

Reaching *for the* Stars

opening photo courtesy NASA

Lt. Col. Rex Walheim works anchored to the mobile foot restraint at the end of the International Space Station's Canadarm2. The station is the destination for the spring launch of Discovery, marking the shuttle fleet's return to flight since the Columbia tragedy in February 2003 [See "Air Force Responds to Columbia Tragedy," March 2003]. Col. Eileen Collins will be the shuttle's commander and Lt. Col. James Kelly its pilot.

Going from Air Force to NASA blue for astronaut wings

by Capt. Christine L. Kunz

It's the all too famous image seen across the world — the orange suits, the big smiles, the friendly waves — as an astronaut crew prepares to launch out of Earth's orbit. Since the first U.S. manned space flight in 1961, the Air Force has been a part of the nation's space program. There are some 54 former astronauts as well as 23 current astronauts and one astronaut candidate who also wear Air Force blue.

Ask any astronaut and he or she will say the most exciting day for anyone who wants to travel into space is the day he or she is selected to be an as-

Astronaut and pilot Col. Pam Melroy is assisted by three scuba-equipped divers in the deep pool at the Neutral Buoyancy Laboratory at the Sonny Carter Training Facility near the Johnson Space Center. She and the rest of the STS-92 crew were participating in an emergency bailout training exercise preparing for next year's scheduled visit to the International Space Station.

courtesy NASA



tronaut candidate. But only then does the real work begin. It can take up to two years of training to become fully qualified. But for those who choose a life among the stars, the extensive training and the long wait are well worth it.

Astronaut candidates

In 1959, the National Aeronautics and Space Administration asked the military services to list members who met specific qualifications. According to NASA, jet aircraft flight experience and engineering training were required for its first astronauts. Height could be no more than 5 feet 11 inches because of limited cabin space available in the Mercury space capsule being designed. After many series of intense physical and psychological screenings, NASA selected seven men from an original field of 500 candidates, three of whom were Airmen — Capt. L. Gordon Cooper Jr., Virgil "Gus" Grissom and Donald K. "Deke" Slayton [See "Stepping into the Unknown," September 2003].

The first group of astronaut candidates for the space shuttle program was selected in January 1978. By then, prime emphasis had shifted away from flight experience and toward superior academic qualifications, where astronaut selection still stands today [See "Do You Have the Right Stuff?" Page 30].

Duane Ross has 37 years of experience at Johnson Space Center in Houston selecting and training astronauts. NASA receives about 3,000 applications every two years when it selects its next class, said the astronaut candidate selection and training manager.

Out of the thousands, 100 will be interviewed and about 10 will be selected. Both civilian and military applicants are considered.

"The number of new applicants needed is always fluctuating," Mr. Ross explained. "How many we need is based

by Master Sgt. Lance Cheung



on projecting NASA's needs five years from now."

It's been four years since the last astronaut class was chosen since NASA canceled the 2002 selection board because of a lower projected need. The latest astronaut class was selected in April and included an Air Force bluesuiter as one of only two pilots in the class of 11.

Astronaut training

When Col. Pam Melroy reported to Johnson Space Center for astronaut training in 1995, she was finally completing her plan, conceived from the moment she began courses at Wellesley College in Massachusetts and set foot in undergraduate pilot training in 1985. And the constant training she endures to this day doesn't stray her.

"What we do is so much fun," the Rochester, N.Y., native said. "The harder something is, the more fun it is. It [astronaut training] tests ourselves."

Candidates participate full-time for a year during initial astronaut training at Johnson Space Center. This includes more than 60 classroom lessons in shuttle systems, mathematics, basic science, navigation, geology, meteorology and a host of other science courses; studies in more than 40 workbooks; 25 computer-based lessons; and a multitude of training in different simulators, including virtual reality trainers. Candidates also receive training in land and sea survival, scuba diving and space suits.

For Colonel Melroy, it's the water survival part she finds most physically demanding.

"I just meet the minimum height to be a pilot,"

Colonel Collins became the first (and currently only) female Shuttle commander.

"When I was very young and first started reading about astronauts, there were no women astronauts," she said. However, she was inspired as a child by the Mercury astronauts, and by the time she was in high school and college, new opportunities were opening for women in aviation.

she said. "And because of that I have to use some ingenuity to pull myself up into the raft with the full 'pumpkin' pressure suit on."

So how does Colonel Melroy solve this dilemma? When in the water, she turns her back to the raft, grabs hold of the end and pulls the raft under her. "It doesn't matter how silly you look," she said.

In addition, candidates must also complete minimum flying hours. Pilot candidates maintain their proficiency flying 15 hours a month in NASA's fleet of two-seat T-38 Talon jets and practicing orbiter landings in the shuttle training aircraft, a modified Gulfstream corporate jet aircraft. Mission and payload specialists fly a minimum of four hours a month in the back seat of the Talon.

Now after serving as pilot on two shuttle flights — STS-92 in 2000 and STS-112 in 2002 — Colonel Melroy can add 562 space hours to her over 5,000 hours of flight time in more than 45 different aircraft.

Advanced training includes 16 different courses covering all crew training requirements. Courses range from guidance, navigation and control systems to payload deployment and retrieval systems. Advanced training continues even after a

For more info

Have a question on astronaut selection and training? Visit NASA's Web site at www.nasa.gov/astronauts.

crew has been given a flight assignment.

After completing training, astronauts are given a full-time office assignment with NASA, but must still maintain proficiency in their advanced training while waiting for a flight assignment. And often-times, astronauts are called upon for public relations events. Colonel Melroy isn't currently assigned to a flight and is working with NASA in technical duties supporting the investigation of the Columbia shuttle accident last year [See "Air Force Responds to Columbia Tragedy," March 2003].

Flight assignment

Even though Col. Eileen Collins has been an astronaut for 13 years, she still remembers the moment she was assigned to her first shuttle flight, STS-63 in February 1995, the first flight of the new joint Russian-American Space Program.

"That by far was the most memorable assignment in my career," said the 26-year Air Force veteran whose first job was supposed to be as a computer systems design engineer at Offutt Air Force Base, Neb. That was before the Air Force began to allow women pilots.

Once an astronaut is assigned to a shuttle mission, training once again becomes a full-time endeavor. But this time, the training is unique to the assigned mission and is more intense to include multi-system malfunction scenarios and integrated training with the assigned Mission Control Center flight control team which will assist from Earth. Colonel Collins is currently in full-time training for her next shuttle mission as commander of STS-114.

"You need to learn to juggle a lot of different things," said Colonel Collins, who was the first female shuttle pilot and commander. "You're constantly changing from different phases of training. Half a day you're in the T-38, then that afternoon you're giving a speech to the public, but then the next day you're in the pool training all day. You have to adapt quickly."

By far, learning to handle the immense workload of training schedules in any given day is the one thing astronauts agree is the hardest to get used too. Besides the many hours training in simulators or working in a virtual reality world, they must also learn skills in photography and videography, since once they're in space they have only themselves to rely on to "capture the moments" for the world below.

And for Colonel Melroy, it's those non-flying skills that have become her favorites.

"Teaching a rookie astronaut how to use the shuttle kitchen in zero-g [gravity]," she said, "or learning how to stow gear in space. Everything we thought we knew how to do, we have to learn all over again."

The beginning for one

As part of the newest astronaut selection class, Maj. Jim Dutton Jr., assistant operations officer for the 411th Flight Test Squadron at Edwards Air Force Base, Calif., beat out nearly 2,900 other applicants his first time applying for the job. After a six-month wait following his formal interview and nearly a year since his application met the Air Force board,

Major Dutton's dream of "sharing the vision and excitement of space exploration" is coming true.

"In the end, I boiled it [desire to be an astronaut] down to four things. A love for space, the desire to contribute to a great endeavor, to be able to work with exceptional people who share the same vision and to play a part in continuing to push outward the boundaries of human space travel," said the 35-year-old from Eugene, Ore.

Major Dutton's part in pushing those boundaries started this month when he reported for a year and a half of candidate training — beginning with a week of survival training in Maine and then flying the T-38 Talon. Although this part of training may be easy for the F/A-22 Raptor test pilot, the hardest part Major Dutton expects is his geology lessons.

"I never studied it."

Although the study time involved in astronaut training is lengthier than that of any other professional career requiring graduate or post-graduate

by Master Sgt. Lance Cheung



A systems engineering simulator supports STS-114 mission specialists Andy Thomas (left) and Dr. Charlie Camarda, who is practicing robotic arm manipulation, while instructor Jeff Sugar (in green shirt), monitors their progress. The simulator shows them "virtually" over Saudi Arabia with the Red Sea on the left of the International Space Station's docking module.

study, for many it's a long, steadfast dream come true. And then the long work hours simply become a labor of love. ☺

Do you have the right stuff?

Got what it takes to become an astronaut? Here are the jobs and the requirements:

Commander/Pilot

The commander is the captain of the space shuttle and makes all the critical decisions on behalf of the crew and in coordination with the ground control team. The commander flies the shuttle during approach and landing, and is ready to take over from the computers and fly at all

other times. Commanders fly at least once — usually twice — as shuttle pilots before they become commanders. The pilot is the commander's backup and is trained to do all the same tasks as the commander. Both participate in experiments and on-orbit operations, with some limitations. For safety reasons, they are not allowed to take spacewalks, except in an emergency.

- Requires U.S. citizenship and at least a bachelor's degree in engineering, biological science, physical science or mathematics
- At least 1,000 hours pilot-in-com-

mand time in jet aircraft; flight test experience is highly desirable

- Ability to pass a NASA Class I space physical, which is similar to a military or civilian Class I flight physical, and includes the following standards: vision-distance visual activity — 20/70 or better uncorrected, correctable to 20/20 in each eye; blood pressure — 140/90 measured in a sitting position; and height between 64 and 76 inches

Mission Specialist

Mission specialists coordinate all onboard operations. They perform experiments, spacewalks and handle the

payload.

- Requires U.S. citizenship and at least a bachelor's degree in engineering, biological science, physical science or mathematics
- Three years of related, progressively responsible professional experience must follow the degree. An advanced degree is desirable and may be substituted for all or part of the experience requirement (i.e., a master's degree equals one year of work experience)
- Ability to pass a qualifying NASA Class II space physical, which is similar to a military or civilian Class II flight

physical, and includes the following standards: vision-distance visual activity — 20/200 or better uncorrected, correctable to 20/20 in each eye; blood pressure — 140/90 measured in a sitting position; and height between 58.5 and 76 inches

Payload Specialist

Payload specialists are professionals from the physical or life sciences field, or are highly skilled technicians who can operate shuttle payload equipment. Payload specialists are chosen from outside NASA by the payload sponsor or customer. Training for payload

specialists may begin as many as two years ahead of the scheduled flight, depending on the task to be performed.

Although payload specialists aren't part of the astronaut candidate program, they must have the appropriate education and training related to the payload or experiment. All applicants must meet certain physical requirements and must pass NASA space physical examinations with varying standards depending on classification.

— Capt. Christine L. Kunz