

Russian Nuclear Command, Control and Communications

The Defence Ministry in Moscow has spent millions of Roubles maintaining and upgrading the Russian nuclear command and control system. They have repaired the fabric of their Cold War bunkers and installed new equipment in these key underground command centres.

Several experts have published accounts of how the nuclear control system works.¹ The modernisation contracts provide additional detail, including the locations of many key sites. These can be confirmed by examining publicly-available satellite photographs. This jigsaw puzzle is slowly coming together, although some pieces are absent and others, no doubt, misplaced.

The United States continues to prepare for a no-warning nuclear attack from Russia. Likewise Moscow's command system is designed to respond to a "bolt from the blue" attack from America. The first part of this response structure is the early warning system. The initial signs of a missile attack might be detected by satellites. This information would be processed at two ground-stations, Serphukhov-15 in the West and Komsomolsk-on-Amur in the East. Within minutes, early-warning radar stations would provide additional data. Computers at Space Forces Headquarters, Solhenogorsk-7, and a duplicate facility, Kolomna-1, would rapidly collate this information. These four facilities immediately share their conclusions with key command posts over the Crocus system.

The Russian president, sun-bathing at his Black Sea resort of Sochi, relaxing at his countryside retreat of Zavidovo, sitting in the Kremlin, or travelling by car or plane, is always only a few steps away from the nuclear command system. He is accompanied by a Navy officer with the Cheget suitcase which can be linked into the Kavkaz-7 nuclear communications system. Kavkaz-7 has tentacles which stretch into the corners of Russia frequented by the country's leaders. Its subsystems include a mobile communications network in Moscow and several airborne relay stations.

The Russian President, Defence Minister and Chief of Defence Staff can talk and share data over Kavkaz-7. Through this system, they can heighten the state of alert and authorise a nuclear attack. Their decisions are then displayed on Baksan terminals at central command posts.

Although the President gives his permission through Kavkaz-7, this system does not actually fire the missiles. Senior military officers issue the launch instructions. They have several methods of doing this and each one uses multiple communications channels. Authority can be delegated to lower levels in the hierarchy. At each level there are main, alternate and mobile command posts. Planes, trains and automobiles all play their part in the command chain.

The most important bunker complex is the Central Command Post of the General Staff at Chekhov-3, 70 kilometres South of Moscow. This is at the heart of Centre, the Russian military's automated command system. Centre is currently being modernised. Fort, the key component of this upgrade, is in Chekhov-3. Chekhov-3 also houses two parts of the Monolith nuclear command structure, an exchange system for Kavkaz-7 and an interface between the General Staff and Rocket Forces command systems.

Chekhov-3 is the most significant site but it is not essential. Each system at Chekhov-3 is duplicated at two or more other locations. The main back-up facility is the General Staff Alternate Command Post at Kuznetsk-8, 600 kilometres East of Moscow.² In addition there are several underground command centres within the capital. Six aircraft at Chkalovsky airport are equipped as airborne command posts. There is

¹ Nuclear Command, Control Cooperation, Valery Yarynich, Centre for Defence Information, 2003;

² This was called Chaadayevka in old US and British reports.

also a special train, based at Borodino. A chosen band of senior officers, riding this Nuclear Oriental Express, can unleash Armageddon as they speed across the plains of Russia.

The Generals sitting in Chekhov-3 don't just have the ability to issue orders. They can remotely launch all of the ICBMs in Russia's nuclear arsenal through Signal, the automated command system for the Strategic Rocket Forces (SRF). Once the decision has been made and the procedures followed, there is no need for human involvement outside the confines of this command post. There is no requirement for junior officers, sitting in a remote missile field, to simultaneously turn their keys, as in the American system. The coded signal travelling from Chekhov-3 finds its own way into each missile silo and triggers the launch sequence.

This capability is not unique to Chekhov-3. Alternate and mobile command posts of both the General Staff and Strategic Rocket Forces can all remotely launch the missiles through Signal, if permission has been granted.

Signal is a two-way communications network. As well as issuing instructions it provides feedback on the status of individual missiles to central command posts. It is backed-up by a simpler one-way transmission system, Blizzard, which can send commands directly to Missile Regiment Command Posts.

The Central Command Post for the SRF is at Odintsovo-10 and the Alternate Command Post is at Balabanovo-1. There is a third SRF command centre at Kitlim in central Russia. This is deeper and better protected than other bunkers. Radio messages can be transmitted through the granite of Kosvinsky mountain to missile bases across Russia.

In the film *Dr Strangelove* a deranged United States Air Force colonel "exceeds his authority" and sends his nuclear bombers to attack the Soviet Union. The Russian ambassador then tells the American President that Moscow has secret deployed an automated response, the dead hand, which cannot be disabled. As truth mirrors fiction, the Soviet Union did consider designing a completely automated system in which computers would launch missiles if American nuclear weapons detonated on Soviet soil. The proposal was rejected but a semi-automatic system, Perimeter, was deployed. There are several Perimeter command rockets. If these are launched they transmit messages to all Russian nuclear forces - automatically unleashing all ICBM from their silos, issuing instructions to nuclear bombers and, indirectly, sending firing orders to submarines at sea. Officers in a special Radio Command Post(s) can be delegated authority to launch these command rockets if sensors detect that nuclear weapons have exploded in Russia and there is no contact with the main Command Posts. It has not been possible in this study to determine where the Perimeter Command Post(s) is located but signs have been spotted, in a contract and a court report, that the Defence Ministry may still maintain this semi-automated network.

The Russian Navy has its headquarters in Moscow and an alternate command bunker at Gorki-25, North of the capital. Both can issue orders to the nuclear-armed submarine fleet. The primary means of communicating with submerged submarines is through six VLF transmitters, one of which is in Belarus and another in Kyrgyzstan. In addition, six command-post aircraft at Chkalovsky and thirteen communications aircraft at Fedotovo and Alexseyevka are equipped with airborne VLF transmitters. Other frequencies are also used for submarine communications - including ELF, from the Zeus transmitter near Severomorsk, HF and satellites.

The Air Force has two underground command centres on the Eastern outskirts of Moscow at Balashikha and Monino. The 37th Air Army, which controls the nuclear bomber fleet, has a major communications

facility and command post at Kostino, 115 kilometres East of the capital. There is also an Air Force bunker at Plotnikovo, near Novosibirsk.

This command system was developed in the days of the Soviet Union. The end of the Cold War presented major problems for the designers and manufacturers who had built this complex structure. The Soviet leadership had chosen to base their main computer components' factory not in Russia, but in Armenia. As the Soviet Union fell apart, so Moscow lost this unique IT manufacturing capability. At the same time funding for the research institutions was slashed. Throughout the 1990s the focus was on keeping the existing equipment functioning. Serious work on updating the system only began around 2002.

Since 2007 the Defence Ministry have made a concerted effort to modernise many elements of the network. They have introduced a revised version of the early warning display system, Crocus-YP. They have upgraded components of the Kavkaz-7 nuclear authorisation system, including its main exchanges, airborne relay stations and mobile communications' network. The 12 switching stations at the core of the Centre automated command system are all included in a major modernisation programme. A new version of the top-level automated system, Summit-2, is entering service. The interface between the main command system, Centre, and the SRF command system, Signal, has been upgraded. Several new components of Signal have entered service in recent years. Some of these are designed to ensure that messages are automatically passed through the optimum channel when communications networks are under attack. A new variant of Monolith has been rolled out. This passes nuclear instructions between level one and level two of the command structure.

The organisation responsible for "special objects", 9 TsUMO, has commissioned work to maintain the fabric of many command and communications bunkers – repairing blast-proof doors, air-tight doors, diesel generators, air conditioning and water supplies. They have also installed new radiation monitoring equipment at several sites.

Within the descriptions of these modernisation projects there are occasional insights into how the bunkers are designed. Two contracts for work at the Central Command Post, Chekhov-3, indicate that visitors to one part of the facility must travel for 2 kilometres through an underground tunnel to reach their destination. The lift shaft at Object 320 in Moscow is 52 metres deep, and the shaft down to Air Force headquarters in Balakisha is 112 metres deep. The numbering of bunker doors hints at the layout of rooms in several of the subterranean complexes.

Satellite photographs of Chekhov-3 show the headshaft of a mine in one compound. This is the tell-tale sign of a bunker under construction. Around the compound are what appear to be excavation machines. There are no published contracts for excavation work, so it is possible that the plan to expand the complex may be on hold.

There is an intriguing contract for a survey of Youth-10. The study will determine how to modernise this "special object" and maintain its protection against nuclear explosions, while concealing its secrets from foreign seismic monitoring. Neither the function of Youth-10, nor its location are evident.

The thousands of students who attend classes in Moscow State University might be surprised to know that the spire at the top of the main university building is a vital part of the nuclear command system. The University is the home to Message-1, one of two main transmitters for the Kavkaz-7 nuclear communications system. The metal rods that sprout like the needles of a pine tree from the giant Star above the University are antennae for Kavkaz-7.

Its sister transmitter, called Message, has found an even higher home, near the top of Ostankino tower. This TV mast and Moscow tourist attraction does not just broadcast the latest Russian soap operas, game shows and news programmes. It also houses this special system to transmit the President's message authorising a nuclear attack.

There are indications, from Defence contracts, of command centres beneath the streets of the capital - between Frunzensaya Embankment and Komsomolski Avenue, on Bolshoy Znamenski Lane and on Tverskaya Street - but it is far harder to pinpoint these urban sites than to identify the bunkers and communications facilities which are scattered across the countryside.

The research behind this report was started in order to gain an insight into British nuclear planning. US intelligence agencies have for decades known about the sites listed here. The key facilities will be on Strategic Command's National Target Base (NTB). Britain does not produce its own nuclear target data. Royal Navy Trident submarines go to sea with targeting coordinates which have been copied from the American NTB.

Between 1978 and 1982 Britain considered how to replace Polaris. At the same time there was a significant shift in the Damage Criteria, which lie at the heart of British nuclear planning. The new Trident system was not to be targeted at cities as such but rather at Governmental Capabilities, many of which happen to be in or around the Russian capital. The new aim was "to destroy the command centres of the Soviet political and military systems (both above and below ground) inside the Moscow ring road and extra ones in the wider Moscow area."³ An official map which formed part of this study pinpoints 8 command centres outside the capital.⁴ It is likely that this policy of targeting bunkers remains in force today.

Russia is not alone in modernising its nuclear command and control network. The American system has been transformed since the end of the Cold War. Instead of slowly producing one fixed set of plans, the SIOP, the US military has a new system, ISPAN, which can rapidly adjust the main plans and also create entirely new options at short notice. They have introduced REACT, which can rapidly retarget ICBM, and SRS, which does the same for Trident. Britain has shadowed US developments, acquiring from the same retargeting software for Royal Navy submarines and the targeting complex in Wiltshire.

A case can be made for the Russian modernisation programme. If the command system is rusting and full of holes then perhaps there is a greater danger of an accidental use of nuclear weapons.

One of the dilemmas facing Governments in all countries with nuclear weapons is whether to base their preparations on Launch Under Attack, firing back only when there are explosions on the homeland, or Launch On Warning, ordering the counter-strike as soon as there is a sign that the opponent's missiles are on their way. The second is a more precarious and dangerous approach.

It could be argued that burying command centres and maintaining alternate means of ordering a response makes it easier to ride out an attack and reduces the pressure to Launch On Warning. Valery Yarynich argues that Perimeter is a Launch Under Attack system, and as such has its merits.

³ Cabinets and the Bomb, Peter Hennessey, OUP, 2007, page 324. There are similar descriptions of the new approach in documents in The National Archive.

⁴ The sites on the map are Chekhov (Chekhov-3 General Staff Central Command Centre), Sharapovo (Chekhov-2), Chaadayevka (Kuznetsk-8 General Staff Alternate Command Centre), Perkhushkovo (Odintsovo-10 SRF Central Command Centre), Chernoye (Balashikha Air Force Command Centre), Monino (Air Force Command Centre), Naro Fominsk and Alabushevo. Duff-Mason report Part 2 Annex.

However, the modernisation of the Early Warning structure, Crocus, and the authorisation network, Kazbek, suggest that the Defence Ministry's plans are focused on Launch On Warning. The system is designed so that critical decisions can be made and missiles fired within the small gap, of a few minutes, between when incoming missiles are detected and when their warheads detonate.

In the past, Soviet planners feared that the United States was developing the means to launch a devastating strike to decapitate their command structure. American planning may have regarded attacks on the Leadership as the last option, but the Soviet leadership concluded that some US weapons were well-suited to this task.⁵ Since the end of the Cold War, STRATCOM has continued to stress the need to maintain and develop the capability of striking Hard and Deeply-Buried Targets. Their rhetoric suggests that the main concern is underground facilities in new nuclear states. But, Moscow could easily interpret the focus on HDBT as evidence that the US has plans for attacks on Russian command bunkers.

The high degree of automation in the Russian system is problematic. Centralising positive control has its advantages. However, the Russian system, in its normal automated mode, deliberately eliminates the possibility that junior officers might refuse to implement their orders on the grounds that it would be wrong or pointless to launch their missiles.

⁵ The Soviet Union were concerned that Pershing II missiles might have sufficient range to reach Moscow. The US were planning an Earth Penetrating Warhead for Pershing II.