I wish to sell. I just recently purchased the Orion EON 130 MM triplet APO and I don't think I will use the Meade going forward. Is it ok to advertise to this email group ? I am asking \$ 950 for mount and scope with a few accessories.

And, finally, a blast(literally-as in blastoff) from the past, courtesy of Michael Caskey. I remembered this brochure, or one similar to it, when I was growing up in the 1960s-Thanks for the memories, Michael-the editor

SPACE—SAVINGS BONDS—AND YOU

Mankind's most exciting dream—the exploration of the universe beyond our earthly boundaries—is beginning to come true. The trail has been blazed by the first American "men in space" and their fellow members of the Project Mercury team.

The road beyond, to the moon and planets, may be long and difficult. We know it will be costly, requiring the nation's fullest economic strength.

You can help in the job. Your dollars will go to build a stronger America, to help insure our leadership in the race for space. Bond savings help you, too. They make your personal future a brighter one, and help defend our heritage of freedom.

Now—during the Freedom Bond Drive—buy an *extra* Savings Bond, where you work or where you bank. Invest in a stronger America for the exciting Age of Space.

**KEEP FREEDOM IN YOUR FUTURE
with U. S. SAVINGS BONDS**

SCHOOLROOM FOR ASTRONAUTS

On America's drawing boards and in the laboratories are two, three and five-man spacecraft, space platforms and manned lunar craft. The goal is interplanetary flight—a chance to explore and perhaps discover the origin of our universe; a chance to understand more fully man's earth and his opportunities in space. Not since the voyages of Columbus has man's exploration held such promise.

Now serving as the space classroom for America's astronauts is McDonnell's Project Mercury spacecraft. This compact, one-man capsule carrying the first Americans into space is an astro-medical laboratory to measure man's capabilities in this new environment.

Packed into the six by nine foot spacecraft cabin are seven miles of electrical wiring, hundreds of instruments, switches, radios and lights and the electronic nervous system for putting each into action at the proper time. Behind every safety of flight component is at least one alternate system. Nearly every Mercury spacecraft operation can be conducted automatically, or by radio from the earth, or by the Astronaut operating manual controls. A maze of tiny tubes, pumps and valves weighing only a few pounds makes up the life support system which supplies the Astronaut with the necessary artificial atmosphere.

A. ESCAPE TOWER
B. ANTENNA HOUSING
C. RECOVERY COMPARTMENT
D. PRESSURIZED CREW COMPARTMENT
E. RETROGRADE PACKAGE
F. HEAT SHIELD

AMERICA'S ASTRONAUT TEAM

ALAN BARTLETT SHEPARD, JR.
Commander, USN
Made first sub-orbital flight in Freedom 7 Mercury Capsule on May 5, 1961. A native of Derry, N.H., Comdr. Shepard graduated from the Naval Academy in 1954, received his wings in 1957, and was graduated in 1958 from the Naval War College, Newport, R.I. He has accumulated 3,700 hours of flight time, of which 1800 is in jets.

VIRGIL IVAN GRISSOM
Captain, USAF
Captain Grissom made the second sub-orbital space flight on July 21, 1961 in the Liberty Bell 7 Mercury Spacecraft. A graduate of Purdue University, 1950, Captain Grissom received his Air Force wings in March, 1951. He flew 100 combat missions in Korea in the F-86, and received the Distinguished Flying Cross and Air Medal with cluster.

JOHN HERSCHEL GLENN, JR.
Lt. Col. U.S. Marine Corps
Made first orbital flight in Mercury 7 Spacecraft on February 20, 1962, circling the earth three times. Total distance traveled: 80,428 miles. A native of Cambridge, Ohio, Col. Glenn was commissioned in the Marine Corps in 1943. He flew 59 combat missions in Europe during World War II and 63 in the Korean conflict.

MALCOLM SCOTT CARPENTER
Lt. Commander, USN
After graduating from the University of Colorado in 1949, Commander Carpenter joined the U.S. Navy and received his wings in April, 1951. During the Korean conflict he served with Patrol Squadron 6 which was engaged in anti-submarine control. He has flown over 2900 hours, 400 of them in jets. Comdr. Carpenter is a native of Boulder, Colo.

DONALD KENT SLAYTON
Major, USAF
Major Slayton won his wings in April, 1943. In Europe during World War II he flew 56 combat missions in B-25's; later, while based on Okinawa he flew several missions over Japan. Major Slayton graduated from the University of Minnesota in 1949. He holds the Air Medal with cluster, and has flown over 3400 hours, 2000 of them in jets.

LEREOY GORDON COOPER, JR.
Major, USAF
Attended the University of Hawaii for three years, where he received a commission in the U.S. Army. He transferred to the Air Force and was recalled to extended active duty in 1949. Received B.A. degree in 1956 from the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio. He has flown over 2500 hours, 1500 of them in jets.

WALTER MARTY SCHIRRA, JR.
Commander, USN
Commander Schirra holds the Distinguished Flying Cross and two Air Medals for services in Korea flying the F-84E with 154th Fighter Bomber Squadron. Commander Schirra graduated from the U.S. Navy Academy as aviation cadet in 1945. He was born in Hackensack, N.J., but his parents now reside in Hawaii.