

## Diving into the abyss aboard Britain's world-leading submarine rescue system

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Eleven years after 118 submariners met a grisly death at the bottom of the ocean in the Kursk, a British team has developed the most advanced underwater rescue system in the world. Andrew Preston watches them go into action



The Nato submarine rescue vehicle (SRV) mates with a bottomed sub. Nemo is the most advanced in the world and is jointly owned by Britain, France and Norway.

The British co-pilot of the rescue vehicle speaks slowly and deliberately into his microphone: 'Lima, Lima, Lima.'

The signal is broadcast directly into the Mediterranean Sea via 'underwater telephone' using low frequency sound waves. The message is picked up in the control room of the Alrosa, a Russian submarine from the Black Sea fleet. The code words mean that the Nato rescue vehicle, known as Nemo, has successfully 'mated', or docked, with the Russian sub.

At the same time a diver clammers through a hatch in the floor of Nemo with a spanner. He follows up the message with two loud taps on the hatch of the submarine casing beneath him, then after a short pause taps a third time. This is the signal that it is now safe for the Russian crew to open the outer hatch. The two vessels have established a hydrostatic water-tight seal, and suction is now the only thing holding them together 300ft underwater.

All this is happening on the bottom of the Mediterranean Sea just off the coast of Cartagena in south-east Spain. Shortly afterwards the submarine hatch of the diesel submarine opens and a smiling Russian face appears. History has been made.

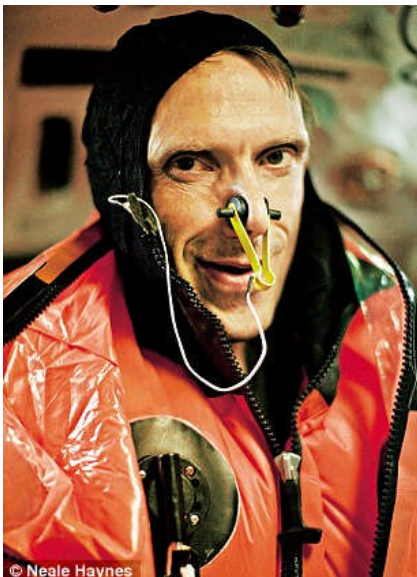


The SRV prepares to launch from the back of the Norwegian mother ship, KL Sanderford, in the Mediterranean.

When it was built during the Cold War, the Kilo-class Alrosa was designed for anti-submarine and anti-ship warfare. Its mission was to snoop, avoid detection, and try to track and, if required, attack Nato forces. Now, for the first time, a Russian submarine is actually taking part in a Nato exercise.

Inside the rescue vehicle it is cramped and humid. In the forward compartment, with its bulbous clear acrylic nose on the front, the pilot and co-pilot sit surrounded by joysticks and a myriad of dials and switches. Behind them, a Navy diver acts as the operator for the rescue chamber, which in an emergency can deliver up to 15 people at a time to the surface, or two injured submariners on stretchers.

But today special guests are moving the other way. Squashed together in the back of Nemo, their heads bent forwards and knees touching from benches on either side, are military VIPs from Russia, the U.S. and other Nato nations, who cross from the module into the submarine, led by General Nikolai Makarov, Chief of Defence Staff of the Russian Armed Forces.



Andrew Preston in part of a Royal Navy escape suit, but nowadays submariners are encouraged to wait, unless something catastrophic has happened

This exercise comes 11 years after the Kursk disaster, when 118 Russian submariners were left to die 350ft down in the Barents Sea. Back then the Russian government refused to ask for assistance after an explosion onboard sank the submarine. It is still unclear how many died in the initial explosion and how long the other survivors stayed alive, although grim tales have since come out of tapping being heard from inside the hull. What remains a possibility is that some of those men might have been saved.

'The Russians learned many lessons after that,' says Captain David Dittmer of the U.S. Navy.

'But when a Russian auxiliary sub with seven men on board became entangled in lines and stuck on the Pacific Ocean floor in 2005 they did ask for help,

and a British remote vehicle was sent to cut them free. They were just one hour short of their oxygen running out.

'Now the Russians have changed further and are very enthusiastic to participate. They publicly want to be portrayed as leaders in this field. Submariners are a family too; we all understand that we have an enemy in common: the sea.'

Nato's submarine rescue system is the most advanced in the world and is based in Faslane just north of the Firth of Clyde.

Nemo was built in North Yorkshire and Britain is a world leader in this technology. The system is jointly owned by Britain, France and Norway, and is now managed by Rolls-Royce. The £75 million cost for development, construction and the first ten years of its life is shared three ways. Nemo can operate in heavy seas, in waves up to 16ft high, and can rescue from depths of 2,000ft beneath the surface. Beyond that, submariners recognise that there is no hope their boat will simply implode and be blasted into pieces.

This latest 'free-swimming' vehicle replaced an earlier LR5 rescue vehicle, the idea for which came to former Royal Navy submariner Roger Chapman after he almost died when he was trapped 1,575ft down in a civilian mini-submarine in 1973. He and a colleague had been laying a telephone cable in a two-man sub on the bed of the Atlantic, 150 miles off the coast of south-west Ireland. After three and a half days they were found and pulled to safety.



The Faslane-based submarine rescue vehicle (SRV), which weighs 30.2 tons and travels at just under four knots

The LR5 has since been leased to Australia, while the British have also sold systems to Singapore, South Korea and the LR7 rescue vehicle to China. At a recent submarine rescue conference a Chinese admiral made it clear to members of the British contingent, through an interpreter, that China would have bought more had our defence export rules not forbidden it. For the 'Bold Monarch' exercise in the Mediterranean, diesel submarines from Spain, Portugal, Turkey and Russia were 'bottomed', with rescue vehicles from Italy, the U.S., Russia and Sweden as well as Nemo, along with specialist divers and hyperbaric medical teams working to help rescue them.

The 2,000 participants in the exercise included representatives from more than 20 nations; so as well as a historic meeting for Russian submariners with Nato, it also gave a Greek officer the chance to go onboard a Turkish submarine.

'By their very nature submarine missions are secretive, except in the conduct of search and rescue, which brings nations together,' says Rear Admiral Ian Corder, commander for allied submarine operations in the north Atlantic region.

He is based in the Nato building at the high-security military headquarters in Northwood, just outside London. Down a spiral staircase from his office and below ground is the Maritime Operations Centre, with one side wall covered in giant screens.

At the moment counterpiracy is a major focus here, but if a sub were to get into trouble in the north Atlantic region, for which he is responsible (from the North Pole as far south as Gibraltar), then this is where the rescue operation would be co-ordinated.

If a submarine is in danger it will release UHF/VHF indicator buoys, which broadcast using reserved maritime frequencies. They can also release buoys linked to satellites which send signals with an ID for the submarine which can only be recognised by its own country's authorities.

Rescuers can then log on to a password-protected website, which holds details of all the potential rescue systems around the world, and their availability, and they can plan via instant messaging and in secure chat rooms.



Admiral Sir Trevor Soar sits with senior pilot Tom Heron in the front of the SRV

But it's once they are alerted that the problems begin: how deep is the stricken submarine, how bad is the damage, what is the state of the sea, how is the submarine positioned, is there debris around it, and how many injuries are there?

Submariners can evacuate via escape locks if it is not too deep, but nowadays they are encouraged to wait □ they can survive for up to seven days on a bottomed boat, unless something catastrophic has happened. Nemo is designed to make its first rescue within 72 hours.

First, a 'vessel of opportunity' has to be chartered. This must have at least 4,400sq ft of deck space, and will deliver Nemo to the location of a stricken submarine. A total of 1,007 such vessels are being tracked at the moment, most of them working in the offshore oil industry. They cost between £17,000 to £40,000 per day to charter. Today's 'mother ship' is Norwegian, the second biggest tug in the world, which is so new it still smells of paint.

But Nemo is just one part of an entire rescue system. First an ROV (Remotely Operated Vessel) is sent to check the state of the sub, look for debris and, if required, deliver a pod containing equipment for oxygen generation and carbon dioxide extraction, as well as water and food.



A two-man portable decompression chamber at the front of the Transfer Under Pressure (TUP) unit – it can be docked with the main chamber to transfer patients

If a submarine is damaged then those on board will more than likely be experiencing high levels of pressure deep under the sea so the other vital part of the Nato set-up is the TUP (transfer under pressure) system, which is designed to prevent rescued men suffering decompression sickness, or the bends. If Nemo acts like an ambulance then this is the hospital.

When it returns to the surface and is raised into its cradle it docks with two decompression chambers, which can house 72 crew members. A special medical chamber holds up to six. If required there are also two pods, which look like Apollo capsules, which can be used to air-transport under pressure anyone seriously injured to a hospital.

A control room above the chambers is manned by British and French divers who together monitor those inside using CCTV cameras, and watch gauges that measure the oxygen, carbon dioxide and pressure levels. It takes 28 lorries and seven giant transport planes (four C-17s and three Antonov AN124s) to carry the entire system.

The Affray was the last British submarine to be lost with all hands, off the coast of Alderney in 1951, but there have been many accidents since.



Inside the portable chamber, in which a patient and an attendant can be airlifted to hospital while under pressure

'Most of these have been in relatively shallow water,' says Commander Charlie Neve, the UK authority on submarine escape and rescue.

'Accidents are most likely to happen in busy shipping lanes when a submarine is on the surface and also at night when the black submarine is difficult to see. 'There have been plenty of potential disasters. In 2002 Trafalgar hit the seabed off the Isle of Skye, in 2008 Superb struck an underwater pinnacle in the Red Sea, and then last year the new Astute ran aground. There's also the memory of the Thetis in

Liverpool Bay in 1939, which stunned people at the time. The water was not that deep, only about 150ft, and her bow became wedged on the bottom while her stern was sticking up in the air. People couldn't believe that we couldn't get the men out it just seemed unbelievable but we lost 99 men there.'



British and French divers monitor the decompression chambers from the control room above

Once the Alrosa has surfaced again, some of the submariners come out into the light to gather on the upper deck of the Spanish ship Galicia, to mingle with other nationalities and shake hands in the early evening sun. One Royal Navy medic, who is back from a trip to see how Russian sailors live and work aboard one of their ships, says they were 'surprisingly welcoming. It was just like one of ours really, with family pictures everywhere and lots of dead pot plants.'

The next time they will all gather will be in three years' time in the seas around Poland. 'We all hope never to have to use these skills but it does give confidence that it won't matter who or where you are, help will be there,' says Captain Damiar Shaykhutdinov of the Russian navy. 'Maybe one day Russia can host a similar exercise in our waters.'

Then, for his submarine crew, it's back down below to return to Sevastopol or wherever the Alrosa is ordered to go, once more unseen and unheard.

Read more: <http://www.dailymail.co.uk/home/moslive/article-2016798/Diving-abyss-aboard-Britains-world-leading-submarine-rescue-system.html#ixzz1T886zX39>