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The report

Missiles and their real and perceived threats to the security of nations.

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Benchmark I

In this benchmark section I tried to trace the basics of rockets and the history of rocket and missile development.

What is a rocket?

Rocket is a machine that develops thrust by the rapid expulsion of matter. Rockets are used for many things including space exploration, launching satellites, and military operations. In this paper you will learn a little about rockets ,the major components of a rocket, and the differences between cruise missiles and ballistic missiles.

When we speak about rockets we use the following terms

The first:
Thrust-thrust is the force generated, measured in pounds or kilograms.

The second:
Launch vehicle- the actual rocket.

The third:
Impulse(“total-impulse”) is the product of thrust and the effective firing duration.

The forth:
Specific Impulse (Isp)- the thrust divided by the mass of propellant consumed per second(expressed in seconds).

The fifth:

All of its propellant has been consumed.)

The sixth:
Propellant- mixture uses to power the rocket.

The seventh:
Payload- what the rocket is delivering. Its cargo .

Rockets are made up of five components. A rocket requires three of these components in order to work effectively. The other two are not actually needed.

The three that are absolutely necessary are: a rocket motor or engine, propellant consisting of both a fuel and an oxidizer, and a frame to hold the components of the rocket together. The other two: control systems and cargo. A rocket engine is different from ordinary engines. It burns its fuel/oxidizer internally;

thus it can work just as effectively in the vacuum of space as it can in our atmosphere. The “gas” of a rocket is always a combination of a fuel and an oxidizer. Fuels can be different: liquid hydrogen, RP-1 kerosene, aniline, and hydrazine (a mixture of fuel and oxidizer). The correct mixtures of these fuels and oxidizers is what makes up the rockets propellant. The frame is the part of the rocket that you see. It is responsible for keeping all the parts of the rocket (engine, propellant, cargo, control systems) in place and secured. Now, rockets can be controlled much like airplanes, only very effectively. We now have rockets that are able to literally chase targets through alleys, tunnels, etc: all thanks to advanced control systems. Finally, what defines a rocket pretty much, is what is known as the payload. The payload can range anywhere from satellites to warheads. In fact, that is what distinguishes a rocket from a missile; its payload. If a rocket is carrying a satellite, than it is just a space launch vehicle. However, if a rocket is carrying a warhead, it becomes a missile(a ballistic or cruise).

There are a few differences between them. Cruise missiles are much like an air craft. They can fly at odd angles, change course in midair, and are very accurate. A ballistic missile on the other hand has to rely on raw speed. You cannot change the course of a ballistic missile once it is in flight.

The are many different types of early ballistic missiles that are still around. Some of them are: SAMs, HQ-2/SA-2, FROG-7B, SA-2, SA-3, SA-5 etc,. Once these missiles are launched into the air, they are guided to a certain point in the sky, then they are able to follow a ballistic path to their targets. These missiles actually have good range, for example the HQ-2/SA-2 has a range of about 150-200km.

So , a lot goes into rocketry .We should understand the following things: the way they work, what are they made of, we should differentiate between different types of them.

The History of Missiles

The earliest known missiles originated in China. The Chinese would use fireworks in their celebrations. Their fireworks worked when the flame from a fuse reached the powder; then the powder would ignite propelling the rocket into the air where it would explode. However this is only a primitive form of rocketry. It would take years to come before scientists launched the world of rocketry into what it is today.

Herman Oberth, a German Scientist was born on June 25, 1894. His first invention was a “Lighting Factory” that collected lightning and stored it’s energy to be used at a later time. Oberth designed the first manned rocket space ship in 1909. He determined that powder rockets were not sufficient for flights to the moon and planets after talking to people who were expected on guns and gun powder. When he was eighteen years old he designed his first hydrogen-oxygen rocket. He described all the facets of the modern rocket: Propulsion, combustion, pump, and pressure feed systems , tank design thermal protection, air and jet vanes, gyro control, inertial guidance, aerodynamics, thermodynamics, and flight mechanics etc. In 1923, he became professor of physics and mathematics at a high school in Schaessburg. Aroun that time he heard about Konstantin Tsiolkovsky and they exchanged papers on their theories. Oberth developed a combustion chamber and nozzle for liquid propellants and liquid oxygen, “Cone jet nozzle.” He continued his developmental work on rocket motors in Rumania. His progress was slow because there was no technology base that he could use. Then during WWII, Oberth moved to Dresden, and in 1941 joined Dr. von Braun’s rocket development group in Peenemunde. He died in 1989.

Wernher Von Braun was one of the most important rocket developments during the period of 1930-1970. He enjoyed reading novels by Jules Verne and H. G. Wells. He also read the writings of Herman Oberth. As a teenager Von Braun became involved in the German rocket society Verein fur Raunschiffarht (VFR). In 1932 he went to work for the German army to develop ballistic missiles. Also, working at a secret laboratory at Peenemunde on the Baltic coast Von Braun and his rocket team developed the V-2 Rocket. The V-2 was used against targets in Europe in September 1944.

By 1945 Von Braun knew Germany would lose to the Allies, so he began planning for after the war. During this time Van Braun devised a plan for the surrender of 500 of his top rocket scientists, along with plans and test vehicles to the Americans. After the war Von Braun worked for fifteen years for the United States. He was taken to Fort Bliss, Texas where they worked on the development of ballistic missiles. In 1950 the Von Braun team moved to Redstone Arsenal near Huntsville, Alabama and developed the Jupiter Ballistic missile.

Then in 1960 the rocket development center was reassigned to the newly

Braun became director of NASA's Marshall Space Flight Center and became chief architect of the Saturn V launch vehicle, the super boosted that propelled Americans to the moon. NASA then asked Von Braun to move to Washington D.C. to head the strategic planning effort for NASA. However, within two years he retired from NASA and went to work for Fairchild Industries of Germantown, Maryland. After six years, Von Braun died in Alexandra, Virginia on June 16, 1977.

An American, Robert H. Goddard, was one of the pioneers of rocket and missile development. Preceding him were such people as Herman Oberth, and Konstantin Tsiolkovsky. Although most of the research and development for rockets and missile came from foreign scientists like Oberth and Tsiolkovsky Robert H. Goddard contributed a lot to this science. He created two patents on missiles. One was for a liquid fueled rocket and the other was for a two to three stage rocket using solid fuels. Goddard was the first to successfully build and fire a liquid fueled rocket (March 16, 1926). He was also the first person to launch a rocket with a payload including a barometer and a camera. He finished his contributions with his launching of a rocket with a motor pivoted on gimbals under the influence of a gyro mechanism in 1937.

Konstantin Eduardovich Tsiolkovsky, the founder of astronautics, was born in 1857, in the village of Izhevsk, in Ryazansky province. When he was ten he had scarlet fever, and was left permanently deaf. This had a great influence on his life.

Only when Tsiolkovsly reached the age of fifteen he begun to study elementary mathematics. At about this time he first thought of constructing a large balloon with a metallic envelope. Realizing that his knowledge was not enough, he began to study higher mathematics. The result was that he became a mathematics and physics teacher and remained so for nearly forty years.

Tsiolkovsky carried out experiments on steam engines for a time, but then he returned to the theoretical study of the metallic dirigible. In 1887, his first published paper on the dirigible appeared. Mendeleev was interested in this work and helped Tsiolkovsky. The account of this aeronautical work was submitted to the Academy of Science who regarded it favourably and made Tsiolkovsky a grant of 470 roubles.

He had not given up his idea about space travel. A popular record on this subject was first published in 1895. Tsiolkovsky's idea of a spaceship was based on the use of liquid fuels.

During the next fifteen years Tsiolkovsky worked over other designes for spaceships. They were not meant to be working drawing for the construction of these vessels but as a rough guide to the equipment. Some of them are now standard practice in the guided missile field. He published several articles and books dealing with the mathematical theory of rocket flights and space travel. His calculations were used in modern theory of cosmonautics and practical space flights. They showed that it would be possible to travel out space in rockets and even to set up manned space stations around the Earth.

Tsiolkovsky's contribution to science is so great that he is considered to be "Father of Cosmonautics".

These four great scientists are responsible for the technology that is used today. Oberth and Von Braun came with the early missiles. Goddard furthered the work of Von Braun and Oberth. Tsiolkovsky with tower launch pad idea.
Those were the ideas that got the world to where it is today.

Missile Development.

Missile development has spread coutries such as Russia, the United States, Germany, France, China, Pakistan, the United Kingdom, Israel, North Korea, India, Iran, Iraq and Argentina now possess missiles.

Russia possesses a huge arsenal of intercontinental ballistic missiles along with submarine launched ballistic missiles. Russia has enormous striking power. In 1994, it was agreed by the United States, Russia and Great Britain, to " detarget " their nuclear missiles to avoid an accident. Our current intercontinental missiles are the SS-18, the SS-19, the SS-24, the SS-25, and the SS-X-29. Our submarine launched missiles are the SS-N-6, the SS-N-8, the SS-N-28, the SS-N-20, and the SS-N-23.

The United States heavily relied upon the German technology. Currently in the United States' possession are the Minute Man III, MX Peacekeeper, intercontinental-range ballistic missiles, as well as the Trident I C-4, a Trident II D-5, which are submarine-launched ballistic missiles.

The United Kingdom currently has submarine-launched ballistic missiles. Some of their missiles are the Trident II D-5 and the Polaris A-3P. The United Kingdom acquired the Trident missiles form the United States on March 11, 1982. The Polaris A-3P was also obtained from the United States, after the Skybolt project was cancelled. The Skybolt projest was a developmental project where the United States was sharing with the United Kingdom.

The missile program of France is indigenous. They currently have the Am-39, the Exocet Sm-39, the Exocet Mm-40, the Armat, the Apache, the Asmp, the Apache C, the Asura, and the Aslp missiles. France has supplied key technologies for yhe Israeli Jerico TBM program.

Iraq has acquired a large amount of knowledge in the past years, legally and illegally. Iraq has contracted with Brazil, China, Eqypt, France, and the Soviet Union. All of these countries sold missile technology to Iraq, West German companies, the United States, the British, the French, and Italian governments have all helped Iraq recieve technological advances. Iraq received 820 Scud B short-range ballistic missiles from the Soviet Union in 1974. From these Scuds they developed a longer range scud, the Al Hussein. In 1988, the Al Abbas was the second TBM developed from the scuds. These were not efficient missiles. The Al Abid was developed as a longer range scud missile.

developed the Badr 2000 with assistance from Pakistan. Iraq refuses to comply with requests to dismantle their missiles. Their indigenous missile program is active.

Pakistan has made or are producing all of their missiles. These missiles include the Hatf-1, Hatf-2, Hatf-3/M-11, the Shaheen-1, the Ghauri/Nodong, the Ghauri-2, the Ghaznavi, the Shaheen-2, and the Ghauri-3. Currently, all of Pakistan's missiles are short-range ballistic missiles.

Israel received their first missiles from France. They hold both short and medium-range Jericho missiles. Israel possesses the Jericho-1 and the Jericho-2 from France. The Jericho-3 is indigenous; and the Lance is from the United States.

North Korea is not a nation known for advanced technological advances or for their human resources, but they have managed to rapidly become one of the world's leading missile exporters because of their ability to attract foreign assistance. They have had help from both China and Egypt to begin their Scud production. As of right now, they have in their possession, the Scud-B, Scud-C Variant, the Nodong-1, the Nodong-2, the Taepodong-1, and the Taepodong-2 missiles.

India's missiles program is second only to China's in the developing world. A combination of high defense posturing and considerable technical expertise has made India's military-industrial base one of the most diversified in the developing world.
India's security environment is dominated by their mistrust of Pakistan. India's missiles currently include the Prithvi-150, the Prithvi-250, the Dhanush, the Bramhos, the Sagarika, the Prithvi-350, the Agni, the Agni-2, the Agni-3, and the Surya.

Argentina has a great ballistic missile program that developed out of their Space Research Program. The ballistic program can be developed from space launch capability. The program produced three missiles, the Condor-1, the Condor-2, and the Alacran. The Condor program was funded by Egypt and Iraq, but when funds stopped because the Missile Technology Control Regime's (MTRC) key technologies and guidance system came into play, the program was put aside. The project was reopened in 1995. Argentina's future missile programs would have to conform to the MTRC's guidelines.

So, missile development has come a long way.

Next I examined missile development and proliferation for two countries: Russia and the USA(history, the importance of the programme and the way they are deployed).

Russia

Our country began constructing the world's first ABM program in the 1960's. This system relied upon a large A-frame radar for long-range tracking and battle management. A nuclear armed missile was used as an interceptor, which used a warhead with a yield of several megatons. A major upgrade of the system began to take form in 1978 and is still in the process of being built. This system will defend our capital Moscow . We have had many internal developments since then. Russian technology has been spread out around the world. The Russian's have sold to countries such as Eqypt, North Korea, China, Kazakhstan, Pakistan, Iran, Saudi Arabia, Syria, Iraq, Vietnam, India, Belarus, Yemen, Afganistan, the United Arab Emirates, and Ukraine. These countries are able to defend their countries by way of Russia's technology. Russia possesses missiles in a wide variety of areas. Up until recently, Russia was considered the largest enemy of the United States. Russia could have attacked the United States at any time. However, in 1994, it was agreed by Russia, the United States, and Great Britain to "detarget" their missiles to avoid an accident that could be fatal to one of the countries. During the four years since the START I program began, Russia has cut its deployed strategic nuclear warheads on missiles, bombers and submarines from about 11,000 to about 8,600. Also, START I reductions were said to get rid of 26 more of the 10-warhead SS-18s and were to cut Russia's nuclear warhead total to 6,000 by the year 2001. Nuclear warheads on operational ballistic missiles are to be cut from the current 6,157 to 4,900.Russia still will have a very powerful strategic force with an excess of 6,000 nuclear warheads. Under the START II program. Russia must eliminate by its remaining multiple warhead missiles and cut its total number of deployed nuclear warheads to 3,500 by the year 2003. Russia is expected to keep between 500 and 800 single-warhead ICBMs operational, about 1,750 submarine-launched ballistic missiles on some 25 submarines, and the rest on bombers from that total.So, Russia still has enormous nuclear striking power and will continue to have it in the future. We are still one of the leading nations when it comes to missile defense.

United States

By the end of the second world war, Americans and their British allies decided they needed to 'liberate' or make Americans out of a bunch of German and Russian rocket scientists they also took back Germany's V-5 ballistic missile component and literature. Some of the rocket scientists which were 'liberated' included pioneers Herman Oberth and Wernher Von Braun. It was from their first patents that the new generation rocket scientist created their own version of missile/rocket technology.

Most of the rocket/missiles came from the original V-2 rocket from Germany. Probably the first of the missiles to be spawned from the V-2 was the atlas missile. It was created in 1956. The next two missiles that were mainly put to use were the two titan models. The first, titan 1, was built in 1955 and was retired 10 years later in 1965. Then the titan 2 was born in 1959 and was dismissed almost 30 years later in 1986, the minuteman were developed. Both Minuteman 1 and Minuteman 2 were made in the mid-sixties and were done away with by 1990. The peacekeeping was made during the Vietnam War . It's still used today.

The U.S. deploys missiles in many places worldwide: throughout the continental U.S. territory, in Alaska, Canada, Britain, and Germany. The reach of U.S. missiles is virtually total. The U.S. has inadvertently aided missile programs in many nations by providing aeronautical engineering educations to foreign students at U.S. universities. These students have clearly representatives from China, Egypt, India, Iran, Iraq, Pakistan, and Syria.

They say the U.S. possesses the most powerful military in the world at the present time. A U.S. missile defense program was stated by President Ronald Reagan, called Strategic Defense Initiative (SDI). Critics of a missile defense system argue that it is not yet technologically feasible. Citizens worry that if U.S. breaks the technology, it will threaten Russia and China and start a renewed arms race. Today’s missile defense program has changed dramatically since the early 1980s, but its primary objective the same: to stop ballistic missiles before they candidate.

In Benchmark II I tried to examine the real and perceived threats of

SPACE MISSILE DEFENSE FORCES: YESTERDAY, TODAY, TOMORROW

According to Victor Smirnov(Colonel-General, Commander of Space Missile Defense Forces) Russia has an almost 20-year experience in operating AMD systems and is now capable of finding solutions to any problems associated with the "accursed dimentionality", i.e. it can develop and operate a complex ergotic system for a long time. The history of the SMD forces development and build-up is closely related to the history of the strategic opposition of two superpowers, history of development of nuclear missile weapons and gradual development of space into a theater of operations.

As the USSR was involved in the strategic arms race for a long time, it had to create and develop missile attack warning (MAW), antiballistic missile (ABM) defense, space monitoring (SM) and counterspace defense (CSD) systems as a retaliatory measure to counter the build-up of nuclear missile potential and rapid development of military space systems by the potential enemy.

The development of these systems began in the early 1960th under rigorous security conditions. They aimed above all to ensure a timely supply of reliable information to the Supreme Command about enemy-launched nuclear-missile attack, disclosure of the attacker, clarification of the present state of the space grouping of military space systems and determination of the time of the onset of military operations by the enemy in space, actions to be taken to counter enemy space groupings, as well as protection of key military, political and economic objects against missile strikes.

Separate elements of such systems were developed in phases as follows:
- on March 4, 1961, for the first time in world practice, a warhead of a target ballistic missile was destroyed by an anti-ICBM missile developed by General Designer Grushin;
- in 1978, the A-35 ABM defense system was commissioned and put on combat duty. Despite certain limitations, the system was capable of hitting composite ballistic targets;
- in the 1970th, an over-the-horizon (OTH) radar capable of detecting ballistic missiles approaching from north and north-west was developed and placed into service with the MAW system. Steps were taken to enhance MAW system capabilities and a continuous radar-covered field around the former USSR was set up;
- a reliable space monitoring system, comprising CSD elements, was set up.

Today, the MAW system is built on a two-echelon principle. It uses a grouping of space vehicles and highly-effective ground-based stations. The system monitors missile-threat directions, intercontinental ballistic missile (ICBM) launch areas and station areas of ballistic missile submarines, and

The space monitoring system keeps track of space vehicles in low and high orbits (from 120 to 40,000 km and higher) of certain inclinations, makes it possible to continuously control any changes in low orbits, determine overall dimensions and stabilization parameters of objects, disclose the purpose and current functional capabilities of foreign space vehicles. In low orbits, the SMS information collection facilities can monitor and catalogue space objects 10 cm in size. The size of the objects that can be tracked by the system in quasistationary orbits is 0.5 m and more.

Although the ABM system capabilities cannot be fully utilized owing to the ABM Treaty of 1972, it can intercept and destroy ballistic missile warheads. The great responsibility of decision-taking, based on missile and space weapon attack information has predetermined integration of the MAW, SM and AMD systems into a unified SMD system, making it possible to solve a conceptual problem of its functioning as a integrated defensive strategic intelligence/strike system.

Information/intelligence tasks are carried out by the SMD forces continuously in all strategic aerospace directions in the monitored strategic space zone. The information exchange between SMD system elements is accomplished automatically on the real-time basis.

The developed infrastructure of command and control centers, use of some elements of space and various ground-to-ground communication facilities, duplication of vital system elements, as well as sophisticated software support, underlie the system required stability and high degree of reliability.

A universal tendency towards further expansion and sophistication of technical systems is visible in the weapon systems and equipment in service with the SMD forces.

Work collectives designing new systems and improving existing SMD systems are faced with a fairly complex problem, called the "accursed dimentionality". The basic features of SMD systems represent the highest degree of readiness of individual devices (assemblies, complexes) and, at the same time, feeble prognostication of the behavior of these devices and their multivariant configuration. As a consequence, the mandatory requirement for the performance of missions conflicts with the required quality parameter. The cost of false alarms is very high. The software support presently adapted to various conditions helps resolve this problem.

Operation of the SMD system in a unified information field with preset parameters is attributable to the highest achievements made by scientific and production organizations in system engineering, information technologies, development of computer complexes, perfection of radar and optronic equipment, application of most advanced technologies to rocket design and the development of space vehicles. Naturally, the difficulties we are facing today have had effect on the present state, modernization and development of the SMD system. Funds allocated for the maintenance and modernization (extension of service life) of the available equipment and R & D work have

has been delayed.

Admittedly, safety is costly. One can set hopes on available strategic nuclear-missile weapons, but when one speaks about a "nuclear club" it should be borne in mind that this statement should not be in foolhardy manner. The agreed levels of strategic nuclear forces can ensure strategic stability in Russia and prevent large-scale wars and conflicts from being unleashed by potential adversaries, provided that the SMD forces carry out effective information/intelligence activities. The silence of the President's "case" indicates that the SMD system meets the requirements for the strategic stability preservation.

In terms of difficulties, one must seek ways to overcome them.

Strange as it may seem, sophisticated SMD systems, costly both at the design stage and in service, can in many ways compensate development costs by using them to solve applied peacetime problems.

What is meant here?

Firstly, there are only two systems in the world which can monitor space and, consequently, acquire the information required to keep space pollution under control. According to existing estimates, space pollution with man-made objects has reached threshold point.

Now space should be continuously monitored. A service must be established to predict possible collisions of space vehicles with fragments of space debris and provide advance warning. Contacts maintained between the Russian space monitoring system and NASA of the USA make us optimistic that a catalog of space debris can be compiled, which would make space navigation safer.

As well as performing missions they have been designed for, the MAW systems can concurrently warn us of natural calamities (fires, radioactive contaminations, etc.).

Adjustment of the CSD development programs would allow us to have a "remover" in emergency situations, where a dangerous object would have to be urgently removed from its orbit (for example, a space vehicle carrying a defective nuclear power plant) and placed into a long-life orbit.

Finally, under conditions of intense development and scatter of rocket technologies, more and more often conversations are held about the establishment of AMD systems in theaters of operations and people become more and more anxious about a new form of international terrorism. The AMD looses its strategic frames and becomes a subject of concern for the countries trying to protect their territories against non-strategic missiles.

The existing threat of missile terrorism can be countered by the combined efforts of the states possessing systems comprising SMD elements (Russia and USA above all). At the same time it should be remembered that the rich states of the Near and Middle East, as well as some European states (or alliances) would also like to have certain elements of such systems, say AMD in the theater of operations.

potential customers for the aerospace (space-missile, antimissile) defense systems and who will conquer a market that is extremely promising for the military-industrial complex.

Here it would be appropriate to note that only Russia has an almost 20-year experience in operating AMD systems and is now capable of finding solutions to any problems associated with the "accursed dimentionality", i.e. it can develop and operate a complex ergotic system for a long time.

According to Vladimir Kuzmenko(Headquarters of Space Missile Defense Forces) our system is unique, the only operating AMD system in the world.

As you know in 1945 the United States challenged the whole world by creating nuclear weapons. In summer 1953, the Soviet Union became aware of US tests of a long-range ballistic missile intended as a primary means to deliver nuclear payloads to strategic targets. Despite the supposed allied relations between the two states, it was quite evident at what these missiles would be aimed in the near future. The air defense systems in service with the Soviet Armed Forces, as well as those under development, could not fight such an enemy. A warhead attacking a target is small and approaches at a speed close to that of a projectile. The potential interceptor would have to feature high maneuverability, a speed not less than that of the warhead and could be effective in atmospheric and extra-atmospheric zones.

At first the idea of "missile-to-missile" firing seemed unreasonable. However, a group of young scientists, including Ph.D. (Technology) Grigory Vasilyevich Kusinko, General Designer of the AMD system, resolved this problem. Several years passed to conduct research work and prove that it was possible to intercept warheads

The decision of the Council of Ministers, dated August 17, 1956, authorized work on antimissile defense, indicated the date and determined who was to create an experimental AMD system and build an AMD proving ground. By that time the location for a future proving ground had been found and the design was in progress. The proving ground was to be built in an arid stony Betpak-Dala desert, West of Balkhash Lake. The starting point for the first military builders was the small railway station Sary-Shagan. It took years of hard effort to obtain the first practical results.

On March 4, 1961 the R-12 ballistic missile fitted with a mockup in the form of a 500-kg steel plate, simulating the standard warhead, was launched from the State proving ground of the Defense Ministry. The target was detected by proving ground radars at a range of 1,500 km and destroyed by a V-1000

At the same time America was busy creating its own AMD system, Nike-Zeus, designed for the use of nuclear missiles. For the first time this system intercepted a ballistic missile on July 19, 1962. The AMD missile missed the target, although theoretically the latter would have been destroyed if the missile nuclear payload had been exploded. In the USA a ballistic missile warhead was first intercepted and destroyed by a conventional antimissile missile (the requirements for guidance accuracy are more stringent) on June 10, 1984, i.e. 23 years after the Soviet Union.

The quantitative and qualitative development of U.S. nuclear forces necessitated the creation of a multichannel AMD system, provided with more advanced active facilities.

To design and create such a system, a group of design organizations headed by their general designers was involved: central-computer system - general designer academician Lebedev; early antimissile missiles - general designer Grushin P.D.; launchers - general designer Ivanov I.I.; antimissile guidance radar - general designer Rabinovich S.P.; data transmission system - general designer Lipsman F.P.

The SKB-30 design bureau, headed by general designer Kisunko G.V. coordinated the activity of these organizations, solved general problems, developed the antimissile missile control system, precise guidance radar, command transmission station and other components.

In 1972, the AMD system passed state tests and was adopted for service. The military might of the USSR had grown then to ensure a balance of strategic offensive forces of the two states. Besides, the growth of the number of ballistic missiles and consequently AMD facilities proved unpromissing.

Benchmark III

In this benchmark I’d like to focus on treaties between The Soviet Union and The United States.

On September 20, 1961, the United States and the Soviet Union announced an agreement for general disarmament that included the disbanding of military forces, dismantling of military bases, ceasing weapon production, and eliminating all weapon stockpiles. However, no treaty was signed, because they could never agree on all points. For instance, Russia wanted the U.S. to dismantle all foreign bases and destroy nuclear weapons, but this would have given Russia an edge in conventional weapons. The Disarmament Committee of the United Nations, composed of 18 members, also failed to come up with an adequate agreement between the two countries.

President John F. Kennedy had promised to close the missile gap in order to reestablish their military strength, but his Secretary of Defense, Robert McNamara, wanted to allow their defense program to decline until Russia was equal to the USA. In a speech on September 18, 1967, McNamara said that our inventory of nuclear warheads was "greater than we had originally planned and in fact more than we require." The move towards unilateral disarmament began when McNamara announced that Russia wouldn't sign an arms limitation agreement until they caught up to the United States in strategic offensive weapons.

The Strategic Arms Limitation Talks(SALT) originated from the discussions between President Lyndon B. Johnson and Soviet Prime Minister Aleksei N. Kosygin, in 1967. These conferences developed into the SALT I Agreement, which was signed by President Richard M. Nixon and Soviet Premier Leonid I. Brezhnev, in 1972. While the number of U.S. strategic missiles had been frozen at the 1967 level, the Soviet Union had continued to build, matching that amount in 1970. By 1972, Russia had a 3-2 advantage in the number of intercontinental ballistic missiles(ICBM's).

SALT I was actually two agreements, The first, was a treaty of indefinite duration, restricting defensive anti-ballistic missiles(ABM's) to 200 on each side (reduced to 100 in a 1974 agreement). It also froze the number of offensive missiles at the 1972 level for five years. With Russia having 2,358 land and sea-based missiles, and the U.S. only 1,710, we were certainly getting the best part of that deal. Submarine-based missiles were restricted by a complicated formula which gave our country a numerical advantage, but was balanced by permitting the U.S. more warheads for its reliable and more accurate missiles.

The second part of the agreement was a five-year pact limiting some offensive strategic weapons, and the number of launchers for ICBM's carrying nuclear warheads. It limited each side to 2 ABM installations, totaling 200 missile launchers; one at the nation's capital, and the other would protect an offensive missile site(Grand Forks, North Dakota). This stipulation was amended in 1974 to only one site in each country.

SALT I was ratified by an 88-2 vote in the Senate, but the Jackson Amendment stipulated that the next agreement was to be more equal. The Agreement was to remain in effect until October 3, 1977.

On November 24, 1974, President Gerald R. Ford and Brezhnev reached an agreement to limit the number of all offensive strategic weapons and delivery systems until December 31, 1985.

SALT II was a treaty that resulted from a second round of talks, and was signed by President Jimmy Carter and Brezhnev on June 18, 1979, and was to remain in effect until 1985. It limited each side to 2,400 ICBM launchers and long range bombers, within six months of ratification(By the end of 1981, a new limit of 2,250 was to take effect). It would allow each country to develop one new missile, and to modernize their existing weaponry, with certain limitations. Each side would be expected to verify the other's compliance by its own surveillance methods. Regardless of the many stipulations, it still did not meet the requirements of the Jackson Equality Amendment. The numbers were manipulated to make them appear equal. For example, in the count of U.S. Strategic Weapons, 100 B-52's(a heavy bomber capable of hitting speeds of 650 mph, altitudes of 50,000 ft., and has air- launched missiles and bombs which can hit several targets hundreds of miles apart) that were mothballed in a graveyard in Arizona, were included, even though it would take more than a year to get them all flying again. However, 150 of the new Russian "Backfire" bombers were not counted.

A prominent general stated: "If SALT II is passed, we are in the final 1000 days of history."

The Senate never ratified SALT II, because the Soviet Union invaded Afghanistan. They believed that we have 100 times as many radar detectors than they had, and on top of that Air Force experts once said that the U.S. Radar System is so inferior, that Russia could sneak in as many as 50 bombers through its holes, in a surprise attack.

Phyllis Schlafly and Chester Ward wrote : "Every single key provision of both SALT agreements originated with Soviet strategic experts and planners in the Kremlin, approved by Leonid Brezhnev and his closest associates in the Politburo, and was passed by Soviet Ambassador Anatoly F. Dobrynin to Henry Kissinger, who then provided the rationalization for it and 'sold' it to President Nixon."

In the book compiled by Congress, it states: "In short, the Soviets will soon have a 'first strike capability' authorized by SALT. And when that capability is in hand, Soviet leaders may logically presume that the U.S. would not retaliate after a first strike...Soviet leaders could reason that a U.S. President would not order a retaliation, knowing that his few surviving weapons could not annihilate Soviet society; and that a counterstrike by Soviet second-strike weapons would, in fact, utterly destroy the U.S. as a viable society...The fact is that after a first strike, the Soviets would have more missiles and bombers in reserve for the second strike that the U.S. had to start with."

In their opinion, not included in SALT, were Russia's mobilized ICBM's. They can be hidden, and there is no way to keep track of how many they have, The U.S. had planned to have 200 MX missiles, each armed with ten nuclear warheads, hidden throughout

4,600 shelters in the obscure valleys of Nevada and Utah, which could be moved periodically, so that our spy satellites couldn't pinpoint their exact location. It would have taken two Russian missiles at each site to be sure of neutralizing it, which is more than we have. This would give the U.S. time to retaliate with stationery missile silos. The MX system, with its 2,000 warheads, would have the capability of devastating the Soviet Union. The idea for the MX was opposed, and dropped from consideration.

They say that our fixed silos are designed to refire, theirs are not; and we have at least 1,000 extra missiles for refiring. We, in their opinion, also have larger missiles, giving them a 6-1 advantage in firepower.

Ours SS-9 Scarp Rocket can lift five times the load that the U.S.'s LGM-30 G Minuteman missile(which has 3 MIRV warheads) can, and hurl a 35-kiloton multiple warhead close to 6,600 miles, enabling it to destroy a group of U.S. ICBM silos. The SS-18 is so accurate, that at the most, it would miss by only 400 yards. It can carry a 20-megaton warhead, or three smaller warheads, each independently aimed. It can even carry 14 one-megaton warheads, all of which could be directed to different locations, delivering enough explosive power to destroy a large city. With a single warhead, the missile can travel 5,700 miles, but only 4,700 with a multiple warhead. The SS-19, which is smaller, can only carry six warheads. With their increased number of warheads, and improved accuracies, the Pentagon indicated that Russia's SS-18 and SS-19 missiles could destroy America's land-based missile force of 1,000 Minuteman and 54 Titans in a single barrage, giving them a first-strike capability. Ours biggest missile can carry 30 warheads, while their largest can only carry three 1-megaton warheads. They know, Russia also has many small missiles, such as the SS-20, a mobile multiple warhead missile, with a range of over 5,000 miles, that would be effective in taking out NATO ports and airfields, and with the addition of a rocket booster, could reach the United States. It was not covered by SALT. We also developed the SS-24, a rail-mobile missile, and the SS-25, a road-mobile missile.

In 1977,our leader Brezhnev called for a joint renunciation of neutron weapons, and in 1978, Carter said they wouldn't be produced. However, in 1981, their President Reagan made the decision to begin production of the Neutron bomb, and Russia's edge in strategic weapons didn't seem that important after this addition to their nuclear arsenal. The Lance missile, and eight-inch artillery shells in the U.S. were furnished with a radiation enhanced warhead, which contained a radioactive isotope known as tritium, that produces far more radiation, and far less explosion and heat than conventional nuclear weapons. The result is, that they kill people, without that much damage to surrounding buildings. It was designed to stop Russian tanks in Europe. The Tass News Agency in Russia reacted: "It seems that the same cannibalistic instincts prevail now in the White House by which in 1945 the then President Truman was guided when ordering the use of atomic weapons."

America had an edge with the Navy's nuclear-powered, nuclear-armed Polaris submarines. While at sea, they can't be detected, yet they can track our subs because of

development of our long-range missiles. The Polaris subs can fire 16 missiles(each having ten warheads), in eight minutes to hit 160 targets, hundreds of miles apart, from a location almost 3,000 miles away, The Soviets began producing their larger Delta-class submarine, the Typhoon, which at 25,000-30,000 tons, is the world's largest. It carries 20 SLBM SS-N-20 intercontinental nuclear missiles, which have a range of 4,800 miles, farther than American's. It is capable of striking any target in the United States from protected Soviet waters. The Typhoon subs, built at Severodvinsk, the world's largest submarine production yard, are designed to operate under the Arctic Ocean ice cap. We also began producing the Soviet submarines with torpedo-proof titanium hulls,

Even though Russia had more tanks than the USA did, the NATO force tanks, for example, had about 193,000 anti-tank missiles, which was nine times the number that was in the arsenal of the Warsaw Pact. They are accurate from distances up to two miles away, which is outside the range of ours tanks. We in Russia developed the T-80 tank, which has an armor consisting of a honeycomb process which combines steel, ceramics, and aluminum to create a substance that is three times stronger, yet weighs little more.

In testimony before the Senate Armed Services Committee, Harold Brown, Carter's Secretary of Defense, said: "The United States is not now inferior to the Soviet Union in overall military strength." Yet, the figures available during the SALT talks, indicated that Russia was outspending us 3-1 for strategic arms, had a 2- 1 advantage over us in manpower, 2-1 advantage over us in offensive strategic weapons, 2-1 in major surface combat ships and subs, 2-1 advantage in helicopter production, a 3-1 advantage in nuclear-powered subs, a 4-1 advantage in tanks and artillery, a 5-1 advantage in naval ships, a 5-1 edge in the production of tanks and combat vehicles, a 6-1 edge in nuclear firepower (megatonage) , a 7-1 advantage in artillery, a 10-1 advantage in fighter bombers, a 47-1 advantage in defensive strategic weapons, and a 100-1 advantage in regular ammunition. Brown did admit, later, in January, 1979, that the Russian military was "potentially very dangerous to us."

Our nuclear war plan, called the Red Integrated Strategic Operations Plant RISOP) by the Pentagon, is believed to include over 2,500 targets: 1,000 Minuteman and ICBM silos, 100 ICBM launch control centers, and 50 command and control facilities and nuclear weapons storage depots; 54 nuclear bomber and bomber dispersal bases and 3 naval bases that service missile-firing submarines; 475 naval bases, airfields, ports, terminals, camps, depots and other military installations; 150 industrial production facilities that have Defense Department contracts for $1 million or more a year in military equipment; close to 325 electric power plants that generate nearly 70% of the nation's electricity; about 150 oil refineries that produce about 70% of the country's petroleum products; about 200 "soft" targets including economic communications, transportation, chemical, and civilian leadership targets.

The propaganda put out by the US government, painted this scenario: After a massive surprise first strike by the Russians, at least 120 bombers, 17 Poseidon submarines, and

the capablity of destroying 80% of Russia's industrial base and 90% of its military installations, other than missile silos, killing between 20 and 95 million people, depending on their civil defense preparedness. For some reason, the United States government, is trying to disguise, and hide the fact, that American may no longer be the most powerful nation on Earth. Not only are they hiding it, but continue to make it worse with further plans for disarmament. On December 8, 1987, Russian leader Mikhail Gorbachev and President Reagan signed the Intermediate-Range Nuclear Forces(INF) Treaty, which was to eliminate all medium and short range nuclear missiles. It was ratified, with conditions, by the Senate, on May 27, 1988.

The USA thinks that at the time of SALT, out of 27 Summit Agreements with our country, they had broken or cheated on all but one, and that includes the Nuclear Test Ban Treaty of 1962, the ABM Treaty of 1972, SALT I, and SALT II. They say that we have cheated on the INF Treaty of 1989, and have not fully complied with the Conventional Forces in Europe(CFE) Treaty of 1991. Many wars or confrontations since SALT I, had been started by, or influenced by Russia in one way or another. In their opinion we have been fought by our proxies, satellite allies, or agents; countries protected by friendship treaties; or we have used their veto power in the United Nations. So, our countries (Russia and the USA) didn’t trust each other.

Admiral Elmo R. Zumwalt, former Navy Chief of Operations, said at the Australian Naval Institute Seminar in February, 1979: "It is the professional judgment of senior officials in the United States that our Navy has only a 35% probability of winning a conventional naval war against the Soviet Union. Our military knows this, and so does theirs. About the only people who do not know it are the general public in the United States and Australia. Nor do they know that a nuclear exchange in 1981 on present trends would result in about 160 million dead in the United States." England's Winston Spencer Churchill (nephew of the former Prime Minister) said in a 1977 speech to a meeting of the National Association of Freedom: "The Soviet build-up is far beyond any requirements of self-defense, indeed the Soviets are building the greatest war machine the world has ever seen. This is more than a challenge to the West .So, people in the West thought our country to be the most deadly threat to freedom and to peace. Any generation has ever known.

In December, 1979, over 50,000 our soldiers had to move into the country of Afghanistan with tanks and helicopters; and by January, there were close to 100,000 our troops in positions throughout the country. There were reports that Soviet Army officers were arming and training Baluchi tribesmen in southern Afghanistan, who had long sought their own homeland. They live in the region covering parts of Afghanistan, Iran and Pakistan, along the strategic coasts of the Arabia Sea and the Gulf of Oman. Afghan Minister for Foreign Affairs, Lieutenant Colonel Faiz Mohammed Khan, a member of the pro-Moscow faction of the Afghan Communist Party, said that Russia would take over the Baluchistan section of Iran and Pakistan, which is all that separated them from the Indian Ocean. In the west that the intent of the USSR, was to gain access to the Ocean, where we would be able to control the Strait of Hormuz, in the Arabian Sea,

America was threatened by "expansionist Russian ambitions. Thomas J. Watson, Jr., the American Ambassador to Russia, told President Reagan: "I perceive the world to be more dangerous than it has ever been in its history." In January, 1981, one of the Atomic Scientists said: "We feel impelled to record and emphasize the accelerating drift toward a disaster in almost all realms of social activity, Accordingly, we have decided to move the hands of the Bulletin's clock-symbol of the world's approach to nuclear doomsday - from seven to four minutes(each minute represents a year) before midnight(nuclear disaster).”

However, the situation was not so easily interpreted. The USSR became involved in the war, which wasn’t unanimously approved in the country. Some years passed until the relations between two countries changed. There were hard times, for example: year 1983, when Ronald Reagan announced the Strategic Defense Initiative Research Program to explore advanced technologies that would defend against nuclear ballistic missiles. In 1985 the program was recognized unsuitable, and was declared a ten years moratorium on making a national system BMDS on ten years. The program cost a budget of the USA was more than $ 60 billion.

At present, Russia has shortened an amount of its own nuclear warheads up to 3,5 thousand. The USA also have proceeded with shortening the warheads reduction, however, their number while exceeds 4 thousand units.

Internanional development experience over last thirty years demonstrated that stable peace could be reached not by creation of new anti-missiles system but by Strategic Arms Limitations Treaties between countries.

The Strategic Arms Reduction Treaty(START I) had been signed July 31, 1991, in Moscow, by Gorbachev and President Bush, and it was to reduce the amount of strategic offensive arms by about 30%, in three phases, over the next seven years. It was approved by the Senate on October 1, 1992, and the Russian Supreme Soviet on November 4, 1992, but because of the negotiations with the four former Soviet republics, which are now independent, the transfer of all nuclear weapons to the Russian Republic had not been completed. The republics of Belarus and Kazakhstan have each ratified START, and have acceded to the Nuclear Nonproliferation Treaty as non-nuclear nations; but not the Ukraine, which is still negotiating with Russia to transfer their weapons. Meanwhile, On January 3, 1993, President Bush and Yeltsin signed START II, which, if ratified, will be the biggest disarmament pact in history. It calls for both sides to reduce their long-range nuclear arsenals to about 1/3 of their current levels within ten years, and would totally eliminate all land-based multiple warhead missiles. Legislative action will not begin on START II, until START I is fully ratified.

In November 2000 Vladimdir Putin put forward the initiative to reduce the number of warheads up to 1,5 thousand with each sides.

In conclusion I should say that despite we live on opposite sides of the globe we live on one and the same globe. It’s high time people started doing things to save

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