

Educational Department of Novouralsk

School \_41

**MISSILES:  
REAL DANGER  
or  
PERCEIVED THREAT?**

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## **Benchmark One**

Rocket weapons, rockets and missiles are guided, i.e. unmanned weapons the movement trajectory of which is realized through the use of rocket or reactive engines and the means of laying on. Rockets usually have the latest electronic equipment, and in the process of their production the latest technology is used.

### **Historic Reference.**

In China rockets were used to attain military goals in the 14<sup>th</sup> century. But new technologies, which made it possible to equip a rocket with devices capable of delivering it to the target, appeared only in the 1920-1930s. These include electronic devices and the gyroscope.

The Versailles Treaty deprived Germany of the most important weapons and prohibited its rearmament. But the Treaty didn't include rockets, because their production was considered to be lacking in prospects. As a result of this the German Military Department showed great interest in rockets and missiles which opened a new era of weapons. The Nazi Germany was developing 138 different projects concerning missiles at that time. The most famous are V-1 and V-2. They caused a lot of damage to Great Britain and to the Allies during the World War 2.

After the War the most powerful military states were the Soviet Union and the United States of America. During the cold war each of those created incredibly huge regular armies. The most important aspect of proliferation from that moment on was the creation of a nuclear bomb, intercontinental and submarine launched missiles. Different types of tactic missiles were also created at that time. The threat of a global thermonuclear disaster forced the antagonists to take measures decreasing the number of nuclear missiles, which happened in the 1990s.

### **Types of Rockets.**

There are a lot of different types of missiles, but each of them is characterized by the use of the latest technology in the field of control and laying, engines, warheads, creation of electronic interference and so on.

If a missile is launched and doesn't lose its stability during the flight one has to guide it to hit the target. There are different types of laying systems:

- 1) inertial laying,
- 2) self-laying,
- 3) optical-fiber and wire connection.

The movement of a missile is usually conducted through the use of the solid propellant. In some cases the liquid propellant is used and for cruise missiles reaction engines are used.

The most effective warhead is the fragmentation one. It's better when hitting airplanes, means of communication, air defense and people out of cover. The achievements in the field of laying systems development let the designers create kinetic weapons-missiles, which acquire high velocity and produce a great amount of kinetic energy. Such missiles are used in the systems of air defense.

The aim of electronic interference is the creation of signals and noise, which "deceive" the missile and force it hit the wrong target. Defense systems against electronic interference use such methods as changing of the frequency and polarized Herz waves.

### **War Missiles.**

Ballistic missiles are used for the transportation of thermonuclear payloads. They could be classified like this:

- 1) intercontinental ballistic missiles(IBM),
- 2) intermediate-range ballistic missiles(IRBM),
- 3) submarine-launched ballistic missiles(SLBM),
- 4) medium-range ballistic missiles(MRBM).

IBM, SLBM and strategic bombers form the so-called "nuclear triad". A ballistic missile spends just a few minutes to deploy its warhead to the target. Heavy ballistic missiles usually carry several warheads. When entering the atmosphere, a warhead is imparted a lens conic shape. The apparatus is supplied with thermal protective covering. The warhead is supplied with a small navigation system of its own.

### **V-2.**

V-2 of the Nazi Germany, which was designed by Werner Von Braun and his colleagues, was the first missile in the world. It worked on a liquid propellant. Air defense systems could identify V-2 and people were not aware of the attack. V-2 was first successively launched in October 1947

5,700 V-2s were produced and 85% of them were successively launched, but only 20% hit the target-all the rest exploded in the air.

Within the limits of large-scale research involving German specialists and V-2s which were seized after Germany's defeat, the USA's military engineers designed and tested Short-range ballistic missiles (SRBM) *CORPORAL* and MRBM *REDSTONE*. *CORPORAL* was replaced with a solid propellant *SERGEANT* and *REDSTONE* was replaced with *JUPITER*-an IRBM working on a liquid propellant.

### Intercontinental Ballistic Missiles.

The creation program of the USA's IBM began in 1947. *ATLAS*, the first American IBM, was added to the US armory in 1960. Nearly at the same time the Soviet Union began its program of designing bigger missiles. The Soviet *SAPWOOD* (*SS-6*) was the first IBM in the world. It became real in 1957 after the launch of the first satellite.

The American missiles *ATLAS* and *TITAN-1* as well as the Soviet *SS-6* used cryogen liquid propellant. That is why it took an enormous amount of time to prepare such missiles for the launch. They were kept in hangers. First IBM carried enormous payloads measured in megatons. This type of missiles was succeeded with *TITAN-2*, and later *MINUTEMAN* in 1962. By the year of 1975 the USA had 1,000 missiles *MINUTEMAN-2* and *MINUTEMAN-3*. In 1985 *PEACEKEEPER* was added to the list. The necessity to consider public opinion and international treaties led to decreasing the number of missiles to 50 units.

The Soviet rocket strategic units have got different types of powerful IBM, which usually use liquid propellant. *SS-6 SAPWOOD* gave place to the whole arsenal of IBM, including:

- 1) *SS-9 SCARP* which deploys the one and only 25-megaton bomb,
- 2) *SS-18 SATAN*,
- 3) *SS-19* which was similar to *TITAN-2*.

### Sea-Launched Ballistic Missiles.

The Headquarters of the US Navy considered the question of equipping ships with a huge *JUPITER* of major priority. But the success acquired in the technology let use smaller and therefore safer missiles *POLARIS*,

which works on solid propellant. *George Washington*, the first of 41 US submarines (which were the result of the use of the latest technology and had a nuclear-power installation) equipped with these missiles was designed so that to be constructed it had to be cut and a compartment with 16 missiles was to be installed. These SLBM were later changed to *POLARIS A-1* and *POLARIS A-2*, and yet later to *POSEIDON*.

Submarines with *POLARIS* on board changed the balance of powers during the cold war. Such submarines became very quiet. In the 1980s the US Navy began the project of constructing submarines equipped with more powerful missiles *TRIDENT*. In the 1990s each submarine from the new series had 24 such missiles on board.

The first Soviet submarines with missiles on board of the *Zulu*, *Golf* and *Hotel* class carried 2-3 *SS-N-4 SARK* missiles which worked on liquid propellant. Later a series of new submarines and missiles appeared: submarines of the *Delta-4* class the first of which were used in the 1970s carried 16 missiles *SS-N-23 SKIF* which also worked on liquid propellant.

Submarine of the *TYPHOON* class was designed in reaction to the US submarine systems with *TRIDENT*. The treaties which limited the amount of strategic offensive weapons, the end of the cold war and the increasing age of submarines with missiles on board led to the reconstruction of the old submarines into common ones and later to their dismantling. In 1997 the USA dismantled all submarines with *POLARIS* on board and they only kept 18 submarines with *TRIDENT* on board. Russia was also supposed to decrease the number of its nuclear weapons.

### Medium-Range Ballistic Missiles.

The most famous missiles of this class are *SCAD* created in the Soviet Union. They were later used and improved by Iraq. The other class of the most famous MRBM is *PERSHING-2* and *SS-20 SABRE*. The former were designed to destroy underground headquarters. These missiles were the first ones which were included into the Treaties.

### **Cruise Missiles.**

Cruise missiles are unmanned airplanes which can cover a big distance and hit the target with a usual or nuclear payload unseen for the air defense systems. The French military officer R. Laurant began a research

concerning “flying bombs” with reactive engines. But his ideas were ahead of time.

In 1918 in the town of Bellport, NY the US Navy and the Sperry Company launched their “flying bomb”-an unmanned airplane.

In 1926 F. Drexler and some German engineers worked on an unmanned flying apparatus which was to be controlled by a autonomous stabilization system. The equipment designed as a result of this research became the basis of the German technology in the World War 2.

V-1.

V-1 of the German Air Forces was the first guided missile use to attain military goals. Circular error probable of the missile was 1-2 kilometers, its velocity was 580 km/h. It was the weapon for the destruction of the population. It was controlled by a mechanism programmed beforehand, which gave the command to stop the engine and the payload exploded because of the collision with the object to be destroyed.

The US Cruise Missiles.

First American cruise missiles were *SNARK* (the US Air Forces) and *REGULUS* (the US Navy). They were dismantled at the end of the 1950s when the power, range and accuracy of hitting a target of missiles increased. But in the 1970s US military engineers that the US Army needed cruise missiles. This was facilitated by:

- 1) the latest innovations in the electronic technology,
- 2) the appearance of small and reliable gas turbines.

When *TOMAHAWK* was being worked out it was decided that these cruise missiles should be launched from modern attacking submarines *Los Angeles*. Air-based cruise missiles *ALCM* were launched from another launching pad: instead of being launched from bombers B-52 and B-1 they were launched from mobile ground-based complexes of the Air Forces.

*TOMAHAWK* and *ALCM* use a very precise inertial navigation system. Its effectiveness grew when signal receivers of the global navigation system GPS were installed.

## Russian Cruise Missiles.

We would like to have a closer look at a Russian strategic cruise missile *X-55 (AS-15 KENT)*. It's a small-size subsonic cruise missile which performs its flight on low heights and is for hitting important strategic targets of the enemy.

The program of its designing started in 1982. This cruise missile is carried by planes of strategic aviation TU-95 MS and TU-160. The missile was designed according to the usual aerodynamic scheme, i.e. the engine is in the front part of the aircraft.

*X-55* can hit stationary targets with great precision. It uses inertial navigation system. The latter makes this missile different from other ones.

A bomber TU-95 MS can carry up to 6 missiles of this type. A TU-160 can carry 12 cruise missiles of a longer range *X-55 SM*, and 24 cruise missiles of *X-55* type.

This missile has got several modifications:

- 1) *X-55*,
- 2) *X-55 OK*,
- 3) *X-55 SM*,
- 4) *SSC-X-4*,
- 5) *SS-N-21 SAMPSON (3M-10)*,
- 6) *X-65*,
- 7) *X-555*.

After the disintegration of the USSR some missiles and the aircraft happened to be left in the Ukraine and Kazakhstan. 575 of them were returned to Russia in 1999.

## **Benchmark Two.**

### Historic reference.

The story begins on January 1<sup>st</sup>, 1959 when the Revolution happens. Cuba starts the construction of a new state. But the USA have other views on this. After some economic reforms such as nationalizing of the biggest enterprises and expropriating of the land Cuba becomes the greatest enemy of the USA.

The US government gives rise to anti-Cuban campaign including terrorist and military activities. The US military forces attack Cuban sugar cane fields, sugar mills, oil refineries and cities. The CIA puts out a contract on Fidel Castro's life and several attempts were made to assassinate the Cuban leader.

All these actions completely paralyze the Cuban economy and to avert catastrophe Cuba has to look for allies. It turns for help to the Soviet Union. The USSR agrees to buy Cuban sugar and export to the island oil, wheat, iron, fertilizers and machinery.

The Cuban government reaches out to the USA for peace, but the US Secretary of State refuses to negotiate peace because the US economy loses too much on the Island of Freedom.

On April 14, 1961 the USA begins its invasion of Cuba. It begins with the bombing of the airports. The next step is the landing of US frogmen in the Bay of Pigs. But they don't succeed because of such enemies as coral reefs, poor navigation ability of the crew and as a result of this two war vessels sink. The Cuban Air Force bombards the US invasion fleet and sinks two more ships. Cuban police arrest CIA operatives.

Khrushchev and Kennedy exchange letters. Kennedy calls off all support of the 2506 Brigade and says that the USA isn't involved in the invasion. Around 200 soldiers are killed and 1,000 others are captured as prisoners of war.

### US Nuclear Deployment Throughout the World

In 1954 the USA began to stockpile atomic bombs on Okinawa. The weapons were planned for use against the Soviet Union. In the same year the US spread its atomic weapons to the Japanese mainland.

In 1956 the USA deployed nuclear bombs to Puerto Rico and later, *CORPORAL* and *HONEST JOHN* tactical nuclear missiles (IRBM) to Italy.

In 1957 the Soviet Union tested the world's first ICBM, called the *R-7(SS-6 SAPWOOD)*. In the same year the USSR launched the first human satellite Sputnik.

The USA's counter-measure was the expansion of its nuclear empire. The Philippines became host to nuclear and depth bombs at the end of 1957. In 1958 Greenland became another host of the US nuclear bombs. In Spain the US nuclear missiles were deployed in March of 1958. They were installed in France in August of the same year. Then the US nuclear weapons were installed in the Republic of Korea and Taiwan. In 1959 the USA deployed nuclear weapons to Turkey.

In 1959 the Soviet Union deployed its first *R-12 MRBM (SS-4)* later sent to Cuba. In 1960 the USSR deployed the world's first ICBM (*SS-6*) within its borders.

### Deployment of Nuclear Missiles in Cuba.

In May of 1961 the Cuban Republic became a Socialist Republic. The Cuban government sent requests for peace. But the USA refuses. US General Maxwell Taylor called for the creation of a new method for destroying the Cuban Republic.

On November 30, 1961 President Kennedy authorized OPERATION MONGOOSE. The chief aim was to attack Cuban ships and aircraft, and any non-Cuban ships trading with Cuba. It consisted of 6 phases and included political, psychological, military, sabotage and intelligence operations.

In 1962 a conference of the OAS was held in Uruguay. At the close of the conference the foreign ministers from 21 American republics voted to exclude Cuba "from participation in the inter-American system". Another resolution prohibited OAS members to sell arms to Cuba and set measures for collective defense against it. A total embargo of trade with Cuba was instituted by the USA, cutting off all US aid to the country not following this embargo.

In April 1962 15 *JUPITER* US missiles were ready to hit the targets in the Soviet Union, and terrorists attacked the NY offices of the Cuban press agency.

Khrushchev realized by now the nuclear threat to the Soviet Union. He considered deploying nuclear weapons to Cuba to prevent a full US invasion to the island. Raul Castro and Khrushchev met in Moscow and agreed that the missiles would be maintained under the jurisdiction of the USSR.

In September 1962 Soviet troops began arriving in Cuba. The *Poltava*, a Soviet ship, docked at a Cuban port Mariel and brought the first *SS-4* MRBM to be deployed. Soviet *IL-28* light bomber aircraft was also shipped to Cuba. The first missile site was constructed at San Cristobal.

### Missile Crisis.

In October 1962 the US Atlantic Command were ready to institute a military blockade against Cuba. The US Navy and Air Force were directed to be prepared for a full-scale invasion of Cuba. Kennedy directed the start of a quarantine: nothing and no one could go to or leave Cuba. In his televised speech, Kennedy announced that any nuclear missile launched from Cuba would be considered an attack by the USSR on the USA.

The Cuban government placed all its military forces on alert status. The Armed Forces of the Warsaw Pact were also put on alert. Khrushchev was eager to negotiate peace, but Kennedy ordered to go on with the preparation for establishing a government in Cuba after the invasion. But yet, the USSR insisted in peaceful negotiations and Kennedy agreed.

On October 27, 1962, Khrushchev publicly announced that the Soviet Union would remove its missiles from Cuba, if the USA removed its missiles from Turkey. Kennedy replied Khrushchev's request sending U Thant (UN Acting Secretary General) to talk to the Soviet government for him, but the State Department rejected the Soviet proposal of a nuclear deployment trade. And as a result of this Kennedy decided not to move US missiles from Turkey.

The UN negotiated with Cuba on their own initiative, and the Cuban government agreed to stop building missile sites within the country, if the USA ended its military blockade of the island.

The missile crisis ended the following day with a new message from Khrushchev: "The Soviet government has ordered that the weapons should be dismantled and returned to the Soviet Union." He explained that not ending the crisis could have led to nuclear war. Khrushchev insisted that the USA lifted the military and economic blockade and withdrew from the Guantanamo Naval Base.

After almost a year of continual operation, the USA had to stop their terrorism against the Cuban government.

### Continued US Aggression and Terrorism.

All MRBM sites were bulldozed and all the equipment was removed. Constructions on the IRBM sites were stopped and the installations were dismantled. But the USA never stopped their blockade of Cuba.

On behalf of the USA, U Thant demanded that the Soviet Union remove its IL-28 aircraft. Vasily Kuznetsov, the Soviet First Deputy Minister, stated that the USA hadn't stopped their aggression in Cuba. Kennedy objected to Soviet personnel on the island.

On November 12, 1962 Khrushchev and Kennedy exchanged messages concerning the removal of the missiles. But the air invasion from the US side went on. Looking for the peaceful solution of the problem, Castro agreed with the weapons to end the nuclear crisis. Kennedy announced a lower state of alert for the US military forces. Khrushchev agreed to remove IL-28s from Cuba. And at last, the USA lift their military blockade of the Island of Freedom. However, the US terrorism against Cuba continued.

Negotiations went on, and they led to the signing of Test-Ban Treaty on August 5, 1963. In January 1963 Italy and Turkey phased out the US IRBM nuclear missiles. And on January 7, 1963 the USSR and the USA agreed that the missile crisis was over. A "hot-line" between the countries was established.

The end was dramatic for the USA and very neutral for the USSR: J. F. Kennedy was shot dead on November 22, 1962, and Nikita Khrushchev was replaced as the Premier on November 13, 1964.

## Appendix

Having studied all this information we decided to watch a movie about the Caribbean crisis. Luckily enough, one was shot not so long ago in Hollywood. The movie we've seen is *Thirteen Days* with Kevin Costner. Though it is a politically correct movie, it's full of lies about the Cuban missile crisis.

1. In the film the intermediate range ballistic missiles were manned by people of African origin who should have been Cuban. But the Russians didn't allow the Cubans to access the missile bases, and they didn't have any people with dark skin as privets.
2. Kennedy and his close associates were surprised to know that the Russians had strategic missiles in Cuba. But their surprise was faked because people in Washington heard about it already in August, 1962 when Senator Kenneth Keating made 10 speeches and 14 public statements on the topic. Cuban refugees had also been reporting seeing Soviet army trucks carrying big cigar shaped objects.
3. The world was more close to the brink than ever before. But it was not so true: Kennedy ordered to defuse the nuclear warheads in Turkey and he didn't alert the civil defense. The Soviets never placed their troops, nor the civilian defense, under alert.
4. The world was even closer to the brink than most people think. But when the Russians announced they had both strategic and tactical missiles in Cuba, they never produced any evidence to support their claim. And besides, it would have been extremely foolish to commit a nuclear suicide to defend a small island in the Caribbean, and Khrushchov wasn't a fool at all.
5. The Soviets deployed 32 nuclear warheads in Cuba in 1962. But the presence of nuclear missiles was never confirmed by any intelligence service
6. The Soviet officers in Cuba had an open hand to use nuclear weapons without any authorization with Moscow. But it's very difficult to believe because it would have been equal to suicide.
7. It was Khrushchov's idea to protect Castro from American invasion. But actually, in April, 1962 Castro expelled from Cuba Soviet Ambassador Kudrvaev and some of his colleagues. To bring the

balance back the Russians offered their military support, but such great power as the USSR would never give missiles to anybody who asks for them. So the missiles installed in Cuba were never operational.

8. The Soviets deployed the missiles with cunning and stealth. In fact, they went to great pains to let the Americans discover the missiles. The plan to set up the missiles was carried out in such a way that they would inevitably be discovered by the USA.
9. Kennedy approved the U-2 flights over Pinar del Rio, where most missiles were located. Actually no U-2 flights were made over that part of the island until the middle of October. This seems to be a very strange game-the Russians were trying to get the Americans discover their missiles in Cuba, and the Americans were doing everything not to discover them.
10. American invasion to Cuba would have resulted into nuclear war with the USSR. But Khrushchov was bluffing all the time and was pleading with Kennedy to stop the aggression against Cuba. And the crisis ended with condemnations of the capitalist world in the Soviet press.
11. Khrushchov and Kennedy signed a secret pact guaranteeing non-invasion to Cuba. In fact, when Secretary of State Henry Kissinger searched for it in 1970, he found none.
12. General LeMay was a mad warmonger out of control. But he was not. It was former Secretary of State Dean Acheson's idea that the US President had the responsibility for the whole world, and only air raids and invasion could save from the Cuban aggression.
13. On October 28, 1962 a Soviet missile battery shot down a U-2. But on October 26, 1962 a Cuban army unit attacked a Soviet-manned SAM base in Orient, killing many Soviets and seizing control over the site. This was the very base that later fired at and destroyed Major Rudolf Anderson's U-2.

## **Benchmark Three**

### **Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (Outer Space Treaty)**

The Cuban, or Caribbean Crisis led to the beginning of the Cold War. It lasted for almost 50 years and the world was split in two halves-the East and the West. Perestroika which happened in the middle of the 60s in the USSR brought the confrontation between the Western and the Eastern states to its end.

The end of the Cold War and the global changes, which followed that made mankind think more of the different types of weapons it uses. The newly formed states became a real threat to the west. And the governments all over the world focused their attention on the problem of proliferation of nuclear and other weapons. National and international organizations have made more attempts to strengthen the nonproliferation regimes: the UN has become more active, export control agreements have acquired more power, chemical weapons have been prohibited, etc.

We would like to have a closer look at the Outer Space Treaty. The problem is highly relevant. It can be explained with the increasing opportunities of mankind in the outer space, which need to be limited in some way. The Treaty was signed on January 27, 1967 in Washington, London and Moscow. It entered into force on October 10, 1967. The Treaty followed the rapid development of space exploration: man entered into outer space, people's interest in the exploration and use of it grew, etc. But nations needed this to be carried out for the benefit of all peoples and on terms of mutual co-operation.

The initiators of the Treaty were three very powerful states-the USA, the USSR and the UK. 96 states participate in this and 27 states signed it. It is based on the "Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space" of 1962. The document consists of 17 articles.

This Treaty became the turning point in space exploration. It gives equal rights to all the nations, regardless their economic or scientific development. Outer space is free for exploration and use. All nations have got free access to investigation of outer space and all celestial bodies.

No country can claim sovereignty or occupy any celestial body.

All nations should follow the international law to keep peace, security and international co-operation in the world.

The Treaty prohibits the use of any objects carrying nuclear weapons in the Earth's orbit. Installation of such objects on any celestial body is also impossible. All celestial bodies should be used in peaceful purposes only-any establishment of military bases, testing of any types of weapons or maneuvers are forbidden. But military personnel is

not prohibited for scientific research or any other peaceful purposes, as well as the use of any equipment for peaceful exploration.

In case of any accident astronauts, considered to be messengers of mankind in outer space, should be rendered all possible assistance, including the return to their state. All astronauts carrying out any kind of activities in outer space should render all possible assistance to other astronauts. All Treaty states should be informed of any phenomena discovered in outer space, which could be dangerous for astronauts' life or health.

Each nation should bear responsibility for activities in outer space. If such activities are carried on by non-governmental organizations, they require authorizing and supervision by the state. If this is the case for an international organization, responsibility lies both on the organization and the state.

Each state that launches an object into outer space or provides territory or facility to do that is responsible for damage on the Earth, in air or outer space.

All states launching objects into space retain jurisdiction and control over them and over the personnel; ownership of such objects is not affected by the presence in the space or by their return to the Earth-they will return to the state which launched them.

Exploration and use of outer space should be carried out on the principles of mutual assistance and co-operation. These activities should also be carried out with regard to interests of all the states. Studies and exploration of outer space and any celestial bodies should be pursued so as to avoid their contamination or harmful changes in the environment of the Earth. If so, appropriate measures should be adopted. If a state believes that any activity or experiment would cause harmful interference with activities of other states, international consultations should be held.

Any state to the Treaty should be able to observe the flight of objects launched into space in order to promote international co-operation.

To achieve this goal, states should inform the Secretary-General of the UNO, the public and the scientists about possible results of activities carried out in outer space.

All stations, installations, equipment and space vehicles should be open to representatives of other states. The latter should give notice of the visit so that consultations may be held in order to assure safety.

The provisions of the Treaty should apply to the activities carried out in outer space either by a single state or in co-operation, including international intergovernmental organizations. Any questions concerning this should be resolved by the states parties to the Treaty together with international organizations and between themselves.

Any state not party to the Treaty may join and sign it any time. Instruments of ratification and accession should be provided by the USA, UK and Russian Federation. These governments should inform other states of any signature.

Any state may propose amendments to the Treaty.

Any state may withdraw from the Treaty after one year.

This Treaty is available in English, Russian, French, Spanish and Chinese.

## INDEX

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