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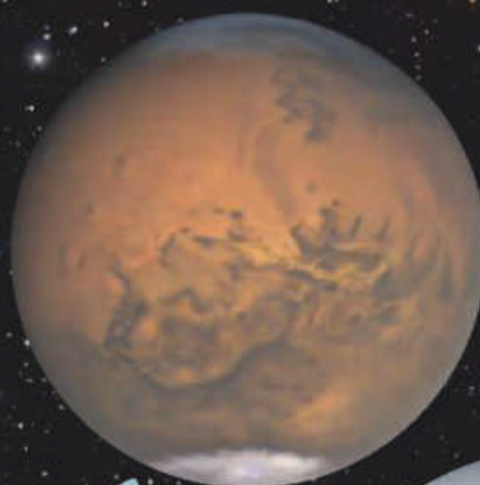
2020's

UNMISSABLE NIGHT SKY

The top 20 sights to observe in the New Year, including

MARS

High & bright at opposition

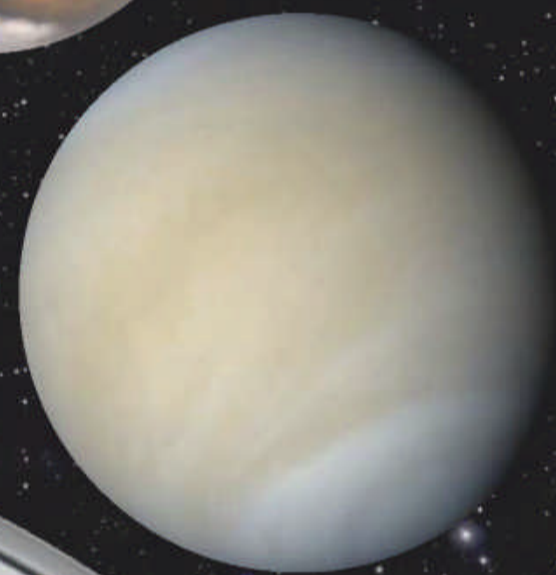


STELLAR CHALLENGE

Can you capture bright Sirius and its Pup?

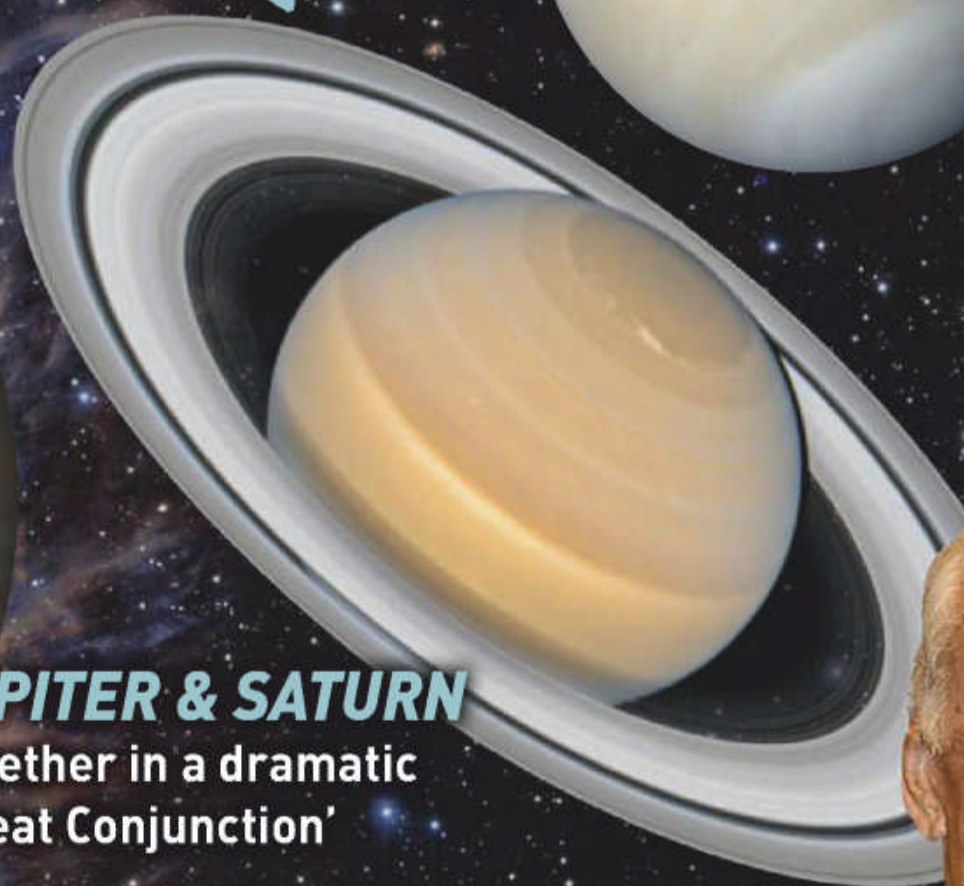
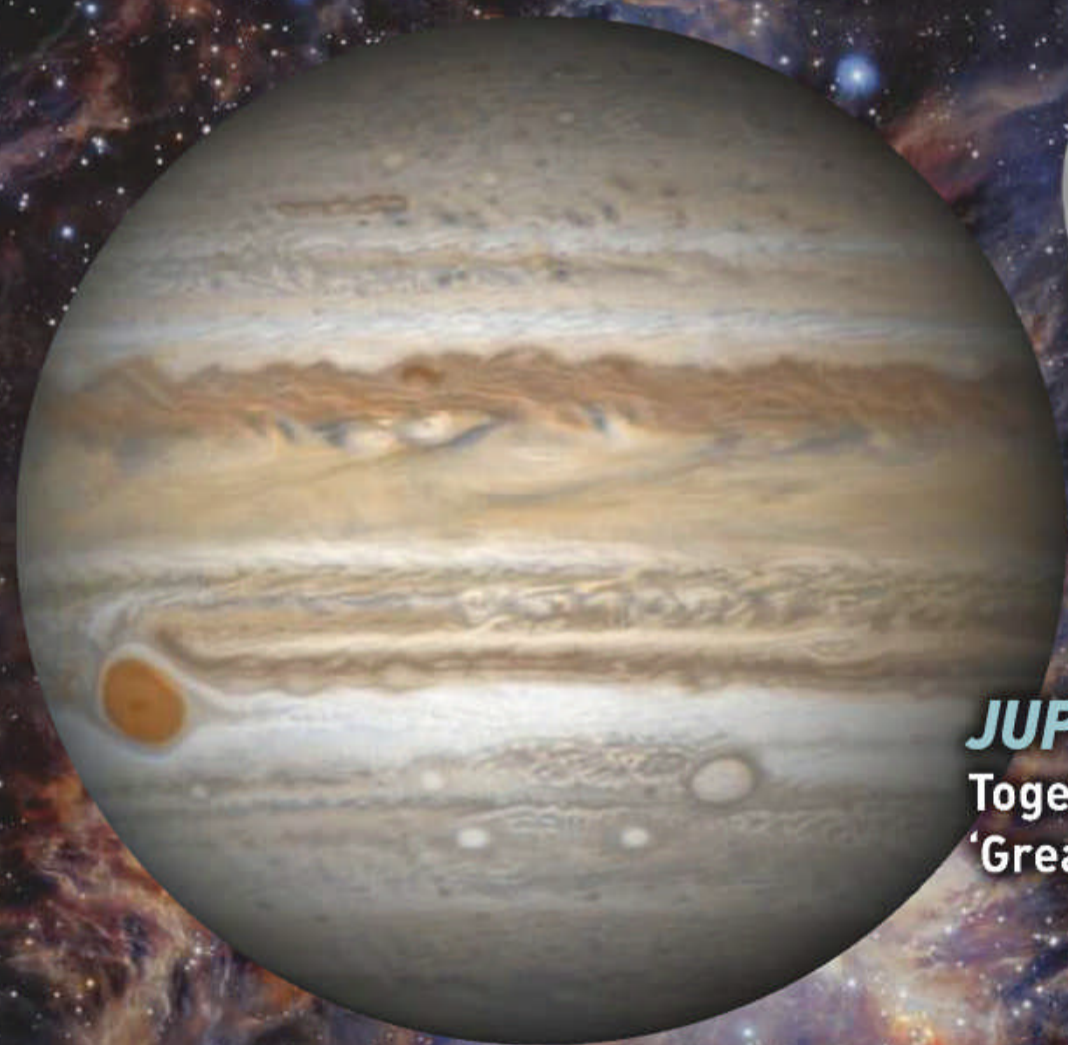
VENUS

A beautiful Evening Star



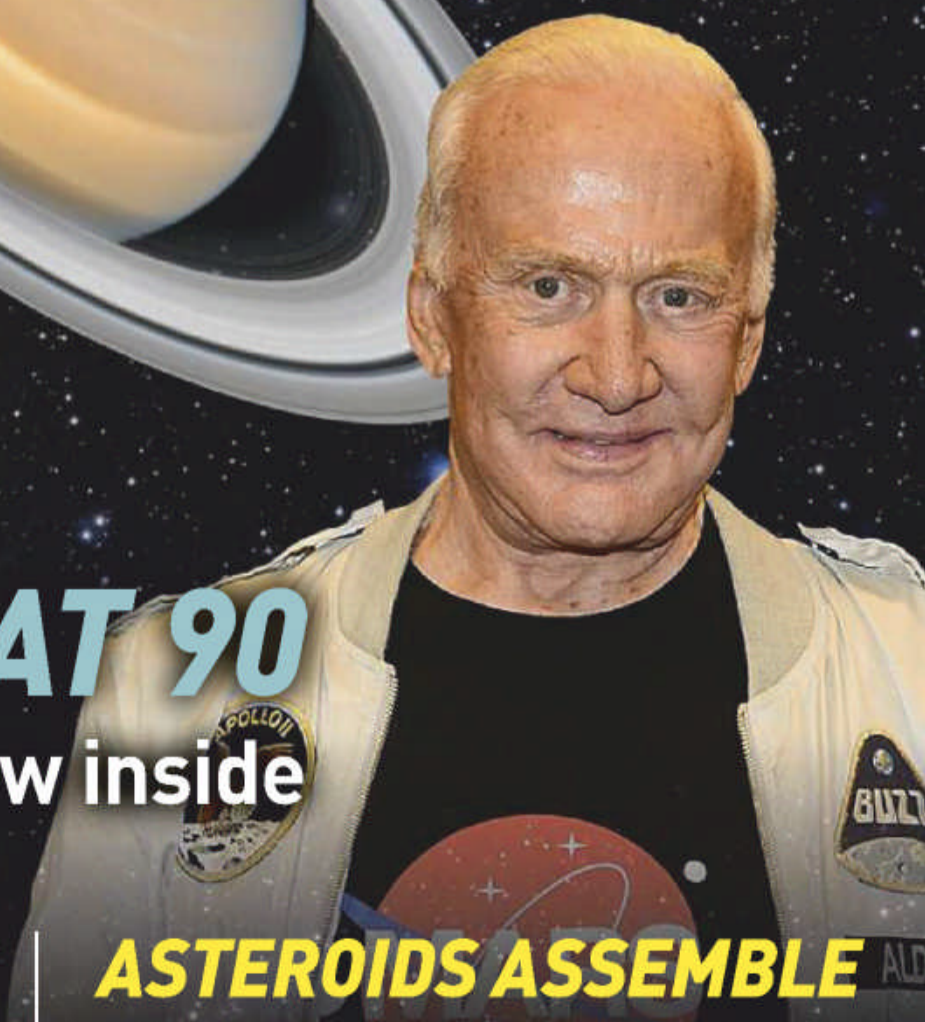
JUPITER & SATURN

Together in a dramatic 'Great Conjunction'



BUZZ AT 90

Exclusive interview inside



200TH ANNIVERSARY

Royal Astronomical Society's milestone

SPITZER SIGNS OFF

Mission end for NASA's infrared space scope

ASTERIODS ASSEMBLE

How peanut-shaped space rocks are created

"It's time to get on with it":
he may be 90, but Buzz Aldrin
remains as passionate as ever about
getting humankind back to space



BUZZ ALDRIN:

Still aiming high at 90

Buzz Aldrin, the second person to walk on the Moon, has led an extraordinary life. He talks to **Rod Pyle** about his passion for spaceflight as he celebrates his 90th birthday

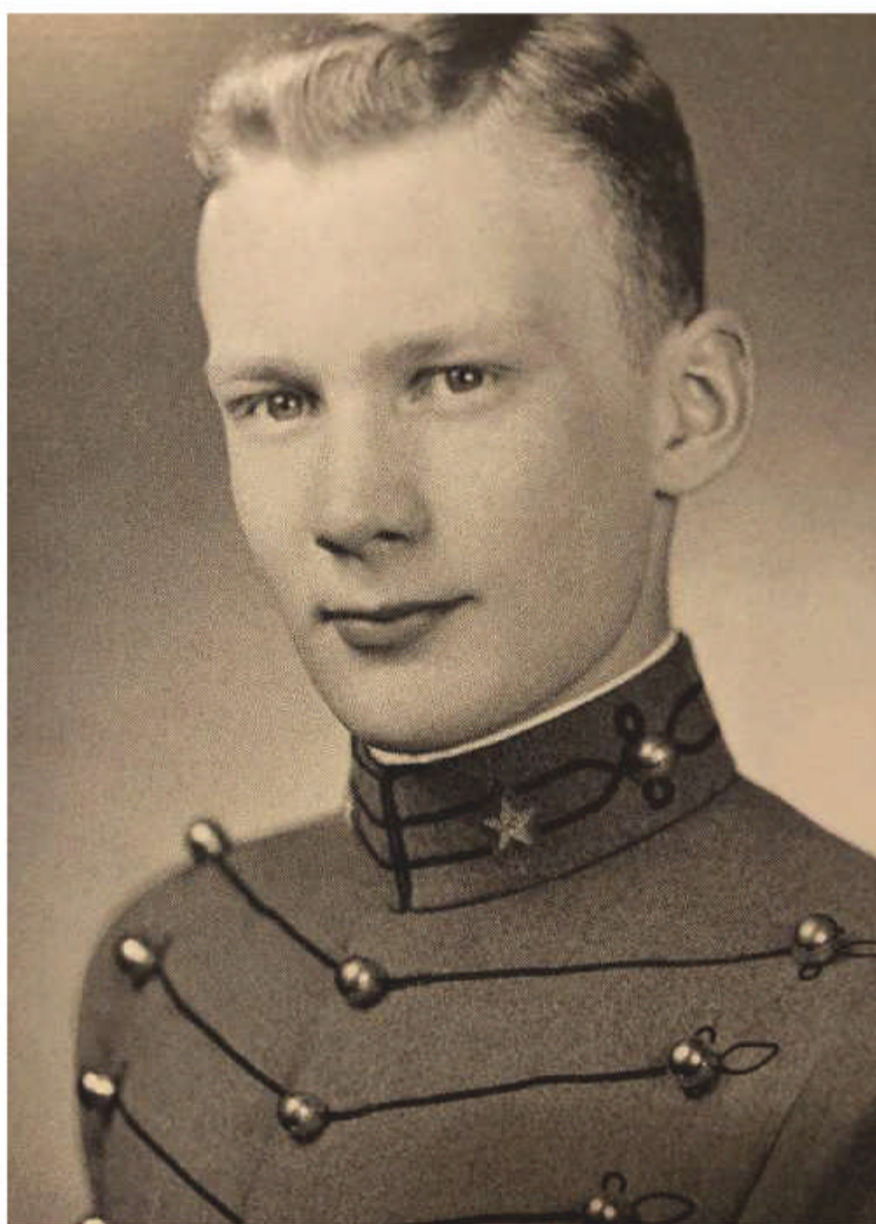
When Buzz Aldrin talks to you, the topics always turn to spaceflight. And the discussion will not be primarily the reminisces of an ageing moonwalker as you might expect, but about the future of human spaceflight and the role of young people – from all nations – to achieve it.

You see, Buzz is a visionary, and vision is something that must be shared.

As his son Andy recently told me, "It's absolutely his life's work... he never stops thinking about it." Buzz's passion for spaceflight is boundless, and he's impatient as hell to see humanity get back out there. And as he turns 90 on 20 January 2020, he wants it to happen soon.

Buzz remembers clearly when his passion for flight evolved into one for exploring space. After graduating from the US Military Academy at West Point in 1951, he spent two years flying jets in the Korean war. Buzz then flew aerial patrol in Europe supporting NATO, and enrolled at the Massachusetts Institute of Technology (MIT) to study astronautics in 1959. It was while at MIT that he heard President John F Kennedy's challenge to send American astronauts to the Moon.

"The country was swept up in the space programme, and I wanted to be a part of it," Aldrin recalls when I spoke to him, "But NASA retained its requirement that astronauts have a diploma from a military test pilot school – not one of my credentials.



▲ Buzz cut: an early photo of Aldrin from his West Point Military Academy yearbook

"Since I knew that the Moon landing programme Kennedy had described would need astronauts with skills other than the ones they drummed into you at test pilot school, I opted for another 18 months of intensive work on a doctorate in astronautics, specialising in manned orbital rendezvous."

It took two applications to become a NASA astronaut, but by 1963 he was accepted and was immediately assigned to work on orbital dynamics and rendezvous for the upcoming Gemini Program.

Preparing for space

Gemini started flying in 1965, and Buzz's Gemini 12 flight was the last of the missions. As with all the Gemini flights, there was a long list of objectives to be fulfilled, but perhaps the most critical was that of extravehicular activity (EVA), also known as spacewalking. Performing

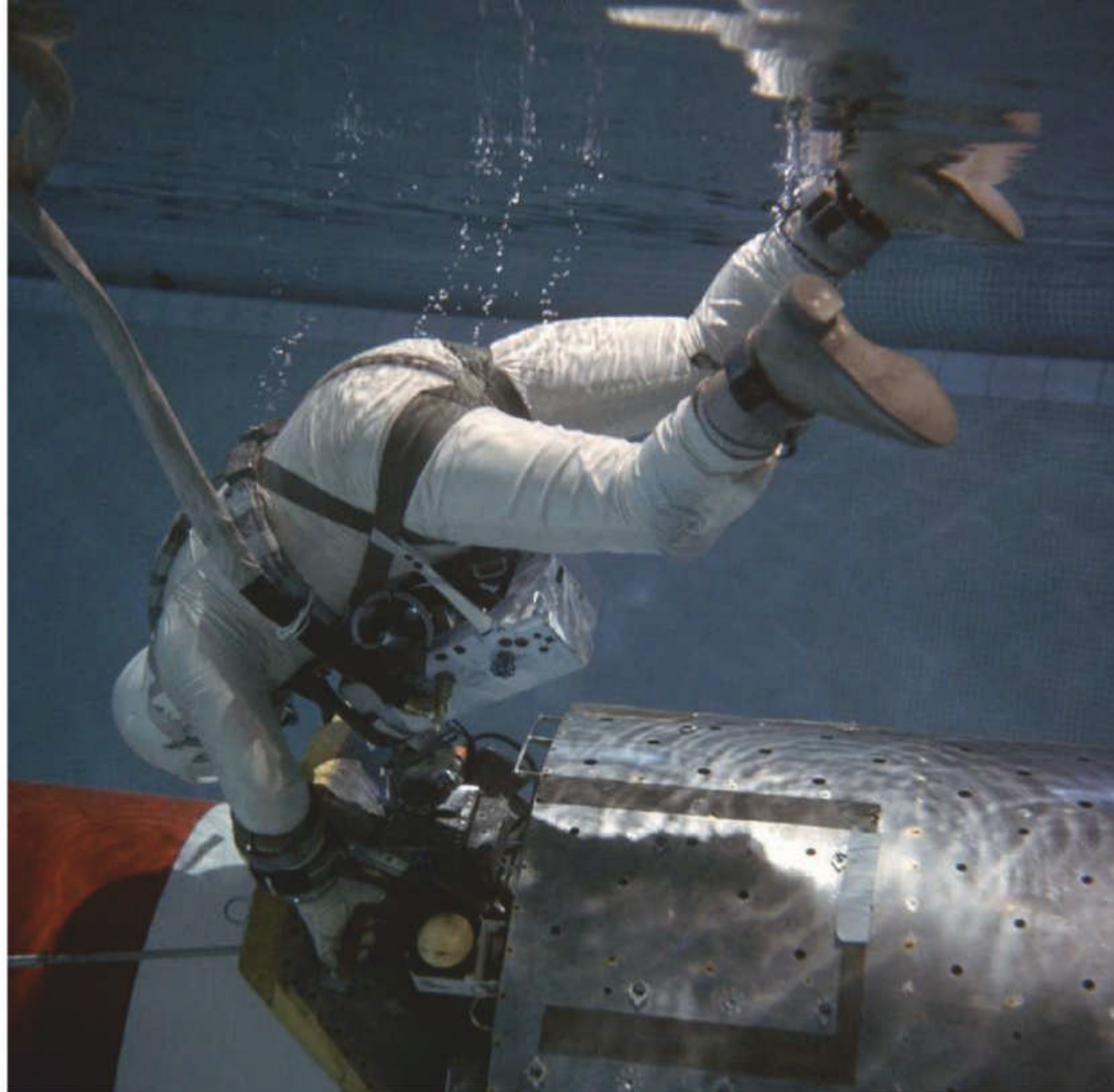
tasks during EVA was deemed critical for the Apollo Program, and one that had not yet been mastered despite many attempts on previous Gemini flights. Other astronauts who had attempted to perform tasks in zero gravity had become overheated and physically exhausted. Aldrin's mission was the last chance to get it right.

Buzz was determined to hit his marks. He spent hours training for his EVA; far more than NASA mandated. He repeatedly went up in the Zero-G simulator aircraft but was not convinced that the minute-long periods of freefall were enough to assure success. But NASA had started experimenting with ▶

► underwater training, and Aldrin, already an avid scuba diver, seized on this opportunity. He could be found day after day in a pool that NASA had rented from a high school, sealed in a Gemini pressure suit, clambering over the Gemini simulator in the deep end of the water.

Then on 11 November 1966, it was time to strut his stuff on Gemini 12 alongside Jim Lovell. Buzz's first triumph came just hours after launch, when he had to manually guide the spacecraft to their docking target – an unmanned Agena rocket stage – when the Gemini's radar failed. He did so using paper charts, a sextant, and a slide rule – and burned less fuel in the effort than any previous flight.

Days later it was Buzz's turn to try to master EVA. The first spacewalk was a simple 'stand-up' affair, rising from his seat through the open hatch and taking photographs. For the second and far more challenging spacewalk the next day, he carefully made his way out to the Agena stage and placed an experiment there, before moving toward the rear of the Gemini capsule. He made it look easy. Once at the rear section of the spacecraft, he easily performed the tasks that had so vexed his predecessors – turning bolts and manipulating fixtures on a unit they called 'the busybox'. In just over two hours, Aldrin had completed the final major objective of the Gemini missions. As he later put it, "Project Gemini had finally triumphed. All of its



▲ **At the deep end:** Buzz spent long periods submerged in a pool practising for his spacewalk...

▼ **...which he went on to perform flawlessly during NASA's Gemini 12 mission**

objectives had now been met. We were ready to move on to Project Apollo and the conquest of the Moon."

In late 1968, Aldrin was assigned to the crew of Apollo 11 with Neil Armstrong and Mike Collins. Training started immediately and did not let up for the next six months.

Destination Moon

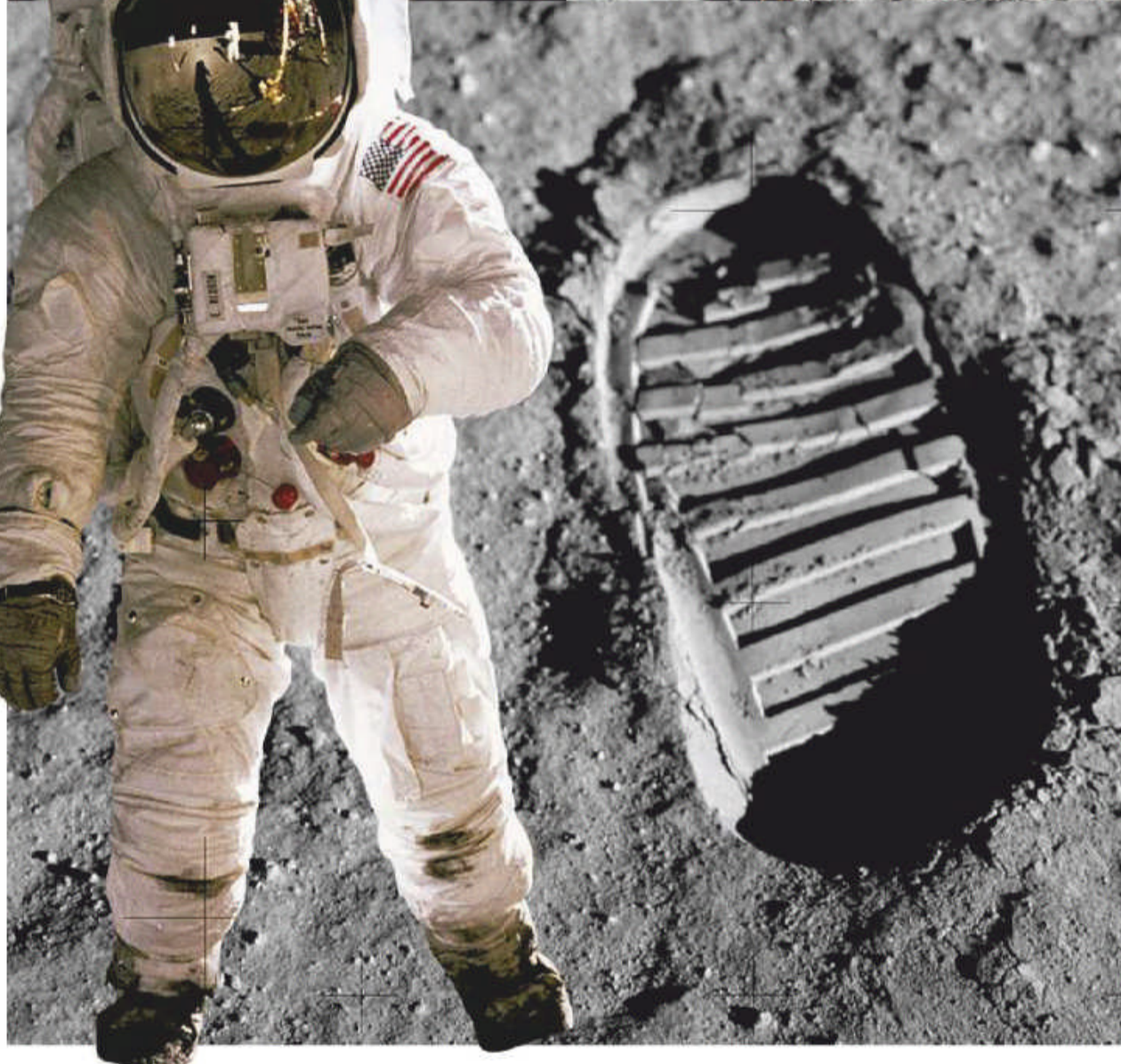
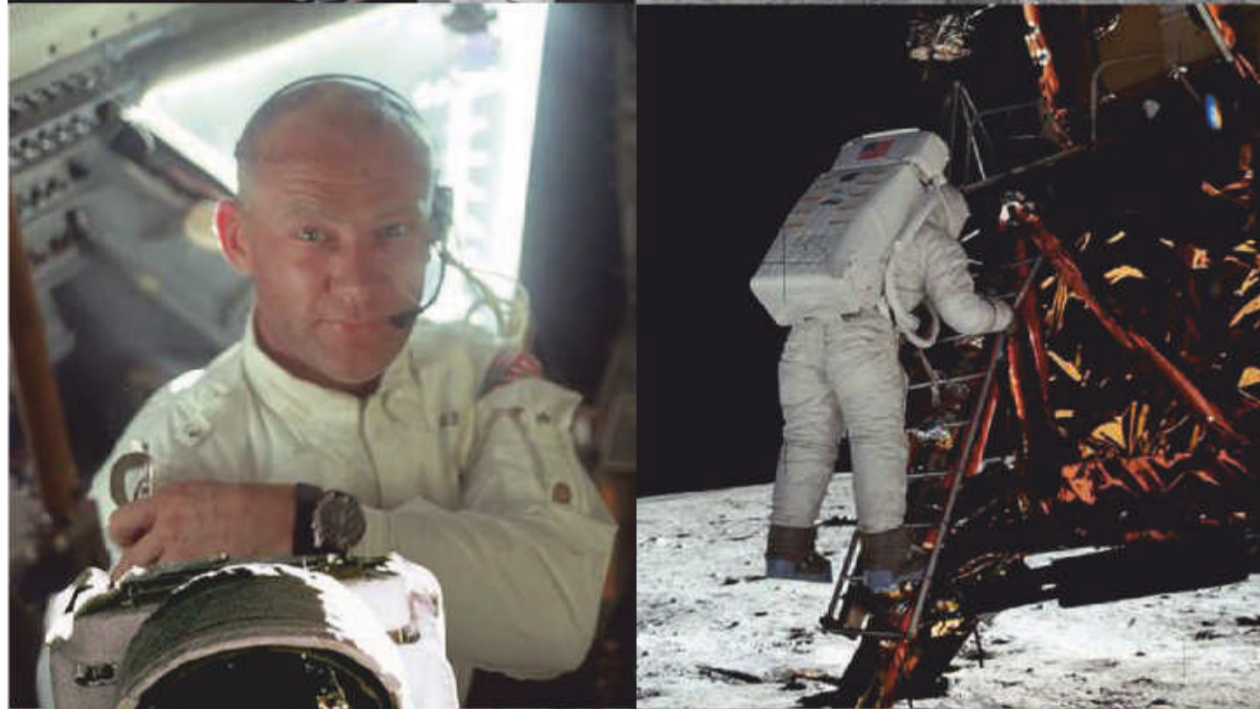
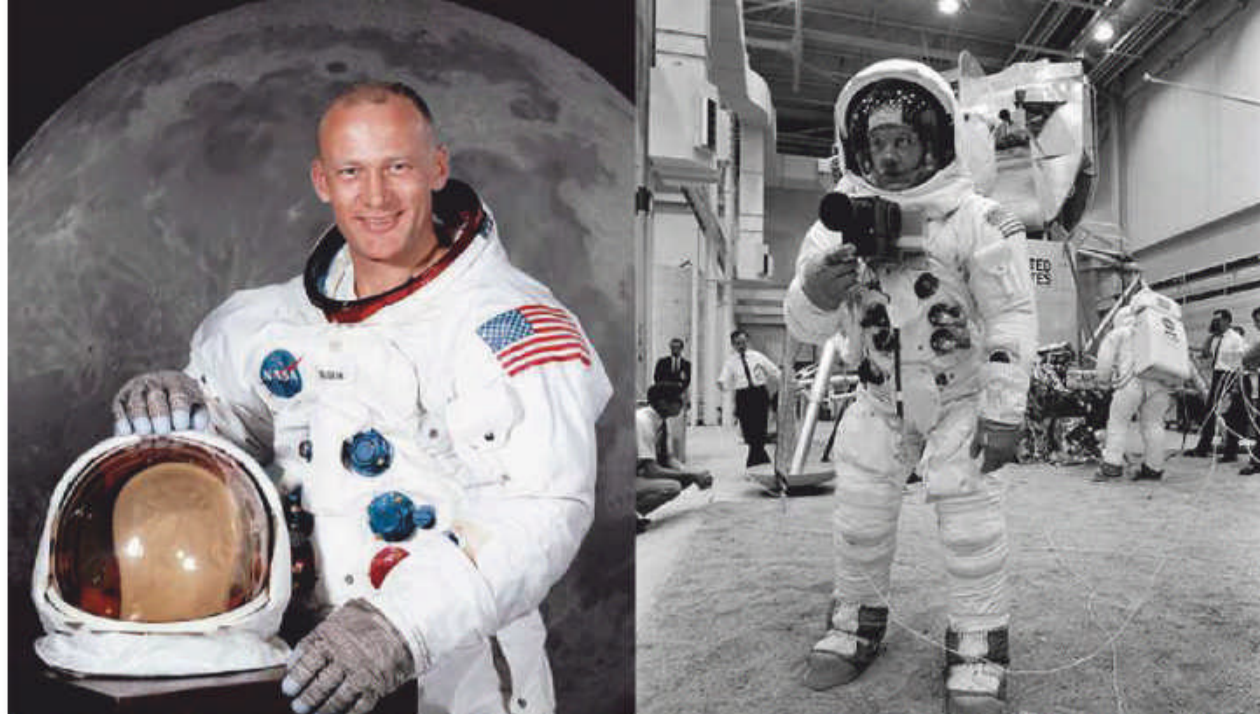
On 16 July 1969, every preparation that could be made for the first landing attempt was complete, and at 9:32am Eastern Daylight Time, they were off. A few days later, and after a harrowing landing during which the guidance computer locked-up multiple times, the lunar module (LM) Eagle set down on the Sea of Tranquility. After a rest period, it was time to explore. They suited up and depressurized the cabin – but when they tried to open the hatch, it wouldn't budge. Despite having opened a valve to vent the LM's oxygen, there was still too much pressure inside the cabin.

"We didn't fly 240,000 miles [386,000km] to not explore the Moon," Aldrin later told me. "I reached down and grabbed the corner of the hatch and flexed it back – there was a hiss of escaping oxygen, and it swung open... You do want to be a little careful about not bending that door," he added with a chuckle.

Stepping onto the lunar surface about 20 minutes after Armstrong, Aldrin turned to see a sweeping view of the stark terrain. Aldrin said, almost dreamily, "Magnificent desolation". That term, forever etched in our collective memories, remains the most poetic description of the lunar surface by any astronaut.

Just over two hours later, as they re-entered the LM, the astronauts noticed a small plastic tab on the floor of the cabin. When Armstrong had been manoeuvring his way out of the LM, his backpack had brushed a switch, snapping it off – it was the ascent engine arming breaker, the very switch they would need to throw to return to lunar orbit. As they rested, Mission





Control developed a time-consuming workaround, but as the astronauts prepared for lunar liftoff about 10 hours later, the ever-pragmatic Aldrin looked at the breaker – now just a plastic hole in a panel – pulled a pen out of his pocket, and jammed it inside the switch. Problem solved for less than the cost of a beer.

After splashdown, their ordeal was still not over – the trio would spend the next three weeks in quarantine. “It was a bit of a blessing,” Aldrin would later say. “We had time to decompress.”

At one point during their lockdown, Armstrong and Aldrin were watching recorded footage of the moonwalk. Aldrin smirked, and turned to Armstrong. He recalls saying, “Neil, you know what? We missed the whole thing!” ▶

▲ **Making history:** after months of training and a three-day flight to the Moon, Aldrin set foot on the lunar surface and became the star of some of the most iconic images of the Apollo era



High flyer: a career takes off

Buzz Aldrin’s flight career spans decades and orbits. Here are some of the high points

- ▶ During training at Bartow Air Base in Florida, Aldrin attempted a double-Immelmann (a complex aerobatic manoeuvre) and briefly blacked-out from g-forces. He recovered just in time to avoid crashing.
- ▶ Trained in single-seat jet fighters including the F-80 Shooting Star and F-86 Sabre at Nellis Air Force Base in Nevada.
- ▶ Flew 66 combat missions in Korea in the 16th Fighter-Interceptor Squadron, and shot down two enemy aircraft, 1952–53.
- ▶ Received two Distinguished Flying Crosses and three Air Medals.
- ▶ Flew the F-100 Super Sabre, armed with nuclear weapons, on patrol in Europe, 1956-59.
- ▶ Gemini 12 launched on 11 November 1966, and returned on 15 November. First manual orbital rendezvous with an Agena docking target vehicle.
- ▶ Apollo 11 launched on 16 July 1969. Buzz Aldrin and Neil Armstrong land on the Moon on 20 July 1969.
- ▶ Flight time: 2,500 hours in aircraft (2,200 in jets); 3 days, 22 hours in the Gemini spacecraft; 8 days, 3 hours in Apollo spacecraft.





► After a whirlwind world tour, the crew went their separate ways. Armstrong headed off into a university teaching career, and Collins to lead the National Air and Space Museum. But Aldrin was struggling with his future: how would he follow up such a magnificent experience? As he wrote in an autobiography called *Magnificent Desolation*, "I wanted to resume my duties, but there were no duties to resume," adding, "There was no goal, no sense of calling, no project worth pouring myself into." Not that there weren't plenty of offers – he spent time on the board of a major insurance company and began what would become a lifelong engagement with university students. But it was simply not enough. Nothing was enough.

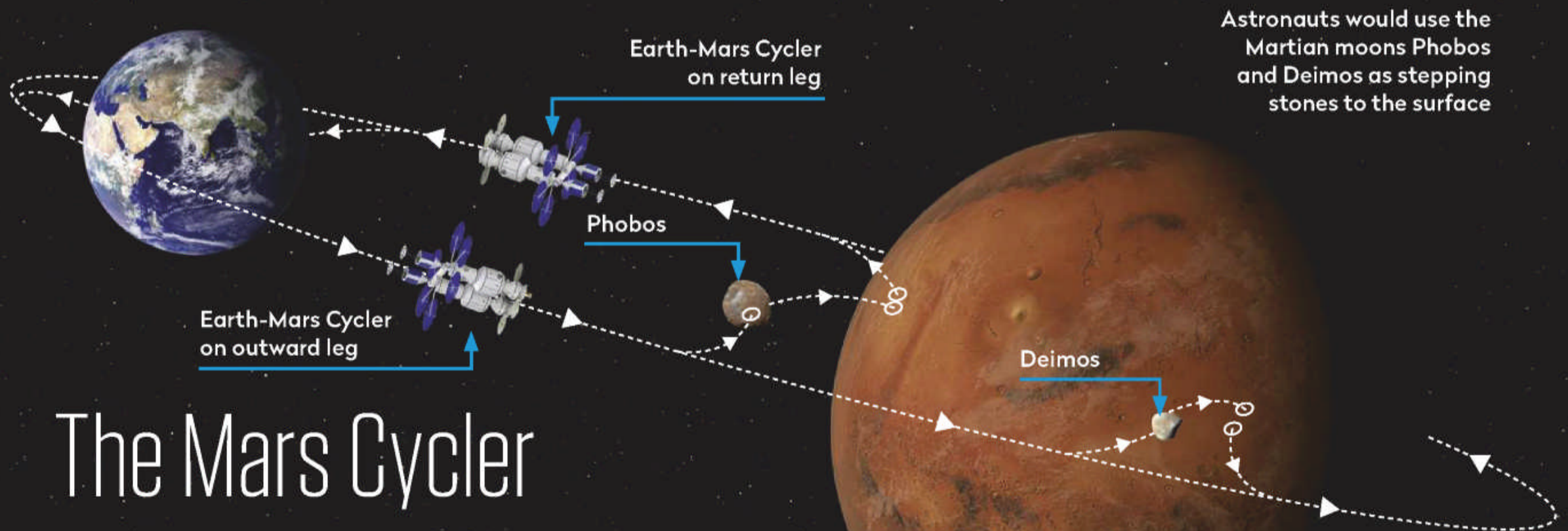
In his books about his career, he spoke openly about facing what he now realised was chronic depression, and his struggles to cope, using alcohol

▲ **Creating a buzz:** Aldrin engages a new generation of TV viewers on *Dancing with the Stars* in 2010

as a crutch that ultimately became an addiction. This was an incredibly bold step – combat pilots and astronauts rarely discussed such things among themselves, and certainly never with the public. But Aldrin felt it was important for the world to know the pressures people such as himself worked under, and the ultimate costs that could accrue.

In the succeeding years he overcame these challenges, emerging as somewhat of a media favourite, with appearances on numerous TV shows including *Dancing with the Stars* (2010), *The Simpsons* (1994), and *The Big Bang Theory* (2012), as well as numerous documentaries. He became a staunch advocate of the human exploration of space, continuously pushing NASA to go farther, returning to their roots as leaders of human space exploration.

As part of this effort, in 1987, Aldrin joined the Board of Governors for the National Space Society



The Mars Cycler

Now concerned with the future of spaceflight, Aldrin has come up with an ingenious way to get to Mars

There have been many mission plans to send humans to Mars, but Aldrin's is among the most audacious. "About 1985 I began looking at how we might go to the Moon and Mars with free return trajectories – to swing around and return from these places, and this led to the cyclers," says Aldrin.

The Aldrin Mars Cycler is a large spacecraft that would orbit between Earth and Mars on a continuous, looping trajectory. Once in this orbit, no further propulsion is required – the Cycler provides, in effect, a permanent free ride between the two planets. At each end of the journey, crew members are shuttled between the Cycler and the nearest planet by a 'taxi' spacecraft.

The Mars Cycler itself would probably look something like a smaller, modified International Space Station, though some have even suggested that a small asteroid could also be used, with living facilities burrowed inside. Aldrin has recently repurposed his designs to include a Lunar Cycler that would maintain a permanent pathway between the Earth and the Moon.

► Mars in his sights: Buzz tries out a Microsoft HoloLens mixed reality headset at the Kennedy Space Center's Destination: Mars experience in 2018

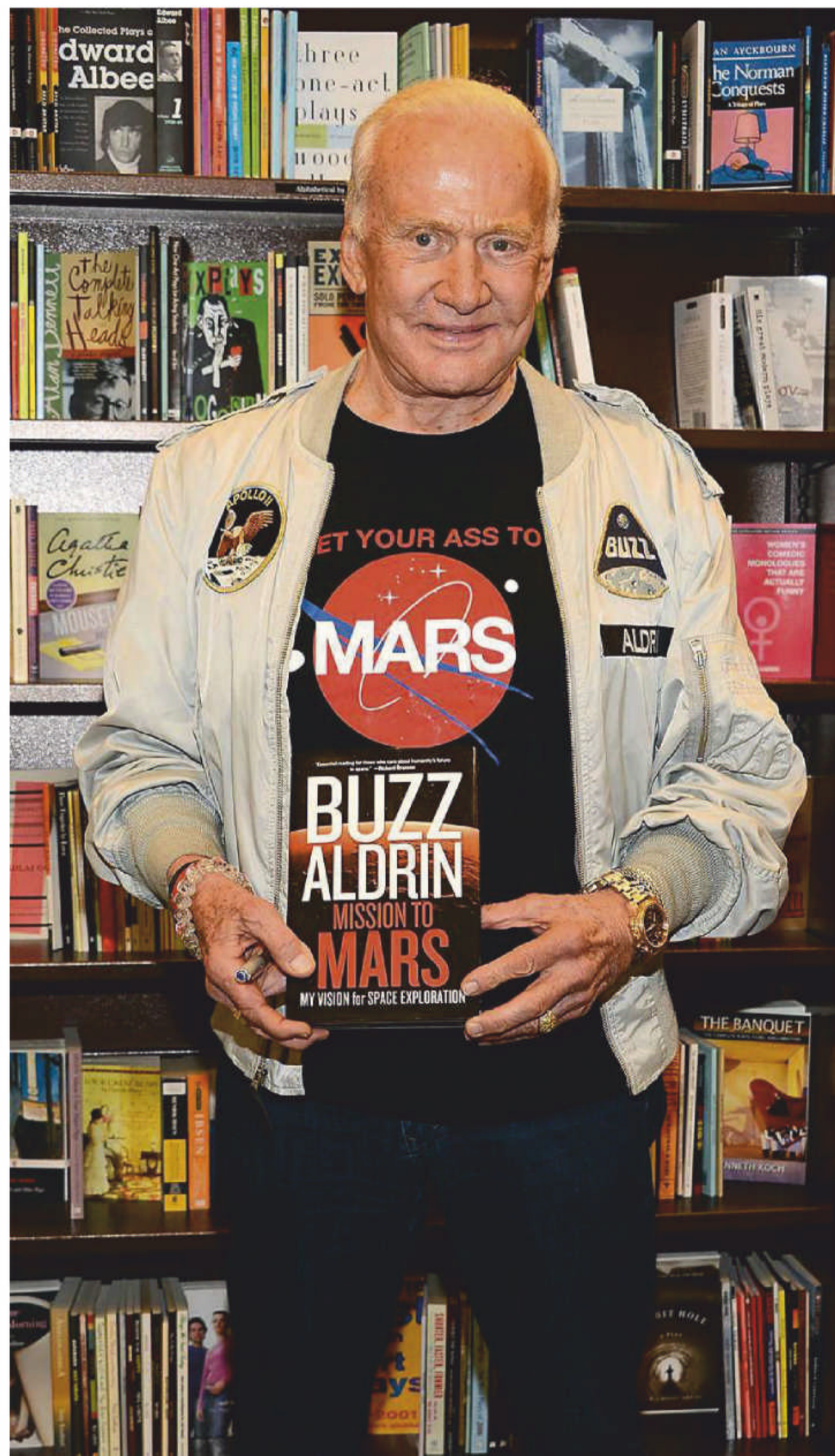


(NSS), a preeminent pro-space organisation.

"There are a lot of organisations that have been a joy for me to be with," he said, "but the NSS is one that is available to all," adding that a key purpose is to "exchange... ideas that stimulate".

Space is the place

Today, Aldrin continues to advocate for returning humans to the Moon and then onward to Mars. He remains a prominent voice for internationalism in space, pushing for greater collaboration with a number of nations, most notably China. He recently formed the Human Spaceflight Institute to continue



the push and is working to form a global alliance for space exploration.

"Let NASA put this together along with the Europeans, Japan, Russia and China," he told me, along with commercial entities. "I'm very interested in dealing with international groups. It's very crucial to not have a competition with China," he says. "We're better at problem solving as an international group of thinkers."

Now 90 years old, Buzz Aldrin remains a true force of nature. It often seems as if there are five brilliant minds competing for one mouth, and the ideas and plans come fast and furious, as he continues to work towards his final legacy: humanity's greatest adventure.

"50 years after Apollo, what can we actually do?" he recently said. He's not a fan of NASA's current plans. "We don't need a permanent orbital structure at the Moon," he says of the planned Lunar Gateway, which he thinks could be better employed as a transit vehicle between the Earth and the Moon. "If that's not a winner, I don't know what is," he says. But he then summed up the interactions between people like himself and NASA with a chuckle. "It's hard to mix fighter pilots with managers..."

That may be true, but after nearly a half-century of developing ideas to return humans to deep space, his ideas seem to be increasingly relevant.

"It's time to get on with it," he concluded. "Now." 🚀



Rod Pyle is an author and journalist. He has written 15 space books and is editor-in-chief of *Ad Astra* magazine for the National Space Agency

◀ Force of nature: Aldrin is a keen author who passionately advocates for a global alliance to get humans into space and to settle on Mars