

LOOK UP AND DREAM

Rocket history

For thousands of years, people looked up at the night sky and wondered what it was like, out there in space. But serious, scientific attempts at space travel only began in the 20th century – a period of incredible progress and change. In 1900, no one had ever flown in an aircraft, watched a television or listened to a radio. Only a few people had even ridden in a car. Yet within 70 years, humans had left Earth to explore space for the first time, and a tiny handful had made it all the way to the Moon. How did this revolution happen?

EARLY ROCKETS

The first rockets were invented in China over 800 years ago. They used gunpowder packed into tubes of bamboo. In the 1920s and 1930s, pioneers like Robert Goddard built the first rockets to burn liquid fuel. These were puny and flew only a few metres high. It took the hard work of thousands of scientists and engineers during the Space Race to turn these early, feeble rockets into massive machines powerful enough to carry astronauts into space.



ROCKET ROBERT

Robert Goddard (1882-1945) pioneered many of the technologies and theories required for sending rockets into space. Many thought his ideas were far-fetched, but Goddard persisted and built gunpowder rockets as well as developing key theories for rocket flight. In 1926, he launched the first ever rocket powered by liquid fuel. It landed in his auntie's cabbage patch but paved the way for future rocket science.

“The dream of yesterday is the hope of today and the reality of tomorrow.”

ROBERT GODDARD

WEAPONS OF WAR

During World War II, Germany produced the terrifying, rocket-powered, V-2 guided missile. It took just minutes to travel hundreds of kilometres, soaring up to the edge of space, and then plummeting down towards its target. Some of these rockets, and the scientists who made them, fell into the hands of the Soviet and US military at the end of World War II. The US smuggled dozens of V-2 engineers and scientists out of Europe and into the United States.

ROCKET RIVALS

A race to be the first into space began in the 1950s between the two most powerful nations at the time – the United States and the Soviet Union. The rivalry was far from friendly and the competition was intense. Both sides used knowledge gathered during World War II to power their own space programmes. This book tells the story of this rivalry and the brave voyages of discovery made by astronauts and cosmonauts as both sides battled for supremacy in space.



SUPERPOWERS COLLIDE

US and Soviets struggle for control

When World War II ended, in 1945, the United States and Soviet Union found themselves as the world's two most powerful nations. They fought on the same side during the war, but it had been an uneasy alliance. The two nations had very different views on how to run a country. The Soviet Union was communist, with just one political party and with the state in control of all industries. It wanted to spread communism across the globe, and after the war it introduced communist governments in other countries, particularly in

Eastern Europe. Alarmed at this, the United States formed a military alliance with countries in western Europe, called NATO. The USA also offered help to countries or groups who were standing up against communism. The Soviet Union formed its own communist alliance (the Warsaw Pact), and Europe found itself divided in two.

“An iron curtain has descended across the continent.”

BRITISH POLITICIAN
WINSTON CHURCHILL, 1946

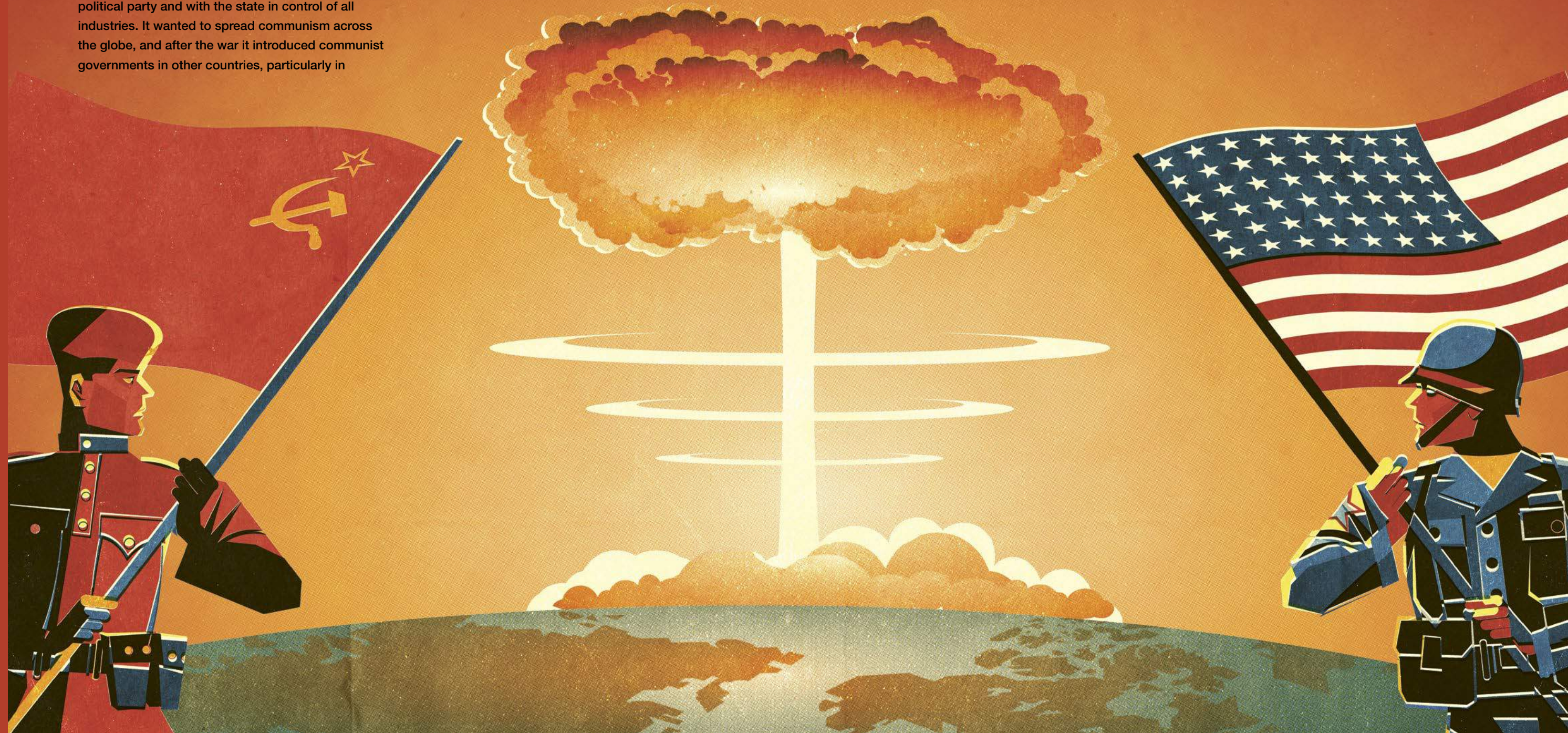


COLD WAR

A period of tension, hostility and competition between the superpowers followed. This conflict is now known as the Cold War. It was labelled 'cold' as the two sides never declared physical war on each other. Instead, both sides tried to influence events in other parts of the world. This often meant sending troops, weapons or aid to a particular side in a regional war. They also competed in other ways, such as building large spy networks for gaining secret information, and starting a massive arms race to see who could build the deadliest weapons.

NUCLEAR POWER

The United States was the first country to develop nuclear weapons, and they detonated two devastating atomic bombs in Japan, bringing about the end of World War II. But the Soviets were not far behind. In 1949, they tested their own atomic bomb. With each superpower fearing the other, both built up frighteningly large stores of nuclear weapons. One of the main goals of each country was to find out how to fire these weapons over long distances. To achieve this, they turned to rocket experts for help.





ROCKET MEN

Thousands of engineers and scientists in the Soviet Union and the United States worked on missiles during the 1940s and '50s. Each side tried to make them travel faster, farther and more accurately. Two of these engineers would become world-famous, not as missile makers, but for pioneering the peaceful exploration of space. These gifted rocket men were Wernher von Braun in the USA and Sergei Korolev in the Soviet Union.

SERGEI PAVLOVICH KOROLEV

Born in Ukraine in 1907, young Sergei became hooked on flying at the age of six, when he saw an aerobatics pilot perform spins and tricks. Sergei soon learned to fly gliders and started designing his own aircraft at the age of 17. When he began studying at a technical school in Moscow, Russia, one of his teachers was the great plane designer Sergei Tupolev.

By 1933, Korolev was the chief designer of a group of young rocket engineers known as GIRD. He led the team to launch the country's first liquid-fuelled rocket. It only travelled 80 metres into the air, but it was enough to start dreaming about space travel. The country's military became interested and Korolev was offered a job at the Jet Propulsion Research Institute.

The late 1930s was a dangerous time in the Soviet Union. Its leader, Joseph Stalin, had thousands of Soviet politicians, generals, scientists and engineers tortured and imprisoned. Korolev was one of the victims. He was sentenced to death, then forced to work at a brutal prison camp called a gulag. Korolev suffered beatings and nearly died, before being ordered to return to work on rockets. He wasn't freed until 1944, but after World War II ended, he was put in charge of OKB-1 – a Soviet team tasked with building long-range rocket weapons.

“Soviet rockets must conquer space!”

SERGEI KOROLEV, 1933

“At night I would stand spellbound looking at the Moon and telling myself how near it was, how near.”

WERNHER VON BRAUN, REMEMBERING HIS CHILDHOOD

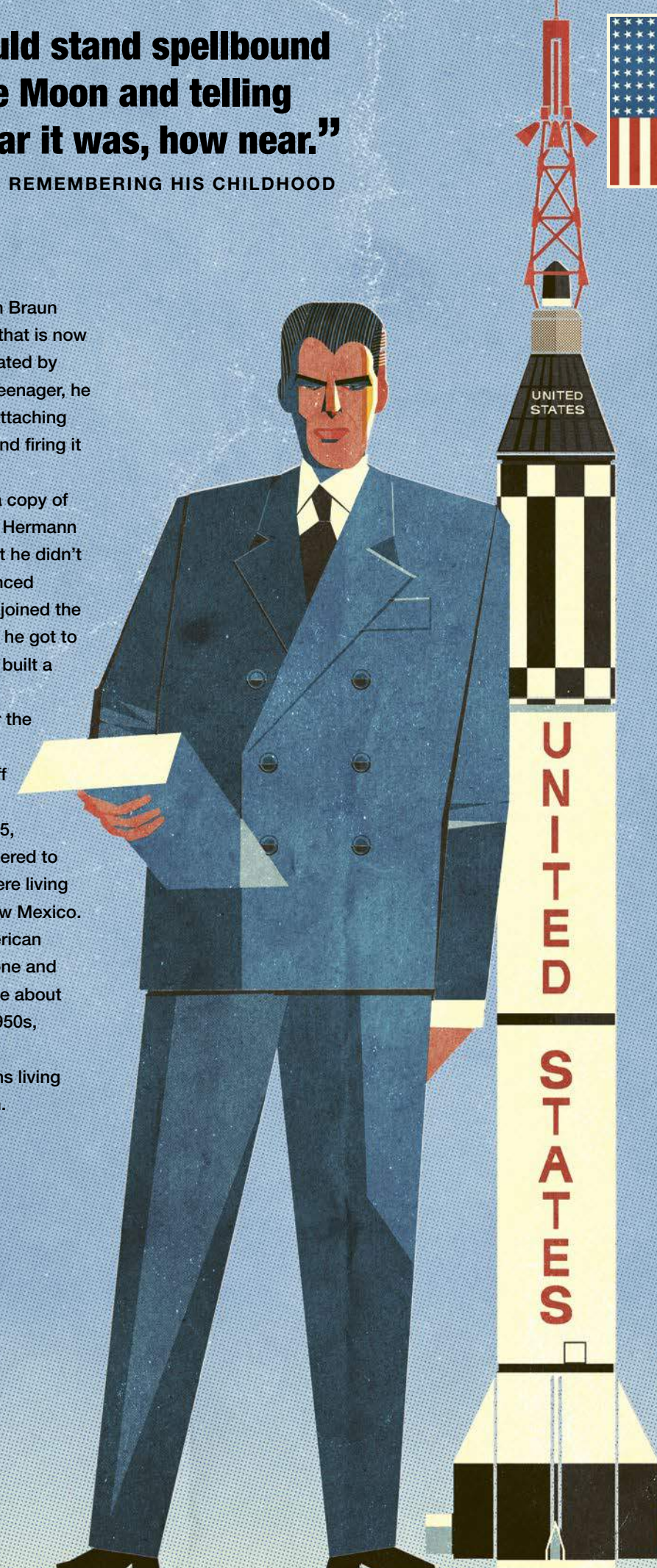
WERNHER VON BRAUN

Wernher Magnus Maximilian Freiherr von Braun was born in 1912 in an area of Germany that is now part of Poland. As a child, he was fascinated by two things: speed and astronomy. As a teenager, he caused mayhem in the city of Berlin by attaching six enormous fireworks to a toy wagon and firing it down a busy street.

When he was 14, von Braun bought a copy of *The Rocket into Interplanetary Space* by Hermann Oberth, but was disappointed to find that he didn't understand it. Determined to learn advanced maths and physics, he studied hard and joined the Society for Space Travel in Berlin. There, he got to meet his hero, Oberth, and the pair even built a small rocket together.

During the war, von Braun worked for the German military at a top secret site in northern Germany. There, he and his staff developed the V-2 rocket that was used in the later stages of World War II. In 1945, von Braun and many of his team surrendered to American troops. Within months, they were living and working at a US Army test site in New Mexico.

Von Braun was soon working on American rocket-powered missiles such as Redstone and Jupiter. However, he remained passionate about peaceful space travel. Throughout the 1950s, he wrote many articles and appeared on television to promote his vision of humans living in space stations and reaching the Moon.





1957

21 August

THE COLD WAR HOTS UP

Mega-missile to launch satellite

Throughout the 1950s, the USA and the Soviet Union each built bigger and more powerful rocket engines, so that their nuclear missiles could travel farther. Both Korolev and von Braun found themselves working on destructive weapons when their real passion was peaceful space exploration.

SATELLITE SURPRISE

The International Geophysical Year (IGY), planned for 1957 and 1958, would see over 60 nations work together on science experiments to learn more about the Earth. In 1955, US President Dwight Eisenhower announced that the US would launch a peaceful,

scientific satellite to travel in space during the IGY. The Soviets responded that they, too, would launch a satellite. It would take a huge amount of work to create engines powerful enough to send an object into orbit.

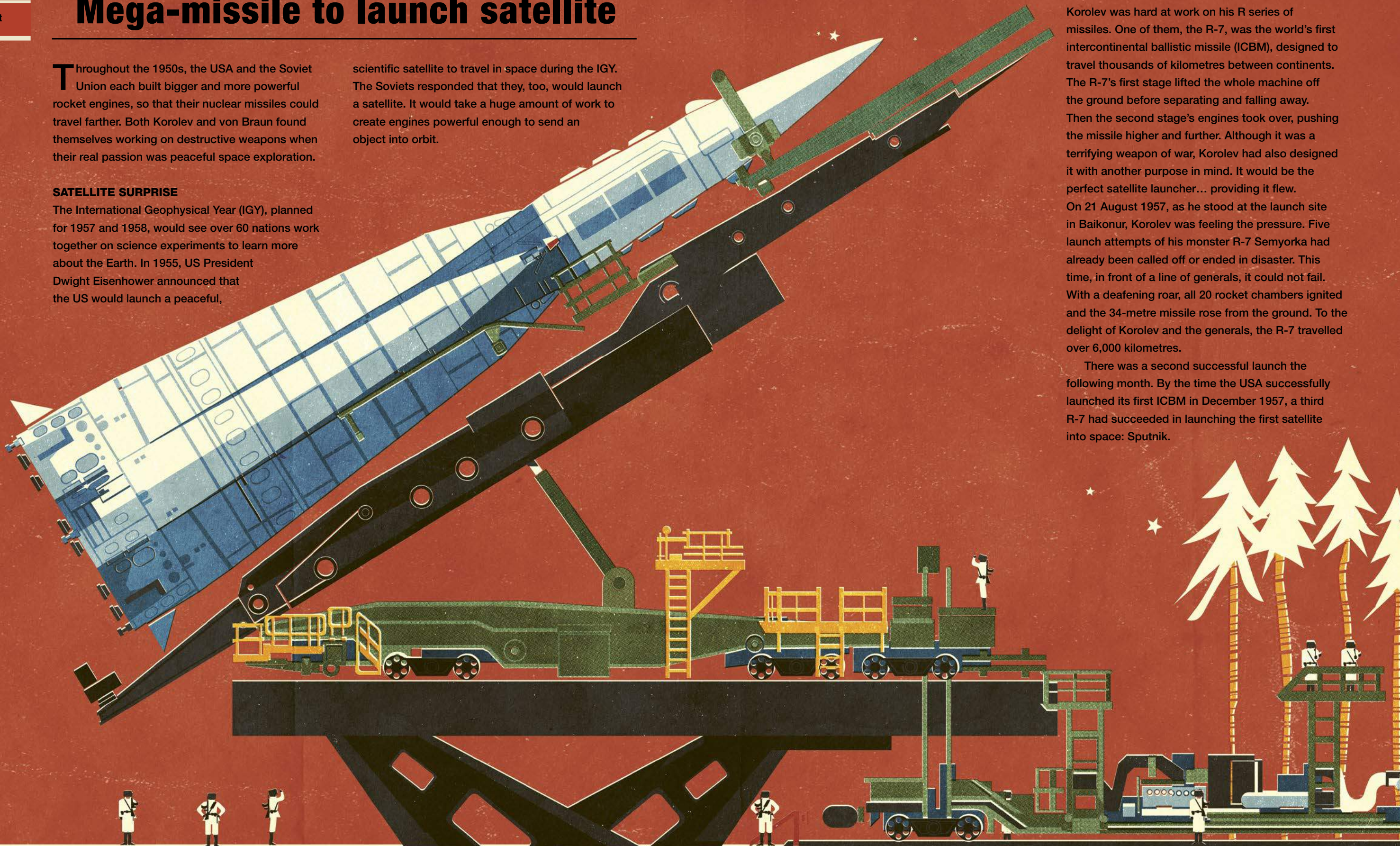
R-7 SEMYORKA

Height: 28–34 metres
Diameter: 3.02 metres (10.3 metres at base)
Weight: 280 tonnes
Missile Range: 8800 kilometres
Fuel: Kerosene
Payload: Up to 5500 kilograms

MONSTER MISSILES

Korolev was hard at work on his R series of missiles. One of them, the R-7, was the world's first intercontinental ballistic missile (ICBM), designed to travel thousands of kilometres between continents. The R-7's first stage lifted the whole machine off the ground before separating and falling away. Then the second stage's engines took over, pushing the missile higher and further. Although it was a terrifying weapon of war, Korolev had also designed it with another purpose in mind. It would be the perfect satellite launcher... providing it flew. On 21 August 1957, as he stood at the launch site in Baikonur, Korolev was feeling the pressure. Five launch attempts of his monster R-7 Semyorka had already been called off or ended in disaster. This time, in front of a line of generals, it could not fail. With a deafening roar, all 20 rocket chambers ignited and the 34-metre missile rose from the ground. To the delight of Korolev and the generals, the R-7 travelled over 6,000 kilometres.

There was a second successful launch the following month. By the time the USA successfully launched its first ICBM in December 1957, a third R-7 had succeeded in launching the first satellite into space: Sputnik.





1957

5 October

SPUTNIK SOARS INTO SPACE

Soviet satellite circles Earth

“Listen now for the sound that forever more separates the old from the new.”

NBC RADIO ANNOUNCER IN THE UNITED STATES
INTRODUCING SPUTNIK'S BLEEPS TO THE LISTENERS

With a thunderous roar, the R-7 rocket left its launch pad and propelled the world's first satellite into orbit around the Earth. The metal sphere, only the size of a beach ball, had a name meaning 'fellow traveller'.

Korolev's team had worked feverishly to produce Sputnik in the weeks before the launch. The 58-centimetre wide satellite had a metal casing made in two halves held together by 36 bolts. Inside, a ring of heavy batteries weighing 51 kilograms formed a doughnut shape with a small radio transmitter in the hole in the middle. The batteries managed to power the radio for three weeks after launch and Sputnik orbited Earth for a total of three months, a sign that the Space Age had truly begun.

GLEAMING GLORY

Sputnik raced through space at 29,000 kilometres per hour, 20 times faster than the speed of sound. It orbited Earth once every 96 minutes, as its four long antennae sent out radio signals. These chirping bleeps could be picked up on radios by people all over the planet. The polished satellite shone brightly and could be spotted glinting in the night sky. The fact that people could see and hear Sputnik, as well as read about it in newspapers, increased its impact and made it headline news. The Soviets were overjoyed with the world's response. It showed them as a technologically advanced nation – the first to launch a working machine into space.

NO NAME, NO NOBEL

Despite his triumph, Korolev's identity remained a secret. A Nobel Prize was offered if the Soviets named the brains behind Sputnik. Soviet leader Nikita Khrushchev refused, declaring that the entire Soviet people deserved the prize. In truth, he thought that singling out Korolev would cause problems within the teams that worked on the programme. To the outside world, Korolev remained the mysterious 'Chief Designer'.

“Don't forget this is the Earth's satellite... the very first one. It must also be beautiful.”

SERGEI KOROLEV, SPEAKING
TO HIS STAFF ABOUT SPUTNIK

KAPUTNIK!

America's response falls short

Stunned by the success of Sputnik, the Americans sped up their own plans to launch a satellite. In December 1957, the US Navy's Vanguard TV3 rocket launch was broadcast on live television. Unfortunately, it proved an embarrassing and explosive flop. The rocket blew up in a spectacular ball of flames two seconds after lift-off. The newspapers responded with headlines such as 'Flopnik', 'Oopsnik' and 'Kaputnik'.

EXPLORER 1 SUCCEEDS

Wernher von Braun had not been involved in the Vanguard mission, but he now got his chance. His Juno rocket, developed from the Redstone missiles, launched the USA's first satellite, Explorer 1, on 31 January 1958.

Explorer 1 was long, thin and only one-sixth of the weight of Sputnik, but its body was crammed with scientific sensors. These detected tiny space particles called micrometeoroids that struck the satellite, as well as areas of radiation surrounding the Earth. These regions were named the Van Allen Belts and were the first major discovery made in space. Explorer 1's batteries ran out in May 1958, but it kept orbiting Earth until 1970.

SPACE SUSPICIONS

Space was now in the news and many Americans were excited at the thought of space travel and exploration. However, others were fearful of Soviet machines like Sputnik flying over the United States many times a day. In 1958, after the successful launch of Sputnik 3, Soviet leader Nikita Khrushchev boasted about his country's superiority in space technology and knowledge. The USA became determined to close the gap.



"America sleeps under a Soviet moon."

NIKITA KHRUSHCHEV, 1958

The US government set up new schemes, such as increasing science lessons in schools, and created new organisations. Some of them, such as ARPA, were dedicated to military space research, while the National Aeronautic and Space Administration (NASA) focused on peaceful space exploration. In 1959, 5000 staff were moved from the US Department of Defense to NASA and its budget for the year 1960 was tripled. America meant business!



1957

6 December

