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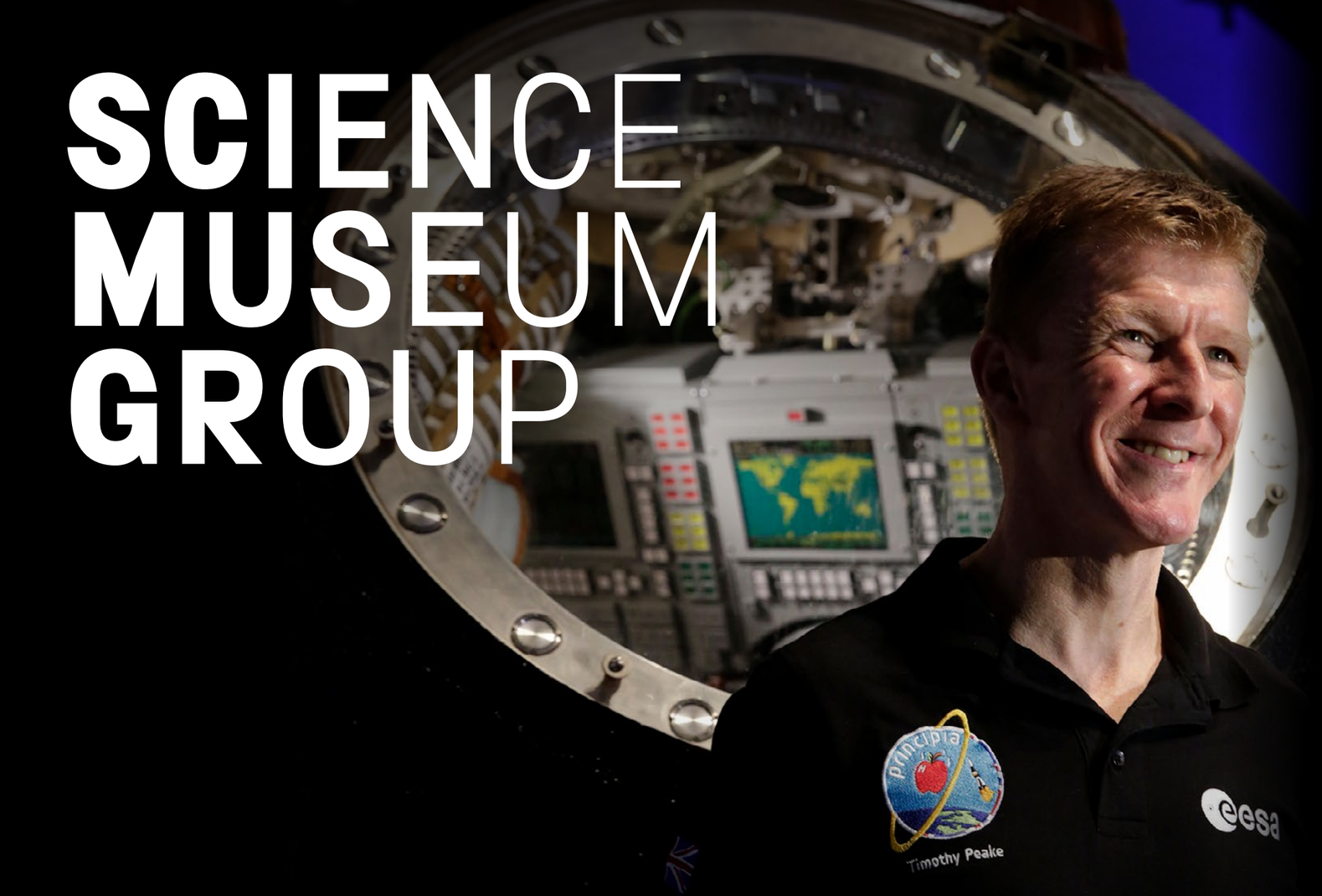
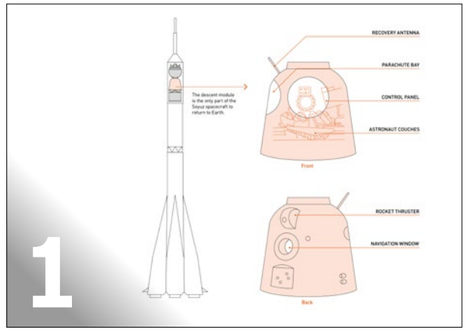


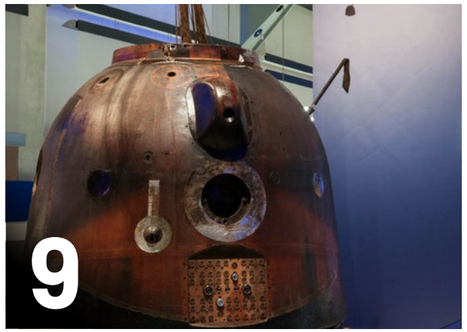
TIM PEAKE'S SPACECRAFT

SOYUZ DESCENT MODULE TMA-19M

TALKING	Ages	7–11 11–14 14–16	Topics: EARTH AND SPACE • FORCES Skills used: OBSERVATION • DISCUSSION

Images in this pack



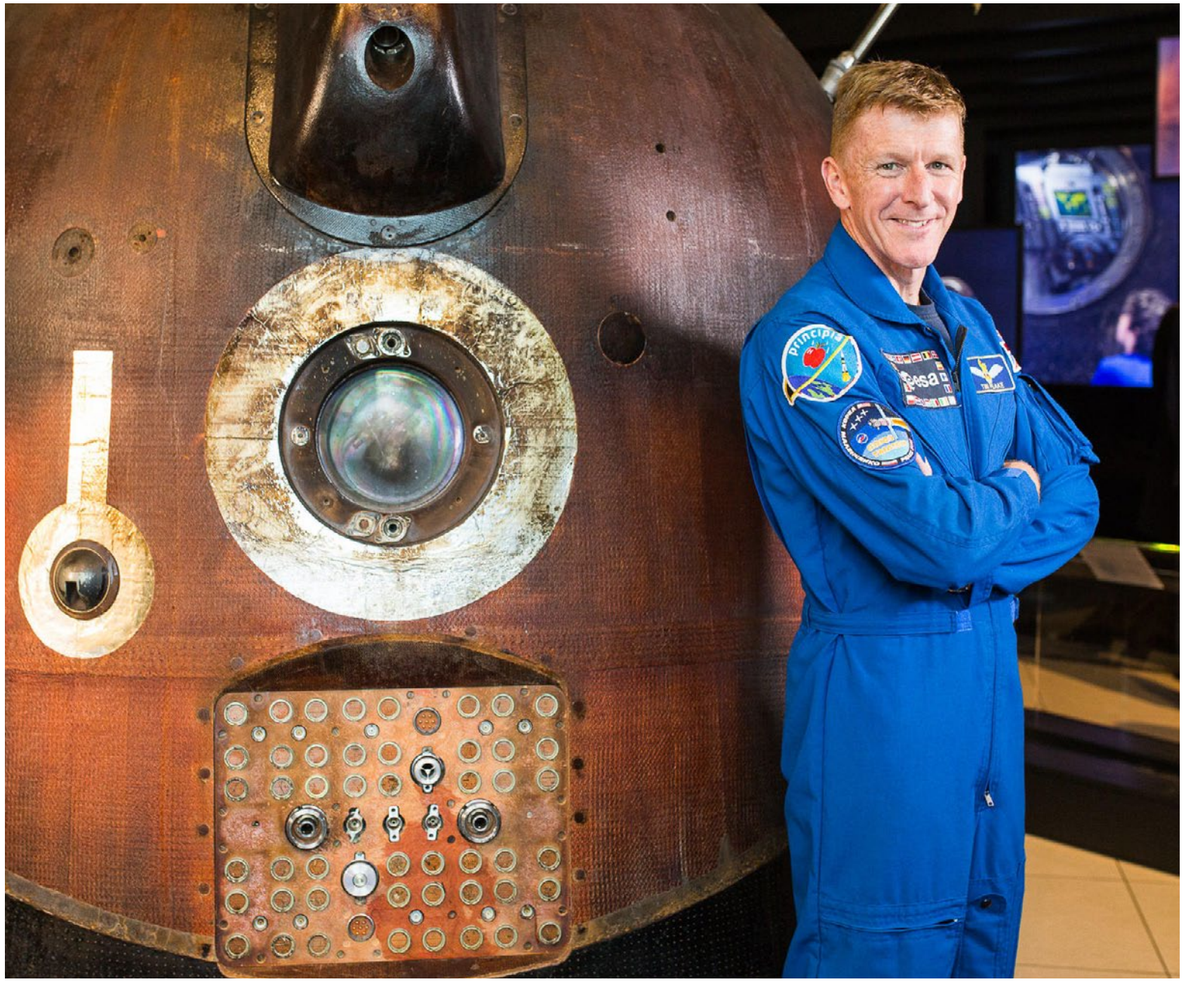


Tim Peake’s spacecraft

Tim Peake was the first European Space Agency astronaut from Britain to travel to the International Space Station (ISS). He blasted into orbit with American NASA astronaut Tim Kopra and Russian cosmonaut Yuri Malenchenko.

Tim and his crewmates spent six months on the ISS working on science experiments that will help us in the next stages of our exploration of the Solar System and help improve our lives on Earth.

These images follow Tim’s journey, from the launch of the Soyuz rocket towards the ISS, right up to his return to Earth on 18 June 2016.



Using images in your classroom

Our Science Museum Group museums are full of amazing objects which are all examples of how science and technology has changed and improved our everyday lives.

You can use images:

- To hook students' interest at the start of a lesson or to introduce a new topic.
- To highlight the relevance and practical applications of science principles in our everyday lives.
- As part of a discussion to explore the stories of the people who have shaped the world we live in through their passion and creativity.
- As mystery objects and get your students using their science skills such as observation, using prior knowledge and asking questions.
- To create a display of applications of science in your classroom, connecting past, present and future examples of technology.
- In a pre-visit activity to familiarise students with some of the objects and themes they will find in the Science Museum.

Talk about...

Use these starter questions to help get your students thinking and talking about how the science and technology of space travel affects our everyday lives:

- What interests you or surprises you about these images?
- If you lived on the ISS for 186 days, like Tim Peake, what would you take with you to remind you of home?
- Do you think it's important to spend money sending humans into space?
- Do you think humans will ever live on another planet? What factors would you have to consider if you were sending humans to live in space?
- What would you like to know more about? How could you find out more?

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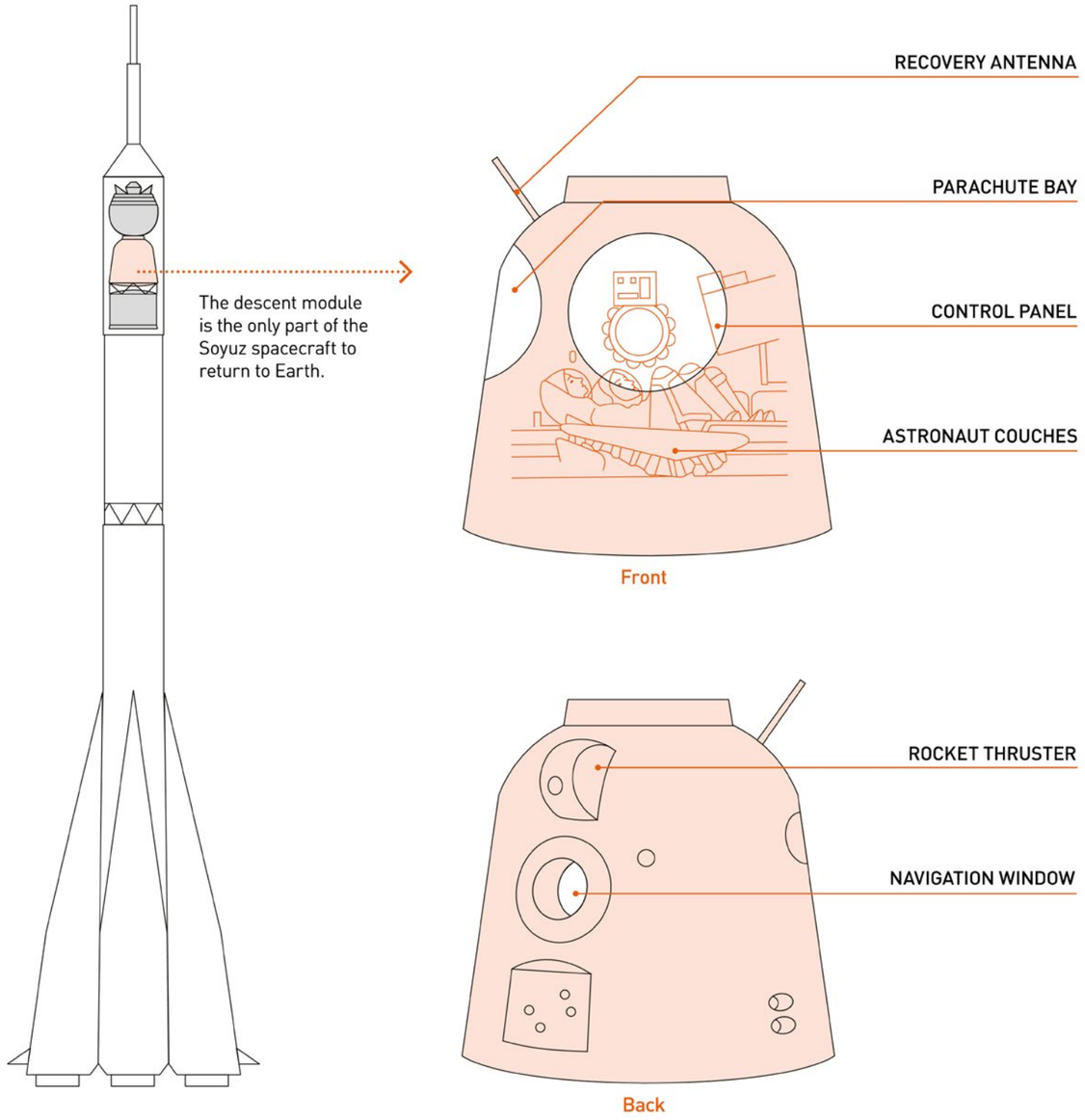

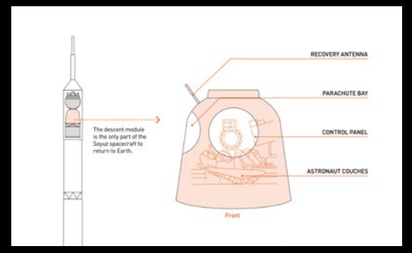

1

This diagram shows the Soyuz rocket, spacecraft and detail of the descent module. The Soyuz rocket launches the spacecraft into space. After the launch the rocket separates from the spacecraft and returns to Earth. The Soyuz spacecraft docks with the ISS and the crew enter the space station through a hatch. When it’s time for the crew to return to Earth, they ride in the descent module, the middle section of the Soyuz spacecraft, which is the only section that returns to Earth.

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2

Image: UKSA Max Alexander

NASA astronaut Tim Kopra, Russian cosmonaut Yuri Malenchenko and British ESA astronaut Tim Peake sit outside the Soyuz simulator (a version of the spacecraft used for training) in Star City, Moscow. Malenchenko was the commander, the two Tims were flight engineers.

Think and talk about...

How do you think Tim Peake and the crew might have felt before launching into space?

What do you think it would feel like to wear a spacesuit?

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3

Image: UKSA Max Alexander

Tim Peake inside the Soyuz spacecraft simulator. The rocket itself is largely automated, but occasionally the crew are required to take control manually.

Think and talk about...

The descent module is only 2.2 metres wide. What do you think it would have felt like to complete the six-hour journey to the ISS in this small space with two other astronauts?

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Image: ESA–Stephane Corvaja

The Soyuz rocket takes off from its launch pad in Baikonur, Kazakhstan, with the crew on board.

Think and talk about...

How does this rocket look similar or different to other rockets you have seen?

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Image: ESA/NASA

5

The Soyuz spacecraft docks with the ISS, ready for the crew to disembark. The spacecraft consists of three parts, which you can see in the image. The orbital module docks with the ISS. The descent module is in the centre, and is where the crew sit for their journey to and from space. The third module contains life support systems such as batteries, solar panels and steering engines – it is known as the instrument service module.

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6

Image: NASA/Bill Ingalls

During the final stages of its return journey to Earth, the descent module used a parachute to slow from a speed of 287 km/h to 22 km/h to ensure a safe landing. The module is shaped for maximum strength during its fiery descent through the Earth’s atmosphere. Its underside is covered with a heat shield, jettisoned before landing, which protects the spacecraft from the intense heating of re-entry.

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Image: ESA–Stephane Corvaja

The descent module lands back on Earth in the plains of Kazakhstan. The distinctive white and orange stripes of the parachute mean that the module can be found easily by the recovery team. The parachute is about the size of two tennis courts. The Soyuz descent module has a main parachute plus a reserve one to use in case the main parachute doesn't open. The clouds of smoke you can see are from the landing engines, which fire a couple of metres from the ground to ensure a safe landing.

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Image: NASA Bill Ingalls

After spending a long time in the weightlessness of space, the astronauts' muscles will have weakened significantly, so they need to be helped out of the capsule by the ground crew. The sun will seem very bright after several hours in the descent module, which is why Tim is wearing sunglasses.

Think and talk about...

You might also notice that Tim is on the phone – who do you think he is talking to? Who would be the first person you would call after returning to Earth from space?

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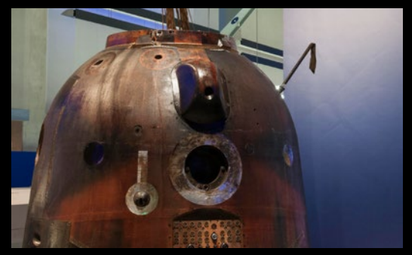

The Soyuz descent module on display in the Science Museum. The outside of the module is covered in a heat-resistant coating to protect it from the intense heat generated during its descent through the Earth's atmosphere, when temperatures reached 17,000 °C. If you look closely you can see some scorch marks caused by this extreme heat.

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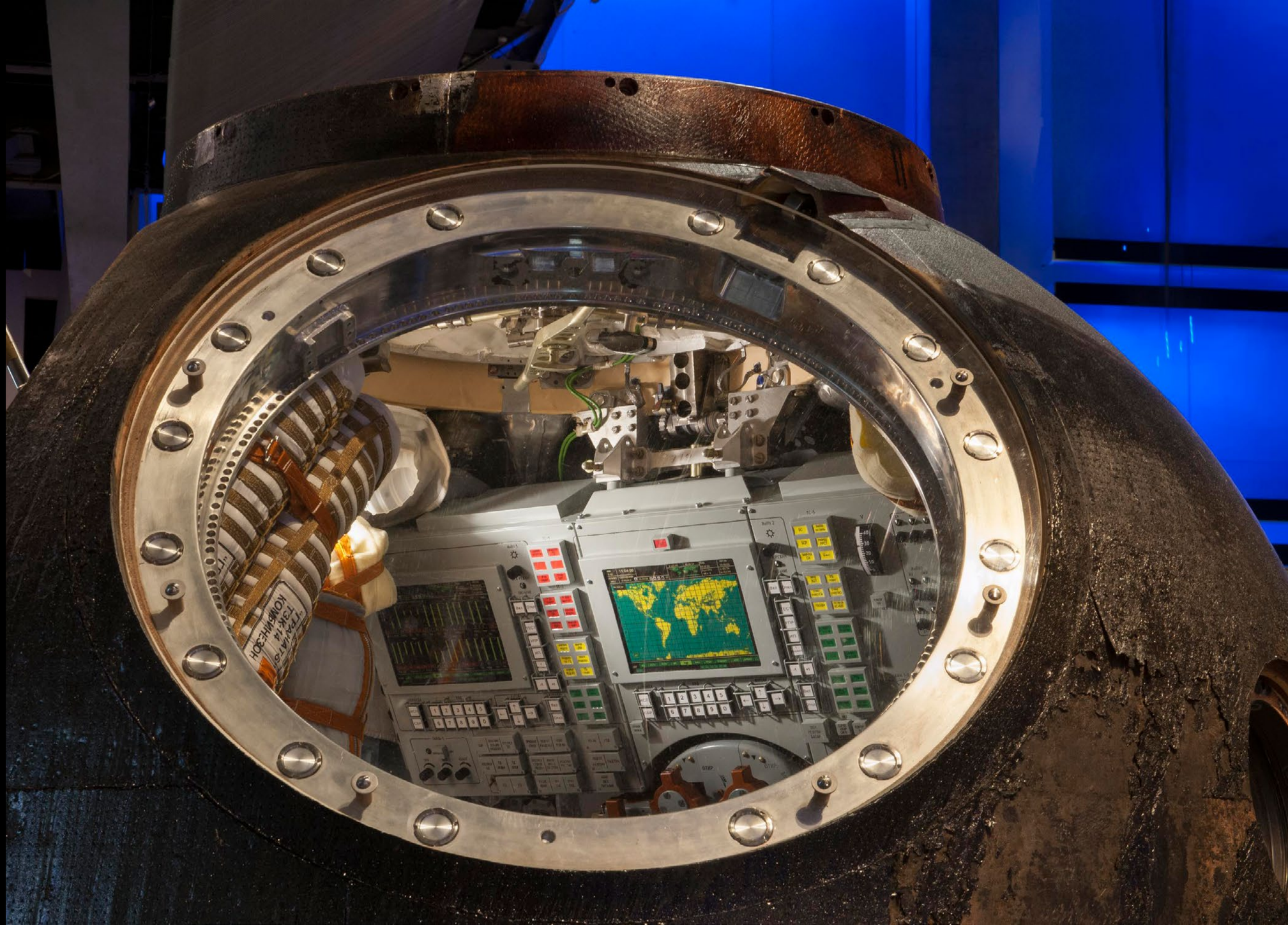

10

The Soyuz descent module’s interior, seen through the empty reserve parachute hatch.

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Inside the module you can see the three seats used by the crew. The seats are specifically moulded to the body shape of each crew member, which ensures the astronauts are kept safe and firmly in place during the bumpy ride back to Earth. Tim Peake made the journey up to and back from the ISS in the right-hand seat.

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12

Control panels inside the descent module. Some of these are exact replicas of the controls the astronauts used – the real ones can be used again on future space missions.

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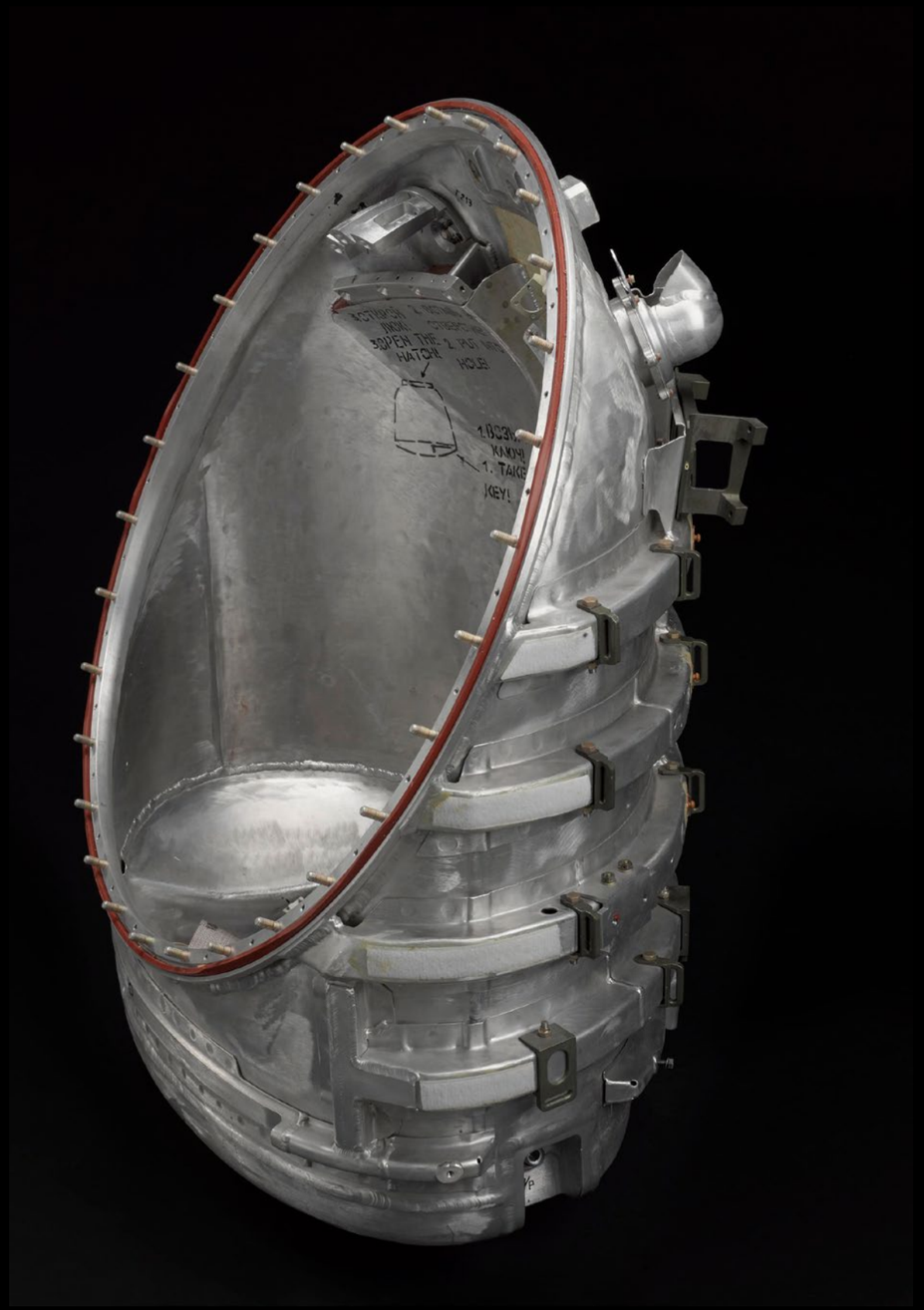
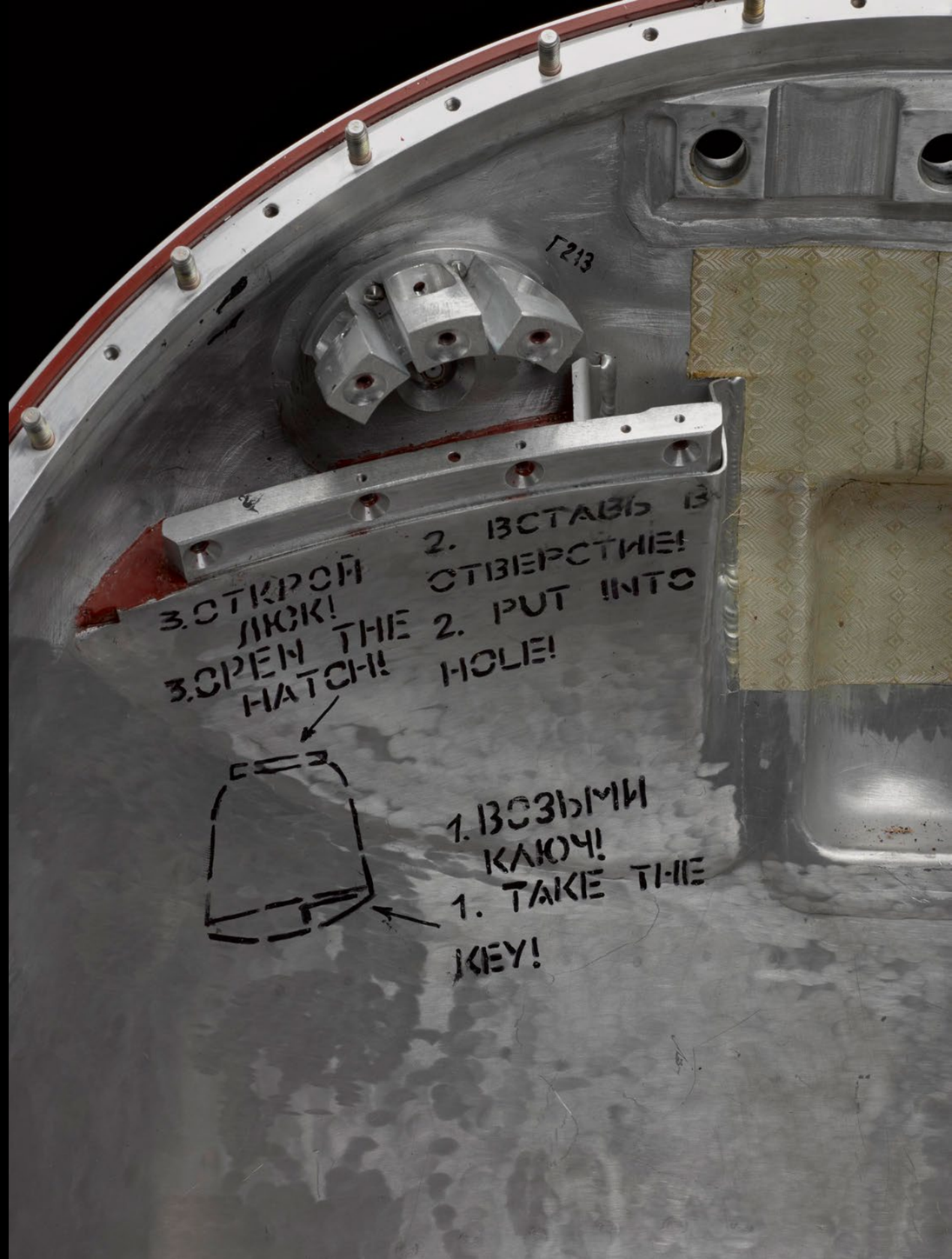
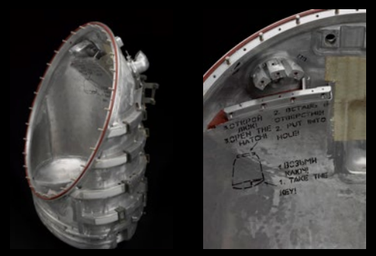
13







This is the reserve parachute container for the Soyuz descent module (the parachute has been removed). You can see lettering inside which explains in Russian and in English how to open the hatch and get the astronauts out. This has been added in case the module drifts off course when it lands and is found by an ordinary citizen.

Think and talk about...

What would you do if a descent module landed in your back garden?