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Ready for action

AFRC2022-0042-37 NASA/Carla Thomas

NASA's ER-2 No. 806 returned to high-altitude flight April 7, after three years of heavy maintenance. NASA Armstrong operates two ER-2 aircraft to collect information about Earth resources, celestial observations, atmospheric chemistry and dynamics, and oceanic processes.

X-59 is back from Texas

Critical ground tests complete

By Matt Kamlet
NASA Armstrong Public Affairs

The X-59, NASA's quiet supersonic experimental aircraft, has arrived back at Lockheed Martin's Skunk Works facility in Palmdale, California, following several months of critical ground tests in Fort Worth, Texas.

Ground tests on the X-59 were done to ensure the aircraft's ability to withstand the loads and stresses of supersonic flight – or flight at speeds faster than Mach 1. The vehicle's fuel systems were also calibrated and tested at Lockheed Martin's Fort Worth facilities. With its return to California, the X-59 will undergo further ground tests as it approaches full completion of its development and continues to make progress on its way to first flight.

The X-59 is designed to fly

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AFRC2022-0041-22 **NASA/Lauren Hughes**

The X-59 is lowered to the ground at Lockheed Martin's Skunk Works facility in Palmdale, California, following a crane operation to remove it from the back of its transport.

AFRC2022-0041-8 **NASA/Lauren Hughes**

AFRC2022-0041-10 **NASA/Lauren Hughes**

AFRC2022-0042-37 NASA/Carla Thomas

ER-2 is mission ready

By Elena Johnson
NASA Armstrong Public Affairs

NASA's ER-2 high-altitude aircraft No. 806 returned to flight after three years of significant modifications and heavy maintenance.

Flying from NASA Armstrong's Building 703 in Palmdale on March 21, the ER-2 conducted its first low-level flight since it was disassembled in October 2018.

During the maintenance period, pilot safety was enhanced through the Cockpit Altitude Reduction Effort, or CARE. The modification allows the pilot to safely operate the ER-2 by reducing effective cockpit altitude from 29,000 feet to 15,000 feet altitude when operating at 65,000 feet. Changing the altitude in the cockpit significantly reduces the possibility of decompression sickness.

Another important modification to the ER-2 utilizes the Automatic Dependent Surveillance-Broadcast (ADS-B) technology. The installation of the ADS-B system makes flying the ER-2 safer by allowing the pilot increased traffic situational awareness. The ADS-B system also brings the ER-2 in compliance with the Federal Aviation Administration and the International Civil Aviation Organization to operate in the national and international airspace.

AFRC2022-0042-19 NASA/Carla Thomas

NASA pilot Greg "Coach" Nelson prepared for flight on the ER-2 by air crew life support at Armstrong on April 7.

Following a series of check flights April 7, the ER-2 was scheduled to fly the Dynamics and Chemistry of the Summer Stratosphere, or DCOTSS, project. The project will directly study the convective impacts of thunderstorms over North America for NASA's Earth Science Division.

NASA Armstrong operates two ER-2 aircraft to collect information about Earth resources, celestial observations, atmospheric chemistry and dynamics, and oceanic processes. The aircraft fly as high as 70,000 feet altitude. The ER-2s are also used for electronic sensor research and development, satellite calibration, and satellite data validation.

News at NASA

60-year mystery solved

In just minutes, a flare on the Sun can release enough energy to power the whole world for 20,000 years. An explosive process called magnetic reconnection triggers these solar flares and scientists have spent the last half-century trying to understand how the process happens.

It's not just a scientific curiosity: A fuller understanding of magnetic reconnection could enable insights into nuclear fusion and provide better predictions of particle storms from the Sun that can affect Earth-orbiting technology.

Now, scientists with NASA's Magnetospheric Multiscale Mission, or MMS, think they've figured it out. The scientists have developed a theory that explains how the most explosive type of magnetic reconnection – called fast reconnection – occurs and why it happens at a consistent speed. The new theory uses a common magnetic effect that's used in household devices, such as sensors that time vehicle anti-lock braking systems and know when a cell phone flip cover is closed.

Magnetic reconnection is a process that occurs in plasma, sometimes called the fourth state of matter.

Bottom line: safety first

Melroy credits Air Force, NASA for her safety focus

By Jay Levine
X-Press editor

"Be ready to meet the expected and prepare for the unexpected." Those are the words of NASA Deputy Administrator Pam Melroy as she spoke virtually during the NASA Armstrong's Safety Day on April 11.

Highlighting some of the agency's top priorities for a very busy year, Melroy mentioned preparing for the launch of the Artemis mission, bringing the James Webb Space Telescope online and capturing the first science with it, and closer to home at NASA Armstrong, preparing to fly the X-59 supersonic aircraft and the all-electric X-57 Mod II.

Pam Melroy

Before she was selected as a NASA astronaut, piloted two space shuttles, and commanded an orbiter's mission, Melroy was a U.S. Air Force test pilot. It was there that safety was instilled in her, including best practices and recognizing that some factors are outside people's ability to control, such as weather.

Melroy is familiar with Edwards Air Force Base, where she graduated from the Air Force Test Pilot School in 1991. Her first assignment was to the Air Force Test Center at Edwards Test Operations, and she talked about her work with the C-17 Combined Test Force. The C-17 was in developmental testing and Melroy oversaw structural testing.

Melroy, page 7

Courtesy of the U.S. Air Force Test Center at Edwards Air Force Base

NASA Deputy Administrator Pam Melroy spoke at the NASA Armstrong Safety Day and recalled her first assignment at Edwards Air Force Base in California. After graduating from the base's Test Pilot School, she joined Test Operations in 1991 to work on the developmental testing of the C-17 (behind her) at the Air Force Test Center.

NASA

Astronaut Peggy A. Whitson (left), Expedition 16 commander, and Pam Melroy, STS-120 commander, took a moment for a photo in the Unity node of the International Space Station, while space shuttle Discovery was docked with the station. The joint mission of the two marked the first time both spacecraft were commanded by women simultaneously.

Event had full slate of activities

NASA Armstrong's Safety Day April 11 featured NASA Deputy Administrator Pam Melroy, former NASA Armstrong Deputy Director Pat Stoliker, and NASA Astronaut Randolph "Komrade" Bresnik. Separate stories on each are included in this issue. Safety Day also included:

• Center Director David McBride said although NASA is withdrawing the pandemic framework, the coronavirus is still a concern and people need to keep their guard up. The center also will adhere to state and federal guidelines.

"You are required to keep an N-95 mask with you," McBride said. "If a colleague asks, put it on. There are people with underlying health conditions or have someone at home that is."

McBride also asked NASA Armstrong employees as more and more we are coming back onsite, to carefully prepare their worksites, check equipment calibration

Safety Day, page 11

Astronaut says focus on details

By Jay Levine
X-Press editor

It doesn't matter if you are on the ground or in space, paying attention to details, training like you intend to fly, and practicing clear, correct communication are invaluable to safe operations.

Those were the messages from Randolph "Komrade" Bresnik, a NASA astronaut and former commander of the International Space Station Expedition 53 Crew, highlighted during the April 11 Safety Day at NASA Armstrong.

His first space flight aboard space shuttle Atlantis was not without a few scares.

"As we were starting to feel the effects of gravity during our descent into the atmosphere, there was a loud metallic bang that was heard on the flight deck and the mid deck and it caught everybody's attention," he explained. "When it is your first space flight you depend on your crewmates to determine what is normal and not. When you have the commander sit there and say, 'What was that?' in a terse and concerned voice, it is of concern."

As the shuttle begun a maneuver, another bang rang through the orbiter.

"It was really quiet in the cockpit," he said. "In my mind I am thinking, 'Is it coming apart?' The silence was broken when a crewmember spotted a fire extinguisher had come out of its holder on the wall and was sliding back and forth with the reentry maneuvers."

It illustrates that an internal voice has people running through experiences to make sense of an unknown situation. That can be good when that voice is reviewing procedures and checklists, but not when it causes a person to ignore data that does not fit with what they are sensing.

NASA

Astronaut Randolph Bresnik, STS-129 mission specialist, performed a task on the exterior of the International Space Station during the second spacewalk of the Atlantis' visit.

Attention to detail is a vital part of safety culture. That was reinforced to him before he was an astronaut when he was an F/A-18 pilot. On a practice mission at night by himself, Bresnik believed he had properly engaged the autopilot button. However, he had not. An audio alert indicated he was losing altitude. This additional layer of safety, along with years of training, enabled him to recognize the problem and regain control.

"I should have noticed it had not engaged properly," he said. "Without a wingman, I needed to have more attention to detail. You must have good habits and don't get complacent."

Training is another area that can help people remain safe when things are not as expected.

"Plan for deviation and when something starts to happen be ready to look at the data, evaluate, prioritize, and make a decision," Bresnik said. "For all of that to work, we need to observe something. Take the extra time to pause to review settings and procedures on the ground. In flight you might not have time"

Another example where things didn't go well involved an aircraft formation.

"The planes were lined up on the side of the runway," Bresnik said. "As they begin to take off, the tower called to abort at the same time as radio call from one of the aircraft. The pilots did not hear the abort call. Wings crossed and the aircraft did not have enough room to maneuver, resulting in the death of one of the pilots. Procedures are set up, but you may not always be able to execute. Even when someone is doing the right thing, like making the call to abort, communication does not always get through."

However, communication did go well on the third evening on Expedition 53. That and training for the mission as it was intended to unfold were factors for success. On that spacewalk, mission control called on the second of three planned space walks and managed a situation as it unfolded where an item became stuck and ripped out stitches in a strap to secure a spacewalker.

"A ground controller saw it from watching the video from the ground and radioed to pause and check if that was the case," Bresnik said. "I was concentrating on the task and paying attention. Hearing the communications and knowing the procedure, I was already there and was hooking up to his suit before the instructions came to do so. Listen and know procedure, know what needs to be done, prioritize, and execute."

While NASA's work can include a lot of unknown and first-time missions, the proper preparation can reduce the risks that are known to focus on the unknown when it arises.

X-31 lessons

X-57, X-59 are beneficiaries of past projects

By Jay Levine
X-Press editor

As project teams at NASA Armstrong prepare to fly two new experimental aircraft this year, Pat Stoliker, former center deputy offered some advice.

Stoliker spoke at the center's Safety Day on April 11 about the planned last flight of X-31A No. 1 aircraft and the lessons learned from its loss in an accident Jan. 19, 1995. The investigation indicated the crash resulted from ice accumulation in the unheated nose boom. That led to incorrect data reaching flight computers. The aircraft became uncontrollable, and the pilot ejected.

Two delta wing X-31 aircraft demonstrated enhanced fighter maneuverability at higher angles of attack, or the angle of the wing and the wind in flight. The aircraft flew at such a high angle of attack, up to 70 degrees, it appeared that the aircraft's nose was nearly straight up.

The aircraft featured improvements like thrust vectoring, or directing engine thrust with paddles for controlling the aircraft in previously uncontrollable flight situations. The research was to determine the maneuverability advantage when engaging enemy aircraft.

A video of a younger version of Stoliker was played where he described the day of the pilot's ejection and the loss of the aircraft.

EC94-42478-03 **NASA**

The X-31, the world's first international X-plane, demonstrated controlled flight at high alpha courtesy of its canards and thrust vectoring paddles in the exhaust stream.

"At the peak of the program there were days with five flights," Stoliker said. "There were only three flights that day and it was the last flight for the first airplane. We had completed all the test points for that mission. In addition, we were going through our return to base checklist and at that point every one of us kind of relaxed. In my mind I was thinking I can't wait to get this data because something funny is going on and I want to figure it out."

Lessons learned from the X-31 are applicable to the first flights of the X-57 all-electric Mod II aircraft and the supersonic X-59 set to fly later this year.

"The information on the displays in front of you, the displays pilots have in front of them, the data that you have – you have to pay attention to it, you have to draw your inferences from it, and quickly make decisions," Stoliker said. "You have to keep the focus on each and every test point."

Stoliker also warned about complacency.

"You are flight testing from the moment you step into the airplane until the airplane is secured on the ground, and systems are shut down," he added.

A key modification to the X-31 was adding the Kiel air data probe. The Kiel probe was seen as a more accurate way to provide data to the flight computers. However, it was known to be vulnerable to icing, and it did not have a heated version until later, Stoliker explained. To mitigate the risk, one of the mission rules prohibited flying in icy conditions.

A few hundred flights were successfully flown with the Kiel probe on the X-31 without incident prior to the Jan. 19 flight. It was the third and final flight of the day and the planned conclusion of the experimental aircraft's flights to gather a few test points that were missed earlier in the program.

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Melroy... from page 4

"We loaded the aircraft with weird cargo configurations, test modes, and maneuvers," she said. "We tested the aircraft at 80% of its load limits and then we did analysis, while defining the 100% load limit."

On one particular flight, conditions were not right for the tests, leading the team to complete a maneuver that was briefed, but not practiced. To make matters worse, it was nearly sunset.

"The C-17 was one of first heavy aircraft to use fly-by-wire controls," she explained. "It was not always predictable. We did the maneuver, and every light went off on the warning panel. We took a step back, reset the electronic controls, and determined we had exceeded the aircraft's load limits. We completed a full flight controllability check and then we landed 30 minutes after sunset in total dark. It was not an ideal situation."

The decisions leading to that situation are attributed to rushing to meet an artificial deadline.

"There was some complacency late in the program. Most test mishaps do not happen in middle of challenging test card, because everyone is very focused. It's when there are transitions, or when the team is doing something that isn't that challenging where situations can arise."

It was comfort that led to the maneuver that wasn't flown in the simulator and here's the real surprise – the maneuver resulted in the aircraft reaching 138% of its design limit.

When Melroy commanded space shuttle Discovery in October 2007, she had to weigh options to repair to a solar array.

"When it was unfurled, it was snagged and started to tear," she recalled. We stopped and it was like a boat with the sail halfway up. It is a terrible place to be as commander and decide to repair the solar array, as it violated safety rules. I weighed potential risk during a spacewalk versus the present risk."

Mission specialist Scott Parazynski, who was balancing on an extended robotic arm, worked to put the first stitch in the array without touching it. It was not obvious to him, but Doug Wheelock was watching closely and was able to alert Parazynski to look out as the solar array was about to strike him.

"Often times doing hazardous operations, the team focuses on the hazardous and misses the big picture," Melroy said. "All of us play a part. It is on all of us to keep our eyes wide open."

Melroy extended one more piece of advice – wait until the danger is over before celebrating. The crew wanted to celebrate the major accomplishment of repairing the solar array, but Melroy reminded everyone to hold off until the spacewalkers were safely through the airlock.

"It's after, or in between, when everything is fine and seems normal, or something you've done all the time, when complacency gets you," she said.

X-31... from page 6

"We knew there were weather constraints and low clouds, we knew what the temperatures would be, and we felt we would be safe because all of our flights were at altitudes below those clouds," Stoliker recalled.

NASA Armstrong has a flight review process that has many layers and opportunities to catch a potential challenge, he said. Add to that the team that was involved in the mission was an experienced team. In addition, a briefing prior to the flight included mission rules and limits, the weather report, and the objectives of the three flights that day.

"There was a mission rule precluding flight in visible moisture on the Jan. 19 flight, but there should have been a rule precluding flight in icing conditions," Stoliker said.

One of the lessons learned, also applied to any flight, but especially to an experimental aircraft – make sure mission rules are clear.

Stoliker warned to make sure the mission rules also make sense. He offered an example of a project that had a rule that precluded flight below 5,000 feet altitude, which he said would make it hard to land.

Clues are there when something isn't right, but someone must pick up on it and alert others to discuss it.

During the flight inconsistencies between airspeed and angle of attack information became apparent about midway through the flight. Sensors were showing 160 knot airspeed, but that was not possible for the aircraft's angle of attack, Stoliker recalled.

"We had microphones on headsets and did not use them," he said. "Had that comment about the air data been louder, maybe someone else would have picked up on it and said wait a minute."

Another clue should have been when the pilot mentioned he was going to turn on the pitot heat and no one questioned it, even though it was in the mission rules.

Stoliker said recounting lessons from past project challenges is one way of helping to avoid similar situations and reinforce, "it is our responsibility to be diligent, take our business seriously, and work together as a team."

EC95-43114-50 **NASA**

The X-31 aircraft was rolled aboard an Air Force Reserve C-5 transport, which ferried it to Europe for the Paris Air Show. The aircraft impressed crowds with its ability to fly with its nose nearly straight up.

Burcham recalls career

X-15, Propulsion-Controlled Aircraft are highlights

Guest column

Bill Burcham
Former NASA Armstrong project manager

I was so very fortunate in 1965 to come to the NASA Flight Research Center! It was exciting closing out the rocket-powered X-15 and getting into F-111 and F-15 propulsion research. We had great teams, management, and freedom to try out some new and exciting ideas. In addition, we had close allies at NASA Ames, NASA Glenn, NASA Langley, the U.S. Air Force, and the U.S. Navy. Inlet research on the XB-70 and SR-71, digital propulsion controls, acoustics, and a propulsion group of talented energetic young engineers made for a good time. Dances, picnics, sports, and post-flight parties added to my experiences too!

But back to 1965. On my first day, I met my division chief, Don Bellman. Don had transferred to the desert from the NASA Lewis Research Center (now Glenn) at Cleveland and had worked on several flight projects. He assigned me to study the flow field beneath the X-15, where a dummy ramjet would be located. Also, he wanted me to look into the coming study of the troublesome air inlet of the F-111. I had two tasks on my first morning. And then Ed Saltzman asked if we could get together at lunch. Wow, while still at the University of Missouri, I had recently read Ed's report on the separated flow base drag of the X-15. It was quite a first day!

Eventually, I had data on that X-15 flow field up to Mach 6.72 – still today the fastest a piloted airplane has flown. Don lined me up with some contacts at NASA Glenn, Pratt & Whitney, and soon we were exchanging and comparing dynamic pressure data on our F-111 with data from NASA Glenn and Pratt & Whitney's ground test facilities. This understanding went into the inlet and engine design of the F-15, which is still in production today, 50 years later! In every assignment I was fortunate to be able to find expert and willing assistance, for emerging computing and analysis capability, in the machine shops, in the pilot's office, in reports and publications, and the projects office, and not just at NASA.

Photo courtesy of Bill Burcham

Bill Burcham and Gordon "Gordo" Fullerton shake hands following a 1995 throttles-only control T-38 flight.

In the 70s at Dryden, we were privileged to get involved with the triple supersonic Blackbirds, the YF-12 and SR-71. We had new issues to study and understand. Gene Matranga, Bill Schweikhard, Berwin Kock, Fitz Fulton, Don Mallick, and so many others, found ways to get the information in a classified environment. I had almost no background in control systems, but in the next office was access to world famous flight controls experts like Herm Redeiss, Ken Iliff, Cal Jarvis, Dwain Deets, Kevin Petersen, Don Berry, Ken Szalai, and scores of others gave me a glimpse into ways to improve airplane performance without changing the airplane shapes.

First, there was the digital world. Flight control work was exploding thanks to the F-8 Digital Fly By Wire aircraft, the Highly Maneuverable Aircraft Technology aircraft, and the Drones for Aerodynamic and Structural Testing vehicles project. How could that technology apply to propulsion? We were asked by the Air Force if we could test a digital engine/inlet control on an F-111, and we did, and it worked well. Then they asked if we could investigate the troublesome F100 engine control in the F-15, maybe a digital version? We did the tests and some high-powered analysis and found and fixed several issues. Project managers like Terry Putnam, Jim Stewart, Wally Sefic, and Don Gatlin allowed us to see if the engine and inlet and flight controls could be integrated, and these schemes improved performance, saved fuel, and improved safety. Research dove-tailed nicely with efforts at NASA Glenn, NASA Ames, the U.S. Air Force Flight Dynamics Laboratory, and several universities.

In the 1990s our experience in engine controls, flight controls, and control integration was put to good use to study emergency methods for landing a damaged airplane. The center simulation facility and pilots were used to study the B-720, the F-15, the F/A-18, and C-17, and all were found to have some

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AFRC2022-0049-02 NASA/Josh Fisher

NASA Armstrong Center Director David McBride presents the Director's Award to Dr. Dwight Peake.

AFRC2022-0049-18 NASA/Josh Fisher

Alaric Sessions and Hani Safi, second and third from left, accepted a Team Peer Award for the Low Boom Flight Demonstrator Simulator Team from Matt Berry, left, and Dan Bartlett, right.

Staff recognized with Peer Awards

The NASA Armstrong Peer Awards April 19 recognized some of the outstanding individuals and teams nominated for the 2021 honors. Here are the recipients:

NASA Armstrong Center Director's Award – Dr. Dwight Peake

Pride in NASA Award – Dede Dinius, James Kitahara

Can-Do Attitude – Andrea Muir, Kirstin Sharrer

Engineer, Scientist, Pilot Award – Alejandro Alex Osorio

Exchange Council Humanitarian Award – Francisco Rodriguez

Peer Awards, page 10

AFRC2022-0049-19 NASA/Josh Fisher

Brian Griffin, center, accepted a Team Peer Award for the X-59 Emergency Oxygen System Qualification Test Team from Berry, left, and Bartlett.

AFRC2022-0049-03 NASA/Josh Fisher

NASA Armstrong Center Director David McBride presents the Pride in NASA Award to Dede Dinius.

AFRC2022-0049-20 NASA/Josh Fisher

Matt Versteeg and Jeffry Sutherland, second and third from left, receive a Team Peer Award on behalf of the X-59 Flight Test Instrumentation Software Team, from Berry and Bartlett.

Burcham... from page 8

capability to control flightpath with engine thrust. But in most cases, a safe runway landing was unlikely. Again, control integration was investigated as a possible solution. With Propulsion-Controlled Aircraft (PCA) software in the on-board computers, two landings on the F-15, and four landings on an MD-11, were made without using the flight controls. Frank Batteas, Gordon "Gordo" Fullerton, Dana Purifoy, Jenn Cole, Bruce Cogen, John Burken, Mike Venti, the Federal Aviation Administration, the Air Force, the U.S. Department of Homeland Security, and many others participated. If PCA was not available, we also studied throttles-only control on all the Boeing twinjets, the F/A-18, and my only front seat jet ride, the T-38 with Gordo.

My last year as chief engineer was great. I flew on the DC-8, watched Ed Schneider and Rogers Smith refuel the SR-71 from a tanker, and flew the F/A-18 the T-34C. What a way to end a career! And now at NASA Armstrong, it must be just as exciting!

Photo courtesy of Bill Burcham

Bill Burcham is seen by the X-15 ramjet flow field probes in 1967.

NASA TechFlights proposals due June 2

The NASA 2022 TechFlights solicitation is now open. TechFlights offers up to $750,000 per awardee to researchers from U.S.-based industry, academia, and private research institutions to rapidly test promising technologies on commercial flight vehicles.

In addition to flight testing with commercial suborbital flight providers, Flight Opportunities is joined by NASA's Small Spacecraft Technology program, which will allow researchers to propose flight tests of payloads hosted on commercial orbital platforms. Awardees will receive a grant or cooperative agreement to purchase flights directly from any eligible U.S. commercial flight provider that best suits its technology demonstration. Read the full NASA announcement.

Learn More and Submit a Proposal

- Read the full solicitation on NSPIRES
- Download the infographic with key facts about the 2022 solicitation
- Mandatory preliminary proposals due: June 2, 2022
- Full proposals (by invitation) due: August 29, 2022
- Subscribe to the Flight Opportunities newsletter for reminders and updates

X-59... from page 2

faster than the speed of sound without producing the typically loud sonic booms that occur when an aircraft flies at supersonic speeds. The advanced X-plane will instead reduce that sound to a quiet sonic "thump", which will be demonstrated in flights over communities around the U.S. starting in 2024. NASA's goal is to collect and provide data to regulators that may finally solve the sonic boom challenge and open the future to commercial supersonic flight over land, reducing flight times drastically.

Peer Awards... from page 9

"Stepping Up" Award (award created by peers) – Nick Kiriokos

Facilities Award – Brandon Werner

Henry Arnaiz Mentor Award – Tim Cox, Jerry Dobbins

James Harris Leadership Award – Ralph Anton, Alan Crocker, Randolph Thompson

Jim Ferguson Safety Award – Kody Carr

Mission Impossible Award – Michael Buttigieg

Mission Support Award – Melanie Estrada, Rebecca Jenkins, Onesimo "Uno" Miranda, Susan Moreno, Laura Newton, and Alex Ray

Rising Star Award – Taylor Morais

Steven B. Davis Co-op Student Award – John Bodylski

Teamwork Award – Low Boom Flight Demonstrator Simulator Team, X-59 Emergency Oxygen System Qualification Test Team, X-59 Flight Test Instrumentation Software Team

Technicians and Mechanics Award – David Farmer, Ronnie Haraguchi

Unsung Hero Award – Juan Carrillo, Brian Homiak, Jun Kumazawa, Kelvin Siu

Safety Day... from page 4

NASA/Kirstin Sharrer

dates, take their time to do their jobs right, and not permit complacency to take root.

• There are many center-level avenues for reporting safety concerns, said Glenn Graham, Safety and Mission Assurance director. However, if that doesn't resolve the concerns, NASA's Safety Reporting System is anonymous, voluntary, and responsive.

While safety was solid in 2020, 2021 saw an increase in the number of mishaps from the year before, including a recent event that damaged an F-15 jet engine. In January through March of this year, there were also double the close calls of the previous quarter, and the center is on pace to have the most safety mishaps since 2018.

"What I see when I dig into the mishaps is complacency," Graham said. "Attention to detail is the biggest factor. Think about what you are doing and slow down, none of these things had to happen."

• Debbie Little and Paul Bradley, of the Sonoma County Sheriff's Office, recalled a helicopter rescue mission on Oct. 9, 2017. It was one of the county's worst fires in history, as the mission was flown that night to document what was happening, while waking people to evacuate.

About 7,000 homes burned in 90 minutes. Little and Bradley also communicated to ground crews, while dodging embers, plastic, caps of spray cans, magazines, and unexpected debris. From the helicopter's view, people were seen evacuating a mobile home park as propane tanks were exploding. The turbulence was so intense that Little said it knocked her night vision glasses off her helmet.

"It was overwhelming," Bradley recalled. "It looked like entire east side of the county was on fire. Flames jumped the six-lane freeway. We were trained to be safe, but we were not mentally prepared for this. You try not to get caught up in the moment, but a lot of friends and family were in that area. Debbie's house was completely engulfed. There was no firefighting, just massive evacuations."

The message is simple, "Please evacuate when you have to evacuate," Little said. "You might not get a chance if you wait too long."

• People first, safety always is a good Safety Day theme, said Roosevelt "R.J." Jones, NASA Armstrong Quality Assurance branch chief. Sequence also matters when it comes to staying safe.

As a retired command chief master sergeant in the U.S. Air Force, he provided two examples where this was ignored. The first involved an F-15 mishap. On the first day of his assignment, he saw a $70 million F-15 sticking halfway through a closed hangar. An experienced crew chief, who was fully qualified, failed to oversee an unqualified and inexperienced crew in securing the tail hook to hold the jet back during a max engine run. The result was a very costly error, Jones said.

Another incident was when a C-130 crashed and killed nine people, 10 days after its maintenance was signed off and it was cleared for flight. During its first flight, the pilot made the decision to return. He shut down one engine, with three remaining when the accident happened. Investigators determined the aircraft improperly changed its flight angle and although the aircraft was cleared to handle the flight conditions, the flight oscillation did not match the expected performance.

Sequence and safety, including checklists, and checking, and rechecking, and checking again are vital to safety, he said.

• Moderate stress is good, said Alfred Santos, certified clinical hypnotherapist, but balance, mindset, nutrition, exercise, and sleep are too. He recommended deep breathing, noted what you eat effects what you think, suggested cutting sugar, and shaping your thoughts to get where you want to go.

• Situational awareness is key to safety and Linna Kleinschmidt, Stratolaunch emergency response coordinator, said mistakes are a trail of breadcrumbs that must be followed. She also suggested that if a person forgets where they are in the procedures, to step back three or four steps.

• The impact of burnout on performance and mental well-being was explored by a panel of Ashley Prueitt, psychologist and NASA Armstrong Employee Assistance Program provider; Kendal Martindale, licensed clinical social worker; and Sophie Schmell, a marriage and family therapist.

• Jack Hayes, NASA Armstrong Stratospheric Observatory for Infrared Astronomy operations engineer, said following the rules and doing things right the first time can prevent injuries like the ones he endured when procedures were not followed with an H-46 helicopter. It was cleared for preflight, and the maintenance crew cleared out for the day. He was on a work platform when he was left in a bad situation trying to get down. The result – a 13-foot drop, three broken bones, and his heel was turned to powder.

• NASA Armstrong Safety Awards included Dale Hogg, contractor of the year; the DC-8 secondary aircrew earned team of the year; and Dale McCoy was recognzed as civil servant of the year.

DePaz, configuration manager, dies at 45

Irma DePaz, who had worked at NASA Armstrong for decades as a configuration manager on many high-profile center projects, died April 16. She was 45.

During her career at NASA Armstrong, she worked with the Helios Prototype team, the Orion Abort Flight Test Pad Abort-1 team, the Stratospheric Observatory for Infrared Astronomy team, and the Low Boom Flight Demonstrator (LBFD) team.

It was while working on the LBFD that she was part of the team that was selected for the 2018 Aeronautic Research Mission Directorate Associate Administrator's Award.

People who worked with DePaz said she was proud to work for NASA and that this was her dream job. They described her as hard working, reliable, dedicated, detail oriented, thorough, and someone who had a great sense of humor while initially shy and reserved, was always positive, and had a checklist for everything, took great pride in her work and was really good at her job. Her family said that DePaz loved the NASA team.

Ko, former center researcher, dies at 94

Dr. William Ko, a retired structural mechanics researcher who had a 40-year career at NASA Armstrong, died April 8. He was 94.

His technical accomplishments were many and he was recognized in 2015 with a NASA Distinguished Service Medal, NASA's highest honor. Dr. Ko worked extensively investigating the heat transfer and thermal stress challenges of space shuttle reentry heating, and a program that led to understanding and certifying the shuttle thermal protection system.

He teamed with other researchers at NASA Armstrong to develop methods to determining structural loads and deflections from surface strains for which he shares two patents related to the Fiber Optic Sensing System technology.

Ko also won many awards for his paintings that demonstrated his precision, detail, and concentration – the same qualities that he was known for as a researcher. Ko said in an interview with the X-Press in 1998 that a highlight of his art was meeting President Lyndon B. Johnson at the 1968 world fair in Texas and impressing him with his painting, "LBJ Ranch in Springtime." Johnson was so impressed with the painting, that the artwork was added to the permanent collection at the LBJ Presidential Library in Austin, Texas.

Lock, former controls engineer, dies at 86

Wilton Powell Lock Jr., a former center controls engineer, died March 21. He was 86.

Lock was key in a number of flight programs, but best known for his work integrating the research control systems on the F-8 Digital Fly-by-Wire aircraft, and the F-8 "Iron Bird" simulator.

He also was known for this work evaluating the operation, performance and reliability of the aerodynamic and reaction flight controls of the rocket-powered X-15 aircraft.

Lock was an extremely good engineer, easy to work with, knowledgeable, respected, kind, patient, very dedicated, and hard worker. Several of his colleagues said Lock excelled at communicating and working with the many NASA technicians and mechanics assigned to the F-8 project. He had a balanced management approach and worked to negotiate contentious items. He was considered a technical leader, a role model, and a mentor to a generation of NASA Armstrong engineers.

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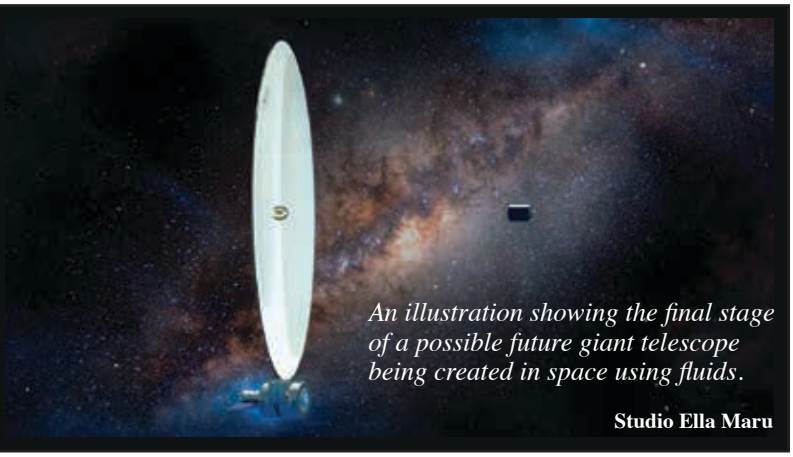
When it comes to telescopes, bigger is better. Larger telescopes collect more light and allow astronomers to peer farther into space and see distant objects in greater detail.

What if there was a way to make a telescope 10 times or even 100 times bigger than before? What started as a theoretical question is now a series of experiments to see if fluids can be used to create lenses in microgravity.



An illustration showing the final stage of a possible future giant telescope being created in space using fluids.

Studio Ella Maru

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