

# The Daily Star WEEKEND MAGAZINE

"THE Eagle has landed." It was July 20, 1969. Humans had arrived on the moon.

The machine that brought them did not look like an eagle. It resembled a leggy metal arachnid. Nonetheless, the Apollo 11 Lunar Module, Eagle, transported across 250,000 miles of void by the command module, Columbia, and then released, performed like a noble bird as it touched down in the Sea of Tranquility.

A half-billion Earthlings watched on television that Sunday afternoon. Many more listened over radio. Millions felt lumps in their throats.

For one thing, the moon had proven fearsome. From lunar orbit, command module pilot Michael Collins looked down upon this new world and shuddered: "The moon I have known all my life, that two-dimensional, small yellow disk in the sky, has gone away somewhere, to be replaced by the most awesome sphere I have ever seen." Collins would remember, "To begin with, it is huge, completely filling our windows. Second, it is three-dimensional. Its belly bulges out toward us in such a pronounced fashion that I feel I can almost reach out and touch it. The sun is behind it, and its light cascades around the moon's rim."

Collins was about to become the universe's loneliest man. He and his two fellow astronauts had travelled together to lunar orbit in Columbia. Now Neil Armstrong and Buzz Aldrin crawled into the attached Eagle and separated from the mother ship. Collins would orbit the moon alone.

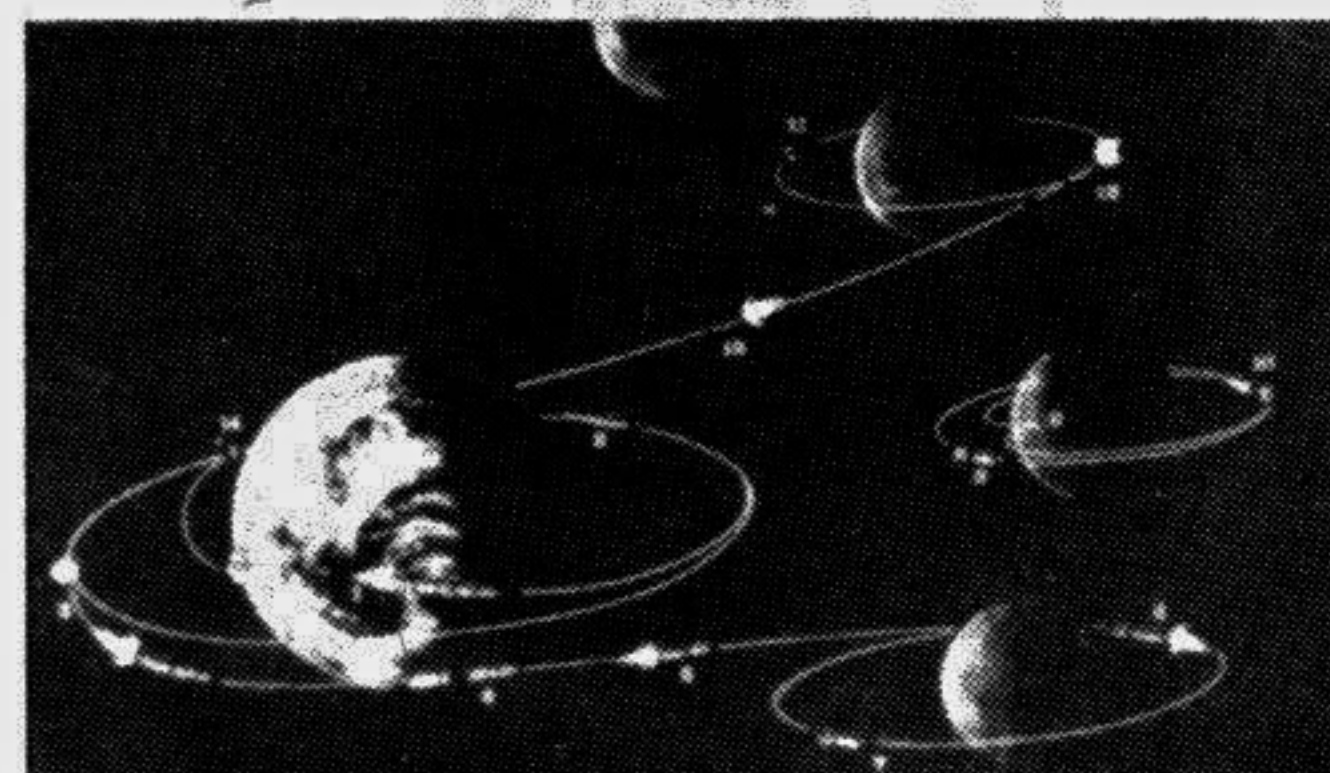
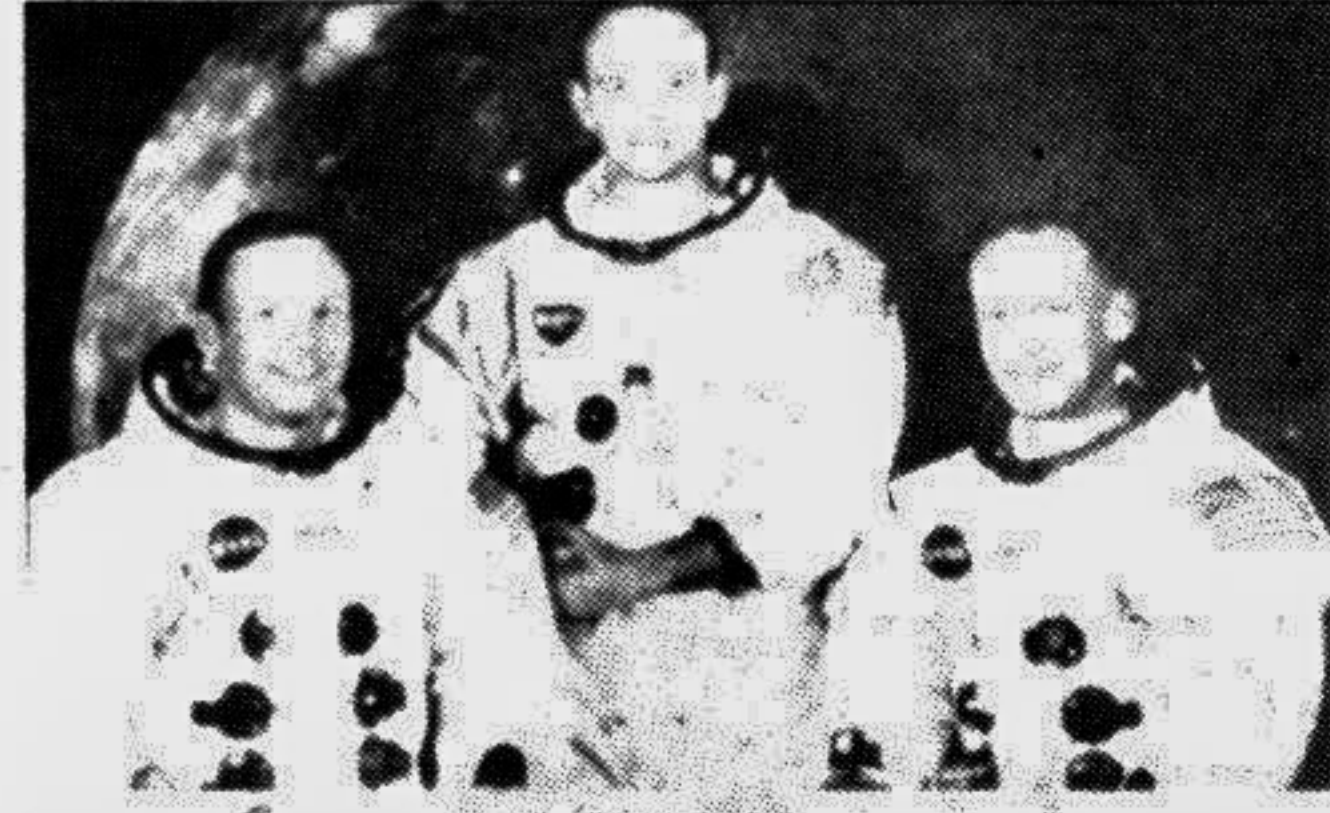
Through his window, he watched the Eagle maneuvering in space. Its spindly legs jutting from a lumpy body, "the weirdest looking contraption I have ever seen in the sky," in his book about the US space programme, *Liftoff*, he admits



THE EAGLE HAS LANDED! - American astronauts Neil Armstrong (left) and Edwin "Buzz" Aldrin plant the US flag on the moon, in the Sea of Tranquility.

## "One Small Step ....": America's Lunar Walk at 25

by Richard Wolkomir



FLIGHT SEQUENCE - Posing in front of a picture of the Moon prior to the flight are (from left) Neil Armstrong, Michael Collins and Buzz Aldrin. At right, the mighty Saturn V rocket starts them on their way from Florida. Drawing shows the flight in numbered sequence from launch to Earth orbit, to lunar orbit, to lunar separation and landing, to rendezvous in lunar orbit and return to Earth.

fibbing a little over the radio: "I think you've got a fine looking flying machine there, Eagle, despite the fact you're upside down."

Nobody knew what would happen. Would the descending Eagle sink into deep lunar dust and disappear? Would space-suited humans lurch uncontrollably in the moon's low gravity? Could they withstand 239 degree F. (118 degree C.) sunlight? Would Eagle success-

fully leave the moon and rendezvous with the speeding mother ship?

Now the time arrived. Michael Collins gazed down at the moon, "this withered sun-seared peach pit," and thought about blue Earth. He told himself: "I'd just like to get our job done and get out of here."

At 3,000 mph, Eagle descended to 40,000 feet (12,000 meters). Abruptly, as Armstrong and Aldrin lay on

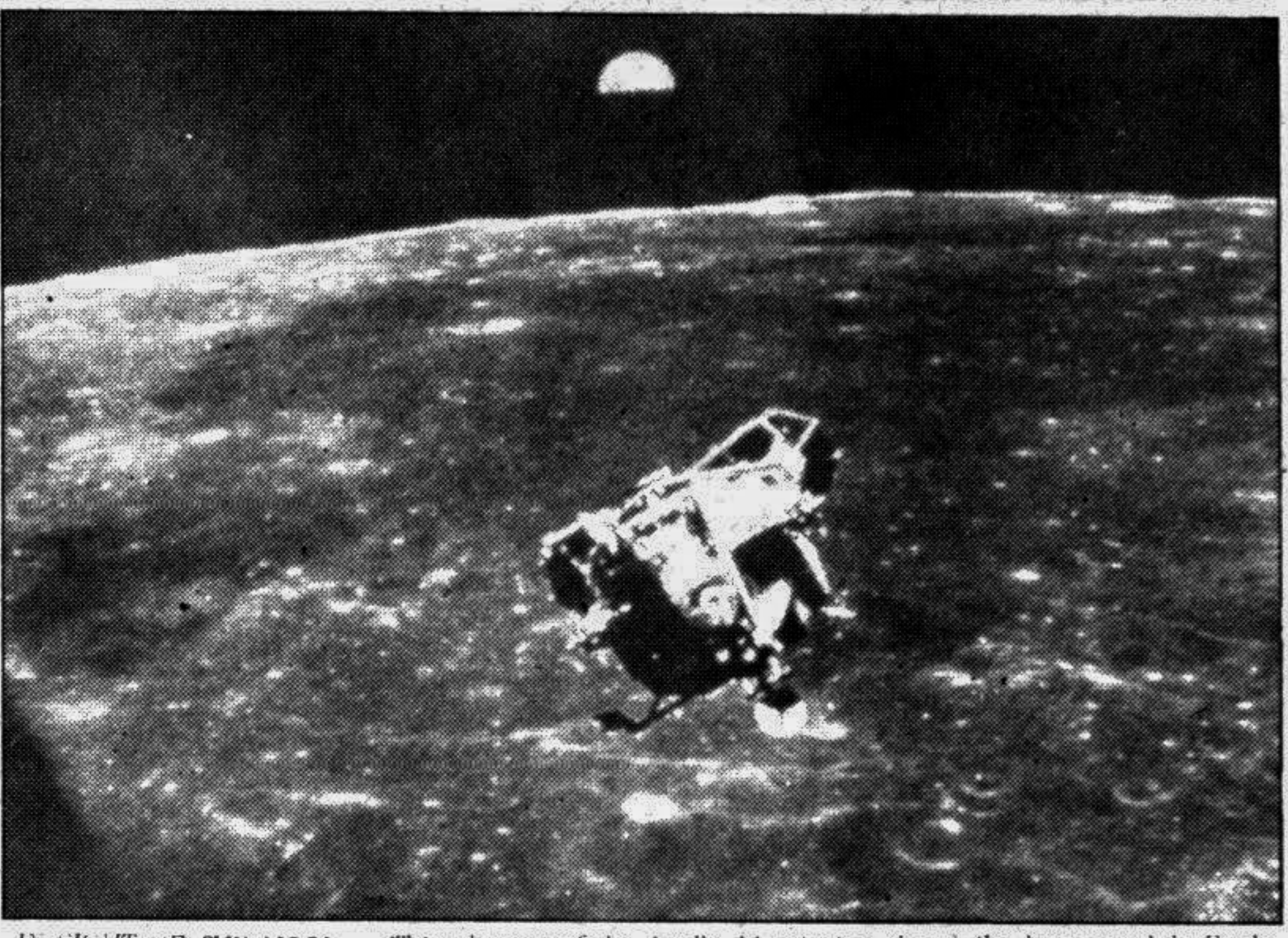
their backs, red alarms flashed. The onboard computer, controlling the Eagle, was overloaded with data, and approaching an electronic nervous breakdown. Mission Control in Houston had 30 seconds to decide — abort the landing? Or could computers in Texas take over some work from Eagle's system?

"Go, Go, Go, Go," came the instructions over the radio.

At 4,000 feet (1,200 meters), Eagle pointed its legs down, swinging Armstrong and Aldrin upright. Finally, out their window, they saw the Sea of Tranquility. The previous lunar mission, Apollo 10, had photographed this region in minute detail. Armstrong had memorized all landmarks leading to the chosen landing site. But now through his window he saw only unfamiliar boulders and craters. Eagle had edged off track into *terra incognita*. They were too low to go back up. But Armstrong saw no flat place to land. He seized control from the computer. Now he was flying the Eagle himself.

Armstrong's heart rate, normally 77 beats per minute, climbed to 156. He dropped the craft at just a foot per second, scanning the rubble on all sides for a spot to touch down. He had limited fuel. And then he saw a flat place that he later described as only "the size of a big house lot."

"Houston, we uh....." Armstrong started to say over the radio, then switched to official lingo: "Tranquility Base



IN SHIRT OF THE MOON - This glimpse of the Apollo 11 mission shows the lunar module Eagle in the vicinity of the surface of the moon, with a Earthrise in the distance.

here. The Eagle has landed." Mission Control responded: "Roger, Tranquility, we copy you on the ground. You've got a bunch of guys about to turn blue. We're breathing again. Thanks a lot."

Millions of television watchers breathed again, too. For now, the astronauts were safe among jagged crests bathed in white Earthshine. And so we knew: we no longer were tied to the third planet.

Armstrong was about to take "one small step for a man, one giant leap for mankind." Propelling him to that moment was what another astronaut, Eugene Cernan, later called the "culmination of a vision," a technological vision, energized by politics and Cold War competition. As Cernan pointed out, it was not just an adventure for a few test pilots.

At its apex, the Apollo project employed 400,000 Americans. It involved 20,000 industrial firms and it cost American taxpayers \$24 billion. It also cost three lives. On January 27, 1967, as astronauts Gus Grissom, Ed White and Roger Chaffee tested a spacecraft on a Florida launch pad, fire erupted. All three died. Still, the Apollo programme filled a national psychological need.

World War II left America strong, confident of its uprightness. But then came the Cold War. In the 1950s, American schoolchildren practiced ducking under their desks to fend off potential Soviet H-bombs. In the late 1960s, the war in Vietnam escalated, followed by antiwar protests at home.

Meanwhile, the Cold War

had a sideline — the "space race." To America's astonishment, the Soviets were winning.

On August 3, 1957, the USSR launched the first Intercontinental Ballistic Missile, or ICBM. Two months later, the Soviets orbited the first artificial satellite, Sputnik I. The following month they launched a dog, Laika, or "Little Lemon," into space.

Soviet rockets produced one million pounds (450,000 kilograms) of thrust, as opposed to 75,000 pounds (33,750 kilograms) of thrust generated by the US Redstone, designed by German-born rocket engineer Wernher von Braun. Meanwhile, America's own first attempt to orbit a satellite ended when the rocket exploded on liftoff. "It was a bleak day, a terrible day," former Johnson Space Center Director Christopher Columbus Kraft later remembered.

Under political pressure, in the summer of 1958, President Dwight Eisenhower signed into existence the National Aeronautics and Space Administration (NASA). And on December 17, 1958 — exactly 55 years after Orville Wright's first flight — NASA began an effort to achieve manned spaceflight, called Project Mercury. It proved to be the first step toward the moon. Looking back, Collins calls Mercury the start of "one of the greatest and most successful engineering ventures of all time."

It didn't look like much. The Mercury capsule was a metal canister, just large enough to hold a human. It was, says Collins, "about the

same size as a coffin." NASA advisers seriously recommended seeking an astronaut with no legs, who would need less room. But NASA merely limited astronauts to no taller than five feet, 11 inches. The first seven astronauts were embarrassed because the "pilot" of the computer-controlled Mercury actually did little more than Laika, the USSR space dog. Even more humiliating, before NASA entrusted a human to Mercury, the capsules carried chimpanzees into space. Airplane test pilots derisively called their astronaut brethren "Span in a can."

But there was method to NASA's process. For one thing, the US space programme operated in full view of the press. Catastrophes would be instantly visible to the world. And each Mercury launch would answer questions that would lead to improving subsequent flights.

Could man survive a ride on an ICBM? How rough would the ride be? And what about the "pogo effect", in which the rocket's stack of three stages shake vertically during liftoff? Would the capsule protect the rider during reentry into the atmosphere? And how hot would it get inside the capsule?

The space programme was not solely technological. As journalist Joseph Trento puts it in *Prescription for Disaster*, his history of the space pro-

gramme, "it would serve as a popular framework on which to improve our educational and technical capabilities." On April 28, 1961, Vice President Lyndon B. Johnson gave President John Kennedy a report that broached the idea of going to the moon. "To reach the moon is a risk," the report observed, "but it is a risk we must take. Failure to go into space is even riskier..... One can predict with confidence that failure to master space means being second best in every aspect. In the crucial areas of our Cold War world, in the eyes of the world, first in space is first.... Second in space is second in everything."

As the Soviets continued to rack up successes — cosmonaut Yuri Gagarin became the first human in space — President Kennedy told Congress: "This nation should commit itself to achieving the goal, before the decade is out, of landing a man on the moon and returning him safely to Earth."

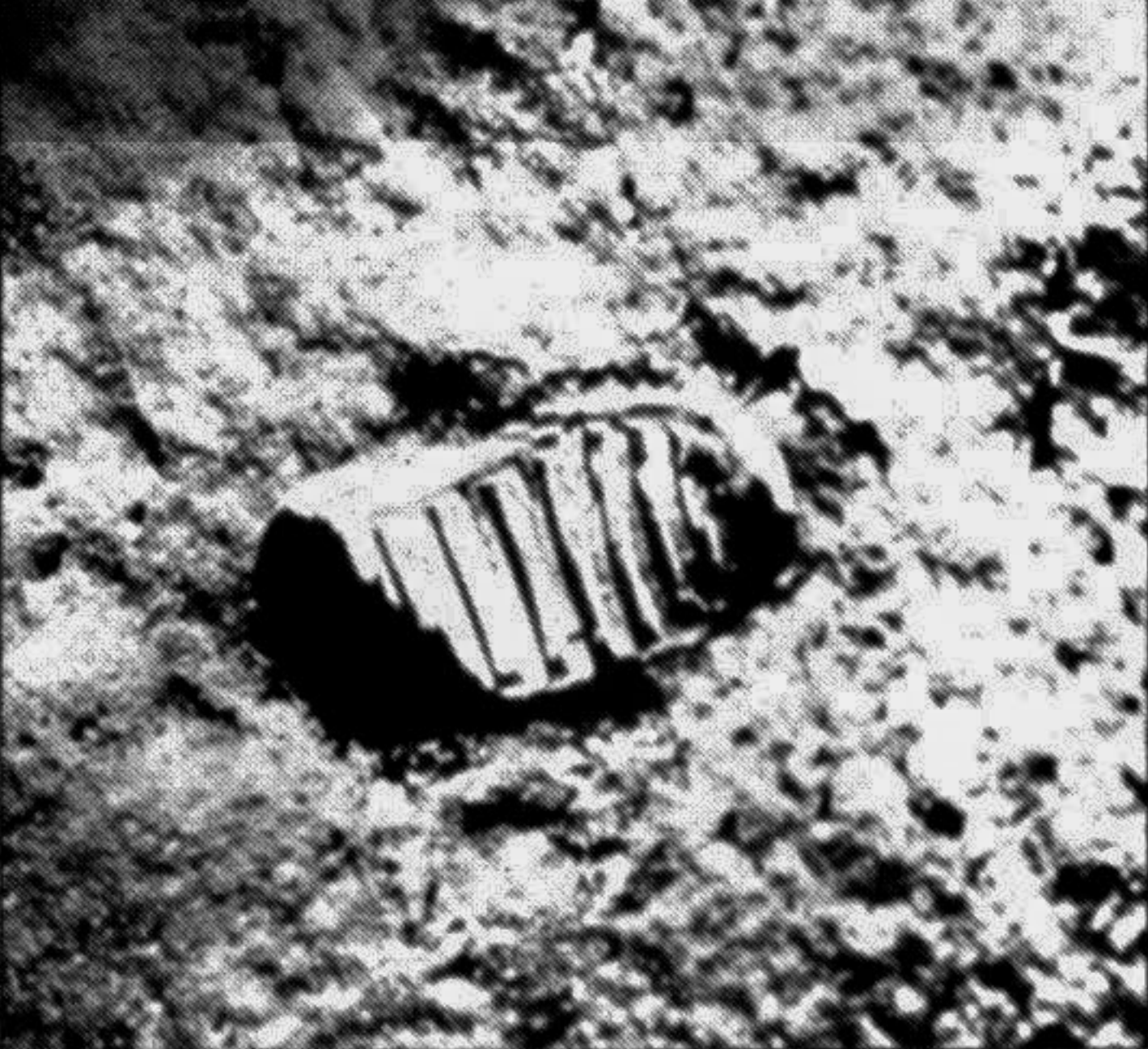
Meanwhile, Mercury had answered all its questions, proving that humans could travel in space almost routinely. In fact, during the last Mercury flight, on May 16, 1963, Astronaut Gordon Cooper was so calm at the controls that, just before liftoff, he drifted off to sleep. Later, in orbit, he drifted off again.

After Mercury came Gemini, step two toward the moon. Gemini required expanding the Mercury capsule — a Rube Goldberg contraption planted atop a plumber's nightmare, "one hostile congressman called it. Gemini would carry two astronauts. It was a test bed for new devices that would be vital to Apollo lunar missions, including a docking collar so that two craft could link up in space, advanced computers and radar, and the replacement of batteries with fuel cells that generate not only electricity but also drinking water for the crew. Gemini would test astronauts' ability to leave their ship and do work in the void. And, unlike Soviet capsules, Gemini could maneuver in space.

Every tiny detail had to be carefully engineered. The space suit in which astronauts would walk on the moon, for instance, needed a zipper that would hold in pressure. The engineers also had to invent an internal tank that would allow space-suited astronauts to urinate. But they could do little to make the suits truly comfortable. Collins, a veteran space-suit wearer, says that "once you were locked inside the suit, none of this gear could be adjusted, nor could an eye be rubbed, a nose blown or an itch scratched."

Rockets, too, required minute adjustments. For instance, welds had to be perfect or leaking fuels could ignite. On the test stands, workers in protective clothing sometimes circled the tanks holding out brooms. If a broom burst into flames, it meant they had found a leak.

Special attention went into the lunar module. It was so delicate that a screwdriver dropped by a worker could pierce its pressure shell. Yet it had to separate from the command module, descend to the moon, and then — after the



LUNAR LANDING - Astronaut Neil Armstrong's footprint on the moon was the climax of the historic event that occurred a quarter-century ago, on July 20, 1969.

lunar exploration was finished — use its exhausted first stage as a launch pad and fire second-stage rockets to ascend back into space. After that, relying on advanced radars and precise computation, it would have to catch the command module speeding around the moon and reattach to it.

The Saturn V moon rocket alone contained three million parts. The Apollo command and service modules comprised two million parts; and the lunar module, one million. If any of those six million parts failed, astronauts might die.

"The surface is fine and powdery," Neil Armstrong reported, as he took his first steps on the moon. "I can pick it up loosely with my toe. It does adhere in fine layers like powdered charcoal to the sole and sides of my boots. I only go in a small fraction of an inch, maybe an eighth of an inch. But I can see the footprints of my boots in the treads in the fine sandy particles."

On 6th June the 50th anniversary of the D-Day was celebrated in Europe in a befitting manner. Important heads of state and government whose forces were participants in the operation 50 years ago were present on both sides of the English Channel to commemorate the event. However, can D-Day be separated as an isolated operation from the campaigns in Africa, the Middle East, northern and southern Europe? Or, for that matter, from the Battle of Britain, Battle of Stalingrad and Battle of Leningrad? For instance, to support the landings of Operation Overlord on D-Day some 12,860 aircraft of various nations flew 14,680 sorties. On that day Royal Air Force alone had 487 squadrons belonging to 14 nations. Those were British 330, Canadian 42, South African 27, French 27, Australian 16, Polish 13, Indian 9, New Zealand 6, Czechoslovak 4, Norwegian 4, Greek 3, Dutch 3, Belgian 2 and Yugoslav 1. The character and composition of the forces on the D-Day were truly international but the representation on eve of the celebration was not really international. Besides, India's contribution to the war was massive. Military personnel numbering 23,93,891 whereas combined strength of Australia, Canada, New Zealand and South Africa numbered only 17,57,000. Direct cost of the war effort for India was also a staggering amount of US\$4,804,000,000. Today very few remember the war which is our rich and glorious heritage without any doubt. Most important, the main brunt of the war was borne by the two eastern provinces of India, first Bengal and then Assam, while the rest of India provided training

## D-Day to V-J Day Air Operation: Battle of Burma

by Group Captain M Kamaluddin Psc (Retd)

logistic and maintenance support to the war. The provinces of Bengal and Assam were used as the springboard to launch the whole offensive and defensive operation of the South East Asia Command against the Japanese invasion. It must also be remembered that only the people of Bengal and Assam died in the intensive Japanese bombing and the infamous famine to defend India and to liberate Burma. Bengal's contribution in war recruitment numbered 1,71,252 between September 1939 and August 1945. It was the fourth largest after the Punjab, Madras and the UP. Let the present generation know, learn and share the pride.

This short narrative on air operation of the Eastern Air Command covers the period from June 1944 to August 1945, the fall of Japan. There is relevant mention of army operation and a summary of naval operation of the British Eastern Fleet. And this is a salute to those few surviving gallant soldiers, sailors and airmen of the subcontinent who fought the war in three continents and are still refusing to fade away.

Before the onset of monsoon Japanese 5th Air Division retreated and withdrew their aircraft to southern Burma, beyond the range of Allied aircraft. For in the month of May, Japanese suffered one of the severe losses to Allied air operation till date, in air combat Allied Air Forces destroyed 58, and damaged 65 Japanese air

craft. Japanese Air Force also lost 20 aircraft, damaged by Allied air attack on the ground. Allied loss of operational aircraft in May was also heavy. RAF lost one Liberator (HB), four Vengeance (LB), seven Beaufighter (TEF), 10 Spitfire (SEF), 20 Hurricane (SEF), eight Dakota (Transport), one Catalina (GR), and two Liberator (HB) did not return. Total loss stood at 52 aircraft. USAAF suffered loss of one B-24 (HB), three B-25 (MB), three P-51 (SEF), three P-38 (TEF), two P-5 (TEPR), 10 C-47 (Transport) to enemy air action on the air and on the ground. Total aircraft lost was 22.

On 6th June two Beaufighters from No. 211 Squadron of No. 169 wing Fenny attacked Hmwabi airfield near Rangoon and destroyed two and also damaged one Japanese aircraft on the ground. The same day 459th Squadron USAAF of No. 166 Wing Chittagong launched 18 P-38 on attack mission against Meiktila. Over the target they sighted more than 30 Japanese Oscars (Fighters) above them. Simultaneously, the enemy also had contact. There ensued a free for all close air combat. The P-38s shot and destroyed three and damaged six Oscars against their own loss of two and three damaged P-38s. Next day on 7th June the same squadron flew another attack mission with twelve P-38 against Meiktila,

Kangaung, Thedaw, Thabukyon and Kewting airfields. But no enemy activity was encountered. On 8th June at 1100 hrs 15 Oscars strafed Churachandpur. Again on 9th June six Oscars strafed the same area.

Meanwhile, due to heavy pressure by the Japanese army against Kohima and Imphal front in the previous months, two GC radar stations had to be withdrawn in the air defence chain of eastern India covering Assam. These two stations were one at Tamu, 35 miles south east Imphal and another one was at Ukhrul, about 50 miles north east Imphal. There appeared a long gap or blind area in the most strategic sector where 33 Div, 15 Div and 31 Div of the Japanese Army were advancing along Tiddim, Imphal and Kohima axis. The wireless observer units were far too few owing to hazardous nature of the mountains. They had to be constantly withdrawn in the face of the Japanese advance.

In fact, two of these units were simply lost, never heard of again in the onrush of Japanese advance. A serious situation developed because low flying tactics followed by the Japanese Air Force which made it more difficult for broadcast control.

Whenever the Japanese mounted a fighter sweep, they would usually come low, 20 or 30 aircraft, then split the formation into twos, threes or even single aircraft head in various directions to attack

designated targets or whatever they thought to be targets. These were often observed by the friendly fighter or bomber aircraft or even transport returning from mission and reported to the operation room. Same type of aircraft and often the same number were simultaneously reported from many sources. Obviously, plotting result was very confusing. To overcome this peculiar situation some counter measure had to be developed. It was decided to initiate weather flights by Beaufighters over the Chindwin river line. Beaufighters would report weather if it was favourable for Japanese foray or not. If weather was fairly good then two sections of fighters would be flown to orbit — the two low exit areas of the Japanese air force over the plains or Palel and Churachandpur. On 17 June at 1100 hrs a lucky incident proved worthiness of the plan. On that day, the Japanese air force attempted their last big operation of the season before heavy monsoon. Over 15 Oscars approached the plains of Palel and Chittagong area. A Spitfire was already airborne for test flight and it soon spotted the large enemy formation. The pilot at once reported the position of the hostile aircraft. He also divided through the enemy formation and attacked. Two squadrons of No. 165 wing, at Jalia No. 607 and No. 615 scrambled their Spitfires based at Rumpkpalong and Nazir. The squadrons and the lone Spitfire on test flight inter-

cepted the enemy while they were making their exit along their usual route of Palel and Churachandpur. In the air battle the Spitfires shot down ten enemy aircraft for the loss of one Spitfire whose pilot successfully bailed out.

In the beginning of June, Indian army's 77th Brigade had reached the outskirts of Mogaung, about 200 mile due east of Kohima. With direct support of the operation for the reconquest of Mogaung No. 84 squadron of 168 wing at Kumbhigram with their Vengeance (LB) attacked troop concentration and supply dumps on 5th and 7th June. Further tasks of air support in the battle of Mogaung were then taken over by Northern air sector force. 80th fighter group at Nagahuli and 811th F-B group at Dinjan flew 35,52 and 50 attack sorties on 11th, 12 and 23 June with their P-40 and P-51 aircraft. The attacks were against the munition dumps and defensive positions of the enemy. Besides map briefing, the pilots were practically talked to the target by the visual observers over radio, by signal smoke and excellent mosaic prepared by the air intelligence. The accuracy of radio relay by the ground troops was demonstrated on 19 June when it was reported that an enemy train was moving from Pinbaw to the North. They called on radio for any aircraft in the zone and a formation of P-51 on another mission answered the call. They were immediately diverted. The formation easily spotted the train and attacked. They were followed by waves of more aircraft and the train was devastated and derailed. It was later found that it carried troops and severely in need of supply for the Japanese garrison.

Continued on page 10