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FOREIGN TECHNOLOGY DIVISION

DICTIONARY
OF
MISSILE AND ARTILLERY TERMS

by

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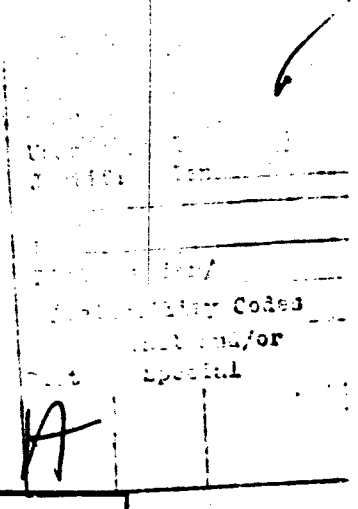

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*Ye initially, after vowels, and after ъ, ь; e elsewnere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

From the Compilers /3

Russian artillery has a heroic history many centuries old.

Russian artillery pieces acquired glory in all past wars: they thundered from the walls of the Kremlin against the hordes of Tokhtamysh, decided the outcome of the Battle of Poltava, smashed German armies in the Seven-Year War, stopped Napoleonic hordes at Borodino, defended the bastions of Sevastopol', opened paths for Russian armies in 1914-1916, and insured victory during the Civil War. Soviet artillery bathed itself in undying glory during the Great Patriotic War in the struggle against German fascist occupiers and Japanese imperialists. In individual operations during the Great Patriotic War, tens of thousands of guns and mortars were called upon to provide artillery preparation and support for infantry and armor attacks. Up to 200-300 and more tubes per kilometer of front were concentrated in breakthrough sectors. к.м

Unusually great interest on the part of our country's workers, especially the youth, in missile and artillery weapons is no accident. The demand for missile and artillery literature continually is rising. The Soviet reader is interested literally in everything about missile and artillery weapons -- the equipment, tactics, history. However, in any serious familiarization with literature on missile and artillery weapons, the reader encounters several specific missile and artillery terms, names, and concepts. It is difficult, and often absolutely impossible, to find explanations for them in extant literature, dictionaries, and encyclopedias.

The last artillery dictionary, by A. S. Shishkov, now a bibliographic /4 rarity already (it can be found only in the V. I. Lenin Library in Moscow), is completely obsolete and does not meet today's requirements, since it was published in 1840. Missiles are weapons of a new type. Therefore, there is a need to publish a contemporary missile and artillery dictionary with explanation of terms, concepts, and words. This work is the first attempt to provide a collection of missile and artillery terms and their brief definition. It can be used by a broad circle of readers, primarily servicemen of the Soviet Army and Navy, as well as workers, engineers, technicians, writers, poets, artists, and other individuals interested in this type of weapon. Extensive materials were used in compilation of this dictionary: textbooks from Soviet Army military educational institutions, training

aids, various types of dictionaries, as well as different foreign open publications on missile and artillery equipment. As a result, we succeeded in compiling 1,795 different terms and individual words, with their explanation provided in this book.

The dictionary encompasses all branches of artillery science: materiel, ammunition, igniters, fuzes, instruments, firing, and others.

The words and terms explained in the dictionary are printed in bold face as headers for individual articles and are in alphabetical order. If the headers are repeated in the text of a particular article, they are so indicated as the first letter with a period. If an explained term consists of several words, it is repeated in that article in the form of the first letter of each word with periods. For example, Artilleriyskiy vystrel kartuznogo zaryazhaniya in the explanatory text is repeated as A.v.k.z.

If the reader encounters unknown terms or words in the text, he should seek their explanation based on the first letter on the corresponding pages of the dictionary.

The authors of this dictionary have strived to include only words and terms employed most often in missile units and artillery. In addition, one will encounter in the dictionary obsolete words and terms not used at the present time, but /5 still often encountered in the literature.

The dictionary, undoubtedly, does not encompass all specialized terms and words encountered in special literature. Textbooks, monographs, and works on individual branches of this vast science are published for more profound and detailed study of questions of artillery science.

The compilers express their sincere gratitude to Hero of the Soviet Union Colonel Yu. D. Sergeyev, Doctor of Technical Sciences Colonel-Engineer A. M. Sinyukov, and Candidate of Technical Sciences, Docent, Colonel Engineer V. F. Semenov, who carefully read the manuscript and who made many valuable comments.

Major General A. P. Bogatskiy, Colonel F. S. Kuznetsov, and Lieutenant Colonel (Reserve) A. F. Shapovalov compiled this dictionary.

Lieutenant General of Artillery G. Ye. Peredel'skiy is chief editor.

ABERRATsIYa OPTIChESKIKh SISTEM [Optical System Abberation] -- distortion or insufficient resolution of optical images provided by optical instruments with precisely-manufactured optics. A.o.s. should be distinguished from optical system errors occuring as a result of manufacturer imprecision.

A.o.s. are categorized as geometric (spherical and others), chromatic, and diffraction aberration.

A spherical aberration is distortion of an object's image due to the flow of parallel rays falling on a lens parallel to the main optical axis. After refraction, it intersects the main optical axis not at one point (as in an ideal optical system), but in a small section, resulting in the object's image being uneven, blurred. A chromatic aberration is a contraction of the object's image along the edges. Diffraction A.o.s. involve the wave nature of light.

It is impossible to eliminate all A.o.s. completely. However, one can achieve essentially complete elimination of chromatic and those geometric (spherical or other) aberrations, which are the most deleterious depending on purpose of the optical instrument, by proper selection of the forms of reflective and refractive surfaces, as well as various grades of glass.

ABLYaTsIYa [Ablation] -- conversion of the metal of an engine's walls into a liquid or gaseous state as a result of the physiochemical action of the /8 products of fuel combustion. The melted or vaporized metal from the combustion chamber is carried away by the gas stream via the nozzle to the outside.

The term A. applies also to the volatilization of the heat-shielding cover material under aerodynamic heating conditions and to several other phenomena.

ABRIS [Description] -- drawing done by hand in the field when making a geodetic (topographic) survey, with designation of angles and measurements.

ABSOLYuTNAYa VLAZhNOST' [Absolute Humidity] -- amount of water vapor in 1 cubic meter of air; measured in grams per cubic meter of air.

ABSOLYuTNAYa SKOROST' SNARYaDA [Projectile Absolute Velocity] (a variable) -- velocity of a projectile's forward motion during its absolute movement in the bore.

ABSOLYuTNAYa PUT' SNARYaDA [Projectile Absolute Travel] (a variable) -- forward travel of a projectile in the bore relative to guides along which recoil elements will move.

ABSORBTsIYa [Absorption] -- absorption, soaking in of the substances from solutions or gases by solids or liquids. A. will find use in production of powders and VV [explosives].

ABSTsISSA VERShINY TRAYeKTORII [Vertex Abscissa] -- distance from the point of origin to the base of the trajectory vertex.

AVIATsIONNOYe UPRAVLYaYeMOYe ORUZhIYe [Aviation Guided Weapon] -- guided missiles (projectiles) with a conventional or nuclear charge, with control, guidance, and launch devices aboard a carrier aircraft. It is fired at airborne, ground, and surface targets. A.u.o are divided into two classes: "air-to-air" guided missiles fired from aircraft at airborne targets and "air-to-surface" aerodynamic projectiles, and guided bombs, airborne guided torpedoes intended for destruction of large ground-based objectives and military vessels from an aircraft. A.u.o. are in the Air Force weapons inventory.

AVIATsIONNYYe NEUPRAVLYaYeMYYe RAKETY [Aviation Unguided Missiles] -- unguided missiles launched from launchers located aboard aircraft and helicopters. /9 They are fired at ground, airborne, and surface targets. A.n.r. are divided into two classes: "air-to-air" fired at airborne targets and "air-to-surface" fired at ground and surface targets. A.n.r. comprise a solid- or liquid-propellant (more often solid) jet engine, warhead containing the explosive charge, fuzes, igniters, and fins. Fins can be non-folding (rigid) and folding (hinged) flexible. Some A.n.r. have fins which impart a rotation around an axis to the missile. Based on purpose, A.n.r. are categorized as high-explosive [HE] fragmentation, HE, and shaped-warhead missiles, and can carry a thermonuclear charge. Fuzes are categorized as proximity or impact, instantaneous or delayed action. A.n.r. can be classified as single-fire or volley-fire missiles. From a design standpoint, volley-fire A.n.r.

in principle do not differ from close-range land-based artillery unguided missiles. A.n.r. launchers take the form of pods, tubes, guide rails, or bracket holders. Several missiles can be housed in each pod and pods can be disposable or reusable.

AVIATsIONNYYe RAKETY KORABEL'NOGO BAZIROVANIYa [Shipboard Aviation Missiles] -- "air-to-air" and "air-to-surface" aviation missiles, with "air-to-ship" and "air-to-submarine" subclasses, used by aviation from aircraft carriers and shipboard remotely-piloted attack resources.

AVIATsIONNYYe SNARYaDY [Aviation Projectiles] -- service projectiles fired from aviation cannons or launched from special devices by aircraft and helicopters to destroy airborne, ground, and maritime targets. Modern A.s. primarily are rocket projectiles of three types: unguided with an electronic fuze, guided with a seeker, and remote controlled with and without a seeker. Long-range areodynamic projectiles and guided airborne torpedoes for destruction of maritime targets are special A.s. There is a wide variety of A.s. designs. Some models have an atomic charge.

AVIATsIONNYYe UPRAVLYaYeMYYe RAKETY [Air-Launched Guided Missile] -- /10 guided missiles launched from special launchers by aircraft and helicopters for destruction of airborne, ground, and maritime targets. They are equipped with seekers, remote control, or self-contained control, more often with a combined control system. Combined control systems make it possible to obtain high impact accuracy when firing at small moving targets. A variety of designs is used. The explosive charge is high explosive or fragmentation. Some missile models carry a thermonuclear charge. A.u.r. are equipped with radar, optical, acoustic, and other types of fuzes.

AVTOMAT [Automaton; Automatic Gun; Submachine Gun] -- 1. Device (automatic machine, apparatus, instrument, attachment) making it possible to accomplish a production process without direct participation by, but monitored by, a human. 2. Automatic gun of special design. 3. Widely-used name for a submachine gun.

AVTOMATIZATsIYa UPRAVLENIYa OGNEM [Fire Control Automation] -- a complex of measures based on use of computers and other technical equipment for the purpose of more advisible distribution of artillery fire, timely target destruction, and full consideration of firing conditions.

AVTOMATIKA [Automation; Automatic Mechanism] -- 1. Branch of technology developing the methods and means of freeing man's physical labor in monitoring and control of technical processes. A. makes it possible significantly to increase speed and precision in accomplishment of technical operations. A. also supports the operation of those technical processes which man is unable to maintain directly due to harm, danger, inaccessability, and other conditions hindering contact with the controlled object. At present, A. has found wide use in military affairs, especially with the development of missile technology. 2. In artillery, A. is a mechanism used in sliding wedge breechblocks for automatic opening of the breechblock after firing (with ejection of the spent case), loading (supply and chambering), closing of the breechblock, and firing without human participation.

AVTOMATIChESKAYa GOLOVKA SAMONAVEDENIYa [Automatic Seeker] -- see /11 Golovka samonavedeniya [seeker].

AVTOMATIChESKAYa PUShKA [Automatic Gun] -- automatic gun of special design (20mm and more) in which the energy of the powder gases during a shot is used not only to impart motion to the projectile, but also to reload the gun. The next shot occurs without direct human participation, but under human supervision. An A.p. has a high rate of fire and is used mainly for destruction of airborne targets.

AVTOMATIChESKIY VZRYVATEL' [Automatic Fuze] -- proximity fuze which automatically trips at a specific distance from the target as a result of the effect on its mechanism of specific characteristic features of the target or its environment (or action of a special mechanism such as a timer). A.v. in design principle and action are divided into radar (electronic fuze), acoustic (which trips upon attainment of a specific sound wave pressure), optical (action of which is based on use of the target's thermal (infrared) radiation, and others. During the Second World War, antiaircraft and aviation projectiles were equipped with A.v. At the present time, A.v. are used also in land-based artillery with fragmentation shells. If a projectile with an A.v. does not encounter the target or does not detonate, then a special destruction device automatically or from a signal from the ground destroys the projectile in the air.

AVTOMATIChESKIY ZENITNYY PRITsEL [Automatic Antiaircraft Sight] -- optical-mechanical sight for a small-caliber automatic antiaircraft gun, which continuously solves the target engagement problem.

AVTOMATIChESKOYe ORUZhIYe [Automatic Weapon] -- firearm in which the energy of the powder gases during a shot are used not only to impart motion to the projectile (bullet), but also for reloading the weapon and firing the next shot. A.o. have a high rate of fire.

AVTOMATIChESKOYe REGULIROVANIYe [Automatic Regulation] -- maintenance of a constant value of any magnitude in a technical process with the assigned accuracy or its change according to an assigned law by means of special instruments without direct human participation. A.r. is used in the majority of automatic control /12 systems and comprises an important element of automation.

Reacting to a deviation from the regulated magnitude, an automatic regulator reestablishes its assigned value with the requisite accuracy, acting upon the regulated object with the aid of its actuator.

A.r. found wide use in missile and artillery armament. It forms the foundation of artillery drive servo systems, gun turret drives, and so on. Servo systems also are used widely in radar equipment and automatic stabilizers are used in missile armament.

AVTOMAT UPRAVLENIYa DAL'NOST'Yu [Automatic Range Control Mechanism] -- device for measurement of the velocity of a missile and engine cut-off (shut-down) when it attains the assigned velocity. An integrator mechanically coupled to the A.u.d. measures velocity.

AVTONOMNOYe TELEUPRAVLENIYe [Self-Contained Remote Control] -- control over movement of an object (missile, projectile, and so on) in which guidance is accomplished by instruments located aboard the object. The object's flight program is provided to the instruments beforehand. Inertial, astronavigational, and others fall in the category of self-contained remote control systems.

AVTONOMNOYe UPRAVLENIYe RAKETOY [Self-Contained Missile Control] -- control of missile flight based on a preplanned program accomplished with the aid of special equipment aboard the missile or by using astronavigatsionnaya sistema and inertsionnaya sistema [astronomical and inertial systems] (see). With A.u.r., the flight trajectory is a program developed beforehand, i. e., prior to missile launch. The assigned

program is carried out by the appropriate equipment installed on the missile. The onboard equipment is tasked to measure deviations of the actual trajectory from the programmed trajectory, as well as other motion parameters affecting the flight.

AVTONOMNYYe SISTEMY UPRAVLENIYa [Self-Contained Control Systems] -- complex of equipment on a missile to control its flight. The guided missile's flight trajectory is considered ahead of time and is a program which is carried out in full by the appropriate equipment installed on the missile.

AVTOPILOT [Autopilot] -- device for automatic control of an airborne platform. /13

The idea and scheme for an A. for the first time were proposed by leading Russian scientist K. E. Tsiolkovskiy in 1898. Initially, A. automated only the rudder control, which made it possible to maintain an assigned flight regime without human participation. Improvements in A. made it possible to create a reliable system which, acting on the rudders of an airborne platform, retains the assigned flight mode or changes it in direction, bank, and altitude. A. are used in missiles and aerodynamic projectiles.

AGITATsIONNYY SNARYaD [Leaflet Projectile] -- projectile for distribution of leaflets. Its distinguishing feature is that an ejection charge is located in the nose and the literature is expelled through the rear. The literature dispersed from the projectile is borne by the wind and falls from the point of detonation over a strip 100-200 meters wind given light winds and 500-1,000 meters given strong winds. The projectile is activated by a time fuze. A.s. were used in Soviet Army surface-to-surface artillery.

ADAPTATsIYa GLAZA [Adaptation of the Eyes] (from the Latin adaptatio -- adjustment) -- adjustment of the eyes to observation under various lighting conditions (brightness). Two types of A.g. exist: light (transfer from a dark room into a lit room) and dark (vice versa).

AZID SVINTsA [Lead Azide] RbN_6 -- lead azide is a white crystallized powder (specific gravity 4.6) essentially almost insoluble in water. A.s. is used widely as a initiator, i. e., it causes other explosives to detonate. It easily interacts

with copper so is used only in nickel and aluminium casings. It is less sensitive than fulminate to mechanical effects (shock, compression, friction). Its initiating capability is greater by a factor of 5-10 than that of fulminate and it is more stable. A.s. is used in detonator caps.

AZIMUT [Azimuth] (A) -- 1. Angle in the horizontal plane between the direction of the geographic meridian and a given direction computed clockwise from north. 2. A. in anciaircraft artillery (β) is the angle in the horizontal plane /14 between the zero line and a given direction computed counterclockwise from the zero line.

AZIMUTAL'NYY KRUG [Azimuth Circle] -- 1. Fixed metal ring divided into 360° attached to the base of an artillery system. It does coarse horizontal laying and measures horizontal angles. It is used in fixed, exposed coastal artillery systems. 2. Instrument to measure horizontal angles in triangulations.

AKKUMULIROVANIYe [Accumulation] -- see akkumulyatsiya [accumulation].

AKKUMULYaTOR DAVLENIYa GASOVYY [Pressurizing-Gas Container] -- device in a liquid-propellant feed system to expel propellant components from propellant tanks into the combustion chamber using high gas pressure (air, nitrogen, helium, or any type gas). Compressed air is used most often. Here, gas pressure must be greater than in the combustion chamber. A feed system with a pressurizing-gas container sometimes is called a compressed-ar container (VAD) feed system. A.d.g. are used in missiles, boosters, and as a supplement in other rocket engine feeds.

AKKUMULYaTOR DAVLENIYa ZhIDKOSTNYY (ZhAD) [Liquid-Reactant Gas Generator] -- small liquid-propellant rocket motor, whose combustion products serve to expel propellant. It is used in the pressure-fed system of several liquid-propellant rocket engines.

AKKUMULYaTOR DAVLENIYa POROKhOVOY (PAD) [Solid Propellant Gas Generator] -- propellant expulsion device using combustion products of a slowly-burning powder charge. It is used in the pressure-fed systems in liquid-propellant rocket engines (ZhRD).

AKKUMULYaTsIYa [Accumulation] -- accumulation of energy. For example, the process of energy accumulation by a recuperator as a barrel recoils for its return to the initial position during counterrecoil.

AKSELEROMETR [Accelerometer] (from the Latin accelero -- I accelerate, and the Greek metveo -- I measure) -- instrument that measures the magnitude of acceleration (delay). A. is a mechanism with a pendulum whose mass reacts to acceleration. It is used in rapidly-moving apparatuses, aircraft, and in guided missile inertial guidance systems.

AKTIVNAYa GOLOVKA SAMONAVEDENIYa [Active Seeker] -- radioelectronic transceiver located in the nose of a guided missile to guide it to the target.

An active seeker operates on the principle of a thermal direction finder or radar. Signals emitted by the seeker transmitter, reflecting off the target, reach the seeker's receiver. Then, with the aid of a computer, the A.g.s. develops commands and transmits them to appropriate actuators (rudders) controlling the missile's flight trajectory. Depending on radiated energy type, A.g.s. are categorized as radar, hydroacoustic, heat, and others. They are used in aktivnaya sistema samonavedeniya [active homing systems] (see) and hybrid missile guidance systems.

AKTIVNAYa SISTEMA SAMONAVEDENIYa [Active Homing System] -- missile guidance system with an active seeker for the terminal leg of the trajectory. It is used on missiles, antiaircraft and aviation projectiles, aerial torpedoes, and others.

AKTIVNYY METOD SAMONAVEDENIYa [Active Homing Method] -- see Aktivnaya sistema samonavedeniya [active homing system].

AKTIVNYY UChASTOK TRAYeKTORII [Active Trajectory Leg] -- missile flight trajectory leg with engine running. A.u.t. sometimes is called boost trajectory or the missile insertion leg. A.u.t. is divided into smaller segments -- launching leg, insertion leg, and others. A.u.t. form will depend on missile type, launch type, and launch range. Missile flight control occurs during the A.u.t.

AKTIVNO-REAKTIVNAYa ARTILLERIYSKAYa SISTEMA [Rocket-Propelled Artillery System] -- artillery piece which fires a rocket-assisted projectile. The projectile acquires

initial velocity due to the energy of the artillery powder charge. The projectile receives subsequent impulse from the combustion of the propellent charge. See Aktivno-reaktivnyy snaryad [rocket-assisted projectile].

AKTIVNO-REAKTIVNYY SNARYaD [Rocket-Assisted Projectile] -- artillery /16 charge whose flight range is provided by a combination of gun and rocket firing principles. Such a projectile is fired from a conventional gun. It receives additional velocity due to combustion of a propellent charge located in the base. This approach noticeably increases the projectile's firing range, but somewhat reduces its combat effect compared to conventional artillery projectiles of the same caliber.

AKUSTIKA [Acoustics] -- the science of sound. Modern A. is divided into general, military, physiological, atmospheric, hydroacoustics, electroacoustics, architectural, musical, and others. Military acoustics examines problems of sound location, sound masking, sound ranging, and others.

AKUSTIChESKAYa GOLOVKA SAMONAVEDENIYa (AKUSTIChESKIY KOORDINATOR TsELI) [Acoustical Seeker (Acoustical Target Coordinator)] -- device which converts the mechanical energy of sound oscillations into electrical energy. An A.g.s. is installed in antiaircraft and aerial guided missiles and torpedoes and guides them to the target in the terminal leg of the trajectory.

AKUSTIChESKAYa LINZA [Acoustical Lens] -- see Linza [lens].

AKUSTIChESKAYa VZRYVATEL' [Acoustical Fuze] -- proximity fuze whose operating principle is based on sensing a specific pressure of sound waves and their conversion to electrical voltage. Elastic membranes and crystal microphones are used as sensing elements. The intensity of the sound oscillations will depend on the power of the sound source and distance away from it. A.v. are used in mines and torpedoes. A major drawback is their vulnerability to jamming.

ALGORITM (algorifm) [Algorithm] -- any system of computations done in accordance with strictly-defined rules which, after any number of steps, obviously will lead to solution of the problem posed. An A. is categorized as mathematical or operational. A mathematical A. determines the approach to solution of any single class of problems. An operational A. is a system of logical arguments and operational calculations

made during step-by-step analysis of the elements of a situation for the purpose of developing a solution. An operational A. will serve as the basis for the /17 compilation of a mathematical A.

ALIDADA [Alidade] -- slide rule with verniers or microscopes at the end, which turns around the center of an azimuth scale for measurement of angles.

It is used in astronomical, geodetic, and physical azimuth mechanisms. The position of the A. relative to the azimuth circle indicates the angular range of an object at which the sight or viewing tube of a given azimuth instrument is pointed.

AL'TIMETR [Altimeter] (barometric height finder) -- instrument which measures flight altitude. It is used in aviation, in rocket projectile control systems, in aerodynamic projectiles in particular, and others.

AL'FA-ChASTITsY [Alpha-Particles] (α-particles) -- nuclei of the atoms of helium emitted by nuclei of certain radioactive substances. An α-particle has an atomic weight of 4.003, a mass of 6.644×10^{-24} grams, and a positive electrical charge greater by a factor of 2 in absolute magnitude than the charge of an electron. α-particles comprise two protons and two neutrons tightly coupled together. Thus, α-particles are almost independent components among the heavy nuclei. Given sufficiently powerful effects, α-particles can disintegrate. One α-particle escapes as one nucleus of radium decays. In this connection, 3.7×10^{10} α-particles are emitted in 1 second by 1 gram of Ra. The atomic nucleus obtained as a result of emission of α-particles has a charge two units of an elementary charge less and an atomic weight four units less than the original nucleus.

The stopping power of various substances directed against one atom of a substance absorbing α-particles is approximately proportional to the square root of the atomic weight. A layer of hard substance several microns thick suffices for complete absorption of α-particles.

Passing through a substance, α-particles ionize it and in their path form ion chains (an α-particle of polonium in its path in air creates 1.45×10^5 ion pairs).

Specific ionization caused by the α-particles, due to a reduction in velocity, initially increases and then sharply drops. Ionization is the basic effect /18 from which α-particles are observed.

Falling on the skin of a human and animals, α-particles cause burns difficult to treat.

AMBRAZURNYY KAChAYuShchIYSYa ShchIT [Tilting Mantlet Plate] -- apparatus in the form of a plate attached to the tilting portion of a gun carriage and covering the gun port at all raised and lowered angles.

AMMONIYNO-SELITRENNYYe VZRYVChATYYe VEShchESTVA [Ammonium Nitrate Explosives] -- explosives based on ammonium nitrate with a mixture of a small amount of explosive (TNT, xylene) or flammables (sawdust, peat). Depending on components making up ammonium nitrate explosives, they are categorized as 1) ammonials -- explosives made up of TNT (see trotil) or xylene (see ksilil) and powdered aluminum; 2) ammotals -- explosives made up of 20-60% TNT; 3) dynammons -- explosives with non-explosive flammable additives. They are used for demolition work and priming antipersonnel and antitank mines.

AMMONITY [Ammonites] -- explosive mixtures made of ammonium nitrate with addition of organic nitro compounds (TNT, xylene, dinitrobenzene, and others), for example 88% ammonium nitrate and 12% TNT. A. are used for demolition work. During wartime, A. can be used for priming artillery projectiles -- high-explosive [HE], fragmentation, and HE-fragmentation.

AMMOTOL [Ammotol] -- double mixture of ammonium nitrate (30-80%) and TNT (20-70%). It is used to prime the HE charges in antipersonnel and antitank mines, as well as in manufacture of demolition charges.

AMORTIZATOR [Shock Absorber] -- device for extinguishing shocks in artillery and missile equipment. Based on the design and action principle, A in artillery systems and missile mounts are divided into spring, pneumatic, rubber, hydraulic, hydropneumatic, and others.

AMPERMETR [Ammeter] -- intrument for measuring the strength of an electric

current. A. can be electromagnetic, magnetoelectric, thermal, electrodynamic, induction, photoelectric, and others.

ANEMOGRAF [Anemograph] -- meteorological instrument, a recording anemometr [anemometer] (see). /19

ANEMOMETR [Anemometer] -- meteorological instrument for measurement of average wind velocity for a specific time interval and, in some designs, for determination of wind direction. An A. is a device counting the rotations of a vane placed in motion by the force of the wind.

ANEROID - BAROMETR-ANEROID [Aneroid - Aneroid Barometer] -- instrument for measurement of atmospheric pressure. The basic part of an A. is ripply (corrugated) metal housing from which the air has been pumped. As the atmospheric pressure changes, the housing contracts and expands and an arrow connected to it drops or rises, indicating the magnitude of pressure on a dial. The scale is numbered in 10's of millimeters or 1 millibar.

ANTIRAKETA [Anti-Missile Missile] -- special type of surface-to-air guided missile possessing high speed, flight range, and altitude capability. It is intended for destruction of attacking enemy missiles at a rather great distance from the defended object. An A. either renders the enemy missile harmless in flight without blowing it up or or blows it up at a safe distance from the defended object.

APEKS [Apex] (from the Latin -- apex) -- tip, top, point of a heavenly body in the direction of which the Earth or Sun move. The point opposite the A. is called the antapex.

APOGEY [Apogee] (from the Greek apogeois -- located far from Earth) -- a point in the orbit of the Moon or of an artificial earth satellite farthest from the Earth.

APPARAT BESPILOTNYY LETATEL'NYY [Unmanned Airborne Platform] -- airborne platform without a human aboard to control movement. A missile also falls in the broad class of unmanned airborne platforms.

APPARAT MNOGOKRATNOGO PRIMENENIYa (BESPILOTNYY) LETATEL'NYY [Reusable (Unmanned) Airborne Platform] -- unmanned airborne platform adapted for multiple use with special

parachutes or automatic landing on the ground. For example, unmanned aircraft, aerial target missiles, space vehicles, which with the aid of braking engines cut back flight speed to the landing speed, and so on. Unmanned target aircraft /20 are used widely as multiple-use target aircraft for the training of surface-to-air missile and antiaircraft artillery personnel, as well as for conducting aerial and operational reconnaissance.

APPARATURA BORTAVAYa [Onboard Equipment] -- special electromechanical and radio electronic equipment on board a missile (ship, aircraft, helicopter, space vehicle, and so on) intended to maintain the missile on the assigned trajectory and control of a missile in motion by means of commands supplied from a guidance command post. In a self-contained guidance system, the entire complex of equipment is located on board the missile. In a system that is not self contained, only part of the equipment is located on board the missile, with the rest located at the control command post.

APPARATURA ZAPUSKA RAKETY [Missile Launch Equipment] -- land-based test and launch equipment used to prepare and tune control system onboard instruments prior to missile launch, checking their readiness, correct functioning and operating precision, inclusion of intruments, engine automation, and missile launch.

APPAREL' [Ramp] -- gently sloping incline (driveway, chute) built in front of the gate to the buildings in enclosed artillery parks, in the slopes of various trenches (for guns, mortars, launchers) and shelters (for vehicles, munition boxes, artillery prime movers) designed for convenience in rolling out or a gently sloping mound facilitating loading a gun.

ARBALET [Arbalest] -- metal weapon used in Western Europe. It appeared in Rus' in the 10th century. In design, an A. is a combination of a bow and arrow with a butt and launching mechanism. Small A. were an improved type of manual weapon adapted for propelling of an arrow by means of a bow. Large A. were installed aboard ships as fixed mounts for propelling large cold and burning arrows. A. were used until appearance of firearms.

AREOMETR [Aerometer] -- instrument for determination of the density of liquids or the concentration of solutions, a hollow glass float with marks inscribed /21 on it. The depth to which the A. sinks will indicate the density of the liquid.

ARKEBUZA (pishchal') [Arquebuse] -- fuzed weapon charged from the muzzle, which appeared in the 14th century. Large A. looked like an artillery weapon.

ARMATA [Armata] -- ancient name for the first models of artillery weapons used in Russia in the late 14th century. A. were made of longitudinal iron strips, initially covered, and later reinforced by iron rings -- hoops. Even wooden guns bound with iron hoops were encountered.

ARMEYSKAYa ARTILLERIYSKAYa GRUPPA [Army Artillery Group] -- artillery group directly subordinate to the army commander and intended for accomplishment of missions in the interests of the overall army operation.

ARMEYSKAYa ARTILLERIYa [Army Artillery] -- artillery organic to an army directly subordinate to the army commander.

ARMEYSKIYe (FRONTOVYYe) ZENITNYYe UPRAVLYaYeMYYe RAKETY [Army (Front) Surface-to-Air Guided Missiles] -- missiles in the inventory of surface-to-air missile units of army (front) subordination.

ARSENAL [Arsenal] -- 1. Place where all types of combat weapons are stored. 2. Special shops with warehouses intended for storage and repair of artilllery and missile weapons.

ARTILLERIYSKAYa BUSSOL' [Artillery Aiming Circle] -- see bussol' [aiming circle].

ARTILLERIYSKAYa GRUPPA [Artillery Group] -- temporary field force of several artillery units or subunits under one command element for accomplishment of missions in combat. The composition of an A.g. is determined in each individual case depending on the situation.

ARTILLERIYSKAYa DIVIZIYa RVGK [Artillery Division of the Reserve of the Supreme High Command (RVGK)] -- a formation of the reserve of the Supreme High Command. It includes several artillery units. A division is intended for employment in the most important sectors.

ARTILLERIYSKAYa INSTRUMENTAL'NAYa RAZVEDKA (AIR) [Sound-Flash Survey] -- component

part of surface-to-surface artilllery reconnaissance and conducted with the aid of special reconnaissance instruments (equipment). Depending on the equipment used, AIR is subdivided into optical, sound, radiotechnical, and ground photography. /22 AIR is used for determination of target coordinates, missile and artillery firing support, as well as position and point area survey.

ARTILLERIYSKAYa KONTRPODGOTOVKA [Artillery Counterpreparation] -- artillery strikes by a defender against an enemy prepared for or deploying for an offensive. A.k. is conducted in coordination with nuclear weapon strikes and in combination with aviation counterpreparation for the purpose of frustrating an offensive or ameliorating the force of the enemy's initial blow.

ARTILLERIYSKAYa METEOROLOGIYa [Artillery Meteorology] -- branch of military meteorology closely linked with artillery, external ballistics, and overall meteorology. A.m. was born in Russia at the end of the 19th century.

ARTILLERIYSKAYa OPORNAYa SET' [Artillery Control Network] -- collection of control points and axes fixed on the terrain, the coordinates and directional angles of which determined in a unified system with sufficient accuracy for artillery purposes.

ARTILLERIYSKAYa POZITsIYa [Artillery Position] -- place designated for placement of guns and accomplishment of firing missions by an artillery subunit.

ARTILLERIYSKAYa RAZVEDKA [Artillery Reconnaissance] -- acquisition and processing of information on the enemy, his fire weapons, defensive structures, terrain, and atmospheric conditions necessary for successful employment of missile troops and artillery in combat. Observation is the basic method of conducting reconnaissance. A.r. of the enemy is conducted by commanders at all levels from ground-based observation posts, by officers and personnel of artillery unit control subunits, artillery reconnaissance groups, and special artillery reconnaissance subunits. Special instruments, artillery fire to reveal enemy defensive structures and mine fields, interrogation of prisoners, study of captured documents and weapons, and other means are used for A.r. A.r. conducted with the aid of special instruments is called sound-flash reconnaissance. Depending on resource use, reconnaissance is subdivided into optical, radar, topographical, sound, photographic, and meteorological reconnaissance.

ARTILLERIYSKIYe KORABEL'NYYe POGREBA [Ship's Artillery Magazines] -- special areas where artillery ammunition is stored. Magazines aboard ship are located in the holds -- beneath the waterline far from engine rooms. In those cases where this is impossible, A.k.p. are isolated from engine rooms by double bulkheads with an air gap between them, with cork or asbestos insulation. A.k.p have: shelving (cellular), bins, fenders, and racks; a system of lighting, heat, ventilation, sprinkling, flooding, and drying magazines; fire-fighting equipment; and magazine temperature and humidity control instruments. Charges and fixed rounds are strapped onto the shelving to prevent motion. Charges in cases are screwed down onto the shelving. Charges in small containers are stored horizonatally in hermetically-sealed racks. See Artilleriyskiye pogreba [artillery magazines].

ARTILLERIYSKIYe POGREBA [Artillery Magazines] -- special areas where artillery ammunition is stored. A.p. have: shelving, bins, and racks for storing ammunition; fire-fighting equipment; instuments to measure magazine temperature and humidity. The temperature in an A.p. must be in the 15-20° C range and not exceed +30° C; otnositel'naya vlazhnost' [relative humidity] (see) of the air must not exceed 80%. Projectiles and charges are stored separately.

ARTILLERIYSKIYe PRIBORY [Artillery Instruments] -- instruments to support artillery firing. Depending on device and purpose, instruments are subdivided into those for observation and measurement of angles (binoculars, periscopes, theodolites, stereoscopic telescopes); for preparation of initial data (aiming circles, theodolites, range finders, plotting boards, calculators); for gun laying (sights, panoramas); for topographical operations (theodolites, aiming circles, stereoscopic telescopes); artillery fire directors (PUAO, binoculars, aiming circles); antiaircraft artillery fire directors (PUAZO), and others. Most A.p. are multipurpose.

ARTILLERIYSKIY BOYeKOMPLEKT [Artillery Unit of Fire] -- 1. Established quantity of ammunition per weapon unit, subunit, unit, and formation. For example, 300 combat firings per gun. 2. The A.b. of a ship is the amount of ammunition which, /24 in accordance with the combat organization, a given ship must have in its artillery magazines.

ARTILLERIYSKIY VES [Artillery Weight] -- until the mid-19th century, the caliber of a gun was measured in artillery pounds, referred to as artillery weight. In

Russia, an artillery pound was the weight of a complete pig iron ball 2 inches in diameter. This generated the names of the guns -- 3-, 6-, 8-, 12-, and 24-pounders, and so on. If one spoke of a "12-pound" gun, this signified that the ball weighed 12 pounds. In Russia in 1877, gun caliber began to be measured based on inner diameter.

ARTILLERIYSKIY VYSTREL [Artillery Round; Artillery Shot] -- 1. The set of elements required to produce one shot (projectile with fuze, powder charge in a bag or casing, and a means for igniting the charge). A.v. are categorized as combat, practice, training, and blank. 2. Phenomenon in the bore of a gun when rapid combustion of a powder charge and impartation by the gases thus formed of continuous and rotating motion to the projectile occurs.

ARTILLERIYSKIY VYSTREL KARTUZNOGO ZARYaZhANIYa [Separate-Loading Artillery Round] -- round comprising a projectile and separate charge with additional elements housed in a sack made of special fabric (in a bag). The casing is absent in a separate-loading round, used in large-caliber and some middle-caliber long-range guns.

ARTILLERIYSKIY VYSTREL PATRONNOGO ZARYaZhANIYa [Fixed Artillery Round] -- fixed round, i. e., a round in which all elements are collected in one (fixed) cartridge.

ARTILLERIYSKIY VYSTREL RAZDEL'NOGO GIL'ZOVOGO ZARYaZhANIYa [Separate Loading Quick Fire Artillery Round] -- round comprising a charge in a casing and separate projectile with fuze.

ARTILLERIYSKIY DEGAZATsIONNYY KOMPLEKT [Artillery Chemical Decontamination Set] -- decontamination set used for chemical decontamination (radioactive decontamination) of guns, machine guns, and mortars by means of a decontamination solution.

ARTILLERIYSKIY ZARYaD [Artillery Charge] -- a specific amount of powder (by weight) located in a casing or cylindrical fabric bag intended to produce one /25 shot. In design, A.z. are divided into casing and bag charges.

ARTILLERIYSKIY ISTORIChESKIY MUZEY [Artillery History Museum] -- one of our country's largest and oldest museums. The richest central storehouse in the USSR

of examples of cold weapons, firearms, and artillery weapons from ancient times up to modern models, inclusively. Military relics and trophies from the Civil and Great Patriotic wars and of other wars which Russia waged in the past, as well as numerous different historical objects, also are preserved here.

The A.i.m. is located in Leningrad in the Peter and Paul Fortress. At the present time, the A.i.m. is combined with the engineer museum and equipment used by Engineer and Signal troops is displayed along with artillery.

ARTILLERIYSKIY KOMPAS (AK) [Artillery Compass] -- instrument showing bearing of a geographical (true) or magnetic meridian. It comprises a housing with an attached axis on which rotates the magnetized needle of an azimuth scale (a circle with angle graduations), a braking lever, and rotatable cover with a mirrored inner surface. The azimuth scale of the compass is graduated in 1-00 increments and inscribed in a clockwise direction. The azimuth circle rotates, which provides the capability at the moment of sighting to place the azimuth scale's zero (north) graduation under the north end of the arrow.

ARTILLERIYSKIY OGNEVOY NALET [Artillery Intense Shellfire] -- sudden intense artillery shellfire. A.o.n. usually is of short duration. The goal of such fires is to destroy enemy personnel, combat equipment, and fire weapons suddenly.

ARTILLERIYSKIY OGON' [Artillery Fire] -- powerful means of material and moral action against the enemy. The power of artillery is fire. A.o. suppresses and destroys enemy personnel, fire weapons, combat equipment, and various defensive structures; it clears a path for advancing troops; obstructs the path of the enemy on defense; forbids the enemy from carrying out a maneuver, defensive work, or reconstruction of destroyed objects. The following types of fire are used when firing for effect: fire against individual targets, concentrated fire (SO) or a long-range fire assault (DON), successive fire concentration (PSO), rolling /26 barrage (OV), barrage fire (ZO), and massed fire (MO).

Sudden, accurate, massed, and flexibly-controlled artillery fire achieves the greatest results.

ARTILLERIYSKIY PRITsEL [Artillery Sight] -- optical-mechanical (electrooptical) device for laying a gun on a target. There are many different A.p. designs. The

simplest sighting device for a gun mainly is a mechanical sight with a panorama, a direct-laying optical sight, or another optical instrument.

ARTILLERIYSKIY SALYuT [Artillery Salute] -- greeting, saluting in an established manner with blank artillery volleys. An A.s. occurs to mark important events and to greet foreign military vessels (21 shots is a salute to a nation). A.s. are categorized as ceremonial or mourning. The number of volleys and of guns in a volley in each individual case is determined by special statutes. The first salute in the history of the Great Patriotic War was given in our Motherland's capital of Moscow on 5 August 1943 with 12 artillery volleys from 120 guns to the glorious Soviet troops of the Bryansk, Western, Central, Steppe, and Voronezh fronts, who liberated the cities of Orel and Belgorod from the fascist occupiers.

ARTILLERIYSKIY STVOL [Artillery Barrel] -- strong steel tube closed at one end by a breechblock. Direct action of powder gases on the projectile occurs in the barrel of a gun, resulting in the projectile receiving the requisite direction and velocity. In addition, a projectile acquires rotational motion around its own axis in a rifled barrel. Barrel length is measured in calibers. If one says that a "gun is 52 calibers long," this signifies that the length of a barrel along the axis of a given gun equals 52 diameters of the bore of this gun. The barrel is the basic part of any firearm.

Guns with built-up and monobloc barrels are used in modern artillery. A barrel consisting of several layers is called a built-up barrel, which usually is made in two layers: an inner tube and outer jacket. The barrels of large /27 shipboard artillery (305 mm and higher) are multilayer. Monobloc is the term used to describe a single-layer seamless nonreinforced forged barrel. Special processing of the metal for a monobloc barrel results in achievement of barrel wall strength through the entire thickness. Monobloc barrels are used in the majority of modern small- and medium-caliber field guns.

ARTILLERIYSKIY STVOL SO SVOBODNOY TRUBOY [Loose Artillery Barrel] -- gun barrel consisting of a tube and jacket. The surface of the tube going into the jacket is machined well and is made, like a liner, slightly conical. A loose barrel differs from a barrel with a liner in that its interior tube has thicker walls, while the outer, i. e., the jacket, is considerably shorter than the interior tube.

ARTILLERIYSKIY STVOL SO SVOBODNYM LEYNEROM [Loose Liner Artillery Barrel] -- artillery barrel consisting of a loose liner, container (jacket), and breech ring. The loose liner is a thin-walled tube with rifled bore and breech chamber. Liner length equals barrel length. There is a slight gap when the liner is placed in the barrel. The size of the gap fluctuates from 0.05--0.20 mm for medium-caliber guns and 0.15--0.25 mm for large guns. The liner expands under the pressure of powder gases at the time of the shot, eliminating the gap between jacket and liner and, as the pressure continues to increase, works along with the exterior jacket, remaining here within the limits of elasticity. After the shot, the gap between liner and container (jacket) is restored. The liner's exterior is slightly tapered for easy removal.

ARTILLERIYSKIY ShchIT [Artillery Shield; Practice Target] -- 1. Armored structure on a ship's deck for protection of the gun crew and gun elements against bullets and shrapnel. An A.shch. comprises armored and hinged shields and attachments fastened to the gun mount and rotating with it. The shield has a gun port and slits for sights. Modern A.shch. are of welded hinged design. 2. Target, high-speed target towed by a ship for the purpose of practice artillery firings by ships and /28 shore batteries under conditions approximating combat. Along with ship targets, the Navy also uses towed A.shch. Naval practice targets are categorized as small and large. Destroyers or other fast ships possessing high speed and maneuverability are used to tow A.shch.

ARTILLERIYSKIY ELEKTRIK [Artillery Electrician] -- seaman, specialist serving in the electrical department of a shipboard gun mount.

ARTILLERIYSKOYe VOORUZhENIYe [Artillery Weapons] -- complex of artillery resources, including gun mounts, ammunition, instruments, artillery system accessories, and other instruments and accessories supporting artillery firing.

ARTILLERIYSKOYe NABLYuDENIYe [Artillery Spotting] -- method of reconnoitering the enemy and observing firing results from ground and other artillery observation posts.

ARTILLERIYSKOYe OBESPEChENIYe [Artillery Support] -- artillery combat operations with the goal of inflicting losses by fire on the enemy and providing uninterrupted

support to the infantry (cavalry) and tanks as they accomplish assigned missions. These goals are attained: prior to an attack -- by destruction and suppression of enemy defensive targets and, during an offensive -- by destruction (suppression) of surviving enemy strong points and fire weapons, as well as by destruction of his reserves, repulsing counterattacks (counterblows), and so on. Defensive A.o. has the goal of inflicting such losses on the enemy as to force him to halt an offensive and, in the event of intrusion into the defense, to support his destruction. The amount of artillery required for defensive A.o. usually is less than for offensive A.o. Antiaircraft A.o. is required to cover troops in an engagement (encounter) and against enemy air strikes. Antiaircraft A.o. missions usually are accomplished in coordination with aviation.

ARTILLERIYa [Artillery] -- not a Russian word. It has no single definition. The word "artillery" was referred to in books for the first time by Nicolo Fontana, an Italian theoretician of artillery affairs, nicknamed Tartaglia (1500-1557). The word "artillery" appeared in Russian during the time of Peter I. Prior to this, all artillery terminology was Russian, distinctive. The term "Armata" also /29 is not a Russian word, having come to us from the West. At the present time, the word "artillery" has three meanings:

1. One of the basic branches of troops of the Ground Forces having the greatest firepower.

2. Type of weapon or combination of weapon types, including the entire complex of firearms and all resources required for effective employment in combat.

3. Science studying the foundation of the design of the elements of a military weapon, its properties, and methods of employment in combat.

A. as a branch of troops is the aggregate of organizationally-formed subunits and units armed with artillery pieces (guns, howitzers, mortars), multiple rocket and self-propelled gun mounts, various communications equipment, as well as instruments for firing and spotting. A. is intended for accomplishment of fire missions on the battlefield. Coordination of A. with infantry, cavalry, armor, and aviation is a very important element of combat activity. A. with its fires clears a path for troops on the offensive and obstructs enemy access on the defensive.

A. is capable of destroying enemy personnel, defensive structures, armor, aircraft, and other combat equipment. A. is capable of broad maneuver and supporting troops in all types of military activity. In modern armies, A. is subdivided into battalion, regimental, divisional, and corps (army) echelons. By types, A. in the Ground Forces is divided into field, multiple rocket, and self-propelled. It also includes mortars.

In addition, based on special combat employment, A. sometimes is categorized as antiaircraft and antitank. In navies, A. is categorized as shipboard and coastal. Based on the power of the guns, mortars, and mounts, A. is subdivided into light, heavy, superheavy, and high-power. Antiaircraft A. is subdivided by caliber into small-, medium-, and large-caliber. Field A. is subdivided by gun type into cannon and howitzer.

All types of firearms fall in the category of A. as an aggregate of /30 weapons types: rifles, carbines, pistols, revolvers, submachine guns, light and heavy machine guns, mortars, guns, howitzers, multiple rocket launchers, self-propelled artillery mounts, and ammunition of all types -- shells, projectiles, mines. Mechanical and horse traction are means used to move A. Contemporary A. has modern sighting equipment (sights, panorama), fire control instruments (binoculars, stereoscopic telescopes, range finders, aiming circles, and others), communications equipment (telephones, radios), sound-flash and aerial reconnaissance equipment (helicopters, spotter aircraft, radars, sound-ranging stations, topographical, optical, and meteorological instruments).

A. as a science combines several disciplines studying the problems of artillery weapon design, its combat properties and technical operation, as well as methods of employment in combat. The main branches of artillery science are internal ballistics, external ballistics, foundation for the design of artillery equipment, foundation for the design of ammunition, explosives and powders, artillery production technology, artillery tactics, firing theory, artillery history.

ARTILLERIYa ZENITNAYa [Antiaircraft Artillery] -- see zenitnaya artilleriya [antiaircraft artillery].

ARTILLERIYa KORABEL'NAYa [Shipboard Artillery] -- one weapon type aboard combat vessels. The number and caliber of the guns on a ship are determined by its combat

role. Modern shipboard artillery is subdivided into heavy (203-406 mm), medium (100-180 mm), and small (20-85 mm) calibers. In role, A.k. is divided into main, dual-purpose, and antiaircraft.

ARTILLERIYa NAZEMNAYa [Surface-to-Surface Artillery] -- artillery subunits, units, and formations armed with artillery pieces (guns, howitzers), mortars, multiple rocket launchers, and self-propelled artillery mounts.

ARTILLERIYa POLEVAYa [Field Artillery] -- surface-to-surface artillery for direct support to troops on the battlefield. All types of artillery are in /31 field artillery: guns, howitzers, mortars, multiple rocket launchers, and self-propelled mounts.

ARTILLERIYa PROTIVOTANKOVAYa [Antitank Artillery] -- artillery for employment against tanks and armored vehicles.

ARTILLERIYa REAKTIVNAYa (RAKETNAYa) POLEVAYa [Multiple-Rocket Launcher Field Artillery] -- multiple rocket launcher artillery with a 10-15 km firing range for direct support to infantry. In the USSR, Guards mortars (M-8, M-13, M-31), which demonstrated high fighting qualities during the Great Patriotic War, are representatives. As a rule, A.r.p. fires in volleys and it has high mobility and a high rate of fire. It is capable of inflicting sudden massed blows against personnel and combat equipment. The A.r.p. unit of fire includes powder, HE-fragmentation, and special combat missiles. The missiles are launched from multibarrel self-propelled and non-self-propelled launchers. A.r.p. found wide use in modern armies.

ARTILLERIYa REZERVA VERKhOVNOGO GLAVNOKOMANDOVANIYa [Artillery of the Supreme High Command Reserve] -- artillery not included in the composition of combined-arms formations and field forces. It consists of artillery formations and units intended for quantitative and qualitative reinforcement of organic artillery.

ARTILLERIYa SOPROVOZhDENIYa [Close Support Artillery] -- organic artillery allocated for direct close support on the battlefield to combined-arms (tank) troop units.

A.s. operates in the combat formations of motorized rifle and tank subunits

(units). Battalion and regimental artillery, including self-propelled artillery mounts, recoilless guns, and mortars, usually are employed as A.s.

ASTIGMATIZM [Astigmatism] -- distortion of an image in an optical system due to unequal refraction or reflection of light rays in different planes (or as a result of a flaw in the sphericity of a lens), causing the object's image to be soft. A. is eliminated by a combination of several lens manufactured from different grades of glass with surfaces of varied curvature. A. of the eye sometimes also is /32 observed sometimes in a human due to a disorder in the eye's refractory apparatus. Glasses with special cylindrical lenses correct A.

ASTROINERTsIAL'NAYa SISTEMA [Astro-Inertial System] -- see inertsial'naya sistema upravleniya raketov [astro-inertial missile control system].

ASTRONAVIGATsIYa [Celestial Navigation] -- navigation system in which the location of a moving object is determined by measurement of the altitude of heavenly bodies.

ASTRONAVIGATsIONNAYa SISTEMA [Astro-Navigational System] -- self-contained control system variant in which a missile's position in space is determined by astronomical instruments (telescopes pointed at previously-selected heavenly bodies) in combination with a gyroscopic system. An A.s. possesses high guidance accuracy and does not depend upon range. It is used for long guided flights of long-range ballistic missiles, aerodynamic projectiles, and so on.

ASTRONAVTIKA [Astronautics] (from the Greek -- astro -- star and the Greek nautike -- seafaring), cosmonautics (starfaring) -- the science of the flight of airborne platforms (space ships) in outer space.

ASTRONOMIChSKIYe KOORDINATY [Astronomical Coordinates] -- geographical coordinates (longitude and latitude) determined from heavenly bodies.

ASTROORIENTATOR [Stellar Tracker] -- automatic onboard astronomical device which continuously determines the geographic coordinates of the location of a moving object (aircraft, missile, ship) from heavenly bodies.

ASTRORADIOKOMPAS [Star-Tracking Radio Compass] -- radio compass whose operating principle is based on reception of solar radio emissions.

ASTRORADIONAVIGATsIYa [Stellar Radio Navigation] -- system of radio navigation in which radio waves emitted by heavenly bodies (Sun, Moon, and others) are used to locate them by direction finding.

ATMOSFERA [Atmosphere] -- 1. Technical unit of pressure measurement equalling 1 kg/cm^2. 2. The Earth's air envelope.

ATOMNAYa ARTILLERIYa [Atomic Artillery] -- artillery for firing projectiles with a nuclear charge.

ATOMNAYa RAKETA (RAKETA S ATOMNYM DVIGATELEM) [Atomic Missile (Missile with an Atomic Engine] -- missile whose motion (thrust) is created by a nuclear missile engine. The basic [Translation ends at page 32, to be resumed at beginning of page 65]

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[Translation resumes at top of page 65]

principle of the first lever type. When the breechblock is opened, a blow is struck against the short arm of the toe (of the extractor), which, turning, extracts the shell case from the barrel using the long arm with the horn. Here, the upper lugs (horns) of the V. engage the lugs of the wedge cams and hold them in the open position until the shell is rammed into the gun.

VYZhIDATEL'NAYa POZITsIYa [Assembly Area] -- section of terrain equipped in the engineering sense intended for sheltered location of the combat equipment and personnel of subunits from missile units and multiple rocket launcher artillery until their departure for the launch or fire position.

VYKOLOTKA [Punch] -- tool, conical steel or bronze rod used for removal and placement of cotter-pins when tearing down and assembling artillery equipment.

VYSOTA LINII OGNYa [Height to Bore of Gun] (H) -- distance between the axis of the bore and the flat support base of a gun in firing position measured when the axis of the bore is parallel to the gun's support base.

VYSOTA RAZRYVA [Height of Burst] (h) -- distance (shortest) from the plane of the target location to an air burst.

GABARITY [Overall Dimensions] -- largest geometric dimensions of an article (artillery mount, ammunition, packaging, and so on).

GAZOVYYe RULI [Jet Vanes] -- control surfaces placed in the path of motion of a jet stream flowing from a running engine's nozzle. G.r., rotating, create a directional force by deflecting the jet stream from the missile's axis, resulting in creation of moment, which turns the missile in the necessary direction. G.r. operate only when an engine is running, i. e., in the boosted leg of a trajectory.

GAL'VANIChESKAYa SKhEMA STREL'BY [Electrical Firing Circuit] -- firing circuit whose feed source is a primary cell, a source of electrical current obtained by conversion of chemical energy into electrical energy. G.s.s. produce a firing in shipboard and heavy surface-to-surface artillery in breech-loaded guns (when firing with an electric tube).

GAL'VANOMETR [Galvanometer] -- instrument for measuring weak electrical currents used to check the integrity of iridium-plantinum bridges in heavy artillery electric tube igniters.

GAMMA-LUChI (γ -LUChI) [Gamma Rays] -- electromagnetic radiation with very short wavelengths. Three types of radioactive radiation, called alpha-, beta-, and gamma-rays, were noted when radioactivity was discovered. G.-l. are the most penetrating of these radiations and are electromagnetic radiation, as opposed to α - and β -rays, which are a flow of charged particles.

G.-l. are characterized by a very short wavelength and, consequently, by /67 very high quantum energy. The main characteristic of G.l. is gamma quantum energy. Emission of a gamma quantum will occur when an atomic nucleus or fast electron in a field of other particles converts from one state to another with less energy. The difference in energies of the two states is radiated in the form of gamma quantum energy. The gamma quantum energy is 1 million times greater than the quantum energy of visible light since this radiation has very great frequency, while energy with frequency is coupled with ratio $E = h \times \nu$; ν is the frequency of electromagnetic radiation oscillation and h is Planck's constant.

G.-l. can penetrate considerable thicknesses of different materials. When passing through thicknesses, the flow of gamma-rays weakens, the more so the denser the substance.

GAUBITsA [Howitzer] -- rifled artillery piece with a barrel shorter than that of a gun (from 22 to 30 calibers) for high trajectory fire of high-explosive and fragmentation charges against targets under cover (behind hills, ridges, in craters). A G. has an initial velocity and firing range less by a factor of approximately 2 than a gun and has a steep trajectory. A G. has a variable full charge comprising bundles of powder (packets) of strictly determined weight. Changing the size of the charge, it is possible to change the projectile's initial velocity and, consequently, the range of its flight and height of its trajectory.

GAUBITsA-PUShKA [Gun-Howitzer] -- type of artillery piece which can accomplish gun and howitzer combat missions. For example, the Mark 1937 152mm gun-howitzer with a full charge has a projectile initial velocity of 655 m/sec. Consequently, it can accomplish missions usually accomplished by a gun, while presence in the unit of fire of a large number of charges (13 different charges) and a 65° angle of elevation makes it possible to accomplish howitzer combat missions.

GAUFNITsA (GAUFUNITsA, GAFUNITsA) [Howitzer] -- ancient name for howitzers introduced into Rus' in the 16th century.

GEKSOGEN [Hexogen] -- high explosive exceeding TNT in explosive power. Used in a fusion with powdered aluminum for priming fragmentation and armor-piercing /68 charges. G. has increased sensitivity to shock (greater by a factor of 1.5 than TNT). Therefore, it is not used in pure form for charging projectiles. Nitric acid and cystamine are used to obtain G. Cystamine is obtained by saturating formaline with ammonia.

GENERAL-FEL'DTsEYKhMEYSTER [General-Field Master of the Ordnance] -- rank of the main chief of artillery introduced by Peter I to replace the old Russian rank of pushkarskiy golova [Head Cannoneer].

GEOGRAFICHESKOYe MESTO SVETILA [Ground Position of a Heavenly Body] -- point on the earth's surface over which a heavenly body will be located at a given moment in the zenith.

GEODEZICHESKAYa SET' [Geodetic Grid] -- system of geodetic control survey points within a theater of operations. It serves as the foundation for building topographic maps, special-purpose geodetic control survey grids, and artillery control survey grids required for tying in the elements of a combat formation of missile troop units and artillery.

GEODEZICHESKIY PUNKT [Trigonometrical Point] -- point on the earth's surface whose position is determined by means of geodetic operations in a specific coordinate system.

GEOID [Geoid] -- overall figure of the Earth restricted by the surface of the ocean undisturbed by rising tides mentally extended inside the continents and perpendicular to a plumb line at any point; the figure of a G. has a complex form, but sufficiently accurately can be represented by an ellipsoid of revolution.

GEOGRAFICHESKIYe KOORDINATY TsELI [Target Geographic Coordinates] -- magnitudes determining the position of a target in space or in a plane relative to a piece (instrument).

GEOFIZICHESKAYa RAKETA [Geophysical Missile] -- missile equipped with special instruments for study of the upper layers of the atmosphere and transmission of research results to Earth. The content of the atmosphere, a change in air pressure, density, and temperature, and wind direction and force in the upper layers of the atmosphere are studied with the aid of such missiles. A G.r. makes it possible to study outer space in proximity to Earth, solar radiation, ionization, and other elements.

GETEROGENNAYa BRONYa [Heterogeneous Armor Plate] -- armor plate having in section nonhomogeneous mechanical properties (unilaterally forged) or nonhomogeneous chemical composition and mechanical properties (case-hardened). The most widely-used is /69 rolled case-hardened G.b. unilaterally forged to a depth of 15-40% of plate thickness and case-hardened, also unilaterally forged to the same thickness. A case-hardened exterior layer of armor is very hard, with this hardness gradually decreasing towards the back.

GIBKOST' ARTILLERIYSKOGO OGNYa [Artillery Fire Flexibility] -- capability of

pieces to shift fire rapidly and accurately from one target to another. Flexibility of fire in space is determined by the area under fire (in front and in depth) within the limits of which a piece can shift fire rapidly and accurately; flexibility of fire over time is determined by the change in the rate of fire from the lowest to the highest.

GIBRIDNOYe RAKETNOYe TOPLIVO [Hybrid Propellant] -- mixed rocket propellant, one component of which (oxider, for example) has a liquid aggregate state, while the other (fuel) is a solid, and vice versa.

GIBRIDNYY RAKETNYY DVIGATEL' [Hybrid Rocket Engine] -- liquid-solid propellant rocket engine. See kombinirovannyy raketnyy dvigatel' [hybrid rocket engine].

GIGROMETR [Hygrometer] -- recorder measuring the relative humidity of the air in percent in artillery magazines and warehouses. Its principle is based on the property of a hair to contract during a decrease in relative humidity of the air.

GIDRAVLIKA [Hydraulics] -- science of the laws of motion of liquids and of the capabilities of using these laws for solution of practical problems. It is used widely in artillery, when designing hydraulic recoil devices in artillery systems, for example.

GIDRAVLIChESKOYe SOPROTIVLENIYe PRI NAKATE (ϕ') [Hydraulic Resistance During Counterrecoil] -- resultant of the hydraulic resistances occurring during counterrecoil in the buffer and recuperator (variable magnitude).

GIDRAVLIChESKOYe SOPROTIVLENIye PRI OTKATE (ϕ) [Hydraulic Resistance During Recoil] -- resultant of the hydraulic resistances occurring during recoil braking in the buffer and recuperator.

GIDRAVLIChESKIY TORMOZ OTKATA [Hydraulic Buffer] -- special device on an artillery mount for recoil braking and softening the shock during counterrecoil of a piece. A hydraulic brake is a cylinder filled with liquid containing a piston. The /70 piston rod is attached to the barrel, while the cylinder is in the cradle (it is the opposite for certain pieces. The rod is attached in the cradle, while the cylinder is with the barrel). There are narrow slanted apertures in the piston. At the

moment of firing, the gun, recoiling backwards, slides along cradle guides and brings the rod with piston along (the recuperator cylinder remains immobile). The piston, moving backwards, with its rear surface compresses the liquid, which will transfer from the rear chamber of the cylinder of the recuperator to the front chamber. Here, the liquid squirts through the apertures in the piston from the rear chamber, as well as into the rod's chamber, with high friction. A great deal of the recoil energy is expended to overcome this friction and, thanks to this, brakes the gun's recoil. The apertures in the piston are regulated, i. e., they are overlaid by a control rod of variable thickness. In the beginning of the counterrecoil, the thickness is greater and, due to the slowdown in the recoil, the aperture decreases in such a way that braking will be equal along the entire recoil path.

GIDROREAKTIVNYY DVIGATEL' (GRD) [Hydrojet Engine] -- jet engine using surrounding water for creation of thrust. GRD can be direct-flow (PGRD) and pulsating (PuGRD). The GRD operating principle is reminiscent of a ramjet engine, only outboard water is used in place of air. A pulsating GRD differs from a direct-flow GRD in that the process of formation of the gas and gas-water mixture occurs intermittently. The water inlet while the gas-water mixture is being formed in the mixing chamber periodically is overlaid by a special device.

GIL'ZA [Shell Case] -- element of a quick-fire fixed artillery round. G. are made of brass (steel) and are intended for: housing the artillery charge with igniter; protection of the charge against moisture and mechanical damage; obturations of powder gases when fired; combination of a charge with a projectile in fixed shells. A primer cup is screwed into the bottom. In external shape, a G. corresponds to the breech chamber of the piece for which it is intended. A G. comprises a body, mouth, chamfer connecting the mouth of the case with the body, flange, base, and /71 primer hole.

GIPERZVUKOVAYa SKOROST' [Hypersonic Speed] -- speed of an airborne platform greater by a factor of 5 or more (Mach 5) than the speed of sound.

GIROVERTIKANT [Vertical Gyroscope] -- gyroscopic instrument measuring bank and yaw angles for generation of control signals as a missile is turned on a longitudinal axis and when it deviates from the plane of fire.

GIROGORIZONT [Gyro Horizon] -- gyroscopic instrument used in missile control systems to measure missile angles of deviation from the programmed pitch angle value.

GIROKOMPAS (GIROSKOPICHESKIY KOMPAS) [Gyro Compass (Gyroscopic Compass)] -- electronavigational instrument based on the giroskop [gyroscope] (see) principle. G. are used on ships, aircraft, missiles, and other airborne platforms to determine (maintain) the assigned course.

GIROMOTOR [Gyromotor] -- gyroscope rotor along with drive housed in the body of a gyroscope.

GIROSKOP [Gyroscope] -- precisely-balanced rotor (spinning top, disc, or flywheel) rotating at high speed (30,000 rpm and more). A G. in a Cardan's suspension is used in the majority of gyroscopic devices. A Cardan's suspension comprises two rings (frames) providing the G. three stages of freedomm -- in three axes of rotation. Here, the axes of the inner and outer rings (frames) and the axis of the G. intersect at one point in the center of the suspension. G. action is possible only when rotating. A rapidly-rotating G. is subordinate to two basic laws of mechanics: 1) the axis of a balanced G. stably maintains a fixed direction in space, i. e., such as would be imparted to it at the initial moment of rotation of the rotor (at the start); 2) due to the effect of an external force applied to the axis of rotation of a balanced G., its axis undergoes precessional motion, displacing not in the direction of the imparted force, but in the perpendicular direction. These G. properties are used widely in different gyroscopic instruments and in missile automatic control systems.

GIROSTABILIZIROVANNAYa PLATFORMA [Gyro-Stabilized Platform] -- stabilized /72 frame of a special device maintaining a fixed position in space independent of the position of a launched missile. It is intended for installation of an accelerometer unit (gyroscopes) and their orientation relative to a base direction. A G.p. is a basic element of an inertial guidance system. During prolonged missile flight, a G.p. can be corrected by means of astronomical devices (telescopes). A G.p. is installed in a Cardan's suspension, which permits different platform and missile mutual positions.

GLAVNAYa KORABEL'NAYa ARTILLERIYa [Shipboard Main Artillery] -- artillery corresponding to the main role of a given class of ships, depending upon which its

caliber also is determined. The armament of destroyers and cruisers in several foreign fleets is moving away more and more from the early-accepted division of artillery into main, dual-purpose, and antiaircraft. Now, they are armed with dual-purpose and small-caliber artillery.

GLADKOSTVOL'NOYe ORUDIYe [Smooth-Bore Piece] -- artillery piece with an unrifled bore.

GLAZOMER [Judgement by Eye] -- capability or gift (skill) of the human eye to determine distance with slight error. This quality is useful to every military man, to a gunner all the more so. The statement by Suvorov about "three military arts" is well known: judgement by eye, swiftness, and dash.

GLAZOMERNAYa S"YeMKA [Eye Survey] -- survey of small sections of the terrain or route with the aid of the simplest instruments (compass, sight rule, binoculars, measuring tape, and so on). The crux of G.s. boils down to determination on the terrain of mutual positioning of the most characteristic individual objects and plotting them on paper. Scale and detail are determined by the purpose of the compiled survey.

GLOBAL'NAYa RAKETA [Global Missile] -- ballistic missile capable of surmounting a distance exceeding one-half the Earth's circumference and destroying a target at any point on the globe. A G.r. is very accurate and can deliver an immensely-powerful nuclear charge to a target.

GOLOVKA ZhIDKOSTNOGO RAKETNOGO DVIGATELYa [Liquid Rocket Engine Injector] -- portion of the combustion chamber for placement of devices (injectors) which /73 supply propellant components to the combustion chamber and serving for their mixing. Spherical, wedge-shaped (similar to the form of a wedge), and plate ZhRD injectors are used.

GOLOVKA SAMONAVEDENIYa (KOORDINATOR TsELI) [Seeker (Tracker)] -- sensitive radioelectronic device located in a controlled object (missile or other weapons) which assists in determination of the position of the target relative to the object and its guidance to the target. The action of a G.s. is based on the operating principles of a conventional thermal direction finder or radar. G.s. sensitivity

can be very high. Influenced by continual reception of signals from the target, a G.s. processes the information (about the target) and forms commands which, with the help of actuators, actuate control surfaces and guide the missile to the target. Based on operating principle, G.s. are categorized as active (with the missile itself painting the target), passive (using target radiation), semiactive (using energy reflected from the target painted by an external source), and combined.

GOLOVKA SAMONAVEDENIYa AKTIVNAYa (RADIOLOKATsIONNAYa) [Active Seeker (Radar)] -- see radiolokatsionnaya golovka samonavedeniya [radar seeker].

GOLOVKA SAMONAVEDENIYa TEPLOVAYa [Heat Seeker] -- see teplovaya golovka samonavedeniya [heat seeker].

GOMOGENNOYe (KOLLOIDAL'NOYe) TVERDOYe TOPLIVO [Homogeneous Propellant] -- double-base propellant containing nitrocellulose with a varying content of nitroglycerin and nitrogen or nitrocellulose and diethylene glycol dinitrite instead of nitroglycerin, and others in which fuel and oxider elements are included in the same fuel molecule.

GORENIYe POROKhA (ARTILLERIYSKOGO ZARYaDA [Powder Combustion (of an Artillery Charge)] -- distribution of flames from the surface into a grain of powder. The time of combustion of the entire powder charge equals the time of combustion of one grain of the powder making up the charge. Powder burns at a rate ranging from fractions of millimeters to several dozen meters per second. For example, black powder in the open burns at a rate of about 10 mm/sec. The rate increases considerably in a closed volume.

GORIZONT ORUDIYa [Horizontal at the Muzzle] -- horizontal plane passing /74 through the point of origin of a projectile.

GORIZONT RAZRYVA [Horizontal at the Burst] -- horizontal plane passing through the point of impact (burst) of a projectile.

GORIZONT (TOChKI) [Horizon (of a Point)] -- horizontal plane passing through a given point.

GORIZONTAL'NAYa DAL'NOST' ($Д_г$, d, $Д_г$) [Horizontal Range] -- distance along

the horizontal at the muzzle in the plane of departure from the point of origin to the point of trajectory in question (more precisely, to its projection to axis OX).

GORIZONTAL'NAYa NAVODKA [Laying for Deflection] -- imparting to the barrel with the aid of sighting devices and traversing gear the requisite direction in the horizontal plane. Or, in another way: G.n. is setting the field of fire built into sights with appropriate terrain angle.

GORIZONTAL'NOYe UPREZhDENIYe ($\Delta\alpha$ or $\Delta\beta$) [Lateral Lead] -- difference between azimuths of future position and present position.

GORNAYa ARTILLERIYa [Mountain Artillery] -- small-caliber pieces built for rapid disassembly and assemby, and for conveniently transportation on people, horseback, or other animals through mountains, ravines, and narrow passes in the mountains.

GORYuChEYe (REAKTIVNYKh DVIGATELEY) [Fuel (for Rocket Engines)] -- substance capable of being combined with an oxidizer (hydrogen, fluorine, and other elements) with expulsion of a large amount of heat and gases.

GRAVIMETRIChESKAYa PLOTNOST' POROKHA [Gravimetric Density of Powder] (gravimetric density of loading $\Delta_{гр}$) -- factor characterizing the volume of powder and determined essentially as the ratio of the weight of powder (in kg) freely poured to the edges of a vessel of specific form and specific volume to the volume of the overall container (in dm^3). The magnitude of G.p.p. will depend on powder quality, vessel volume and form, and method of pouring the powder.

GRADUS (°) [Degree] -- 1. 1/360th of a circumference (G. of arc). Central angle on an arc in 1° (degree of angle). A G. is divided into 60 minutes and a minute into 60 seconds. A G. is designated °, a minute ', and a second ". The ratios between angles expressed in degrees and thousandths: in artillery, a circumference is divided into 6,000 equal parts (goniometer graduations or thousandth). Consequently, one thousandth (0-01) = $\frac{360 \times 60}{6{,}000} = \frac{21{,}600}{6{,}000} = 3.6'$. $1° = \frac{6{,}000}{360} = 16.7$ thousandths, or rounded off, 1° = 0-17, i. e., 17 goniometer /75 graduations. 2° = 0-33; 3° = 0-50; 6° = 1-00; 15° = 2-50; 45° = 7-50; 90° = 15-00; 180° = 30-00; 360° = 60-00. 2. Unit of temperature measurement.

GRANATA [Shell] (from the Latin -- "granatus" -- grainy) -- artillery projectile with a bursting charge. G. appeared in the late 17th century. In external appearance, it was similar to a pomegranate, which has many seeds inside. A bursting smooth-bore artillery round G. had both exterior and interior similarity since it was filled with grains (bursting charge of grainy black powder).

In Soviet artillery, the term G. refers to all HE, fragmentation, and HE-fragmentation charges, regardless of weight.

GREMUChAYa RTUT' [Fulminate] ($Hg(ONC_2$) -- initiating explosive, mercuric salt of fulminic acid obtained as a crystallized white precipitate as ethyl alcohol acts on a solution of metallic mercury in nitric acid. Used in blasting caps.

GRUNTOVAYa TELEZhKA [Ground Vehicle] -- special trailer to transport missiles on highways and dirt roads.

GRUPPIROVKA ARTILLERII [Artillery Grouping] -- composition and disposition of artillery tasked to accomplish combat missions in an engagement and operation. Artillery groups or individual artillery formations and units are the foundation of a G.a.

GRUPPOVAYa TsEL' [Group Target] -- several homogeneous single targets so close together in a small sector that, when one is fired upon, the rest to a certain degree are damaged also. Personnel or combat equipment concentrated in a limited sector, strong points, artillery and mortar batteries, and so on are examples.

GUZhON [Tap Screw] -- threaded bolt with square head used with a wrench to fasten nondetachable components. When tightened down all the way, the square end is cut off and the bolt finished flush.

DAVLENIYe ATMOSFERNOYe [Atmospheric Pressure] -- pressure of the atmospheric environment on all bodies on the earth and in the air. Air pressure at sea level, given normal atmospheric conditions P_o = 10,332 kg/m^2, which corresponds to 760 mm of mercury, is called normal atmospheric pressure. D.a. drops sharply with an increase in altitude. This is explained by the drop in air density as altitude increases. Air density at 30 km altitude is less by a factor of 100 than at the ground, a factor of 3,000 at 60 km, and 1 million at 100 km altitude. A decrease in atmospheric pressure increases rocket engine thrust.

DAVLENIYe NA KhOBOT [Pressure on the Trail] (P) -- force of reaction to a shot from a support or the ground on the trail of a wheeled piece.

DAVLENIYe FORSIROVANIYa [Shot Start Pressure] -- pressure created by a burning powder charge in a barrel imparting motion to the projectile. This will fluctuate from 300-500 km/cm^2. D.f. will depend on charge weight, rifling, and driving band.

DAL'NOBOYNAYa ARTILLERIYa [Long-Range Artillery] -- artillery with great firing range, predominently gun artillery, for suppression and destruction of vital targets out of range of howitzer artillery and mortars.

DAL'NOBOYNOST' ORUZhIYa [Maximum Range of a Weapon] -- greatest range to which a given type of weapon can propell its projectile (missile, mine, bullet). In /77 the entire history of artillery development, the main problem has been the constant striving to increase the maximum range and destructive force of a weapon. This was achieved by means of an increase in calibers of pieces, an increase in the strength of barrels, use of more powerful high explosive, and improvement in the ballistic properties of a piece and projectiles. However, artillery's development in this direction went extemely slowly. In 600 years of its existence, artillery firing range increased only by a factor of 10, while the destructive power of a projectile increased by a factor of 18. Problems of increasing the maximum range of a piece was solved in different ways during different periods. The Russian artilleryman S. A. Pogrebnyakov conducted interesting experiments in Russia on increasing maximum range. He proposed the firing of a 76-mm projectile with a sabot from a 152-mm piece (a centering band was placed on the projectile and a 152-mm

sabot was used). A conventional charge was used. The projectile separated from the sabot in the trajectory. Thus, one could obtain initial velocity greater by a factor of more than 2 from a 152mm piece than when firing a normal projectile of that caliber and the firing range exceeded 100 km. Later, at the end of the First World War, the Germans succeeded in achieving an identical range from the superlong-range gun called "Big Bertha" and shelled Paris from a range of over 100 km. Rifled artillery, having exhausted its capabilities, was unable to solve the problem of a further increase in maximum range. At the end of the Second World War, an increase in maximum range followed a different path -- that of creating rocket projectiles fired from special launchers. The V-series projectiles, which the Germans employed in 1944 to shell London from a range of 200 km or more, is an example. Recently, the operating range of contemporary weapons is unlimited with appearance of intercontinental missiles.

DAL'NOBOYNYYe RAKETY (BALLISTIChESKIYe SNARYaDY) [Long-Range Missiles (Ballistic Projectiles)] -- intended for destruction of important targets in the enemy rear area at ranges of tens, hundreds, and thousands of kilometers.

DAL'NOMER [Rangefinder] -- instrument which determines distance to a target. A D. is a complicated optical-mechanical device comprising various lenses, reflecting prisms, and other components. D. are categorized as optical, acoustical, and /78 radiotechnical.

DAL'NOMERShchIK [Range-Finder Operator] -- specialist operating a range finder. In combat, he measures distance to a target using a range finder.

DAL'NOST' KOMMANDIR -- TsEL' [Observer-Target Distance] (depth of observation -- $Д_н$ or $Д_к$) -- distance (shortest) from the commander (observation post) to the target.

DAL'NOST' ORUDIYa -- TsEL' [Gun-Target Distance] ($Д_о$ or $Д_г$) -- distance (shortest) from the gun to the target.

DAL'NOST' POLETA [Range Ability, Range of Flight] -- 1. Distance from projectile point of origin to impact along a straight line. 2. Path traversed by an airborne platform from launch point to the end of an independent flight measured along the

surface of the globe as the length of the arc of the great circle of the Earth between launch and place of landing.

DAL'NOST' PRYaMOGO VYSTRELA [Point-Blank Range] -- firing range over which the height of trajectory of the projectile (bullet) does not exceed the height of the target. Conditions most advantageous for destruction of the target are created within D.p.v. since the target is located in the danger area during the entire length of the trajectory corresponding to a given sight.

DAL'NOST' STREL'BY [Range] -- distance between a piece, mortar, and other firearm and object of destruction. In missile troop units, the distance between launcher and target is referred to as missile range.

DATChIK [Sensor] -- input portion of an automatic or remote-controlled device which receives a stimulus from without and continually converts it into a form suitable for transmission to other portions of the device. The external stimulus may be a change in a measured or regulated parameter (pressure, temperature, time, velocity, voltage, electrical current force, and so on). In missiles, for example, the readiness of a feed system for launch, output of electrical batteries to a mode, and so on are controlled by a system of pressure and voltage sensors, and so forth.

DATChIK USKORENIYa [Acceleration Sensor] -- sensitive element intended for conversion of acceleration into an electrical signal. D.u. are used in autopilots, missile control computers, automatic speed regulation systems, and so on. /79

DVIGATEL' ZhIDKOSTNYY RAKETNYY (ZhRD) [Liquid-Propellant Rocket Engine] -- rocket engine running on liquid propellant. It comprises a combustion chamber (cylindrical, spherical, or similar shape) with nozzle, fuel tanks, and aggregates providing a supply of propellant to the combustion chamber, cooling systems, starting system, and engine regulating system. Quite varied ZhRD designs are employed. Engine start, operation, and cut-off are completely automated. ZhRD are categorized as having pressure-fed (gas bottle) and pump-fed (delivery) feed systems.

DVIGATEL' MNOGOKAMERNYY RAKETNYY [Multichamber Rocket Engine] -- rocket engine having a cluster (package) of several combustion chambers rather than a single chamber. It permits broad regulation of engine thrust by cutting off one or several chambers.

DVIGATEL'-SVYaZKA [Cluster Engine] -- rocket engine cluster comprising several engines with total thrust corresponding to that of one large engine. It is used when one engine with great thrust is required to avoid vibrational or pulsating thrust in the chamber. Rocket engine clusters are used in the initial and subsequent stages of multistage missiles to increase engine thrust-to-weight ratio.

DVIGATEL' SMEShANNYY RAKETNYY (SRD) [Composite Rocket Engine] -- rocket engine running on a composite propellant (solid and liquid propellant components are used). Usually, the solid component is fuel and the liquid component is the oxidizer. An SRD sometimes is called a hybrid engine.

DVIGATEL' S TURBONASOSNOY SISTEMOY PODAChI TOPLIVA [Turbo-Pump-Feed System Engine] -- liquid-propellant rocket engine in which a high-capacity fuel pump actuated by a special turbine supplies propellant components from different tanks to the combustion chamber. The turbine is actuated by the fuel products of the reaction of the main or any other rocket propellant. This type of supply now is used widely in long-range missiles and aircraft jet engines. /80

DVIGATEL' TVERDOGO TOPLIVA RAKETNYY (RDTT) [Solid Propellant Rocket Engine] -- rocket engine running on solid propellant (propellant powders and mixed fuel compositions). Basic RDTT elements are the combustion chamber (chemical reactor), nozzle, propellant charge (in the form of one or more charges), and a device to ignite the propellant. RDTT are subdivided into engines linked (coupled) with the propellant charge (charge held directly by the walls of the charge chamber) and one with a free propellant charge (freely-placed charge; there is a gap between the inner surface of the chamber's walls and the propellant charge). The RDTT propellant charge ignites with the aid of an igniter and a special device (explosive charge, squib, and so on) when the engine starts. An RDTT has a somewhat lower specific thrust than does a ZhRD (up to approximately 250 kg-sec/kg). RDTT are used over a broad range, from short-range to intercontinental ballistic missiles.

DVIGATEL'NAYa USTANOVKA RAKETY [Missile Propulsion System] -- power plant with a liquid or powder rocket engine which creates the missile's motive force due to the reaction of the mass of gas expelled from the rocket nozzle. D.u.r comprise a combustion chamber, engine with nozzle and cooling system, and a feed system for the combustion chamber (fuel tanks, piping, valves, cocks, and injectors). Each

propulsion system has its own special design features. As a rule, the D.u.r. is located in the tail of the missile.

DVIGATEL' ELEKTROSTATIChESKIY RAKETNYY [Electrostatic Rocket Engine] -- see ionnyy dvigatel' [ion engine].

DVOIChNAYa SISTEMA SChISLENIYa [Binary Code] -- positional numbering system in which only the digits 0 and 1 are used to designate a number. It is widely used in digital vychislitel'naya sistema [computer] (see), where all arithmetic operations are reduced to addition of binary numbers, in missile control systems, and at radar sites.

DVUKhKOMPONENTNOYe RAKETNOYe TOPLIVO [Bipropellant] -- liquid propellant, one /81 component of which is fuel and the other oxidizer. Separately-supplied bipropellants are used most widely. Two piping systems are required to get them to the combustion chamber. Based on oxidizer type, D.r.t. are subdivided into low- and high-temperature.

DEGAZATsIYa [Chemical Decontamination] -- removal and neutralizing of poisonous substances from contaminated terrain, buildings, weapons, combat equipment, accessories, clothing, defensive structures, and so forth. It can be partial and complete. Chemical (neutralizers), mechanical, and other means, special vehicles and instruments, chemical decontamination sets, antichemical packets, bags, and so on can be used for D.

DEGRESSIVNYYe POROKhA [Degressive Propellants] -- propellants in which the influx of gases decreases at a given combustion rate due to combustion of a grain. In other words, propellants whose overall propellant grain surface decreases due to combustion. For example, a grain with a belted form.

DEZAKTIVATsIYa [Radioactive Decontamination] -- removal of radioactive substances formed as a result of detonation of a nuclear weapon from weapons, combat equipment, accessories, clothing, defensive structures and terrain, and purification of water and foodstuffs. D. can be partial or complete. Water, radioactive decontamination solutions, special vehicles (graders, buildozers) which remove the upper layer of soil, instruments, and the like can be used for D.

DEYSTVITEL'NAYa DAL'NOST' STREL'BY [Effective Range] -- distance at which the destructive properties of ammunition (projectiles, bullets) sufficient for reliable target destruction are maintained.

DEYSTVITEL'NOST' ARTILLERIYSKOY STREL'BY [Firing Effect] -- magnitude characterizing firing results. Compliance of firing results with the assigned fire mission. D.a.s. is determined directly by final firing results, i. e., by the degree of damage (destruction). Probability and mathematical expectation of target destruction are the foundations of D.a.s. determination.

DEYSTVITEL'NYY REPER [Check Point] -- registered target or clearly visible /82 local object, whose coordinates are known.

DEKODIROVANIYe -- DEShIFRIROVANIYe [Decoding] -- see deshifrator [decoder].

DELENIYe UGLOMERA (TYSYaChNAYa) [Mil (Thousandth)] -- central angle described by an arc 1/6,000 of the length of a circumference. The length of the arc of the angle to one mil approximately equals one thousandth (0.001) of the radius (range, distance). One hundred mils (sometimes called minor divisions of a dial sight scale) comprises one major dial sight scale division. A minor dial sight scale division is written 0-01 and there are 6,000 in a circumference. A major dial sight scale division is written 1-00 and there are 60 in a circumference.

DEMODULYaTOR [Demodulator] -- see deshifrator [decoder].

DEMONTAZh (DEMONTIROVANIYe) [Dismantling (Disassembly)] -- disassembly into individual nodes, parts, and components of an artillery or missile launcher (aggregate, apparatus, instrument, and so forth) and their removal from the launch point or foundation.

DEMPFER [Damper] -- muffler, deoscillator in a mechanical or electrical system used for stability in the system's action. Used in missile control and guidance system gyrocompasses, and in spring suspension for artillery systems and other mechanisms.

DEN' ARTILLERII [Artillery Day] -- 19 November, annual Soviet holiday established

by a 21 October 1944 Presidium of the USSR Supreme Soviet Ukase to mark the combat deeds of Soviet artillery in the Great Patriotic War. This day was not selected randomly. On 19 November 1942, our troops went over to the counteroffensive at Stalingrad, proclaiming to the entire world the initiation of the historic encounter, which became the turning point of the entire Second World War. More than 3,000 guns unleashed their deadly fire on the positions held by the German fascist occupiers. The offensive at Stalingrad, begun by a powerful artillery cannonade, concluded with the encirclement and destruction of 22 enemy divisions.

DERIVATsIYa [Drift] (Z) -- lateral deviation of an elongated rotating projectile from the plane of departure (to the right in Soviet artillery) caused by the rotating motion of the projectile in the air.

DESTABLIZATORY [Destabilizers] -- fixed cruciform surfaces usually located /83 forward of the fins which serve to decrease the extraordinary static stability of a missile.

DETANDER [Expander] -- reduction (step-down) valve used in artillery gun mount air ducting system to reduce the pressure of a compressed air tank.

DETONATOR [Detonator] -- small charge (10-30 g), sensitive to an initial pulse, of a high or initiating explosive (tetryl, fulminate, lead azide) pressed into a special casing. It is part of an artillery projectile's fuze for amplification of the detonator cap action since the latter is unable with its blast to cause complete detonation of a projectile's explosive charge.

DETONATsIYa VV [Explosive Detonation] -- special type of blast characterized by an enormous distribution rate, on the order of several thousand meters per second. The detonation rate of some explosives under absolutely identical conditions (initial pulse, physical state, casing, and so forth) is not identical. Detonation rate will depend upon the velocity of the shock and blast waves, which in turn are determined by the chemical structure of the explosive. The destructive action during detonation is several times greater than the action of a conventional explosion.

DEFLAGRATsIYa [Deflagration] -- ordinary explosion (as opposed to a detonation).

DEFLEKTOR [Deflector] -- accessory in the form of a reflector looking like a ring (central part of a ball cut symmetrically relative to the diameter) making it possible to regulate the direction of a rocket engine jet stream. It is fastened to the engine nozzle hinged at two diametrically-opposed points. With the aid of drives, it is possible to turn the jet stream exiting the nozzle in the direction in which the control force is created in the requisite direction.

DEFORMATsIYa [Deformation] -- change in the form or dimensions of a body (or of its parts) under the action of forces applied to that body. It is categorized as elastic, which disappears upon removal of the load, and plastic, which remains /84 after the load is removed. The simplest forms of D. are stretching, compression, twisting, bending, and shifting.

DEShIFRATOR (KODOPREOBRAZOVATEL') [Decoder (Code Converter)] -- device determining the value of signals reaching a missile's receiver (communications, radar, telemechanical sets) and transmitting individually decoded signals after amplification to specific actuator input circuits. They are widely used in radio electronics in missile (projectile) control.

DIAGRAMMA NAPRAVLENNOSTI ANTENNY [Antenna Directional Diagram] -- graphical characteristic of antenna directivity, i. e., capability of an antenna to radiate or recieve electromagnetic energy in several specific directions.

DIVIZION [Battalion] -- basic fire and tactical subunit in artillery comprising several batteries and other subunits.

DIMETILANILIN [Dimethylaniline] ($C_6H_5N(CH_3)_2$) -- derivative of aniline ($C_6H_5NH_2$) and methyl alcohol (CH_3OH), a composite tertiary fatty-aromatic amine. Transparent colorless liquid with the specific odor of herring brine. Insoluble in water, highly soluble in alcohol. Boiling temperature 192.5--193.5°, density 0.956. Basic substance in production of a powerful tetryl explosive. Outstanding Russian chemist N. N. Zinin for the first time created aniline and organic dyes.

DIVIZIONNAYa ARTILLERIYSKAYa GRUPPA (DAG) [Divisonal Artillery Group] -- artillery directly subordinate to a division commander in the form of more than one battalion allocated during an engagement for accomplishment of missions in the interests of

the division and combined under common control. DAG were created from divisional and attached artillery and bore the divisional designation.

DIVIZIONNAYa ARTILLERIYa (DA) [Divisional Artillery] -- artillery organizationally part of a division and directly subordinate to the division commander.

DINAMIT [Dynamite] -- high explosive whose foundation is nitroglycerin with an admixture of substances capable of absorbing nitroglycerin. Dynamites exist that have active and inactive foundations. A dynamite with an active foundation is nitrogelatin, with an example composition of 7-13% pyroxylin and 93-87% nitro- /85 glycerin; plastic dynamite comprises 3-6% pyroxylin, 9-27% potassium (sodium) nitrate, 2-8% sawdust, and 62-83% nitroglycerin. Dynamites are used in demolition operations.

DINITROBENZOL [Dinitrobenzene] ($C_6H_4(NO_2)_2$) -- organic nitrogen compound, product of the nitration of benzine. It is a high explosive. It yields to TNT where explosive properties are concerned. It is a solid yellow crystallized substance and a basic ingredient in the production of explosives, dyes, and medicinal preparations. It is used for priming projectiles in fusion or as a mixture with other explosives. For example, the mixture of D. and TNT is used to prime armor-piercing projectiles.

DIOPTRIYNAYa ShKALA [Diopter Scale] -- scale on the outer rim of the ocular of an optical instrument (binoculars, aiming circle, stereoscopic telescope, and others) graduated to set the sharpness of the image of a viewed subject.

DIOPTRIYa [Diopter] -- unit of optical power of a lens (spherical mirror) or lens system. One D. is the optical power of a lens whose focal length equals 1 meter. Determination of a D. number requires dividing 1 by the focal length of the lens (mirror), expressed in meters. For example, given focal length of 0.5 meters, the optical power of a lens will be 2 diopters. A sign (+) with the diopter number corresponds to a coverging (positive) lens, while (-) corresponds to a diverging (negative) lens.

DIOPTRY [Diopters] -- accessories for sighting an aiming circle on some subject used in low-precision geodetic tools. It is two frames attached at the ends of an alidade. The eye must see the objective diopter crosshair and the remote subject through the ocular diopter peephole.

DIREKTRISA [Directrix] -- specific direction on an artillery range prepared for firing on which targets are installed, communications set up, and exercise (firing) control spotting organized.

DIREKTsIONNYY UGOL [Grid Azimuth] (α) -- angle in the horizontal plane /86 between the positive direction of the X-axis of the map's kilometer grid and assigned direction computed clockwise from the positive direction of the X-axis.

DISK [Disk] -- part of a wheel (of an artillery system drive) connecting the steel rim with the hub. Metal wheels have a steel rim with a rubber tire, which is connected with the hub by means of a metal disk or spokes.

DISTANTsIONNAYa GRANATA [Time-Fuzed High-Explosive Shell] (Explosive Shell) -- fragmentation-type artillery projectile with a time fuze.

DISTANTsIONNAYa POROKhOVAYa TRUBKA [Black Powder Time Fuze] -- fuze in which time reference from the moment of firing until the moment of projectile burst is accomplished with the aid of a black powder time compound which burns at a constant rate. The length of the burning portion is changed by rotating the fuze's time rings. A D.p.t. comprises an igniting device, time compound pressed into the time rings, and powder magazine for amplification of the beam of fire to the projectile's bursting charge.

DISTANTsIONNAYa STREL'BA [Time Firing] -- firing with time-fuzed projectiles. For example, with a high explosive shell or illuminating shell.

DISTANTsIONNAYa TRUBKA [Time Fuze] -- mechanism for ignition of a projectile's bursting charge; mechanism with the aid of which the burst of a projectile is controlled in the air at a specific range after a specific time has elapsed. It is screwed into the nose of the projectile. They are categorized as powder and mechanical. Along with a time fuze, a dual-action D.t. has a striker to explode the projectile when it strikes an obstacle. They are used for shrapnel, illuminating, incendiary, and other projectiles.

DISTANTsIONNOYe UPRAVLENIYe [Remote Control] -- control of mechanisms, equipment, and instruments by means of remote-control systems. They are used widely in airborne

platform control and guidance systems and artillery system guidance mechanisms. The most varied technical equipment has been used in D.u. in recent years. They will depend mainly on the distance of the controlled objects and feed sources. Radio control is used at great distances exceeding 1 km. /87

DISTANTsIONNYYe SISTEMY UPRAVLENIYa (DSU) [Remote Control Systems] -- set of instruments and mechanisms for control of different processes at a distance. DSU are subdivided into mechanical, electrical, hydraulic, electrohydraulic (combined), and others. Electrical DSU are the type most often used in equipment. Electrohydraulic DSU are used most often in shipboard artillery systems.

DISTANTsIONNYYe SNARYaDY [Time Projectiles] -- projectiles which explode in the air at any point of the trajectory. They include fragmentation shells and incendiary, illuminating, and other projectiles.

DISTANTsIONNYY VZRYVATEL' [Time Fuze] -- mechanism for detonation of an artillery projectile at a given point in the trajectory. It is used for the final priming of a high explosive shell. They are categorized as powder and mechanical and can have a striker. This type of D.v. combines the properties of a time and proximity fuze. Time-proximity fuzes are used only as noze fuzes.

DISTANTsIONNYY SOSTAV [Powder Train] -- special powder compound comprising fuze black powder pressed into the circular grooves of fuze time rings. The time rings are interconnected by transfer holes. The single-perforated tube time propellant has the following composition: potassium nitrate 73-75%, sulfur 9.5-10.5%, sawdust 14.5-17.5%. A D.s. must meet the following requirements: strictly-determined combustion rate insuring slight dispersion of shot; nonattenuation at high altitudes; stability of properties during storage. The length of the combustible portion of a D.s. can be changed with a turn of a ring and, consequently, the fuze combustion time is changed. The time rings are set by an automatic fuze setter (AUT) or manually with a wrench.

DISTANTsIYa [Range; Distance] (from the Latin distantia -- distance) -- 1. Range; any distance measured in any direction to ground targets of ships, aircraft, and other objects in artillery or gunnery. 2. Distance between vehicles, trains /88 and subunits on the march.

DIFENILAMIN [Diphenylamine] $(C_6H_5)_2NH$ -- simplest aromatic amine, colorless leaflets, sparingly soluble in water but highly soluble in alcohol, ether, and benzene. Used for stabilizing smokeless powders (increases chemical stability). Use of D. increases the safe storage period of powders significantly. In addition, D. can be used in synthesis of several explosives.

DIFFERENTsIAL [Differential] -- gearing which can impart rotation from two shafts to a third so that the rotational speed of the third shaft corresponds to the sum or difference of the rotational speeds of the other two shafts. This addition of speeds is accomplished by a geared D. It is used in transmissions in sights and artillery fire control systems.

DIFFERENTsIRUYuShchIYe USTROYSTVA [Differential Devices] -- devices for computation of velocity or acceleration based on measured angular or linear deviations.

DIFFUZOR [Diffuser] -- 1. Device with a channel of gradully-increasing section on direct-flow air-breathing jet engines for compression of the air by braking the air flow rushing into it. 2. Atomizer.

DLINA KANALA STVOLA [Length of Bore] ($L_{кн}$) -- distance from the bottom of the bore to the barrel's muzzle face.

DLINA NAREZNOY ChASTI KANALA STVOLA [Length of Rifle Portion of a Bore] ($L_{нр}$) -- distance from the beginning of the bore rifling to the barrel's muzzle face.

DLINA OTKATA [Length of Recoil] (L) -- path of retarded recoil responding to the moment retarded recoil ends and computed from the beginning of recoil.

DLINA KhODA NAREZOV ARTILLERIYSKOGO ORUDIYa [Rifling Lead of an Artillery Piece] -- length measured along the axis of the barrel to which rifling makes or can make a complete revolution. Rifling lead is measured in calibers (usually ranging from 30-75 for guns, 25-35 for howitzers, and 15-25 for mortars).

DOMKRAT [Jack] -- 1. Mechanism for raising weights to a low height, widely used in artillery. They are categorized as screw jacks, whose operating portion/89 is a threaded screw; rack-and-lever jacks, whose operating portion is a rack and

pinion gear; hydraulic jacks (turret) operated by the pressure of a compressed liquid (usually oil); pneumatic jacks operated by compressed air. 2. Suspension jacks on the carriage of artillery systems for raising and lowering during transition from firing to travel configuration and vice versa.

DONNAYa TRUBKA [Base Fuze] -- base fuze screwed into the base of a projectile for its detonation.

DONNYY SREZ SNARYaDA [Projectile Base] -- end portion opposite the tip of a projectile.

DOPOLNITEL'NOYe SOPROTIVLENIYe PRI NAKATE [Additional Resistance During Counterrecoil] (K') -- projection in the direction of the axis of the bore as the resultant of all forces imparted to the recoil parts during counterrecoil from the mechanisms placed in motion during counterrecoil (blow-back action, rammer, and so forth). D.s. is a variable.

DOPOLNITEL'NOYe SOPROTIVLENIYe PRI OTKATE [Additional Resistance During Recoil] -- projection in the direction of the axis of the bore as the resultant of all forces imparted to the recoil parts during retarded recoil from the mechanisms placed in motion during recoil (blow-back action, rammer, and so forth). D.s. is a variable.

DOPPLERA EFFEKT [Doppler Effect] -- change in the frequency of a reflected radio signal. It will depend on the relative velocity of the missile and target and is used in a Doppler system of missile trajectory determination.

DOSYLATEL' [Rammer] -- special device on a gun mount to simplify and speed up loading of the weapon by mechanically ramming a projectile (shell). Usually, a D. makes it possible to load a weapon at any angles of elevation. Mechanical (spring), pneumatic, and electrical D. are used in modern artillery mounts. They are categorized by type of action as continuous action (with thrust) against the projectile until the ramming is completed and pusher action (i. e., with pressure along part of the rammed projectile's p[illegible]). They are categorized by ramming method as rod, roller, and lever. A D. is placed into operation manually, by compressed /90 air, by an electric motor, or by recoil energy. Pneumatic and electric D. are used predominantly in shipboard and heavy artillery.

DREVESNAYa MUKA [Sawdust] -- finely-crushed wood used in manufacture of dynamites.

DROBOVIK [Shotgun] -- ancient name of a Russian howitzer which fired "shot," i. e., small stones or pieces of iron, at personnel at short range. Used in 15-16th century Russian artillery. Some had barrels with an expanded muzzle in the form of a bell for great dispersion of the destructive elements. In the late 16th century, lead and iron bullets placed in mesh cartridges with an iron base, replaced "shot." These cartridges began to be referred to as grape shot.

DUGA TRAYeKTORII [Arc of Trajectory] (S) -- distance along the trajectory from the point of origin to the observed target.

DULO [Muzzle] -- forward portion of a piece, rifle, or pistol barrel from which the projectile (bullet) exits during firing.

DUL'NAYa PROBKA [Tampion] -- plug or special bore cover attached to the muzzle section of a piece to protect the bore against dust, dirt, water, and snow.

DUL'NAYa SKOROST' [Muzzle Velocity] -- relative velocity of a projectile at the instant of departure (projectile velocity relative to the barrel).

DUL'NAYa ChAST' ARTILLERIYSKOGO STVOLA [Muzzle End of an Artillery Barrel] -- barrel portion from the muzzle face to the axis of the trunnions.

DUL'NAYa ENERGIYa [Muzzle Energy] ($E_д$) -- moving projectile's kinetic energy at the instant of departure from the barrel. One can compute $E_д$ from the formula

$$E_д = \frac{qv_0^2}{2g} \text{ кг.м (т.м)},$$

where $E_д$ - muzzle energy in kg-m;
q - projectile weight in kg;
v_0 - initial velocity in m/sec;
g - acceleration due to gravity, equal to 9.81 m/sec^2.

$E_д$ determines the basic combat properties of a weapon -- firing range and projectile shock effect.

DUL'NAYa PLAMYa [Muzzle Flash] -- flame forward of the muzzle of a piece formed by ignition of the mixture of outside air and fuel substances (oxides of carbon /91 hydrogen, and methane). At night, D.p. gives away the gun position and blinds the gun crew.

DUL'NYY SREZ [Muzzle Face] -- forward part (end) of the muzzle portion of a barrel.

DUL'NYY TORMOZ [Muzzle Brake] -- massive steel component screwed on the muzzle portion of the barrel of many modern pieces to absorb (25-65%) of recoil energy. A D.t. has an aperture for exit of powder gases during firing. As the projectile exits the bore, powder gases following it forcefully strike the wall of the D.t. port and push it forward along with the barrel, decreasing the force of the recoil pushing the barrel to the rear.

DUL'NYY ChEKhOL [Muzzle Cover] -- leather or canvas cover placed over the muzzle of a barrel to protect it against dirt and moisture during storage and transportation of the piece.

DUL'TsE GIL'ZY [Casing Mouth] -- upper portion of a casing tightly pressing against the base of a projectile to connect it with the casing.

DYMNYY POROKh [Black Powder] -- explosive that is a mechanical mixture of saltpeter (75%), sulfur (10%), and carbon (15%). Percent composition of the powder can vary, depending on purpose. D.p. is made in the form of a polished grain. In form, it is categorized as artillery, prismatic, coarse, and fine. It is used as propellant in small arms weapons and missiles. D.p. is used in artillery as black powder igniter charges, bursters for priming several time charges (illuminating, incendiary), and to prime time fuzes and igniters.

DYMOVYYe SNARYaDY [Smoke Shells] -- artillery shells to blind enemy observation posts and firing points. They also can be used for target indication, signalling, and registration. They are similar in structure to HE-fragmentation shells and differ from them only by presence of a burster tube. D.s. are charged with white phosphorous and a burster charge is loaded into the burster tube.

DYMOOBRAZUYuShchIYe BOEPRIPASY [Smoke Ammunition] -- artillery shells, /92
mines, aviation bombs, grenades, and pots providing a stable cloud of smoke during detonation or combustion. They are used for laying smoke screens and blinding enemy firing points, and command and observation posts.

DYMOOBRAZUYuShchIYe VESHchESTVA [Smoke Agents] -- substances which create a dense cloud of smoke in the air during combustion or detonation. White phosphorous, sulfur trioxide, chlorosulfanic acid, and various liquid and solid mixtures are used in this role. D.v. are used to prime smoke ammunition.

DYuYM [Inch] -- old Russian measure of length equalling 10 lines. One D. equals 25.4 mm. Artillery previously was measured in inches and the inch sometimes is used today as well to measure the caliber of weapons.

YeDINOROG ["Unicorn"] -- In the 18th century, Russian artilleryman Martynov created the "Unicorn," which was in the Russian army and navy inventory in 1757. It existed for more than 100 years, until the introduction of rifled weapons. They were called weapons with the image on them of a unicorn, the mythical horse with the long straight horn on its forehead. According to legend, this image brought luck. The "unicorn" was a unique weapon. Its barrel was longer than that of a howitzer, but shorter than that of a gun. All types of projectiles could be fired from it. The range for firing a ball and a bomb was greater by a factor of 2 than from a mortar of the same caliber. The "unicorn" brought many victories to our Fatherland. They had their baptism of fire in the Seven Year War. The rout of Prussian troops at Kustrin, Frankfurt-on-Oder, and Berlin was insured by their fire. At Kunersdorf, the "unicorn" was one reason for the rout of the armies of Frederick II. A model of this weapon soon was adopted from the Russians by Western European countries.

YeDINIChNIYY ELLIPS [Elementary Ellipse] (ellipsoid) -- ellipse (ellipsoid) of errors whose semiaxis equals average errors.

ZhELEZNODOROZhNAYa ARTILLERIYSKAYa USTANOVKA [Railroad Artillery Mount] -- piece of great power (203--406 mm) installed on a special railroad flatcar. The flatcar is a combat mount for transportation of the piece. It is supported on bogies for movement. A foundation with a plate, on which by means of a trunnion the rocking portion of the mount with barrel and breechblock are installed, are fastened to the flatcar. Loading and gun laying are automated. The bogies usually are disconnected, sometimes tied down, during conversion from the travel to the combat configuration. Support devices are used to reinforce the mount at the moment of firing. Armored train mounts also fall in the category of railroad mounts. Pieces on armored trains are installed just like those in tank and self-propelled artillery.

ZhERLO [Muzzle] -- same as dulo [muzzle], the forward portion of a piece.

ZhESTKIY BARABAN [Rigid Drum] -- massive cylindrical fixed foundation of a large shipboard turret mount receiving and transmitting the force arising at the ship's hull when pieces are fired. The rotating turret turning element is supported on ball bearings on the Zh.b.

ZhESTKIY LAFET [Fixed Carriage] -- carriage without recoil devices on which a barrel with mount are connected directly by a trunnion or ball joints and essentially has no movement relative to the carriage during firing. For example, the Zh.l. of mortars. In old weapons (of the last century), the barrel was connected rigidly with the carriage. Therefore, during firing, due to the action of the recoil /95 force, the barrel recoilled backwards from the carriage in a direction opposite to the movement of the projectile since the gun has nothing except friction to keep it on the ground. The carriages in modern artillery systems are flexible. The barrel is connected to the carriage with the aid of recoil devices and, during firing, can recoil a certain distance along the carriage. Barrel retardation during recoil and its return to the intitial position is accomplished with the aid of recoil devices.

ZhIVUChEST' ARTILLERIYSKOGO ORUDIYa [Artillery Piece Life] -- duration of service of a piece. Zh.a.o. is determined by the maximum number of firings from a given piece and length of a piece's life while retaining its relative fighting efficiency. See zhivuchest' artilleriyskogo stvola [artillery barrel life].

ZhIVUChEST' ARTILLERIYSKOGO STVOLA [Artillery Barrel Life] -- duration of its service determined by the number of combat firings which a piece can maintain while retaining accuracy and initial velocity within the range of established norms for each caliber (i. e., until it has lost its combat properties). The number of firings until complete wear will depend upon the caliber of the piece. This number is smaller for large-caliber weapons, since the pressure of the powder gases in their barrels during firing is significantly greater. This number is about 10,000 firings for medium-caliber weapons. This drops to 1,000 or less for more powerful weapons. This number is about 200 for large shipboard weapons, a 305-mm piece, for instance.

ZhIVUCHEST' BRONI [Armor Life] -- capability of armor during the shock from armor-piercing rounds or other destructive means not to permit breaches and clefts, as well as internal cracks and spalling from the inside.

ZhIDKIY KISLOROD [Liquid Oxygen] (O_2) -- prevalent oxidizer of the fuel components of missile liquid propellents. Zh.k. will contain 100% oxidizer, is obtained from liquid air, and is a transparent bluish liquid with a boiling point of 183° C. Any hydrocarbon can be used as fuel for Zh.k.. Due to its low boiling point, it is loaded into missile tanks just prior to launch. Zh.k. containers have insulated double walls. The volume of liquid oxygen is less by a factor of 790 than gaseous oxygen. Explosive self-ignition will occur when oxygen comes into contact with oils, fats, and other organic compounds.

ZhIDKOYe TOPLIVO REAKTIVNYKh DVIGATELEY [Jet Engine Liquid Fuel] -- fuel consisting of liquid components, fuel and oxidizer.

ZhIDKOSTNYY REAKTIVNYY DVIGATEL' (ZhRD) -- see dvigatel' zhidknostnyy raketnyy [liquid propellant rocket engine].

ZhURNAL TEMPERATURY ARTILLERIYSKIKh POGREBOV [Artillery Magazine Temperature Log] -- monitoring log in which are recorded the temperatures of artillery magazines and warehouses, measured several times per day.

ZAVISIMYYe SOBYTIYe [Dependent Events] (Theory of Probabilities) -- events, occurance of one influencing the probability of occurence of another.

ZAVIKhRENIYe [Backwash] -- formation of eddies in liquids and gases as bodies flow or as two flows meet. A portion of the energy of movement of a body (projectile, missile, mine) is expended to overcome Z. The magnitude of the resistance to Z. will depend on the coefficient of the form of a projectile (missile). The coefficient of the form of a projectile is characterized by the capability of the projectile to overcome air resistance only depending upon its form. To decrease resistance to Z., a flowing form, i. e., a form causing the least Z., is imparted to the parts of a projectile, missile, aircraft, ship, and so forth.

ZAGRADITEL'NYY OGON' [Barrage Fire] -- one of the types of artillery fire involving of placing a fire barrier (frontal or flanking) in a preplanned line (lines) to prevent the movement of enemy infantry and tanks. Z.o. is preplanned and conducted with a specific tempo over a specific time period.

ZADAYuShchIY ELEMENT SISTEMY UPRAVLYaYeMOGO OB"YeKTA [Controlled Object System's Master Element] -- regulates the law (program) of a controlled object's motion. A controlled object's control post operator or automaton (programming device, autopilot, and so forth) fulfills this role.

ZAZhZhENIYe POROKhA (ARTILLERIYSKOGO ZARYaDA) [Powder Ignition (of an Artillery Charge] -- imparting to powder of the initial pulse under the influence of which the reaction of the explosive conversion is initiated in some portion of a powder (powder charge) grain.

ZAZhIGANIYe VNEShNEYe [External Pilot Flame Ignition] -- ignition of the /98 basic rocket propellant with the aid of an igniting pilot flame introduced into the combustion chamber from without via the nozzle. Z.v. is used during ignition of propellant in long-range ballistic missile engines.

ZAZhIGANIYe VNUTRENNEYe [Internal Pilot Flame Ignition] -- ignition by means of a special device located on the rocket engine chamber head or inside it and creating the pilot flame.

ZAZhIGANIYe PIROTEKhNIChESKOYe [Pyrotechnic Ignition] -- ignition of a ZhRD propellant mixture with the aid of a special pyrotechnic cartridge installed in the chamber head or introduced from the nozzle in a rotating impeller. Z.p. also is used in solid-propellant rocket engines. In this case, the pyrotechnic cartridge is a black blasting powder charge with an incandescent filament.

ZAZhIGANIYe FORKAMERNOYe [Precombustion-Chamber Ignition] -- ignition by means of a powerful flame formed inside the precombustion chamber. A constant flame is formed at the precombustion chamber outlet, which ignites the mixture in the main combustion chamber. It is used particularly in ramjet engines (PVRD).

ZAZhIGANIYe KhIMIChESKOYe [Chemical Ignition] -- ignition with the aid of hypergolic liquid propellant components. As the engine is started, the hypergolic components are sprayed into the combustion chamber, they ignite, forming a flame which ignites the main propellent supplied to the combustion chamber. Liquid-propellant rocket engines running on non-hypergolic propellants have additional tanks and starting system with hypergolic components. Given a hypergolic propellant, ignition will occur upon contact (mixing) of the liquid propellant components. Z.kh. is used in liquid-propellant rocket engines.

ZAZhIGANIYe ELEKTRIChESKOYe [Electrical Ignition] -- ignition with the aid of an electric spark (spark plug). It is used in small engines (small-thrust engines). In large engines, a spark plug is used initially to ignite a small amount of auxiliary propellant, with the resultant high-temperature ignition flame used to ignite /99 the main propellant. Z.e. can be used in liquid- and solid-propellant rocket engines.

ZAZhIGANIYe ELEKTROZAPALOM [Electric Detonator Ignition] -- ignition of rocket engine main propellant with the aid of a powder charge ignited by an electric detonator. It is used in liquid- and solid-propellant rocket engines.

ZAZhIGATEL'NYYe SOSTAVY [Incendiary Compositions] -- special compositions used to charge incendiary projectiles (thermite, phosphorous, and others), aerial incendiary bombs, as well as in manufacture of incendiary bullets, bottles, and rifle grenades to cause fires in areas where the enemy is located and to destroy living targets (flamethrower compositions). They are categorized as those with and those without oxidizers. The former category includes thermite and thermite-incendiary compositions,

while the latter includes petroleum products, "electron" fusion, phosphorous, and other incendiary substances and mixtures.

ZAZhIGATEL'NYY SNARYaD [Incendiary Projectile] -- artillery round filled with an incendiary (thermite and others) to cause fires in areas of enemy disposition. Incendiary elements comprising metallic containers filled with thermite are housed in the projectile body. When the Z.s. detonates, the incendiary elements create temperatures up to 3,000° in the impact area.

ZAZOR [Gap] -- small space between two components providing mutual mobility.

ZAKLEPAT' ili ZAGVOZDIT' ORUDIYe [To Rivet or Spike a Gun] -- ancient artillery term signifying the stuffing or pounding a nail into the touchhole to put a gun out of action. This was done in those instances when the enemy abandoned a piece or it was impossible to haul away a captured weapon.

ZAKON OShIBOK [Law of Errors] (φ) -- function linking the magnitude of an error with the probability that corresponds to it.

ZAKON RASSEYIVANIYa SNARYaDOV [Law of Projectile Dispersion] -- briefly, this law states that "given a sufficiently-high number of firings occurring under conditions as close to identical as possible, projectile dispersion is restricted to a specific threshold, is symmetrical, and is uneq 1."

Given a sufficiently-high number of firings, the area of dispersion takes /100 the form of an ellipse (fire pattern).

ZAKRYTAYa OGNEVAYa POZITsIYa [Indirect Fire Position] -- fire position in which not only the weapons, but glint, smoke, and dust from firings, are concealed from enemy ground observation.

ZALP [Volley] -- single firing of several pieces.

ZALPOVYY OGON' [Volley Fire] -- artillery fire when several pieces intended for firing do so simultaneously at the signal to fire. After firing, the pieces are reloaded, laid, and a new signal to fire is awaited.

ZAMEDLITEL' [Retarder] -- substance (black fuze powder) or device to delay the combustion reaction or the process of transferring the flame from an fuze's igniter cap to the detonator cap. The black fuze powder will contain a large amount of sulfur, which increases its density and thereby decreases its combustion rate, while insuring better ignition. Used in delay fuzes for artillery projectiles, aerial bombs, and so on.

ZAMKOVYY (ZAMOChNYY) [Assistant Gunner] -- gun crew member servicing the piece's breech mechanism. In combat, the Z. opens and closes the breech mechanism, if this is not done automatically, or monitors the operation of the mechanism if it is automated. His daily mission is to keep the breech mechanism in full combat readiness.

ZAPAL [Detonator] -- detonator cap connected with an accessory called a blank and causing its action. They are categorized as wick and electrical and are used in demolition work. One must handle detonators with care and insure that they are not dropped or struck.

ZAPAL'NYY KANAL [Fire Channel] -- hole through the axial vent of the obturator of a slotted-screw breech mechanism of a separately-loaded piece. It houses the vent tube during firing and transmits the flame from the fuze to the ignition charge.

ZAPAS STATIChESKOY USTOYChIVOSTI [Static Stability Reserve] -- ratio of the distance between center of pressure and center of thrust to overall missile length.

ZAPOYaSKOVAYa ChAST' SNARYaDA [Shell Base] -- shell portion below the /101 driving band comprising a cylinder and truncated cone with a 6-9° slope. The length of a modern shell's base does not exceed 1 caliber.

ZAPRAVShchIK SZhATYM VOZDUKhOM [Compressed Air Truck] -- vehicle- or trailer-mounted compressor station for checking a missile's hermetic seal, charging the pressure-fed system, supplying ground-based maintenance equipment with compressed air, and other purposes.

ZAPRAVShchIK TOPLIVOM [Fuel Truck] -- vehicle- or trailer-mounted fuel truck configured as a container (cylinder) with pumping station and hoses for refueling missile tanks. There is less requirement for such vehicles when solid-propellant missiles are involved.

ZARYaD MNOGOShAShECHNYY [Multigrain Charge] -- constituent propellant charge of a solid-propellant rocket engine comprising several grains. As a rule, the combustion surface of a multigrain charge is greater than that of a single-grain charge.

ZARYaD MONOLITNYY [Slab Grain] -- solid-propellant rocket engine propellant charge made in the form of one grain.

ZARYaDNAYa KAMORA [Breech Chamber; Charge Chamber] -- 1. Smooth-walled part of the bore of a piece beyond the rifling where the charge and shell base rest when the piece is loaded. A tapered shoulder connects the chamber to the rifled portion. Chamber layout will depend on how the piece is loaded. 2. Shell space in the "chamber portion" (in the chamber) of a barrel given a properly "rammed" shell occupied by powder gases and the unburned portion of the powder charge at the instant the shell begins to move.

ZARYaDNIK [Ammunition Hoist] -- box-like lift to hoist shells and charges from ammunition magazines in the fighting compartment of a turret. Used in a large-caliber shipboard turret mount.

ZARYaDNYY AVTOMATIChESKIY POST [Automatic Loading Position] -- mechanism controlling the gun loading process in large turret mounts. The Z.a.p. controls the breech mechanisms (opens and closes the breech mechanism), rammer (after /102 the breech mechanism is opened, the projectile, then the charge, are rammed automatically into the breech chamber), and hoist raising and lowering.

ZARYaDNYY STANOK [Loading Machine] -- device forming the breech end of a piece with breech mechanism for gun crew loading training.

ZARYaD ODNOShAShECHNYY POROKhOVOY [Slab Powder Charge] -- solid-propellant rocket engine propellant charge comprising one grain. Its magnitude can range from several centimeters to several meters. For example, the charge for a Polaris first stage is 4 meters long and 1.5 meters in diameter.

ZARYaD SOSTAVNOY [Composite Charge] -- see zaryad mnogoshashechnyy [multigrain charge].

ZARYaD S PROGRESSIVNYM GORENIYeM (POROKhOVOY) [Progressive-Burning Charge (Powder)] -- solid-propellant rocket engine powder charge whose combustion surface increases as the engine runs.

ZARYaD S REGRESSIVNYM GORENIYeM (POROKhOVOY) [Regressive-Burning Charge (Powder)] -- solid-propellant rocket engine powder charge whose combustion surface decreases as the engine runs (degressive-burning charge powder).

ZARYaD TVERDOGO TOPLIVA [Solid-Propellant Charge] -- rocket engine charge in a solid aggregate state.

ZASNARYaDNOYe PROSTRANSTVO [Initial Air Space] -- space in the bore of a piece behind the shell between its bottom and the bottom of the bore (breech mechanism) in a loaded piece.

ZATVORNOYe GNEZDO [Breech Recess] -- interior hole through the breech ring for housing the breech mechanism forming the bottom of the bore. Its layout will depend on the design of the piece's breech mechanism.

ZATRAVKA [Touchhole] -- igniter aperture in the breech ring of a piece in Russian smooth-bore artillery for transmitting fire to the charge.

ZATRAVNIK [Priming Wire] -- artillery accessory (fine copper or iron wire with a sharpened tip) for cleaning bush firing holes (touchholes) of guns and puncturing (ignition) of a charge bag in weapons.

ZATYaZhNOY VYSTREL [Hangfire] -- phenomenon in a piece during firing when a hangfire, i. e., abnormal firing time, occurs due to damp powder, poor igniter /103 action, or the like. Normal firing is calculated in thousandths or hundredths of a second. A Z.v. can last several seconds and even tens of seconds.

ZAKhVAT RAKETY LUChOM [Missile Beam Lock-On] -- configuration of a radar station and direction of its beam so that a missile at the beginning of flight is within the beam (enters the radar station beam), thereby insuring receipt of coded control signals by onboard equipment.

ZAKhVAT TsELI GOLOVKOY SAMONAVEDENIYa [Seeker Target Lock-On] -- initiation of missile self-guidance to a target. Following launch, the missile is guided to the target from the ground. When the range between missile and target becomes less than the radius of action of onboard equipment Z.ts.g.s. will occur and the missile guides itself to the target.

ZAKhVAT TsELI RADIOLOKATsIONNOY STANTsIYeY [Radar Station Target Lock-On] -- radar station transition from search to automatic or manual tracking of a target in range, azimuth, and angle of sight.

ZAKhVATYVAYuShchIYe RAZRYVY [Bracketing Bursts] -- bursts of time-fuze shells, whose smoke makes it possible the determine the sense of the burst in range. These include low bursts, grazes, and bursts below a target.

ZAShchITNYYE USTROYSTVA POLEVYKh ARTILLERIYSKIKh SISTEM [Field Artillery System Protective Devices] (gun shields, armor plates) -- protective devices to protect personnel and mechanisms against bullets and shrapnel. Gun shields for field pieces usually comprise two shields, one fixed and the other movable. Their design will depend on piece role, type, and caliber. The movable shield will provide cover for the aperture in the center of the fixed shield and is attached to the rotating part of the piece. It has a slit for the barrel with cradle. The gun shield is a Russian invention. Engineer Plestsov in 1860 for the first time in the world designed a gun shield for field pieces.

ZVUKOVAYa ARTILLERIYSKAYa RAZVEDKA [Artillery Sound Ranging] -- determination of the location of firing artillery and mortar batteries (pieces, mortars) by /104 the sound of their firing. It also will serve for determination of the deviation of friendly shell bursts from the target. Essentially, sound ranging stations determine location of a weapon.

The idea of fixing the position of weapons by sound was born for the first time in the Russian Army as early as 1904 during the Russo-Japanese War. The first sound ranging station in Russia was set up in 1909. That same year, a method was developed for pinpointing targets with the aid of sound ranging. The first tests of a sound ranging station which pinpointed targets took place in May-June 1912 near Ochakov. The tests provided good results and were a brilliant achievement

of Russian scientific artillery thought. Z.a.r. made it possible to determine the precise coordinates of a target by the sound of the firing, which provided the capability to successfully combat enemy artillery.

ZVUKOVOY POROG [Sound Threshold] -- radical increase in resistance of a medium to a moving body as its speed approaches the speed of sound.

ZVUKOMASKIROVKA [Sound Masking] -- special technical procedures to deaden the sound of firing or firing for the purpose of confusing the enemy.

ZVUKOMETRIYa [Sound Ranging] -- method of determining the location of an enemy piece by sound.

ZENIT [Zenith] -- point of intersection of a plumb line with the hypothetical heavenly body above an observer.

ZENITNAYa ARTILLERIYSKAYa GRUPPA [Antiaircraft Artillery Group] -- antiaircraft artillery constituted as more than one unit allocated to cover troops or important rear area objectives against enemy air strikes and having common control.

ZENITNAYa ARTILLERIYSKAYa DIVIZIYa [Antiaircraft Artillery Division] -- tactical antiaircraft artillery formation comprising several antiaircraft artillery units of the same or varied calibers and support (service) subunits.

ZENITNAYa ARTILLERIYa [Antiaircraft Artillery] -- artillery element intended for air defense. In exceptional situations, Z.a. can be assigned for combat against a ground-based enemy, predominently against tanks, while it can be employed in /105 littoral areas against enemy combat vessels and transports.

ZENITNAYa PUShKA (ORUDIYa) [Antiaircraft Gun (Piece)] -- artillery piece specially designed for firing against aerial targets, but can be employed against tanks and other ground-based targets when required. Modern Z.p. are standard automatic weapons with a good high-altitude capability (20 km or more), high rate of fire, and high accuracy. In calibers, Z.p. are categorized as small (20-70mm), medium (70-100mm), and large (100 mm and more). They have an unrestricted circular (360°) and vertical field of fire (90°). Projectiles have initial velocities of 800-900 m/sec and more.

Z.p. rate of fire is increased significantly by creation of paired, triple, and quadruple systems. Small-caliber Z.p. usually are dual-, four-, and multibarrel. They are equipped with fragmentation-tracer proximity shells with a samolikvidator [self-destruction device] (see). The unit of fire for medium- and large-caliber Z.p. includes time delay fragmentation shells with powder, mechanical, and electronic fuzes. Medium- and large-caliber guns have an armor piercing-tracer shell for firing at tanks. These types, as well as some small-caliber guns, have antiaircraft artillery fire control instruments (PUAZO) for conducting accurate and precise fire. Small-caliber Z.p. are equipped with automatic sights for firing at aerial targets by direct laying. Many Z.p. have remote control.

ZENITNAYa STREL'BA [Antiaircraft Firing] -- firing against aerial targets.

ZENITNOYe RAKETNOYe PRIKRITIYe [Surface-to-Air Missile Cover] -- type of coverage of the country's objectives, troops, and ships by surface-to-air missile troop units against air attack.

ZENITNYYe RAKETNYYe VOYSKA [Surface-to-Air Missile Troops] -- one of the basic branches of troops within the National Air Defense Forces [PVO]. They are assigned to destroy an aerial enemy by means of surface-to-air missiles. The Z.r.v. comprises units and subunits.

ZENITNYYe RAKETNYYe ChASTI [Surface-to-Air Missile Units] -- units equipped /106 with surface-to-air missile sites. Organizationally part of the PVO troops.

ZENITNYYe SNARYaDY [Antiaircraft Shells] -- artillery time shells fired against aerial targets.

ZENITNYYe UPRAVLYaYeMYYe RAKETY (ZUR) [Surface-to-Air Guided Missiles] -- type of missile in the "surface-to-air" class intended for air (missile) defense. The flight of a ZUR is controlled from the ground from the moment of launch until entering the target zone. The charge is detonated by a fuze installed on the missile itself. ZUR are armed both with a conventional and nuclear charge.

ZENITNYY DIREKTsIONNYY UGOL [Antiaircraft Grid Azimuth] (α) -- angle in the horizontal plane read from a southerly bearing of a map grid vertical line counter-clockwise to the bearing to a reference point.

ZENITNYY RAKETNYY KOMPLEKS (ZRK) [Surface-to-Air Missile Site] -- includes the surface-to-air guided missile, launcher, its guidance system, supplementary equipment, checkout equipment, and transportation and storage system.

ZENITNYY UPRAVLYaYeMYY REAKTIVNYY SNARYaD (ZURS) [Surface-to-Air Guided Missile] -- one of the basic means of modern air defense. ZURS are categorized as solid- and liquid-propelled, single- and two-stage. They are employed to destroy aerial targets travelling at subsonic and supersonic speeds. Their design varies greatly and they can carry a conventional or a nuclear charge. ZURS are equipped with proximity fuzes and self-destruction devices.

ZIP [Spare Parts, Tools, and Accessories] -- spare parts, tools, and accessories intended for low-level current maintenance, cleaning, and lubricating artillery equipment. Piece and battery ZIP are maintained at the subunit level.

ZONA DOSYaGAYeMOSTI [Impact Zone] -- space within which a given piece can propel a projectile.

ZONA OBSTRELA [Range of Fire] -- portion of the impact zone within which it is possible to obtain an air burst of a shell.

ZONA OGNYa ZENITNOY ARTILLERII [Gun Fire Area] -- space within which a /107 specific antiaircraft artillery grouping can shell an aerial target. This space is a hemisphere with radii equalling the maximum effective altitude range of varied-caliber antiaircraft guns.

ZONA PORAZhENIYa ZENITNOY RAKETNOY ChASTI [Surface-to-Air Missile Unit Impact Zone] -- air space within which destruction of aerial targets is insured with requisite probability. A Z.p.z.r.ch. comprises the impact zones of the launch subunits of a unit deployed to defend a given objective or area.

ZUBChATAYa PEREDAChA [Gear Train] -- transmission of rotation with the aid of two geared cylindrical or conical wheels (pinnions), widely used in artillery systems. Motion between two parallel shafts is transmitted by cylindrical gear wheels, while that between two shafts intersecting usually at an angle of 90° is transmitted by conical gear wheels.

IDEAL'NAYa RAKETA [Ideal Missile] -- missile with flight speed equal to the propellant combustion product's exhaust velocity (if missile movement occurs outside the atmosphere and gravity field).

IDEAL'NAYa SKOROST' RAKETY [Missile Ideal Exhaust Velocity] -- missile velocity in a vacuum during weightlessness determined from a K. E. Tsiolkovskiy formula. The ideal velocity of a single-stage missile differs from that of a multistage missile.

IZMERENIYe TRAYeKTORII [Trajectory Measurement] -- determination of an airborne platform's trajectory by measuring its coordinates during flight, with subsequent processing of measurement results.

IZOKhRONA [Isochrone] -- geometric location of points cooresponding to the identical time of flight for trajectories plotted where t_0 = const.

IMPUL'SNAYa SISTEMA OPREDELENIYa TRAYeKTORIY RAKET [Pulsed Missile Trajectory Determination System] -- radiotechnical system measuring cruise and ballistic missile flight trajectories based upon determination of the time pulses take to travel from a ground-based transmitter to a missile and back.

IMPUL'SNOYe IZLUChENIYe [Pulse Radiation] -- radiation by radiotechnical devices of electromagnetic energy in the form of individual pulses with time intervals usually somewhat greater in duration than the pulses themselves. Used widely in missile control systems to determine distances, coordinates, for identification, and so on.

IMPUL'SNYY RADIOVZRYVATEL' [Pulse Radio Fuze] -- proximity fuze with an /109 operating principle similar to that of a micropulse radar, which uses signals reflected from a target to activate the fuze.

INGIBITOR [Inhibitor] -- antioxidant delaying the combustion reaction of a solid propellent (powder). Solid propellant (powder) surfaces contiguous with the combustion chamber walls are inhibited, i. e., they are covered by I.

INDEKSATsIYa BOYePRIPASOV, ARTVOORUZhENIYa [Ammunition, Artillery Markings] — numerical or letter indicator (short code) found on ammunition and artillery weapons to differentiate them. Markings are placed on artillery (mortar) and other rounds and their components, as well as on packaging. For ammunition, the marking comprises a combination of one to three letters followed by three digits. For example, OF-530 is a projectile designation. The letters in the marking provide a short title for an item:

U — quick fire fixed round;
UO — quick fire fixed round with fragmentation shell;
V — quick fire separate loading round;
F — HE projectile;
OF — HE-fragmentation round;
O — fragmentation projectile;
B — armor-piercing projectile;
BR — armor-piercing projectile with tracer;
R — tracer projectile;
BZR — armor-piercing incendiary projectile with tracer;
G — cement-piercing projectile;
BP, (BK) — shaped-charge projectile;
S — illuminating projectile;
Z — incendiary projectile;
D — smoke projectile.

The trinome defines the weapon system and number of the projectile plan.

INERTsIAL'NAYa SISTEMA UPRAVLENIYa RAKETOY [Missile Inertial Guidance System] — self-contained control system using gyroscopic or accelerometric gauges /110 (accelerometers, gyrointegrators, and so on) which generate error signals in the form of electrical magnitudes (voltages) characterizing the degree of missile deviation from the estimated trajectory. Measured deviations are fed to a computer which generates requisite correction signals allowing the missile to move along the preplanned trajectory. Accelerometers are installed on a platform stabilized in the horizontal plane, with gyroscopic and astronautical instruments used to stabilize the platforms. The former is called inertial-gyroscopic and the latter astroinertial.

INERTsIAL'NOYe UPRAVLENIYe RAKETOY [Missile Inertial Guidance] — most widespread

ballistic missile guidance system using inertial navigation equipment: sensitive acceleration gauges (accelerometers) measuring the missile's acceleration relative to three mutually-perpendicular axes. Missile speed and actual position (actual speed value and coordinates) are determined from measured accelerations using a special instrument, an integrator, after double integration. Comparing these values with estimated (programmed) values, the magnitude of missile deviation and requisite signals are determined. The latter, acting on rudders, return the missile to its assigned flight mode. Basic I.u.r. elements are accelerometers, integrators, a gyrostabilized platform, servos, and missile rudders. I.u.r. mainly are used to guide long-range ballistic missiles, aerodynamic projectiles, and aerial torpedoes.

INZhENERNOYe OBORUDOVANIYe POZITsIONNYKh RAYONOV RAKETNYKh ChASTEY [Missile Unit Launching Area Engineer Equipment] -- engineer measures to build various structures and tactical routes and accomplishment of camouflage and other measures to support missile unit combat operations and protect against nuclear and other type attack effects. This includes preparation of launch positions, control posts, and roads for maneuver and transport of missiles and equipment within the launching area.

INITsIIRUYuShchIYe VV [Primer] -- high explosive with increased sensitivity /111 to various external phenomena. They detonate, or explode, due to flame, spark, pinholes, bump, shock, and friction. Their explosion can cause other high explosives to explode (detonate). They include fulminate, lead azide, and lead trinitroresorcinate (TNRS).

INTEGRATOR [Integrator] -- instrument for computing velocities and coordinates, the basis for measurement of acceleration, and integration of acceleration over time. Used to guide missiles in preprogrammed flight.

INTEGRIRUYuShchIYe USTROYSTVA [Integrating Devices] -- devices for computing velocity or deviation from measured angular or linear accelerations. Used in missile inertial guidance systems.

INTERVAL VEYeRA RAZRYVOV [Interval of a Sheaf of Bursts] -- distance measured along a front between the average points of arrival (bursts) of projectiles from adjacent pieces.

INTERVAL RAZRYVA [Burst Interval] (i or J) -- distance from the projection of a burst to the target line to the target.

INTERTsEPTOR [Spoiler] -- air flow intrusion, small plate crossways to an oncoming air flow on the lower or upper plane of the missile (projectile) empennage to control the projectile (missile) as it moves in air at subsonic speeds, playing the role of elevon.

INFRAKRASNAYa SISTEMA SAMONAVEDENIYa [Infrared Seeker System] -- missile flight guidance using the infrared [IR] (thermal) radiation of the target itself, which is received by a sensor (heat seeker) aboard the missile. The system uses target contrast with the background to obtain target information required for guidance command formation. The heat seeker, receiving target information, continuously and automatically determines the angle between the assigned bearing and the bearing to the target. Used in missile passive seeker systems in the terminal leg of the trajectory.

INFRAKRASNAYa TEKhNIKA [IR Equipment] -- equipment using heat rays. IR (heat) rays (electromagnetic waves) have a wavelength of 0.78--400 microns (somewhat greater than the wavelength of visible light). In military affairs, it is used in night /112 vision devices and thermal direction finding. IR night vision devices are used during darkness for reconnaissance, sighting, engineer operational support, driving, and for covert communications and identification. Thermal direction finders determine the bearing to a thermal radiation source (missiles, ships, for example) and will serve for reconnaissance, missile self-guidance, and navigation.

IONNYY DVIGATEL' [Ion Engine] -- type of electric rocket engine in which acceleration and efflux of electrically-charged atoms (ions) of a propulsive mass will occur due to the effect of an electrostatic field, having high potential (about 10,000 V). An I.d. can achieve an exhaust velocity on the order of 2×10^5 m/sec. The most effective and reliable means of creating positively-charged ions is surface ionization, when electrons separate from atoms in one of the contacting materials. An I.d. has a tank with a propulsive mass, propulsive mass feed supply system, ionization chamber where the propulsive mass will be in contact with an ionizer's hot surface, electric power source, and an electrostatic accelerator (accelerating and directing electrodes), which create an electrostatic field. Substances with high atomic weight are used as the propulsive mass.

IONOSFERA [Ionosphere] -- upper layer of the atmosphere at an altitude of 50-60 km extending tens of thousands of kilometers. It will contain a considerable quantitiy of ions and free electrons.

IRAZER [Iraser] -- quantum-mechanical generator (amplifier) operating in the IR wave spectrum.

ISKUSSTVENNYY OTKAT I NAKAT ORUDIYa [Piece Retraction and Counterretraction] -- recoil and counterrecoil of a piece without firing. Retraction occurs on a special bench where a cable is used to extend the barrel to the magnitude of a normal recoil or, without the bench, by supplying compressed air to the recuperator cylinder housing in front of the piston. The air presses against the piston and the barrel recoils. This also can be done by forcing (pumping) oil into the recuperator's forward housing. Counterretraction is accomplished by expulsing the air (oil). Retraction is /113 used to check proper recuperator fluid and air levels, recoil system operation, automatic or semiautomatic breechblock operation.

ISKUSSTVENNYY SPUTNIK ZEMLI [Artificial Earth Satellite] -- artificial heavenly body moving through an elliptical orbit around the Earth; scientific laboratory with automatic equipment for study of the upper layers of the atmosphere and certain phenomena in outer space. The world's first I.s.Z. was launched successfully on 4 October 1957 in our country, a triumph of Soviet science and technology. The world's first Soviet I.s.Z. was a ball 58 cm in diameter weighing 83.6 kg. Sputnik at a speed of about 8,000 m/sec described an elliptical trajectory around the Earth.

It is known that speeds in excess of 8,000-11,000 m/sec are required to launch I.s.Z. and space rockets. K. E. Tsiolkovskiy, who had proposed manufacture of multistage rockets, "rocket trains," blazed the path to achievement of such speeds.

ISPOLNITEL'NYY MEKhANIZM [Actuator] (element) -- terminal element in remote or automatic control and regulation systems acting upon operating machinery, mechanisms, and technological processes. I.m. are controlled either directly by receptor (initial) elements -- relays or datchik [sensor] (see), which receive the effect of changing parameters or, if the power of the initial elements is insufficient to act upon the controlled or regulated organs, by intermediate supplemental devices -- usilitel' [amplifiers] (see). I.m. are activated usually by external sources of mechanical,

hydraulic, pneumatic, or electrical energy with appropriate drive. A servo is the I.m. in a missile.

ISTORIYA ARTILLERII (RAKETNOGO ORUZhIYa) [Artillery (Missile) History] -- branch of science concerning the basic stages of development of artillery equipment, mortars, ammunition, and missiles and their combat employment depending on the developmental level of productive forces, technology, and military art.

ISTREBITEL'NO-PROTIVOTANKOVAYa ARTILLERIYa [Antitank Artillery] -- gun /114 artillery from 57mm to 100mm formed into special subunits and units for destruction of enemy tanks, self-propelled artillery mounts, and other mechanized equipment by artillery fire (primarily direct laying).

ISKhODNAYa TOChKA [Initial Point] -- actual point fixed at the initial moment.

ISKhODNYYe DANNYYe DLYa STREL'BY [Initial Firing Data] (For Missile Launch) -- data or settings computed for missile launch or conducting firing (registration) of artillery against a target or registration point. I.d.d.s. are computed from initial data, which characterize the position of the target (objective) and of missile launcher or piece (mortar) in space, as well as firing conditions differing from tabular data.

ISKhODNYY MOMENT [Initial Moment] -- moment when target coordinates (final fixes) were last determined, used for shot (volley) data computation. Initial point corresponds to initial moment.

ISChISLENNAYa DAL'NOST' [Computed Range] ($Д_в$) -- sighting range obtained from computations (calculations).

KABEL'TOV [Cable's Length] -- length measurement, unit of distance measurement in shipboard artillery. An artillery K. equals 100 sazhins, 600 feet, 182.87 meters.

KAVITATsIYa [Cavitation] (from the Latin cavitas -- cavity) -- disruption of the continuity of a flowing liquid. It arises in those sections of a flow where the sum of hydrodynamic and hydrostatic pressures attain a certain critical value. Here, accompanying bubbles of gas or steam in the liquid acquire the capability for unrestricted growth and convert to large "cavitational bubbles." Moving with the flow, the bubbles reach an area with a pressure exceeding critical pressure, where they decrease and disappear. Thus, a "cavitation zone" filled with moving bubbles (as if the liquid was boiling) is created near a streamlined body. The process of reduction of a cavitated bubble at the edge of the zone will occur with very great speed and is accompanied by its own kind of hydraulic shock.

Cavitation in a missile with a liquid-propellant engine will lead to a drop in head and decrease in the volume of pumped propellant (fuel and oxidizer), resulting in disruption of the normal combustion process in the engine chamber and possible pump breakdown. The K. phenomenon arises given a significant increase in liquid-propellant rocket engine centrifugal pump rpm. K. is eliminated by means of special and design measures: purging of propellant tanks, use of devices which increase the pumps' anticavitational characteristic, and so forth.

KAZEMAT [Casemate] -- armored structure aboard ships of the line in which /116 antimine-caliber pieces are emplaced.

KAZEMATNAYa USTANOVKA [Casemate Mount] -- piece emplaced in a casemate.

KAZENNAYa ChAST' STVOLA ORUDIYa (KAZNA) [Piece Barrel Breech End (Breech)] -- previously, the part of a gun barrel in which the powder or charge was placed was called the breech end. This was because powder at that time was called breech. Now, this term is used for that part of a gun barrel from the trunnion axis to the breech face, while the word "breech," acquiring a new meaning, remained.

KAZENNIK [Breech Ring] -- barrel part, massive steel component screwed into

the rear end of the jacket (tube) with a bush for the breechblock (in several bush systems, for a semiautomatic breech mechanism as well). The K. links the barrel with recoil system piston rods. The K. is made in one unit with the barrel for small-caliber pieces. In addition, the K. often also functions as a component balancing the barrel.

KAZENNYY SREZ [Breech Face] -- end of the rear part of a breech ring (on the breech bush side).

KALENOYe YaDRO [Red-Hot Ball] -- ball heated red-hot in a fire (until the color of a cherry) prior to loading into a piece. They were fired from coastal fortifications at enemy ships to set them on fire. The balls were heated in special furnaces. They were employed widely by Russian troops during the heroic defense of Sevastopol' in 1854-1855.

KALIBR ORUDIYa [Piece Caliber] -- diameter of the piece's bore determined from the inner diameter of the barrel (at the rifling along the lands). K.o. is a basic magnitude determining the power of a piece. Ball weight previously differentiated K.o. If one spoke of a "24-pound gun,", this meant that a ball fired from it weighed 24 pounds. The word "caliber" comes from the Italian "calibra," translated as "what does it weigh?" A piece is no longer categorized by projectile weight, but the word "caliber," acquiring a new meaning, remains.

KALIBROVANIYe SNARYaDOV [Projectile Calibration] -- checking the accuracy of projectile caliber with a caliber gauge (circular gauge).

KAZhUShchAYaSYa OShIBKA [Apparent Error] (λ) -- difference between the /117 specific resultant value of a measured magnitude and average arithmetic value of all values.

KAMERA SGORANIYa KONIChESKAYa [Conical Combustion Chamber] -- combustion chamber narrowing towards the end forming the input portion of the nozzle. A K.s.k has less specific thrust compared to other chambers.

KAMERA SGORANIYa RAKETNOGO DVIGATELYa [Missile Engine Combustion Chamber] -- missile engine portion where the chemical reaction of propellant combustion occurs

and a significant portion of the chemical energy is converted to kinetic energy of a stream of gases. The special features of combustion chamber design will depend on the missile engine group. The two combustion chamber geometric forms most often encountered in modern missile engines are cylindrical and spherical.

KAMERA SGORANIYa TsILINDRIChESKAYa [Cylindrical Combustion Chamber] -- chamber with the form of a cylinder with nozzle, widely used in multichamber and other variable-purpose engines. The mixing process is accomplished easily in cylindrical chambers.

KAMERA SGORANIYa ShAROOBRAZNAYa [Spherical Combustion Chamber] -- chamber with a spherical form, or one close to spherical. A variety of this form is pear-shaped. K.s.sh. are used for high-thrust engines.

KAMERA FORSAZhNAYa [Afterburner] -- secondary or supplemental fuel reheat chamber installed between the turbine and nozzle of certain turbojet engines to increase thrust. Engine thrust is increased due to combustion of additional fuel in the K.f. An afterburning turbojet engine is used in aerodynamic vehicles, as well as in aviation.

KAMNEMET [Stone Fougasse] -- short large-caliber artillery piece employed in the 14th century. It fired stones, pieces of iron, nails, and so forth and was the first attempt to embody the idea of canister firing. By the early 16th century, it was replaced by the smooth-bore mortar with a canister shell. K. remained in the inventory of Russian fortress artillery until the beginning of the 19th century.

KAMORA SNARYaDA [Projectile Chamber] -- inner cavity of a projectile for placement of the bursting charge or for other destructive or special (illuminating and so forth) elements.

KAMUFLET [Camouflet] -- underground burst of an artillery projectile /118 without formation of an open crater.

KAMUFLYaZhNAYa OKRASKA ORUDIYa [Camouflage Coloring of a Piece] -- one type of camouflage coloring for a piece by placing varicolored spots, lines, and stripes of different form and color on an artillery system (or other equipment) to distort

the object's form and make it difficult for the enemy to identify a masked object. K.o.o. is used in wartime, with a protective paint color used for artillery equipment in peacetime.

KANAL STVOLA ORUDIYa [Piece Bore] -- internal aperture in an artillery barrel.

KANONADA [Cannonade] -- frequent artillery firing.

KANONIR [Cannoneer] -- rank-and-file artillery specialist in a sailing fleet.

KAPSYuL' [Cap] -- metal cap (casing) containing a small amount of percussion (primer) composition closed at the top by a foil washer. They are categorized as igniter caps and detonator caps. The former are used in small-arms shells, fuzes, and so on, while the latter are used to generate an explosion (detonation). They are used in fuzes for different ammunition, hand grenades, demolition and mining operations, and so on. Igniter caps ignite due to firing pin shock or prick of a striker needle, while a detonator cap is activated by fire.

KAPSYuL'NAYa VTULKA [Primer Cup] -- used to ignite charges in casings. It is housed in the bottom of a shell casing and ignited by the firing pin shock against the center of its thin bottom, which transmits the shock to the cap.

KARDAN [Universal Joint] -- device permitting rocking of supports while retaining the immobility of a body. It comprises two concentric wheels with a body suspended inside. Conical rods sometimes are used to connect shafts with an angle between their axes. When this angle is 150-180°, they can be joined using a dual hinged connection called a Hooke's or Cardan joint, widely used in sight drives and fire control instruments.

KARKAS [Shell] -- ellipsoidal incendiary projectile employed in the 17th /119 century in the Russian sail fleet. It contained powder and an incendiary composition, at times with addition of bullets or canister shot.

KARONADA [Carronade] -- short large-caliber piece with cylindrical bore and cylindrical hemispheric bottom firing small charges at close range and used in the Russian fleet after 1805. Instead of a trunnion in the piece's breech end, there

was a boss with an aperture, called the carronade ear, which connected the piece to the mounting. Hence the name for the piece.

KARTAUN [Cartaun] -- 48-pound shipboard piece belonging to the "unicorns" employed in the Russian fleet in the second half of the 18th century. It fired a 48-pound ball.

KARTECHNITsA [Canister-Shot Piece] -- ancient multibarrel artillery piece in which the rate of fire problem was solved by increasing the number of barrels. One such piece was the "Soroka" of Yermak Timofeyevich (1588) comprising several barrels fastened on a board. A two-wheeled cart served as the mounting and laying was accomplished by turning the shaft. Firing occurred from a common powder touchhole. K. were not employed widely in Russian artillery, production of such pieces was limited, and those remaining in 1876 were converted for fortress defense.

KARTECh' [Canister Shot] -- close-range artillery projectile employed in artillery from the 17th through the end of the 19th centuries. It comprised a spherical bullet or small balls placed in a tin or iron cylinder with a thick iron bottom, called a sabot, and closed at the top by an iron washer. It had not bursting charge and fuze. K. was for destruction of personnel at close range. At present, the term "canister shot" is used when shrapnel with a "canister shot" fuze setting is fired, with projectile burst occurring several meters from the piece (76mm shrapnel at 8-10 meters).

KARTINNAYa PLOSKOST' (PERSPEKTIVNAYa PLOSKOST' [Image Plane (Perspective Plane)] -- plane perpendicular to line of sighting.

KARTOChKA OGNYa [Range Card] -- graphic document compiled in a free scale /120 on a sheet of paper by the commander of a piece assigned to fire by direct laying and by the commander of a PTURS [Antitank Guided Missile] combat vehicle. It reflects the location of the piece (PTURS vehicle), basic and additional sectors of firing, and reference points with the range to them in sight graduations (a PTURS vehicle K.o. reflects ranges in meters and projectile flight time to a reference point). Range of a direct fire shot, fire within which accomplished at a fixed sight setting, is designated by a circumference around the piece. An arrow shows a "north-south" bearing. A K.o. will serve as an auxiliary means of determining range to a target (sight setting).

KARTUZ [Bag] -- sack made of dense fabric sewn to fit the charge chamber to hold a powder charge.

KARTUZNYYe ORUDIYa [Breech Loading Pieces] -- artillery pieces in which the powder charge is in a sack (bag) and which is placed in the chamber without a casing prior to a shot.

KATANAYa BRONYa [Rolled Armor] -- combat armor in the form of rolled sheets or plates of varied form, thickness, and overall dimensions manufactured from armor steel -- a carbon-iron alloy with a mixture of various components, mainly nickel, manganese, molybedenum, chrome, vanadium, and others in varied combinations. After appropriate processing, the components impart the requisite properties to the armor. K.b. is manufactured from ingots or other blanks by rolling on rolling mills of different types and sizes depending on armor plate thickness and overall dimensions.

KATAPUL'TA [Catapult] -- ancient siege artillery which hurled stones weighing up to 50 kg, wood, burning barrels, and other objects to destroy walls during the siege of cities and to burn buildings down. They were activated by the force of tightly-twisted animal gut.

KAChAYuShchAYaSYa ChAST' ORUDIYa [Tipping Part of a Piece] -- barrel and individual components (parts) of a piece connected to it which move when a special (hoisting) mechanism is operated manually or automatically to impart angles of elevation /121 to the piece.

KVADRANT [Quadrant] -- flat sector with a central angle of 90°. The first instrument to measure angles for laying pieces in Russian artillery. It was used previously to measure the altitude of heavenly bodies. It was introduced into Russia in 1805 and is a quarter of a circle, the arc of which graduated into degrees (30° and greater) and fractions of degrees. The K. is used in Soviet artillery to determine corrections for disparities in angles of elevation imparted to a barrel by the sight, i. e., for correction of sighting devices.

KVANTOVYYe USILITELI I GENERATORY [Quantum Amplifiers and Generators] -- see lazer [laser].

KERN [Center Punch; Center Dot] -- 1. Tool in the form of a sharpened hard steel rod. It is used in artillery to make dots on the bottom of a casing to indicate how many times it has been used to fire a service charge. 2. Dot on the bottom of a casing made by a center punch, indicating how many times it has been used to fire a service charge.

KINETICHESKAYa ENERGIYa [Kinetic Energy] -- energy of a moving body (projectile, bullet); measure of mechanical movement. K.e. (of a particle) is determined as half the product of mass (m) times the square of its speed (v), i. e., $T = \frac{1}{2}mv^2$. The K.e. of a system of particles equals the sum of the K.e. of all points forming the system. Moving projectiles and an artillery system's recoil mechanisms possess this type of K.e.

KINZHAL'NYY OGON' [Close-Range Concentrated Fire] -- machine gun and artillery fire opened up suddenly point-blank from several ranges in one direction. Camouflage of fire weapons is of important significance for successful K.o.

KIYaNKA [Mallet] -- wooden hammer used for assembly and disassembly of artillery equipment.

KLAPAN [Valve] -- device for by-passing of a liquid or air. It differs from a cock in that, for opening and closing, a cock has to be turned, screwing it into and out of threads. A valve is opened and closed by continuous motion and is used widely in missile and artillery equipment.

KLASSIFIKATSIYa KART [Map Classification] -- subdivision of maps based on /122 content, purpose, and scale. The multiplicity of cartographic images is subdivided into two basic types -- geographic or universal geographic and special. All elements of terrain are reflected on the former, while the terrain depiction on special maps will serve only as a background for depiction of a special item comprising the foundation for the content. Depending on scale, universal geographic maps are categorized as topographic (1 : 1,000,000 or larger) and general (less than 1 : 1,000,000). Topographic maps with 1 : 10,000, 1 : 25,000, and 1 : 50,000 scale are referred to as large-scale maps, those with scales of 1 : 100,000 and 1 : 200,000 as medium-scale, and those with scales of 1 : 500,000 and 1 : 1,000,000 as small-scale topographic or general-topographic maps.

KLASSIFIKATsIYa KRYLATYKh RAKET [Cruise Missile Classification] -- distribution of cruise missiles according to basic features: 1) by type of trajectory (aerodynamic vehicles, variable flight altitude missiles, gliding missiles); 2) by number of engines (missiles with one engine and those with two engines -- launch and sustainer); 3) by aerodynamic scheme (depending on how many mutually perpendicular planes in which control surfaces lie); 4) by guidance system (self-contained, navigational, remote control, seeker); 5) by combat role ("surface-to-surface," "ship-to-surface," "air-to-surface," remotely-piloted reconnaissance vehicles).

KLASSIFIKATsIYa RAKET [Missile Classification] -- distribution of missiles by features: 1) by location of puskovaya ustanovka [launcher] (see) and target (objective) location -- see rakety [missiles]; 2) by form and special design features -- ballisticheskiye and krylatyye rakety [ballistic and cruise missiles] (see both); 3) by flight guidance principle -- upravlyayemyye [guided] and neupravlyayemyye [unguided] (see both); 4) by role -- operativno-takticheskoye [operational-tactical], takticheskoye [tactical], and strategicheskoye naznacheniye [strategic] (see all); 5) by range -- short, medium, and long range.

Missiles can be classified by design and other features due to continuous improvement in missile technology.

KLASSIFIKATsIYa REAKTIVNYKh DVIGATELEY [Missile Engine Classification] -- /123 distribution of missile engines into groups. All are divided into two groups -- rocket and air-breathing.

In turn, rocket engines by the nature of propellant used can be divided into dvigatel' tverdogo topliva [solid-propellent engine], zhidkostnyye raketnyye dvigateli [liquid-propellant rocket engines] (see both), composite rocket engines, nuclear rocket engines, and electric rocket engines, while air-breathing engines, depending on the method used for precompression of the air entering the combustion chamber, are categorized as compressor (the air is compressed by a compressor) and compressorless (air is compressed only under the air flow's velocity head).

Air-breathing compressor engines are categorized as turbojet (the compressor activates a gas turbine) and motor-compressor (compressor receives rotation from a special motor).

Compressor-less air-breathing engines are categorized as ramjet with continuous combustion of propellant at a constant pressure and pulse-jet with periodic propellant combustion.

KLEVANT [Toggle] -- breechblock firing mechanism's metal lanyard hook which activates the firing mechanism.

KLEVOK [Graze] -- shrapnel projectile burst upon striking the ground or water.

KLEYMENIYe [Stencilling] -- application of a mark, usually is such a way that it is difficult or impossible to remove (embossed markings). Projectiles, mines, missiles, casings, fuzes, and igniters are marked for control during ammunition priming, assembly, and acceptance. For example, the letter "M" embossed on the bottom of a primer cup is a factory mark; the letters "BD" on the bottom of the same cup designate a high-pressure primer cup; the digit "3" embossed on on the side of a fuze denotes the number of the manufactured lot, and so forth. Stampings are placed on the bottom and sides of a projectile (mines and so on), on the bottom of a casing and igniters, and on the side of a fuze. Stampings primarily are /124 used at plants, military warehouses, and bases.

KLIN [Wedge] -- in artillery, the basic part of the locking mechanism of a piece's wedge-type breechblock. It is a massive prismatic body locking a piece's bore during firing. The forward plane of a K. is perpendicular to the bore axis, with the rear plane manufactured with a 1.5-2° slope.

KLIRENS [Clearance] -- road clearance, space, distance from the lowest point of a gun carriage, of the bottom of the hull of a self-propelled artillery mount (tank, tractor, vehicle) to the roadbed or horizontal area of a road during transport. For example, the minimum clearance at combat weight for a BTR armored personnel carrier is 152-280mm, 300-500mm for a tank, 280mm for a DT-54 tractor, 382mm for an S-80, and 382mm for an S-100. The K. magnitude determines the passability of a piece, tank, and vehicle along roads and terrain with various obstacles.

KLOTs [Pad] -- 1. forward part of a mechanical rammer which rams home the projectile and charge when loading a piece chamber. 2. Forward part of a manual wooden bore-cleaner (rammer) to ram a projectile into a piece chamber during loading.

KNIPPEL' (KLEPEN') [Bar-Shot (Clipper)] -- artillery projectile comprising two pig iron cylinders, balls, or hemispheres connected by a rigid or folding strut. Two balls connected by a short chain also bore this name. They were fired from shipboard pieces and coastal batteries to cut masts, yards, sheets, and other rigging.

KOVOLYuM POROKhOVYKh GASOV [Covolume of Powder Gases] (α) -- magnitude computing the influence of a volume of gas molecules on pressure of gases.

KODIROVANIYe [Coding] -- transmission of information in the form of conditional signals with a stipulated characteristic difference: by frequency of repeated signals; number of pulses per signal; pulse reception time difference, and so on used in missile guidance to generate signals for communications, telemechanics, radar, and others.

KOZhUKh [Jacket] -- 1. exterior cylinder attached to the portion of a /125 barrel where the greatest powder gas pressure is formed. 2. Cover made of sheet steel protecting mechanisms and their parts against exterior damage and insuring safety as these mechanisms are maintained.

KOKOR [Ammunition Tray] -- metal container for manually supplying ammunition from magazines to pieces. In addition, K. sometimes are used for transporting ammunition.

KOLLIMATOR [Collimator] -- optical device for alignment and laying a piece on a target during direct laying firing. It comprises a housing, lens or mirror, and a cross-hair or other similar mark. A coarse alignment for target search usually is attached to the exterior of the K. base. This also is used in the event the K. is unservicable. A lighted cross on the background of the sky or terrain is visible when one looks through a K. The target must be in the center of the cross-hairs when laying a piece or aligning a target. Different types of K. exist and they are used in automatic sights for small-caliber antiaircraft artillery, mortar sights, and in various measurement and calibrating optical instruments.

KOLLIMATOR ORUDIYNYY [Piece Collimator] -- optical instrument for horizontal laying of a piece in the absence of natural (remote) aiming points or if they are hard to see (at night, in fog, in snow, when the fire position is obscured by smoke). A K.o. is set up near the piece and replaces a remoted aiming point.

KOMANDNAYa SISTEMA NAVEDENIYa RAKET [Missile Command Guidance System] -- missile guidance system in which guidance equipment is located at ground-based facilities and on board the missile. Guidance commands are generated by the ground-based facilities and transmitted to the missile for accomplishment.

KOMBINIROVANNAYa GOLOVKA SAMONAVEDENIYa [Combined Seeker] -- combined device in a heat (passive) and radar (active) seeker. Passive (target contrast against a background in an optical wave band) and active (missile itself paints the target) seekers are used in a K.g.s. Reacting to signals that come directly from a /126 target, a K.g.s. forms guidance commands and transmits them to the actuators controlling the missile's flight.

KOMBINIROVANNYY METOD SAMONAVEDENIYa [Combined Homing] -- method of guiding a missile to a target in the final leg of a trajectory using a combined seeker (heat and radar).

KOMBINIROVANNYY RAKETNYY DVIGATEL' [Hybrid Rocket Engine] -- rocket engine operating on composite propellant, one compenent a liquid aggregate state, the other a solid.

KOMBINIROVANNAYa SISTEMA UPRAVLENIYa I NAVEDENIYa RAKETY [Combined Missile Control and Guidance System] -- a combination of several (two, three, and more) different control and guidance systems is used when no single system fully meets all pilotless aerodynamic vehicle control requirements. Here, each system provides control in a specific leg of the trajectory. For example, a command system can be used in the initial leg of the trajectory, an inertial, astroinertial, or radar navigational system during the main leg, and an active or passive seeker (the missile itself tracks the target) on the terminal leg to attain high accuracy. Short-range guided missiles have one guidance system, while long-range guided missiles can have two or even several guidance systems.

KOMENDOR [Gunner] -- seaman specialist operating an artillery mount aboard ships and in coastal artillery batteries.

KOMENDOR-NAVODChIK [Gunlayer] -- seaman (soldier) operating piece-laying equipment. In combat, he aims the piece at the target.

KOMPAS [Compass] -- instrument indicating the bearing of a geographic (true) or magnetic meridian for orientation to the cardinal points. Extant K. based on design and operation are categorized as magnetic, electromechanical (gyroscopic), radio, solar (for use at the poles), and others. They are used widely in ship /127 navigation, aircraft navigation, and artillery. The Adrianov magnetic compass system and the AK artillery compass are the most widespread compasses used by the Ground Forces.

KOMPENSATOR (POPOLNITEL') [Compensator (Recoil Filling Tank)] -- 1. Additional reservoir connected by a narrow aperture with the buffer cylinder cavity for flow of a liquid from the cylinder into the K. and vice versa. Gravity, pneumatic, and spring K. are used. The K. reservoir is filled partially with liquid. The buffer, absorbing the energy of the movement of the piece's recoil system, warms up. After each firing, the temperature of the liquid rises about 0.5--1°. The volume of the liquid increases due to heating, increasing more rapidly than the volume of the cylinder. The excess liquid goes to the K. and the buffer operates normally. 2. Spring and pneumatic K., regulating the pressure in columns of a balancing mechanism during temperature oscillations. A piston in a spring K. moves as the liquid heats up, compressing a spring, while air is compressed in a pneumatic K. After cooling, the volume of the liquid in the column cylinder decreases and, under the pressure of the spring or air, the K. again fills the vacant cylinder volume.

KOMPLEKS KONTROL'NO-ISPYTATEL'NYY [Checkout Complex] -- comprises checkout equipment for testing a missile and support equipment. One complex can support one or several launchers.

KOMPLEKS RAKETNYY [Missile Site] -- combination of resources for launching a missile and controlling its flight. It will comprise a missile and ground-based (shipboard, aviation) equipment.

KOMPLEKSNYY METOD NAVEDENIYa RAKETY [Integrated Missile Guidance Method] -- see raketa s kombinirovannoy sistemoy navedeniya [missile with combined guidance system].

KOMPLEKTATsIYa BOYePRIPASOV [Ammunition Inventory] -- compilation of a complete

list of firings for a specific model of artillery piece with indication of basic elements and characteristics of each one (weights, indexes, powder type, and so on).

KOMPONENTY TOPLIVA REAKTIVNYKh DVIGATELEY [Rocket Engine Propellant Components] -- propellant component parts -- fuel and oxider. Propellants are categorized /128 by number of components as monopropellant and bipropellant.

KOMPONOVKA RAKETY [Missile Configuration] -- most rational, most advisible arrangement and layout of missile nodes.

KOMPRESSORNYY VOZDUShNO-REAKTIVNYY DVIGATEL' [Air-Breathing Compressor Rocket Engine] -- variety of air-breathing engine in which compression of air coming into the engine prior to propellant combustion will occur by means of a compressor device as well as velocity head. A compressor VRD is categorized as turbocompressor, turbopropellor, and by-pass (turbofan). Used in low-speed aerodynamic vehicles.

KONDITsIONIROVANIYe VOZDUKhA [Air Conditioning] -- process of maintaining a specific air temperature and humidity in special missile and artillery shell (mine) storage facilities.

KONECHNYY IMPUL'S DAVLENIYa POROKhOVYKh GAZOV [Final Impulse of Powder Gas Pressure] -- $(I_к) - I_к = \int_0^{t_к} p\,dt$, where $t_к$ is time of complete powder combustion.

KONECHNYY UCHASTOK TRAYeKTORII [Trajectory Final Leg] -- downward leg of the trajectory from a conditional point of missile entry into the dense layers of the atmosphere until engagement with the target, ground, or other obstacle.

KONNAYa ARTILLERIYa [Horse Artillery] -- 1. Artillery pieces transported by horses. 2. Horse-drawn artillery units (subunits).

KONSERVATsIYA (SOKhRANENIYe) [Mothballing (Storage)] -- preservation of artillery weapons under conditions insuring their full and extended protection. Artillery weapons will be stored completely ready, carefully cleaned, and liberally lubricated.

KONTAKT [Contact] -- point of conjunction of two wires through which electric current can pass.

KONTAKT POD"YeMA [Lift-Off Switch] -- electric switch which at the moment a missile separates from the pad marks its lift-off and cuts in several pieces of onboard equipment.

KONTAKTNYY VZRYVATEL' [Impact Fuze] -- attachment (mechanism) for explosion of any type projectile or charge of explosives (mines, torpedoes, bombs, missiles, and so forth) upon directly striking the target or given the action of a /129 detonator on a charge. They are categorized as percussion, nose, base and side, mechanical, powder, and chemical.

KONTRASTNOST' TsELI [Target Contrast] -- target discrimination on a surrounding background.

KONTROL' STREL'BY [Check Fire] -- checking adjusted mounts with a check series of firings, given variable firing conditions for the target and registration point.

KONTROL'NO-ISPYTATEL'NAYa PEREDVIZhNAYa STANTsIYa [Mobile Checkout Station] -- set of simulator and measurement equipment for self-contained checkout of missile onboard instruments (devices).

KONTRPODGOTOVKA [Counterpreparation Fire] -- sudden, powerful, brief, preplanned conventional strike by defenders against combat formations of an enemy preparing for attack to disrupt the attack or ameliorate the blow and disorganize command and control. This must be accomplished before the enemy initiates artillery preparation for an attack. K. is employed by large combined-arms formations using artillery, mortars, and aviation. In certain instances, tanks and some infantry fire weapons are included. It was used for the first time in the First World War of 1914-1918 and successfully employed by Soviet troops during the Great Patriotic War. K. during the Battle of Kursk in 1943 is a classic example.

KOORDINATNAYa (KILOMETROVAYa) SETKA [Grid (1,000-Meter Grid) System] -- plane rectangular coordinates on a topographic map in the form of a network of perpendicular lines. This network's horizontal lines run parallel to the equator, while the vertical

lines run parallel to the central meridian of the universal transverse Mercator 6° zone. The lines on the map are equidistant from one another and form a network of squares whose sides (distance between lines) equals kilometer whole numbers in the map's scale: 1 : 25,000 every 4 cm (1 km on the terrain), 1 : 50,000 every 2 cm (1 km on the terrain), and 1 : 100,000 every 2 cm (2 km on the terrain).

This system is used for determination of coordinates, target designation, plotting using known coordinates of fire (launch) positions, observation posts, targets, /130 reference points, and so forth. Extensions of lines beyond the boundary of a map sheet are inscribed (numbered). Inscriptions on the horizontal lines (along the west-east edges) designate distances in kilometers from the equator and are for computation of the x coordinate, while those on the vertical lines (along the north-south edges) are for computation of the y coordinates. In the corners of the map sheet, kilometer lines are inscribed completely, while in between, they are abbreviated with two digits designating kilometer units and tenths.

KOORDINATOMER [Coordinate Scale] -- instrument for measurement of rectangular coordinates from a topographic map grid (1,000-meter grid) system. The simplest is a clear celluloid plate inscribed with 1 : 25,000, 1 : 50,000, and 1 : 100,000 scales along a length equal to the sides of the map squares and broken down to 1mm of the map scale.

KOORDINATY [Coordinates] -- magnitudes determining the positions of points on a plane or in space. In military affairs, the most widely used are geographic, geodetic, rectangular, astronomical, polar, and bipolar. Rectangular K. usually are used in artillery. The position of a point in space is determined by three coordinates: x, y, and z.

KOORDINATY GEOGRAFICHESKIYe [Geographic Coordinates] (latitude and longitude) -- magnitudes determining the position of any point on the surface of the globe. A geographic latitude determines the position of a point relative to the equator and is determined by the arc of a meridian from the equator to the parallel of a given place. It is computed to the north and south from the equator along the meridian (north and south latitude) from 0 to 90°. A geographic latitude is expressed in degrees, minutes, and seconds. 0° latitude is at the equator and 90° is at the poles. A geographic longitude determines the position of a point relative to the

initial meridian and is determined by the arc of the equator from the intitial meridian (zero meridian in accordance with an international agreement passing through Greenwich) to the meridian of a given place. It is computed along parallels (west and east longitude) from 0 to 180°. A longitude also is expressed in degrees, minutes, /131 and seconds. Knowing the latitude and longitude of any point, it is easy to find it on a map. The equator, meridians, and parallels form a so-called degree system.

KOORDINATY REAKTIVNOGO SNARYaDA [Rocket Projectile Coordinates] -- linear and angular magnitudes determining the position of a rocket projectile in space. The position of a rocket projectile's center of gravity in space is determined by three linear coordinates (x, y. z), while projectile position is determined by three angular coordinates (φ. ψ, γ). The rocket projectile launch point (0) is accepted as origin of the coordinates. The following are angular coordinates: pitch angle (φ). determining the slope of the projectile's axis to the horizon; yaw angle (ψ) characterizing the deviation of the projectile's axis from the vertical plane passing through the launch point and the target; and bank angle (γ) determining the projectile's rotation relative to its longitudinal axis.

KORABEL'NAYa ARTILLERIYa [Shipboard Artillery] -- one of the armament types aboard surface combatants and some auxiliary vessels. It is categorized in role as main artillery, which accomplishes the ship's main missions, dual-purpose, and antiaircraft. By caliber, it is categorized as large (230-400mm), medium (100-180mm), and small (20-85mm) caliber.

KORABEL'NYYe NEUPRAVLYaYeMYYe RAKETY [Shipboard Unguided Missiles] -- unguided missiles with a rocket engine, usually solid-propellant. Assigned to destroy targets on land, on water, and in the air, they are employed most often during landing operations. Surface vessels (landing fire support vessels, for example), carrier-based aviation, and pilotless shipboard weapons can be K.n.r. carriers. K.n.r. vary from the design standpoint and in principle differ little from one another, including from land-based unguided missile (NR) models. Shipboard NR launchers can be stabilized and unstabilized, with the former having devices insuring missile guidance approximating that from a horizontal platform. Stabilization is achieved in unstabilized launchers by use of fire control instruments which consider the ship's angle of roll. Shipboard missile launchers can fire singly or in volleys. /132

KORABEL'NYYe UPRAVLYaYeMYYe RAKETY [Shipboard Guided Missiles] -- guided missiles fired from surface vessels and submarines. K.u.r. are classified by role as tactical, operational-tactical, and strategic. Firing guided missiles from a ship considerably is more complex than from a land-based launcher. K.u.r. are the most viable and promising weapons for contemporary Navy surface vessels and submarines. Their appearance in the inventory of such vessels, as well as of new missile-carrying ships, makes it possible to inflict nuclear missile strikes against objectives at a range of hundreds and thousands of kilometers for the launching vessel.

KORABEL'-RAKETONOSETs (RAKETNYY KORABL') [Missile-Carrying Ship (Missile Ship)] -- combat vessel armed with launchers for ballistic (cruise) missiles and antiaircraft guided missiles. They possess protective equipment and a high rate of speed. A K.-r. is tasked to destroy enemy surface combatants, transport vessels, and shore installations.

KORPUS RAKETY [Missile Body] -- fuselage of a rigid (usually made of high-strength steel) streamlined design in the form of an elongated cylinder with a pointed nose strengthened in the requisite places by longitudinal (stringers) and transverse (frames) reinforcements. K.r. comprise several bays named for the equipment contained therein. For instance, the instrument compartment, propellant bay, central, tail, and so on. Various designs are used but all are close to the forms of elongated bodies of revolution. A K.r. in flight creates slight lift. The nose cone is covered with a special heat-resistant material to protect against heating. Strategic ballistic missile bodies are categorized as multistage or single stage. About 3/5 of a ballistic missile body's length is taken up by the power plant and propellant component tanks. The walls of the propellant tanks and, for solid-propellant missiles, the walls of the combustion chamber in many instances fulfill the role of K.r.

KORPUSNAYa ARTILLERIYSKAYa GRUPPA (KAG) [Corps Artillery Group] -- artillery /133 directly subordinate to the corps commander allocated for the period of an engagement to accomplish missions in the interests of the corps and united under common control.

KORPUSNAYa ARTILLERIYa [Corps Artillery] -- artillery organic to a corps and directly subordinate to the corps commander.

KORREKTIROVANIYe STREL'BY [Fire Adjustment] -- 1. Change in sight settings

(changing the aiming point) and fuze during firing for coincidence of the average trajectory (center of dispersion of bursts) with the target or with a point insuring conditions most advantageous for target destruction. 2. Change of input data or initial settings occurring due to spotting systematic burst deviations from the target (in antiaircraft artillery).

KORREKTIROVOChNAYa AVIATsIYa [Spotter Aviation] -- aviation specially-equipped for adjusting artillery fire. K.a. conducts reconnaissance of enemy artillery and other objectives subject to destruction by artillery fire.

KORROZIYa [Corrosion] -- harmful surface destruction of metal from mechanical, chemical, and temperature effects. K. will lead to damage to mechanisms.

KOSARTOP [Commission for Special Artillery Experiments] -- commission for development of new artillery systems and conduct of special artillery experiments created by decision of the Soviet government in 1918. Active participants in its work included renowned Soviet scientists N. Ye. Zhukovskiy, V. M. Trofimov, A. N. Krylov, I. F. Drozdov, and many others.

KOSMIChESKAYa RAZVEDKA [Space Reconnaissance] -- conduct of reconnaissance from space by reconaissance artificial earth satellites by means of high-resolution cameras and television, with the aid of which photos are transmitted to reconnaissance stations on Earth.

KOSMIChESKAYa RAKETA [Space Missile] -- aerodynamic vehicle (missile) capable of overcoming gravity and intended for interplanetary communications. The world's first K.r. was created in the USSR on 12 September 1959. A Soviet K.r. was the first in the history of mankind to reach the Moon.

KOSMIChESKAYa SKOROST' [Escape Velocity] -- velocity that must be imparted /134 to a missile for it to become an artificial earth satellite. There are three K.s. relative to the planet Earth and the Solar system. The first is that speed at which a body becomes an artificial Earth satellite and is 7.91 km/sec at the Earth's surface. This decreases with altitude. It is 1.6 km/sec on the Moon's surface or less by a factor of 5 than on the Earth's surface. The second is that speed that must be imparted to a missile for it to escape the Earth's gravity and equals 11,200 m/sec

or 11.2 km/sec. The third K.s. is that speed at which a space missile can overcome the Sun's gravity and leave the Solar system. This equals 16.7 km/sec.

KOSMIChESKIYe SREDSTVA NAPADENIYa [Enemy Space Weapons] -- use of artificial Earth satellites and military space platforms for launching nuclear missle strikes from space (against strategic objectives and antiballistic missile defense). This category also includes artificial satellites and military space platforms equipped with electronic countermeasures equipment. In spite of the agreement reached in October 1963 between the USSR and the USA prohibiting the orbiting of artificial Earth satellites and other devices with nuclear weapons, design work in this area is underway in the USA. The Soviet government supports the peaceful use of space.

KOSMONAVTIKA [Cosmonautics] -- astronautics, space travel, science of the flights of aerodynamic vehicles in space for the purpose of space exploration.

KOSOPRITsEL'NYY OGON' [Oblique Fire] -- artillery fire conducted at an angle to the front of a target (close to 45°) making it possible to employ the greatest concentration of fire weapons and inflict more destruction on the enemy than is possible with frontal fire.

KOChUYuShchEYe ORUDIYe [Roving Piece] -- piece frequently changing fire position to confuse the enemy relative to the disposition and amount of artillery on the defensive and to force the enemy to conduct artillery fire so he will reveal /135 his fire weapons. A K.o. will fire from several specially-prepared fire positions.

KOEFFITsIENT AERODINAMIChESKOY SILY [Aerodynamic Force Coefficient] -- magnitude depending on the missile's form characterized by dimensionless factor C with sign (index) x or y (C_x and C_y) depending on the direction in which the aerodynamic forces are determined. It is determined experimentally, in a wind tunnel, for example.

KOEFFITsIENT VESA ZARYaDA [Charge Weight Coefficient] -- ratio of the weight of a charge in kilograms to the cube of the piece's caliber in decimeters: $C_{\omega} = \frac{\omega}{d^3}$.

KOEFFITsIENT VESA SNARYaDA [Projectile Weight Coefficient] -- ratio of the weight of a projectile in kilograms to the cube of the caliber in decimeters: $C_q = \frac{q}{d^3}$.

KOEFFITsIENT ZAPOLNENIYa (RAKETY) [Loading Factor (of a Missile)] ($\mu_к$) -- ratio of the weight of the propellant to the weight of the missile at the moment of launch:

$$\mu_к = \frac{\omega}{G_0},$$

where ω -- is propellant weight;

G_0 -- is missile launch weight.

K.z.(r) with propellant will depend on missile design and role. For long-range missiles, $\mu_к$ = 0.7-0.8 and more; for tactical missiles, $\mu_к$ = 0.4-0.6 .

KOEFFITsIENT ZAPOLNENIYa DVIGATELYa [Engine Loading Factor] -- ratio of the weight of the propellant (powder charge) to engine weight.

KOEFFITsIENT NAPOLENIYa [Capacity] (a) -- ratio of the weight of a projectile's (mine's) bursting charge to the weight of the fully-primed charge expressed in percents:

$$a = \frac{\omega}{G} 100\%,$$

where ω -- is bursting charge weight in kg;

G -- is weight of the finally-primed projectile in kg.

KOEFFITsIENT NAPOLNENIYa KAMERY RDTT [RDTT Charge Volume-to-Chamber Volume Ratio] -- density characteristic of an RDTT chamber; volume-to-chamber volume ratio is taken to mean the ratio of the volume of propellant to engine combustion chamber volume. This ratio fluctuates from 0.8--1.0. /136

KOEFFITsIENT POLEZNOGO DEYSTVIYa VNESHNIY [External Efficiency] -- magnitude characterizing the ratio of useful power imparted to the missile at the corresponding velocity to its kinetic energy. External efficiency is a function of flight velocity.

KOEFFITsIENT POLEZNOGO DEYSTVIYa VNUTRENNYY [Internal Efficiency] -- magnitude characterizing the ratio of a gas flow's kinetic energy to the propellant's calorific value. Missile engine internal efficiency, computed as prolonged work, ranges from 0.3--0.5.

KOEFFITsIENT POLEZNOGO DEYSTVIYa OBShchIY [Overall Efficiency] -- product of vnutrenniy and vneshniy koeffitsient poleznogo deystviviya [internal and external efficiency] (see both).

KOEFFITsIENT POLEZNOGO DEYSTVIYa SUMMARNYY [Total Efficiency] -- complete efficiency; magnitude characterizing the ratio of the entire potential and kinetic energy to the heat of combustion of all expended propellant during the entire time the engine is operating.

KOEFFITsIENT POLEZNOGO DEYSTVIYa TERMIChESKIY [Thermal Efficiency] -- magnitude characterizing the ratio of the pressures of the gas flows at input to the nozzle and at output from it.

KOEFFITsIENT STEKhIOMETRIChESKIY [Stoichiometric Mixture Ratio] -- magnitude characterizing the weight ratio between propellant components (fuel and oxidizer). It demonstrates how many kilograms of oxidizer are required for complete oxidation of 1 kg of fuel.

KOEFFITsIENT UDALENIYa [Reduction Coefficient] -- (Ky) -- ratio of range of observation to firing range.

KOEFFITsIENT USILENIYa [Gain] -- ratio of the magnitude of an output signal to the magnitude of the input signal. Electrical signal amplifiers are used most often in missile control systems.

KOEFFITsIENT FIKTIVNOSTI [Fictiousness Factor] (φ) -- factor considering the secondary work of powder gases (rotation of the projectile, piece recoil, frictic and so forth).

KOEFFITsIENT FORMY SNARYaDA [Projectile Form Factor] (i) -- relative magnitude characterizing the ability of a projectile to overcome air resistance only depending on its form compared with a projectile standard, whose form factor equals 1. K.f.s. is determined from the formula

$$i = \frac{K\left(\frac{v}{a}\right)}{K_{st}\left(\frac{v_0}{a}\right)},$$

where $K\left(\frac{v}{a}\right)$ -- is a function characterizing the resistance of the air to the movement of the projectile depending on projectile velocity and the speed of sound;

$K_{st}\left(\frac{v_0}{a}\right)$ -- is a function characterizing the resistance of the air to movement of the projectile used as the standard (determined experimentally);

v -- is projectile velocity in m/sec;

a -- is speed of sound in m/sec;

v_0 -- is initial velocity of the projectile in m/sec.

KRANETs [Ready-Use Ammunition Locker] -- metallic cylinder in which projectiles and charges are stored for the first firings. Previously, K. also were called stacks of balls, bombs, and grenades placed in triangular pyramids and squares.

KREPLENIYe ORUDIYa PO-POKhODNOMY [Piece Travel Crutch] -- 1. Rigid interconnection of a piece's movable parts using special devices to avoid bumps and shocks when moving. An artillery mount's tilting portion will be secured at an angle of elevation convenient for movement. The rotating portion will be secured in the middle position to provide a balanced load during movement. 2. The tilting part of a piece in a shipboard mount will be secured in travel configuration by a special device with a hydraulic or spring buffer which ameliorates shock and bumps as the ship rolls and pitches. The rotating portion of the artillery mount (turret) will be secured by a special device with hydraulic or spring buffers to the deck of the ship.

KREPOSTNAYa ARTILLERIYa [Fortress Artillery] -- artillery for fortress protection. It was introduced in Russia for the first time by Peter I. This soon was followed by K.a. which in no way differed from other Russian artillery. Later on, as /138 piece technology improved, K.a. was improved and began to differ from conventional field pieces.

KREShER [Pressure Gauge] -- cuprite cylinder for experimental determination of pressure in the bore. This instrument consists of a steel housing and small piston, whose head presses against the cuprite cylinder.

KRITIChESKAYa MASS [Critical Mass] -- least quantity of fissionable material at which an explosive reaction can occur. The magnitude of a K.m. will depend on

many factors: purity of the fissionable material, form of charge (sphere, cylinder, cube), power of the neutron source, neutron reflector material, speed of charge coupling, and so on. Thus, for example, the K.m. of an atomic charge of U-235 will be approximately 1 kg.

KRITIChESKOYe SECHENIYe SOPLA [Nozzle Throat] -- smallest possible (narrowest) section of a nozzle of a rocket or jet engine. Reaction jet velocity and pressure at nozzle outlet are determined by the ratio of the area of the outlet section to throat area.

KROKI [Area Sketch] -- simplest diagram of an area compiled primarly by sketching by eye. It is attached to a report and has an explanatory note (legend).

KRONShTEYN [Bracket] -- support piece or design for securing protruding or movable more or less supporting portions of a missile, piece carriage, and so on. From the design standpoint, a K. is built in the form of slanted strut or in the form of a significant reinforcement in the component protruding the most.

KRUZhALO [Circular Gauge] -- flat steel ring with two levers for calibrating projectiles. Two K. usually are used to calibrate projectiles.

KRUTIZNA NAREZKI ARTILLERIYSKOGO STVOLA [Artillery Barrel Angle of Twist] (α) -- angle of slope of rifling to bore axis. Sometimes K.n.a.s. is characterized by the rifling lead, i. e., by the distance along the bore axis in which rifling makes one full turn. K.n.a.s equals 6-7° for guns with high initial velocity and is somewhat greater for howitzers and other pieces with short barrels and, consequently with lower initial velocity. Rifling can have a progressive rather than a constant twist (the twist is about 4° where the rifling begins), gradually increasing /139 to about 8-9° twist at the chase). Thus, for example, the 152mm howitzer has rifling with a progressive twist: it begins at 3°54'25" and ends at 8°55'37".

KRYLATAYa RAKETA (SAMOLET-SNARYaD) [Cruise Missile (Aerodynamic Projectile)] -- pilotless airborne platform having bearing surfaces (wings) and guided during the entire flight trajectory. It has, as a rule, a nuclear charge, jet engine, and flight control instruments. It can be launched from ground-based launchers, aircraft, ships, and submarines (surfaced).

KRYLO POVOROTNOYe [Tiltable Wing] -- surface with the capability of rotating relative to the axis of the airborne platform for the purpose of creating maneuver for a missile in flight. It is used on missiles that must maneuver in their trajectory. Wing location relative to missile body can be horizontal, H-, ⊥-, and X-shaped.

KRYLO RAKETY [Missile Wing] -- aerodynamic surface attached directly to the missile's body to create lift. It is used in aerodynamic projectiles, cruise missiles, and so on.

KSILIL [Xylyl] -- high explosive, product of xylene obtained from coal or oil processing. It is used in fusions and mixtures with TNT and melinite used during the First World War to prime projectiles.

KUMULYaTIVNOYe DEYSTVIYe (VZRYVA) [Cumulative Effect (of a Blast)] -- concentration of a blast in one specific direction achieved by a shaped cavity made in the charge by a thin lined metal casing. During the blast, the metal casing is converted by the high pressure action into a liquid and jointly with the directed blast is propelled in the form of a thin metal stream in the direction of the concentration of the blast at a velocity of 12-16 km/sec, insuring a high degree of armor penetration.

KUMULYaTIVNYYe BOYePRIPASY [Shaped-Charge Ammunition] -- artillery projectiles, mines, hand and antitank grenades, explosive charges, and so on with direct blast against an obstacle. Recently, K.b. found wide practical use. They have a /140 bursting charge with a conical or hemispheric shaped cavity. During the Great Patriotic War, K.b. were used widely against enemy tanks.

KUMULYaTIVNYY ZARYaD [Shaped Charge] -- bursting or detonating charge with directed blast towards an obstacle. A K.z. has a conical or hemispheric shaped cavity, thanks to which a directed blast is achieved, which insures high penetrating capability and destructive force. The cumulative (penetrating) effect is increased greatly if the cavity is covered with a thin metal casing. The shaped stream in this instance will contain many fine metal particles (which move at high velocity), greatly increasing the projectile's penetrating action. The shaping phenomenon involves redistribution of energy and its concentration in a specific direction rather than an increase in overall action. K.z are used widely in artillery armor-piercing shaped-charge projectiles, shaped-charge rocket projectiles, mines, shaped blasting charges, in hand and antitank grenades, and so forth.

KUMULYaTIVNYY (BRONEPROZhIGAYuShchIY) SNARYaD [Shaped (Cavity Charge) Projectile] -- artillery projectile with a conventional bursting charge having a conical or spherical shaped cavity.

KURS [Course] (from the Latin -- cursus -- run, movement) -- direction in which a tank, ship, or airborne platform moves.

KURSOVOY PARAMETR [Ground Range] -- shortest distance from a piece (piece locatic to the projection of the target's course to the horizontal at the muzzle.

KURSOVOY UGOL [Course Angle] -- angle between the piece's plane of fire and direction of target movement. K.u. is measured as the angle between the direction of target movement and direction from the target to the piece; its value can range from 0--180°. Depending on the K.u. value, target direction can be: frontal at a K.u. of 0--30° and 150-180°; flank where K.u. is 60--120°; and oblique where K.u. is 30--60° and 120--150°.

KURSOVOY UGOL ORUDIYa [Piece Course Angle] -- angle at the piece in the /141 horizontal plane between the bearing to the target and course of the piece (measured from 0 to 180°)

KURS ORUDIYa [Piece Course] -- straight line coinciding at a given moment with the piece's direction of movement.

KURS TsELI [Target Course] -- straight line coinciding at a given moment with the target's direction of movement.

KUChNOST' BOYa ORUDIYa [Piece Accuracy of Fire] -- property of an artillery piece to group projectile impact points in the least area of dispersion. The smalle the area of dispersion during firing with identical sight settings, the better the K.b.o. This will depend on piece and ammunition quality, firing conditions, as well as proper piece and ammunition handling during firing.

LABORATORIYa [Laboratory] (from the Latin, in translation -- work area or work cabin) -- place or building where various ammunition and charges are produced and where percussion and igniting fuzes, missiles, and other incendiaries are primed.

LAZER [Laser] -- quantum-mechanical generator (amplifier) of inductive radiation operating in waves of the optical band of wavelengths. It is a crystal of an artificial ruby, with slight admixtures of chrome ions to impart a red color, housed in a spiral-shaped flash lamp serving as a green light source. Other crystals can serve as the active substance. The laser's operating principle is based on use of the properties of excited microparticles of a substance to radiate electromagnetic energy (when most of the microparticles are excited). Lasers sometimes are called optical quantum generators (OKG). Optical-band quantum-mechanical generators in the USSR and abroad are called lasers. Superhigh-frequency (SVCh) quantum-mechanical generators are called masers, and IR wavelength band quantum-mechanical generators are called prasers. L. possess exceptional brightness (greater than that of the Sun by a factor of 1 million) and create a narrow light beam (several thousandths of a millimeter), which makes it possible to concentrate it on very tiny areas, subjecting the area of the radiated object to momentary heating to hundreds and thousands of degrees. In /143 recent years, L. have been used widely in all fields of science and technology. They are proposed for use in creation of missiles with great terminal velocities. Further acceleration can be imparted to a missile by a narrow powerful beam of high light pressure.

The foreign press reported the tendency to employ L. for tactical antitank missile guidance. Priority in discovery of the generation and amplification of radio waves and creation of quantum-mechanical generators and amplifiers belongs to Soviet scientists N. G. Basov and A. M. Prokhorov.

LAFET ARTILLERIYSKOGO ORUDIYa [Artillery Piece Carriage] (a French word translated as gun mounting) -- in contemporary meaning, the carriage is part of a wheeled piece comprising, along with two other parts -- the barrel and the sighting device -- a piece in combat configuration. The carriage serves as the vehicle for moving the piece and is intended for safe, rapid, and accurate firing, for absorption (with recoil systems) of the piece's recoil and transmission to the ground of forces arising

during firing, and piece transportation. A carriage comprises a lower and upper mount, cradle, recoil systems, laying mechanisms, equilibrator, protective devices, and drives.

LEGIROVANNAYa STAL' [Alloy Steel] -- steel to which so-called alloy elements have been added: nickel, molybdenum, chrome, vanadium, silicon, titanium, magnesium, and others, either separately or in various combinations.

LEYNER [Liner] -- thin-walled tube with rifled bore and breech chamber inserted with slight clearance into a piece's barrel. Easily replaced by a new liner in case of burnout. As a result, reestablishment of a worn piece requires replacement of a damaged liner rather than manufacture of a new piece. Replacement of the internal tube is referred to as relining a piece. Liner length equals barrel length. The piece liner is a Russian invention. In 1874, 60 years earlier than in the West, Admiral A. A. Kolokol'tsev designed the world's first liner in Russia.

LEYNERNAYa SMAZKA [Liner Lubricant] -- dark-gray thick grease to lubricate the exterior surface of liners and loose barrels prior to their insertion into /144 jackets. L.s. does not burn and evaporate at high temperature, making it simple to remove a liner or loose barrel from a jacket and replace it.

LEKALO [Template] -- item for measuring unexploded and partially-detonated projectiles, as well as large fragments from projectile bases. It is a metal plate with graduated hemispheres corresponding to basic projectile calibers. Applying the L. to a recovered unexploded projectile which has retained its initial form, one selects that notch which would equate fully to the projectile's surface, permitting determination of its caliber.

LETATEL'NYYe APPARATY [Airborne Platforms] -- platforms employed in air and space. They include ballistic and cruise missiles, space platforms (piloted and pilotless), rocket gliders, flying stands, aircraft, helicopters, and gliders.

LIKVIDATOR [Destruction Device] -- device installed on a missile for automatic destruction of the missile in the flight trajectory in the event it does not intercept the target and is not detonated by a proximity fuze.

A missile will be destroyed in flight to avoid its explosion on the ground (and damaging ground-based objects), as well as to provide security protection for the design.

The L. trips and destroys the missile when the preplanned time interval required for it to reach the target expires or by a command (radio signal) from the Earth.

LIMB [Azimuth Scale] -- aiming circle graduated in thousandths for computation of angle magnitudes in aiming devices (in an artillery aiming circle, battery commander's telescope, and other instruments).

LINEYNOYe UPREZhDENIYe [Linear Lead] (Δs) -- distance (shortest) between present position and future position.

LINEYNYYe KOORDINATY VOZDUShNOY TsELI [Airborne Target Linear Coordinates] -- target slant range and altitude determined by rangefinders, rangefinder-altimeters, and radars. Target altitude is measured in kilometers, hectometers, or meters. /145

LINZA [Lens] -- transparent body (usually glass or quartz) restricted to two spherical surfaces or a plane and a spherical surface, or two concave surfaces. There are different forms of L., including converging (double convex, planoconcave, convexo-concave) and diverging (double concave, concavo-convex, planoconcave).

LINIYa BOKOVYKh OTKLONENIY [Line of Lateral Deflections] -- straight line perpendicular to the plane of the target.

LINIYa BROSANIYa [Line of Departure] -- continuation of the bore axis at the moment of projectile departure. It refers to trajectory at the point of origin.

LINIYa VIZIROVANIYa [Sighting Line] -- in optical sighting devices, a straight line coinciding with the device's optical axis; in nonoptical sighting devices, a straight line passing through sighting points (a windage gauge and front sight, for example).

LINIYa VIZIROVANIYa LETATEL'NOGO APPARATA [Airborne Platform Sighting Line] -- imaginary straight line passing through the origin of coordinates and center of gravity of an airborne platform.

LINIYa VYSTRELA [Line of Elevation] -- extension of the bore axis of a laid piece.

LINIYa ZENITA ORUDIYa [Piece Zenith Line] -- vertical line passing through a piece.

LINIYa NABLYuDENIYa (TsELI) [Observer-Target Line] -- straight line connecting an observation instrument or observation post with the target.

LINIYa NAVODKI [Piece-Aiming Point Line] -- straight line connecting the piece with the aiming point.

LINIYa PADENIYa [Line of Fall] -- refers to trajectory at impact point.

LINIYa PRITsELIVANIYa [Line of Aim] -- sighting line of piece sighting devices occupying a specific (fixed) position relative to bore axis at each given moment of laying a piece. This line coincides with the piece-target line during direct laying firing.

LINIYa RAZRYVA [Line of Burst] -- straight line connecting the piece with the burst.

LINIYa TsELI [Piece-Target Line] -- straight line connecting the piece /146 with the target.

LOBOVOYe SOPROTIVLENIYe [Drag] -- projection of the full resultant aerodynamic force directed opposite to the missile's velocity vector. L.s. increases proportional to the square of the missile's velocity and will depend on air density, missile form, velocity, and cross-section, missile position in the air stream, and other causes.

LOZhNYYe SOORUZhENIYa (POZITsII) [Dummy Structures (Positions)] -- structures (positions) simulating (displaying) military objectives where they actually do not exist. Diversion of enemy fire and nuclear missile strikes from actual targets is achieved in this way. Those employed at the troop unit level include dummy slit and communications trenches, radiation shelters for military equipment, foxholes,

artillery fire positions, structures, artillery and missile mock-ups, bridges, roads, and so on.

LOZhNYY PERENOS OGNYa [False Lifting of Fire] -- lifting of fire to a new target or objective in order to confuse the enemy.

LOKATOR [Detector] -- see radiolokator [radar].

LOPAST' [Body] -- in artillery, the central part of an axle. For stability, the L. of an axle usually is manufactured in the form of an H-beam or tubular beam.

LOTOK [Loading Tray] -- hinged tray (trough) in the breech ring for guiding heavy projectiles as they are rammed into a piece.

LYuL'KA [Cradle] -- massive steel component of an artillery mount on which the barrel (secured by the recoil system) lies. The barrel recoils along cradle guides at the moment of firing, then returns to its initial position due to recuperator action. A L. looks like a trough in the form of a piece jacket. The barrel of a contemporary piece does not have trunnions. It is held in the cradle and kept from slipping backwards by the elastic force of the recoil devices. Trunnions are built onto the L. A L. secured in the top carriage's trunnion sockets (in the rotating part of the mount for shipboard artillery) can be tilted in the vertical plane along with the barrel.

MAGAZIN [Magazine] -- in small-caliber antiaircraft artillery, a special box holding shells (5--20 depending on piece caliber) and supplying them to the carrier. Shells in a clip are placed in the M. Moving holders with pawls feed shells from the M. into the carrier.

MAGNIY [Magnesium] (Mg) -- chemical element, silver metal, burns in air with a blinding white flame. It is used mainly in superlight alloys for equipment. M. is used widely in artillery as flammables and in pyrotechnics (in illuminating, tracer, and incendiary compositions, as well as in illuminating and incendiary projectiles).

MAGNITNOYe SKLONENIYe [Declination] -- horizontal angle between a true meridian and the bearing of a magnetic needle (magnetic meridian). M.s. is considered easterly (with a plus sign) at a given point if the northern end of the magnetic needle declines to the east from the true meridian and westerly (with a minus sign) when the needle declines to the west. The magnitude of M.s. is shown on the southern edge of each topographic map sheet.

MAGNITNYY MERIDIAN [Magnetic Meridian] -- bearing (imaginary line) shown by a magnetic needle and passing through a location. The M.m. does not coincide with the true (geographic) meridian, differing from it by the magnitude of the magnitnoye sklonenive [declination] (see).

MAZER [Maser] -- superhigh frequency quantum-mechanical generator (amplifier). See lazer [laser].

MALOKALIBERNAYa ARTILLERIYa [Small-Caliber Artillery] -- pieces of less than 76mm caliber for employment against aerial targets and small ships. Most M.a. /148 pieces are automatic and have magazine projectile loading and great initial velocity.

MAMERINETs [Scupper Hose] -- special device on a ship's upper deck beneath the rotating portion of a turret to prevent penetration of water, poisonous substance radioactive dust, and radiation penetrating into the turret. The term also is used for strips of hide or paint sailcloth covering the gap between fixed and rotating turret parts in tank and self-propelled artillery.

MANEVRENNOST' ARTILLERIYSKOGO ORUDIYa [Artillery Piece Maneuverability] -- capability of a piece to move from one point to another.

MANEVRENNOST' LETATEL'NOGO APPARATA [Airborne Platform Maneuverability] -- capability of an airborne platform rapidly to change flight direction. M.l.a. is evaluated by possible overloads for it based on a standard and referring to the flight trajectory.

MANEVRIRUYuShchIY KOSMIChESKIY LETATEL'NYY APPARAT [Maneuvering Space Airborne Platform] -- space airborne platform making it possible to control its flight trajectory directly in orbit in all planes and over a rather broad range. Launch of the Soviet Polet-I maneuverable space vehicle marked a new era in space exploration.

MANEVR OGNEM [Fire Maneuver] -- retargetting weapons for simultaneous or successiv massing (concentration) of their fire against vital enemy groupings and obejctives or fire distribution for simultaneous destruction of several groupings (objectives). M.o. is employed by missile and artillery subunits (units) when accomplishing missions to destroy enemy targets (objectives).

MANZhETA [Packing Ring] -- component of the seal of artillery system hydropneumati recuperators in the form of a ring, usually leather, to prevent leakage of liquid (or air) from the high-pressure to low-pressure side.

MARKIROVKA BOYePRIPASOV (RAKET) [Ammunition (Missile) Marking] -- notations /149 on projectiles (mines) and missiles designating role, ammunition (missile) quality, and handling instructions. Projectile (mine) markings show the characteristic of the explosive, fuze type, manufacturing plant, projectile (mine) year of manufacture, lot number, and other data.

MARShEVYYe DVIGATELI [Sustainer Engines] -- rocket engines operating on the entire powered leg of the trajectory of a missile or other airborne platform. M.d. are installed aboard airborne platforms as main engines. Sustainer rocket engines usually are installed on ballistic missiles and air-breathing M.d. on cruise missiles. The operating time of M.d. is considerably greater than that of other power (auxiliary plants on a given missile. If this is a multistage missile, each stage has M.d., which are main engines.

M.d. rigidly attached to the body of an airborne platform in most cases are installed in the tail section of the platform or stage of a multistage missile.

MASSIROVANIYe ARTILLERII [Massing of Artillery] -- concentration of the main mass of artillery in the sector of the main thrust in an offensive or in important sectors on the defensive.

The battles of Stalingrad, Kursk, and Berlin are classic examples of M.a. in combination with aviation and tanks in offensive operations of the Soviet Army in the Great Patriotic War (1941-1945). Some 41,000 pieces, mortars, and multiple rocket launcher vehicles participated in the storming of Berlin alone.

MASSIROVANNYY OGON' ARTILLERII [Artillery Massed Fire] -- fire of all or most of the artillery of a combined-arms formation conducted simultaneously against a vital enemy grouping or objective for the purpose of inflicting a decisive defeat in the shortest possible time.

MASSIROVANNYY YaDERNYY UDAR [Massed Nuclear Strike] -- strike inflicted by a large quantity of nuclear ammunition simultaneously or in a very short time. Its purpose is destruction of discovered enemy means of nuclear attack, the /150 destruction of enemy main troop groupings, and disorganization of the rear area, economy, and troop and state command and control.

MAT [Mat] -- covering woven of hemp for ammunition stacked by a piece or equipment during unpacking under field conditions.

MATEMATIChESKOYe OZhIDANIYe (VELIChINY) [Mathematical Expectation (of a Magnitude)] -- sum of the products of all possible individual values of a given magnitude by the probabilities corresponding to them.

MEZhKONTINENTAL'NAYa RAKETA [Intercontinental Missile] -- long-range multistage ballistic missile that can be launched from one mainland (continent) to another (to any point on the globe). An M.r. can reach any point on the globe. The first models of such missiles were tested successfully in the USSR in 1957.

MEZhKONTINENTAL'NYYe SREDSTVA VOORUZhENNOY BOR'BY [Intercontinental Means of

Armed Conflict] -- aggregate of means for inflicting powerful nuclear missile strikes against vital enemy targets located on other homelands (continents). Global'naya and mezhkontinental'naya raketa [global and intercontinental missiles] (see both), long-range (strategic) missile-equipped aviation, and missile-equipped submarines are M.s.v.b.

MEZOSFERA [Mesosphere] -- layer of the atmosphere extending from 40 to 80 km.

MELANZh [Mixed Acid] -- acid mixture; mixture of nitric (HNO_3) and sulfuric (H_2SO_4) acids.

MELANIT (PIKRINOVAYa KISLOTA) [Melinite (Picric Acid)] -- high explosive, derivative of the nitration of carbolic acid. It was used to prime artillery projectiles before the appearance of TNT.

At present, M. is used to manufacture demolition slabs, antitank mines, and fougasses.

MERA TOChNOSTI [Modulus of Precision] (h) -- ratio of 1 to the product of the average square error (E_2) to a root of two: $h=\frac{1}{E_2\sqrt{2}}$.

MERTVAYa VORONKA [Dead Space] -- danger area above a piece in the form of a cone possessed by antiaircraft guns with a firing elevation less than 90°. A cone formed by the rotation of the ascending branch of trajectory at maximum quadrant /151 angle of departure around the line of the piece's "zenith." Subunits from antiaircraft artillery units are deployed in firing positions so that aerial targets in dead spaces are covered by fire from adjacent subunits (pieces).

MERTVAYa ZONA RADIOLOKATsIONNOY STANTsII [Radar Station Dead Zone] -- space (zone) in which a radar station cannot detect an object (target) due to technical parameters or terrain factors. M.z.r.s. is determined by station elevation and field of view angle in the vertical plane (based on angle of site), operating waveband, and pulse width insuring observation of objects at minimum possible range from the station.

MERTVOYe PROSTRANSTVO [Dead Space] (of a piece, battery) -- section of terrain within the firing range of a given piece (battery) in which a target (obstacle) cannot be destroyed by a direct hit during firing from a given fire position. Essentially, M.p. is measured only along the piece-target line.

METALLOKERAMIKA [Cermet] (powder metallurgy) -- method of manufacturing articles from metal powders by hot pressing (i. e., by simultaneous action of pressure and temperature or initially to press under pressure, then sintering at high temperature). It found wide use in the technology of manufacturing hard alloys and refractory metals. In artillery, in particular, M. is used for manufacture of armor-piercing cores for subcaliber armor-piercing projectiles. A core made of a hard alloy (cermet) resembles a diamond in hardness. Upon striking armor, the body of the subcaliber projectile is destroyed, but the hard core penetrates the armor to a thickness greater by a factor of almost 2 than a conventional armor-piercing projectile does.

METATEL'NOYe ORUZhIYe [Propelling Weapon] -- military weapon for propelling various types of projectiles to a distance. The first M.o. was the sling (a leather loop) used to hurl stones 200 meters and more. The most-widespread M.o. was /152 the bow, which involved the term "to shoot," designating the hurling of an arrow. The bow remained a combat weapon right up to the 17th century. In ancient times, even heavier propelling weapons existed. Ballistas, catapults, and a variety of other propelling weapons formed siege artillery in ancient times. The first firearms appeared with invention of black powder. In the mid-14th century, firearms were found in all countries of Europe and propelling weapons were done away with once and for all. The first M.o. were unimproved. As productive forces, science, and technology developed, the propelling firearm became a first-class artillery weapon. Rocket artillery, the forerunner of modern rocketry, was created in Russia in the early 19th century. The modern M.o. primarily is the missile, which has been widely developed. The USSR occupies a leading place in missile technology among the world's leading countries.

METATEL'NYYe VZRYVChATYYe VEShchESTVA [Propelling Explosives] -- explosives, the character of the burst of which makes their use possible for hurling projectiles, mortar shells, and bullets. Black and smokeless powder fall in this category. Powders are used in rocket engines, artillery ammunition, in various ignition devices, and so on (see porokha [powder propellants]).

METEOROGRAF [Meteorograph] -- complex weather instrument combining within itself a thermograph, hygrograph, and barograph for continuous measurement and automatic recording of temperature, humidity, and pressure. A timer activates the recorder. M. are categorized as sounding, aircraft, and kite. Sounding M. are sent aloft by a ballon to altitudes of 35-40 km, aircraft M. are sent aloft in an airplane, and kite M. are sent aloft by tendered aerostats to an altitude of 5-7 km.

METEOROLOGIChESKAYa PODGOTOVKA [Meterological Preparation] -- determination of and consideration for meterological conditions for firing. It includes determination of and consideration for ballistic deviation of air temperature, ballistic wind direction and velocity, and air pressure deviation at ground level. During /153 multiple rocket launcher firing, M.p. also includes the direction and velocity of the wind at ground level.

METEOROLOGIChESKAYa RAKETA [Meteorological Rocket] -- rocket for study of the upper layers of the atmosphere. They carry containers with equipment used to measure air pressure, temperature, and humidity, with these containers parachuted back to the ground.

METEOROLOGIChESKAYa SVODKA (METEOSVODKA) [Meteorological Summary (Weather Summary)] -- summary of information on basic meteorological elements and anticipated weather in encrypted (coded) form broadcast by the Weather Bureau on radio and telephone.

METEOROLOGIChESKAYa STANTsIYa [Meteorological Station] -- post conducting continuous meteorological observation of the state of the atmosphere and, at specifically-established times, reporting these observations to interested departments and institutions (in the form of a bulletin).

METEOROLOGIChESKIYe PRIBORY [Meteorological Instruments] -- instruments for measurement of meteorological elements (air temperature, pressure, and humidity, wind direction and velocity, and so forth). They include thermometers of various types for measurement of air temperature; thermographs for continuous recording of air temperature; barometers: mercury, metal, aneroid and barographs -- recorders for continuous registration of atmospheric pressure; rain gauges determining the amount of precipitation; anemographs for continuous registration of wind velocity; instruments determining the magnitude of direct and dispersed solar radiation, aerological instruments for measuring meteorological elements, and so forth.

METEOROLOGICHESKIYe USLOVIYa STREL'BY [Meteorological Conditions for Firing] -- standard (tabular) conditions for firing:

-- atmospheric pressure at the location of the piece 755 mm of mercury;

-- air temperature +15° C;

-- air humidity 50%;

-- wind absent at all altitudes. In actuality, meteorological conditions for firing differ from tabular conditions, which leads to deviation of the average trajectory from the tabular trajectory. Meteorological corrections are computed in order to take these deviations into account.

METEOROLOGICHESKIYe ELEMENTY [Meteorological Elements] -- geophysical magnitudes determining the physical state of the atmosphere at every moment (temperature, atmoshpheric pressure, air humidity, cloudiness, precipitation, wind direction and velocity, and so forth). /154

METEOROLOGICHESKIY BYuLLETEN' (METEOBYuLLETEN') [Meteorological Bulletin (Weather Bulletin)] -- summary of information on surface changes in atmospheric pressure and temperature; on ballistic deviation of air temperature at various altitudes; on ballistic wind direction and velocity. A meteorological bulletin takes the form of a coded telephonegram. The number of digits in each group and the position of the groups in the telephonegram are constant. They are transmitted in the form of circular radio messages without receipt acknowledgement, with transmissions repeated at least two or three times in succession.

METEOROLOGIYa [Meteorology] -- science studying physical processes and phenomena occurring in the Earth's air envelope, i. e., in the atmosphere. It is an applied science in artillery. The main task of M. is weather prediction (forecasting).

METEOSREDNIY BYuLLETEN' [Meteor Telegram for Medium Artillery] -- summary of information on a surface change in the atmospheric pressure and temperature of the air; on a ballistic deviation in air temperature at various altitudes from tabular temperature; on ballistic wind direction and velocity. An M.b. takes the form of a coded telephonegram and is used by all types of tube (multiple rocket) artillery and missile troops.

METKOST' STREL'BY [Firing Accuracy] -- one of the conditions of sure destruction

of a target. In artillery, M.s. is achieved by matching (in the process of registration or complete preparation) the srednaya trayektoriya [trajectory to mean point of impact] (see) with the target or an approximation to it in such a way that the maximum number of projectiles fired can destroy the target and with the desire to reduce projectile dispersion (selection of charge and projectile lots with the same weight signs, uniformity of laying, and so on).

M.s. will depend on quality of weapons and ammunition, ability of the firer to determine target position accurately and to sight correctly (during direct laying) or to approximate to the maximum trajectory to the mean point of impact (during registration), to introduce corrections to firing conditions properly, and to /155 handle the piece and instruments properly.

METODIChESKIY OGON' [Deliberate Fire] -- fire conducted with designated identical time intervals between rounds. Its purpose is to keep a target in a suppressed state in the intervals between intense shellfires or to maintain the requisite smoke screen concentration after intense shellfire when firing smoke projectiles. M.o. also can be employed to harass the enemy.

METOD PRYaMOGO NAVEDENIYa [Zero Bearing Guidance Method] -- simplest method of guiding an object to a target using a seeker rigidly connected with a missile's longitudinal axis in which the missile axis continuously is directed at the target. An error signal is generated if there is a deviation of the missile's longitudinal axis and, consequently, seeker axis from the bearing to the target. Commands are generated on the basis of this signal, control surfaces are acted upon, and the missile is redirected at the target. The error signal will equal zero.

METOD SOVMEShchENIYa [Line of Sight Method] -- method of guiding a missile to a target in which the airborne platform is maintained continuously on one line connecting three points -- operator-missile-target. The guidance trajectory in this case is a three-point curve. This sometimes is called the line of sight method, with the guidance trajectory called a three-point curve. During visual guidance, the operator matches the aiming point (missile center of mass) with the target. In the event the missile deviates from the control post-missile-target line, the operator determines deviation magnitude and direction and, using ground-based control equipment, transmits appropriate commands to the missile. M.s. is used during the

command guidance method, when guiding antitank guided projectiles (missiles), for example.

MEKhANIZM [Mechanism] -- aggregate of interconnected components, movement of each of which determined relative to the others, while one of them is fixed.

MEKhANIChESKIY GIDROBANNIK [Mechanical Hydraulic Bore Cleaner] -- specially-designed machine for cleaning barrels. It can be used for purging, cleaning, /156 and swabbing out 76--152mm barrels. It is manned by one or two gun crew members and run by a 4.5 kW ac electric motor.

MEKhANIChESKIY DISTANTsIONNYY VZRYVATEL' [Mechanical Time Fuze] -- mechanism providing the initial explosive pulse of a bursting charge of an HE (time) shell in which a clock mechanism computes the time from the moment of departure to moment of burst. It will comprise igniting and clock mechanisms, detonator cap, and detonato The fuze is set by turning the ballistic cap. An M.d.v. is more improved than a powder fuze and is more accurate. They activate without fail both in the dense and the rarified layers of the atmosphere and are used predominently for firing against aerial targets.

MEKhANIChESKIY USTANOVShchIK TRUBOK [Mechanical Fuze Setter] -- instrument for setting time fuzes, usually attached to the left side of an artillery mount. Contemporary antiaircraft artillery pieces are equipped with automatic fuze setters (AUT) to increase accuracy and setting (fuze) speed.

MEKhANIChESKIY ChASOVOY VZRYVATEL' [Mechanical Time Fuze] -- mechanical time fuze in which a clock is used for time computation.

MIDELEVOYe SECHENIYe [Frontal Section] -- area of the maximum cross section of an airborne platform in the plane perpendicular to its longitudinal axis.

MIDEL' [Maximum Cross Section] -- maximum area of a missile's cross section. The term sometimes is understood to mean a missile's maximum width.

MIKROBAR [Barye] -- unit of measurement of atmospheric pressure equalling one-millionth of a bar.

MIKROBAROGRAF [Microbarograph] -- meteorological instrument for continuous automatic recording of small changes in atmospheric pressure (in baryes). A M. is a very sensitive measurement instrument.

MIKRON [Micron] -- unit of length, thousandth of a millimeter or millionth of a meter.

MILYa [Mile] -- unit of distance measurement at sea. One nautical mile equals the length of an arc corresponding to 1 minute of a land meridian. One mile = 10 cable lengths = 1,000 sazhins = 1,852 meters = 6,080 feet. One cable's length /157 equals 1/10 of a mile.

MINA [Mortar Shell; Mine] -- 1. Tear- or shell-shaped finned projectile with a stabilizer in the tail section. A M. does not rotate in flight. 2. Engineer ammunition used as an obstacle. Mines are categorized as antitank, antipersonnel, antivehicle, and special. 3. Type of naval weapon placed beneath the water's surface to blow up ships passing over them.

MINOMET [Mortar] -- smooth-bore piece firing a mortar shell equipped with empennage (a stabilizer) for stability as it flies through the air. The stabilizer balances the mortar shell in flight and forces it "to follow" a trajectory (to fly nose forward) It is much simpler in design than a gun and comprises a barrel, legs, base plate, and sight. At present, there are rifled mortar barrels imparting rotation to the mortar shell in flight. The inventories of many countries include 50--60mm company, 81--90mm battalion, 105--120mm regimental, and 150--280mm heavy mortars. The latter organizationally will be included in artillery.

MINOMETNAYa ZAZhIGATEL'NAYa MINA [Incendiary Mortar Shell] -- mortar shell charged with an incendiary substance (thermite and phosphorous) destroying a target with shrapnel and incendiary elements. A mortar shell has a bursting charge and impact fuze. A mortar shell charged with a liquid incendiary mixture has no shrapnel effect. The phosphorous ignites the incendiary fuel, which comprises oil, gasoline, naphtha, or napalm. A mortar shell charged with a liquid incendiary fuel can have an impact or a time fuze. At the present time, 75--200mm M.z.m. exist, one example being the English 200mm mortar shell weighing 25-30 kg with 11 liters of incendiary fuel.

MITKAL' [Calico] -- thin cotton fabric used for artillery charge bags.

MIShEN' [Target] -- artificial or natural target used for firings at a range. Various types are used for artillery firing: rectangular, figures (replicating a tank, piece, mortar, machine gun), various defensive structures (foxhole, /158 dugout, pillbox), and others. Sleeve targets (cloth cone towed by an aircraft), parachute targets, and controlled targets are used for firing at aerial targets. Large and small shipboard targets (practice targets) towed by high-speed ships are used for coastal artillery firing. M. are categorized as fixed and mobile, exposed and pop-up.

MNOGOSTUPENChATAYa RAKETA [Multistage Missile] -- see raketa-mnogostupenchataya [multistage missile].

MODELIROVANIYe [Modelling] -- u ; of models to study physical processes. In the simplest case, the model reprodu es the phenomenon under study while retaining its physical nature and geometrical likeness, differing from the original only in overall dimensions, speed in which studied phenomena occur, and sometimes material. The idea of a M. is that one will judge phenomena occurring in the "original" (or under "full-scale conditions") from results of tests with the model. Use of models to study aerodynamic characteristics of missiles (projectiles, mortar shells) is called aerodynamic M. Electronic modelling devices (electronic models) for study of the dynamics of airborne platforms has found wide use recently.

MODEL' ORUDIYa (STANKA) [Piece (Mounting) Model] -- accurate representation of a piece or other mechanisms on a small scale.

MODERATOR [Moderator] -- portion of certain weapon hydraulic recoil buffers which absorbs the excess energy of the piece's recoil.

MODULIRUYuShchIY DISK [Modulating Disc] -- rotating metal or glass disc with a row of alternating strips transparent or non-transparent for IR rays (i. e., with variable transparency). The M.d. is placed in the focal plane of the lens in an optical system or optical (IR) seeker (tracking head) to modulate radiant flux. The M.d. rotates at a fixed speed by means of a motor, whose rpm are maintained by a governor.

MODFA [Modfa] -- first firearm used by Arabs in the 12-13th centuries. It was a propelling barrel with a bottom and bush firing hole. Small round metal /159 balls called a bondok (in Arabic -- nut) were fired from it. The charge comprised black powder and the piece was loaded from the chase, with the charge and then the projectile (ball) inserted. The charge was ignited via a touchhole.

MOMENT VYLETA [Projectile Exit] -- 1. The moment the "bottom" of a projectile passes the muzzle of the barrel. 2. Moment when a projectile's center of mass is located at the point of origin.

MONOBLOK [Monobloc] -- weapon barrel, single-layer, seamless forged, without reinforcement.

MONTAZh [Assembly] -- assembly and installation of artillery systems, artillery turrets, launchers, and various auxiliary equipment, apparatuses, instruments, and other devices from finished parts and nodes.

MORTIRA [Mortar] -- rifled artillery piece of high trajectory fire with a short barrel and projectile low initial velocity for firing at high angles of elevation. M. have very short relative barrel length (6-9 calibers) fired with relatively small charges. M. now almost are never employed in field artillery.

MORSKAYa ARTILLERIYa [Maritime Artillery] -- artillery in the inventory of combat vessels of all classes, as well as artillery employed for coastal defense. M.a. is categorized as shipboard and coastal and, in comparision with other types of artillery, is more powerful (calibers up to 406mm, firing range 45-50 km, and projectile weights up to 1,200 kg).

MOTORESURS [Motor Potential] -- number of hours (motor hours) during which a machine (aggregate) can operate before scheduled maintenance. Each machine type has its M. established when it is produced.

MOTO-ChAS [Motor Hour] -- unit of measurement of the operating productivity of combat and auxiliary tracked vehicles. It computes the operating reserve of these vehicles, determines between-repair periods of their operation, and technical

maintenance periodicity. In addition, fuel, lubricant, and other requirements are computed from expenditure norms established per motor hour..

MOShchNOST' ATOMNOGO ORUZhIYa [Atomic Weapon Yield] -- determined in TNT equivalents, i. e., that quantity of TNT which, when detonated, would give off the identical energy as would detonation of a given atomic charge. The TNT equivalent of atomic ammunition usually is computed in thousands of tons of TNT, while that of thermonuclear ammunition is measured in thousands or millions of tons of TNT.

MOShchNOST' KORABEL'NOY ARTILLERII [Shipboard Artillery Power] (F) -- determined from firing results to a unit of time. M.k.a. is determined by three elements: probability of hitting the target P, number of firings s and destructive active of each projectile R:

$$F = PsR.$$

MOShchNOST' YaDERNOGO BOYePRIPASA [Nuclear Ammunition Yield] -- amount of energy released during an explosion. M.ya.b. is characterized by a TNT equivalent. Nuclear ammunition is categorized based on power in calibers: small, medium, and large.

MUFTY SOYeDINITEL'NYYe [Connecting Collars] -- device for connecting shafts. Depending on role, the most varied M.s. designs are used in artillery mounts.

MUShKA [Front Sight] -- in small-arms weapons, that portion of the sighting device fastened on the piece's muzzle. The simplest sights (M. and windage gauge) used in smooth-bore artillery until the mid-19th century. At that time, a piece was fired with direct laying only. M. are used at the present time in small-arms weapons. They are categorized by profile as round, pointed, rectangular, and so forth.

MUShKEL' [Mallet] -- wooden hammer, tool, used for disassembly and assembly of artillery (mortar, heavy machine gun) components.

M-ChISLO [M-Number] -- characteristic of the flow of a liquid or gas equalling the ratio of velocity v of the flow of the liquid or gas to the speed of sound a_o at a given place in the environment studied: $M = \frac{v}{a_o}$. M, equalling 1, plays

the role of the critical number separating subsonic and supersonic flows (speeds). In Soviet scientific literature, the M-number often is called the Maiyevskiy number, with Mach number, Sarro number, and Berstow number (B_a) used in foreign literature.

NABLYuDAYeMAYa TsEL' [Observed Target] -- target observed from ground-based observation posts. When firing at an observed target, the firer can adjust fire during the firing process and observe the moment of target destruction.

NABLYuDATEL'NOYe VREMYa [Observation Interval] ($\tau_н$) -- time interval between two sequential observations of the coordinates (between fixes) of a moving target.

NABLYuDATEL'NYY PUNKT (NP) [Observation Post] -- place from which artillery fire control, observation of friendly force activities, and reconnaissance of the enemy and of the terrain in the enemy area of disposition are conducted. NP are categorized as main and auxiliary, with the latter subdivided into forward and lateral.

NABROV [Dish] -- placement of the spokes of a wheel at a slight angle (5--7°) to the plane of the rim. N. increases the resilience of the wheels and decreases breakaway forces on a spoke as an artillery piece moves along an incline.

NAVESNAYa STREL'BA [High Angle Fire] -- firing with a steep trajectory, one understood to have an angle of descent exceeding 20°. Mortar firing is the term used for N.s. at angles of elevation exceeding 45°.

NAVODKA [Laying] -- matching the angles inscribed in the vertical and horizontal planes on sighting devices with angles determined on the terrain. N. is categorized based on sighting character as direct [case I], case II, and indirect [case III]. Direct laying is when the target is visible from the piece's sighting devices and the piece is directed in the vertical and horizontal planes by direct sighting /162 at the target. Case II is the term used when the requisite position in the horizontal plane is imparted to the barrel (guide) by direct sighting at the target, while the requisite angle in the vertical plane is imparted to the barrel (guide) with the aid of the side clinometer present on sighting devices. Indirect laying is the term describing imparting the requisite position in the horizontal plane to the barrel (guide) with the aid of the side clinometer present on sighting devices. Target visibility is not required in indirect laying.

NAGRUZKA POPERECHNAYa [Lateral Load] -- ratio of weight to area of greatest missile cross section.

NADVODNYY YaDERNYY VZRYV [Above-Water Nuclear Explosion] -- nuclear explosion in which the fireball touches the water's surface.

NADDUV [Pressurization] -- filling missile propellant tanks with compressed air (gas). This is done in liquid-propellant rocket engines with a pressure-fed system to expulse fuel and oxidizer from the tanks and supplying them to the combustion chamber. Gas pressure in this system reaches several dozen atmospheres. Pressurization is carried out in liquid-propellant rocket engines with a pump-fed system to insure cavitation-free pump operation and increase fuel tank strength. Air pressure in the tanks in this system does not exceed 5 atmospheres.

NADEZhNOST' STREL'BY [Firing Reliability] -- degree of confidence in accomplishment of a fire mission under given specific conditions or probability of accomplishment of an assigned fire mission for given conditions.

NADKALIBERNYY SNARYaD [Spigot Projectile] -- see snaryad nadkalibernyy [spigot projectile].

NADUL'NIK [Muzzle Attachment] -- sailcloth or leather cover placed on the muzzle of a barrel to protect the bore against dust, snow, rain, and the like.

NAZEMNAYa APPARATURA NAVEDENIYa (UPRAVLENIYa) [Ground-Based Guidance (Control) Equipment] -- radiotechnical missile tracking equipment located on the ground or in a floating or airborne object (ship, aircraft, helicopter, and so on). /163

NAZEMNAYa ARTILLERIYa [Surface-to-Surface Artillery] -- artillery in the Ground Forces inventory for destruction of ground-based targets. A large quantity of various artillery system models of multiple rocket, tube, rifled, smooth-bore, towed, and self-propelled artillery is in the Ground Forces inventory. N.a. is categorized based on piece, mortar, and launcher power as light, heavy, super heavy, and especially heavy, by piece type as guns, howitzers, mortars, and multiple rocket, and by organizational subordination as troop within the composition of combined-arms (tank) units and formations. Artillery of the Reserve of the Supreme High Command was created as well.

NAZEMNOYe UPRAVLYaYeMOYe ORUZhIYe [Surface Guided Weapons] -- guided missiles

(projectiles) with a explosive charge (nuclear or conventional explosives), sighting devices, control instruments, launchers, and launch pads located on land, aboard a ship or submarine, on a tank, armored personnel carrier, and self-propelled missile launcher. This includes "surface-to-surface" and "surface-to-air" missiles, as well as the subclasses "surface-to-sea," "ship-to-ship," "ship-to-surface," "ship-to-submarine," "submarine-to-ship," "submarine-to-surface," "ship-to-air," and "submarine-to-air." N.u.o. possess high accuracy and unlimited power and range. They are employed to destroy objectives on land, in the air, and at sea.

NAZEMNYY VETER [Surface Wind] -- wind whose velocity and direction are measured at the ground (at the earth's surface).

NAZEMNYY YaDERNYY VZRYV [Ground Nuclear Burst] -- nuclear burst in which the fireball touches the surface of the earth.

NAIMEN'ShIY PRITsEL (NAIMEN'ShIY UGOL PRITsELIVANIYa) [Minimum Elevation (Minimum Angle of Elevation)] -- sight setting which, given conditions for firing and /164 disposition of the piece in the fire position, is the least acceptable; elevation corresponding to the piece's minimum angle of elevation. N.p. is determined in three directions: base, right, and left.

NAKAT [Counterrecoil] -- return movement of the barrel of an artillery piece following recoil under the influence of energy accumulated by the recuperator during recoil.

NAKATNIK ORUDIYNYY [Piece Recuperator] -- part of an artillery mount fulfilling two functions: 1) continually maintains the barrel in the extreme forward position at all elevation angles; 2) moves the piece's recoiling parts to the initial position after a shot (recoil). The recuperator stores counterrecoil energy during recoil by compressing springs (air or gas), expending some recoil energy for this purpose. Compressed during recoil, the springs expand and push the barrel forward. N.o. are categorized as spring, hydropneumatic (pneumatic-liquid), and pneumatic (air), with the former used most often in modern artillery pieces.

NAKLONENIYe ORBITY SPUTNIKA [Satellite Orbit Inclination] -- angle between the plane of a satellite orbit and the plane of the equator. Satellite orbits are categorized as polar, inclined, or equatorial.

NAKLONNAYa DAL'NOST' [Slant Range] -- distance (shortest) from piece to air burst or to aerial target.

NAKLONNAYa PLOSKOST' KURSA TsELI [Target Course Inclined Plane] -- inclined plane running through the target course and piece.

NAKLONNAYa ZAPUSK [Inclined Launch] -- missile launch along an inclined line (angle of elevation less than 90°).

NAKRYVAYuSchchAYa GRUPPA [Bracketing Salvo] -- group of bursts of different sign (shorts and overs) obtained when firing at the same angle of elevation.

NAKRYTIYe [Bracket] -- volley in which some splashes (bursts) are overs and others shorts. An N. is considered normal when the average trajectory passes through the center of the target's destroyed area.

NAPALMOVYY ZAZhIGATEL'NYY SNARYaD [Napalm Incendiary Projectile] (Foreign) -- artillery projectile charged with napalm employed to incinerate highly-flammable enemy targets. The casing contains incendiary elements comprising 1 x 5 cm metal /165 napalm-filled tubes. A burster expels the metal tubes, igniting their contents at the same time, when the projectile explodes.

NAPRAVLENIYe DVIZhENIYa TsELI OTNOSITEL'NO ORUDIYa [Direction of Target Movement Relative to the Piece] -- this can be frontal -- target will move directly towards or away from the piece; oblique -- target will move at a sharp or obtuse angle relative to the direction of the plane of fire; or flank -- target will move to the right or to the left relative to the plane of fire.

NAPRAVLENYY VZRYV (KUMULYaTIVNYY) [Directed (Shaped) Burst] -- conventional explosive burst in which the shock wave is concentrated (shaped) in one direction rather than distributed 360°. This phenomenon involves energy redistribution and concentration in a specific direction rather than an increase in the charge's overall action. The shock wave, in the form of a directed stream, has enormous velocity reaching 10,000--15,000 m/sec, high temperature, and pressure up to 100,000 kg/cm^2, insuring great armor penetration. An N.v. is achieved by a shaped (conical or hemispheric) cavity in the charge. The penetrating effect will become more powerful

if the shaped cavity's surface is covered with a thin metal casing. N.v. recently have been used widely in shaped-charge ammunition.

NAPRAVLYaYuShchIYe [Guides] -- launcher components forming sliding surfaces (rails) on which a missile (rocket projectile) will move to obtain flight speed and direction during launch.

NAREZNOYe ORUZhIYe [Rifled Weapon] -- firearm with threaded channels -- rifling -- in the bore's inner surface.

NAREZY [Rifling] -- channels in the bore running in a threaded fashion from the left upwards to the right (if looking up the bore from the breech end) to impart rotating motion to a projectile to insure its stability as it moves through the air. The rifled part of the bore, the depth of the N., and their number differs /166 among pieces: some have rifling with a constant twist, i. e., an identical N. slope along their entire length, while others have progressive (gradually increasing) twist.

N. in the bore is made with a width of 5--10 mm, while the fields (protuberances) between adjacent N. have a width of 2--4 mm. N. depth will depend on barrel design and projectile driving band and usually is 0.7--2 mm.

NASOSNAYa SISTEMA PODAChI TOPLIVA [Pump Feed System] -- supply of liquid propellant (fuel and oxidizer) to a ZhRD combustion chamber under pressure by pumps. A small overpressure of up to 5 kg/cm^2 required for continuous supply of propellant to the pumps is created in the propellant tanks in a pump system. The engine has a turbopump assembly (single machine with a common shaft and connecting a turbine and the requisite number of pumps) for propellant feed. A gas generator plant using the missile's main propellant or a gas-steam plant drives the turbine.

NASTIL'NAYa STREL'BA [Flat Trajectory Firing] -- firing with a flat trajectory, understood to mean one with an angle of descent not exceeding 20°.

NAChAL'NAYa SKOROST' SNARYaDA [Projectile Initial Velocity] -- projectile velocity at point of origin measured in meters per second.

NEAVTONOMNOYe UPRAVLENIYe RAKETOY [Missile Non-Selfcontained Control] -- control of missile flight whereby its entire flight trajectory is determined by a complex of instruments located not only aboard the missile, but external to it as well.

NEBESNAYa SFERA [Celestial Sphere] -- imaginary sphere of indefinite radius whose center is located at some point in space depending on the conditions of the problem posed.

NEDOLET [Short] -- projectile burst closer to the target and designated by a sign (-).

NEZAVISIMYYe SOBYTIYe [Independent Events] -- two events (or several), the probability of the occurence of one of which does not depend on the occurence (non-occurence) of the other. See veroyatnostey teoriya [theory of probabilities].

NEKONTAKTNYYe VZRYVATELI [Proximity Fuzes] -- fuzes whose action occurs due to a magnetic, acoustic, or other effect rather than by striking an obstacle. /167

NENABLYuDAYeMAYa TsEL' [Unobserved Target] -- target unobserved by ground-based NP: artillery and mortar batteries, personnel and tanks located in concentration areas or in jump-off positions, command posts, headquarters, warehouses, and so on sheltered from ground observation, as well as targets fired against at night with illumination and under smoke screen conditions.

NEOKONChATEL'NO SNARYaZhENNYY SNARYaD [Incompletely-Charged Projectile] -- projectile with a bursting charge lacking an igniting or time fuze.

NEPODVIZhNOYe OSNOVANIYe [Base Plate] -- fixed portion of a mounting providing support for a shipboard or fixed artillery mount. The artillery mount's turntable is secured on the N.o. by two latches to prevent it from turning over during firing. The forward latch is wide and the rear one is narrow.

NEPODVIZhNYY ZAGRADITEL'NYY OGON' (NZO) [Fixed Barrage Fire] -- artillery fire (frontal or flank) of great density employed on preplanned lines to restrict enemy movement across them.

NERAZDEL'NAYa NAVODKA [Simultaneous Laying] -- laying whereby one control line (the optical axis of a panorama or optical sight reflector) is used to lay the piece in the horizontal and vertical planes.

NESAMOKhODNYYe PUSKOVYYe USTANOVKI [Non-Selfpropelled Launchers] -- ground-based launcher mounted on special trailers or carriages with wheeled or tracked drive towed by vehicles or by wheeled or tracked tugs.

NESOVMESTNYYe SOBYTIYa [Incompatible Events] -- events, occurence of one of which excludes the probability of occurence of another. See veroyatnostey teoriya [theory of probabilities].

NESTABILIZIROVANNOYe ARTILLERIYSKOYe ORUDIY [Unstabilized Artillery Piece] -- an artillery piece mounted on a ship (tank, self-propelled artillery mount) rolls as the ship (tank, self-propelled artillery mount) rolls and moves, with the axis of the piece's trunnions rolling simultaneously. The piece is laid in the /168 vertical and horizontal planes without stabilizing devices.

NEUPRAVLYaYeMYYe RAKETY [Unguided Missiles] -- missiles with no control systems on board. N.r. flight direction and range are imparted by the launchers. Due to their great dispersion, N.r. are employed for firing at ranges of several dozens of kilometers. They are simple in design but are not as accurate as guided missiles.

NEUPRAVLYaYeMYY REAKTIVNYY SNARYaD [Unguided Rocket Projectile] (Foreign) -- ballistic projectile whose trajectory will depend on the force of gravity and aerodynamic forces and which describes a so-called ballistic curve.

NIZhNIY STANOK [Lower Mounting] -- strong steel casting which, along with the trails, in the combat position comprises the piece's base plate. In the travel mode, these parts form the carriage on which the piece is transported by a tug. Forces acting on the carriage during firing are transmitted via the N.s. to the ground. The N.s. rests on an axle-tree with drive.

NIZKIYe VOZDUShNYYe RAZRYVY [Low Air Bursts] (H) -- air bursts of artillery time projectiles whose burst clouds are visible at target level.

NIZKIY VOZDUShNYY YaDERNYY VZRYV [Low Nuclear Air Burst] -- burst occurring at an altitude at which destruction of a large amount of relatively strong objects is insured while simultaneously ruling out heavy radioactive contamination of the terrain along the path of the cloud.

NISKhODYaShchAYa VETV' TRAYeKTORII [Trajectory Downward Leg] -- portion of a trajectory from its apex to impact point.

NITROGLITsERIN [Nitroglycerine] -- powerful high explosive, product of treating glycerine with nitric acid. It is an oily colorless sweet-tasting liquid. It detonates due to shock, friction, and shaking. At the present time, N. in pure form is not used as a high explosive, but is used in manufacture of smokeless nitroglycerine powders and dynamites.

NITRODIGLIKOLEVYY (DIGLIKOLEVYY) POROKh [Nitrodiglycolic (Diglycolic) Powder] -- ballistic type of black powder, product of the gelatinization of pyroxylin with nitrodiglycol. The latter is a colorless liquid with a specific weight of 1.4, a powerful explosive similar to nitroglycerine but less sensitive to mechanical /169 actions. Nitrodiglycol is used in manufacture of ballistic-type black powders. An important property of N.p. is decreased combustion temperature, which impacts favorably on artillery barrel life.

NOMENKLATURA KART [Map Nomenclature] -- system of conventional literal and numerical designations of individual topographic map sheets of different scales. The nomenclature of an individual sheet is placed above the upper margin, with the nomenclature of adjacent sheets indicated on the remaining three margins.

NOMINAL'NAYa ATOMNAYa BOMBA [Nominal Atomic Bomb] -- atomic bomb with a TNT equivalent of 20,000 tons.

NONIUS [Vernier] -- auxiliary computational graduation increasing precision measurement of a basic scale.

NOChNOY PRITsEL [Night Sight] -- instrument making it possible to conduct direct laying aimed fire from pieces at night and in poor visibility. An N.p. is a

monocular-type instrument including an electro-optical sight, IR searchlight, electric feed source for the searchlight, and converter.

NULEVAYa LINIYa PRITsELIVANIYa [Zero Sighting Line] -- sighting line parallel to the bore axis given basic (zero) settings of the piece's sighting devices.

NUTATsIYa SNARYaDA [Projectile Nutation] -- slight periodic oscillation of the axis of a rotating projectile as it flies through the air.

NYRYaYuShchIY SNARYaD [Diving Projectile] -- projectile fired at submarines and to repulse torpedoes. They have thin walls and a large bursting charge. Thanks to a special device in the projectile's nose, which is cylindrical with an internal conical recess and apertures, as well as a result of the delayed action fuze, an N.s. explodes under water. They are not used at the present time.

OBLAST' OPASNYKh RAZRYVOV [Dangerous Burst Area] -- portion of a space within which a burst can inflict damage (lethal hit).

OBOYMA [Clip; Cradle] -- 1. Metal frame containing cartridges for loading several types of small-arms weapons (rifle and others) and small-caliber antiaircraft guns. 2. Massive steel component, usually cylindrical, for attachment of any portion of a piece's mounting.

OBRATNOYe PLAMYa [Back-Flash] -- flare formed in the rear of a barrel when the breechblock is opened following a shot. After the shot, a certain amount of incandescent powder gases remains in the bore. Oxidizing when the breechblock is opened, these gases form a flame. Muzzle flash and O.p. are harmful phenomena in artillery. The bore of pieces aboard ships, tanks, and self-propelled artillery pieces is purged with compressed air to eliminate the expulsion of gases to the breechblock.

OBSTREL [Shelling] -- destruction of enemy defensive structures and personnel by artillery fire.

OBTIROChNYYe MATERIALY [Cleaning Materials] -- materials (rags, oakum, cloths) used to wipe down equipment and keep it clean.

OBTYuRATOR [Obturator] -- device in separately-loaded slotted screw breech mechanisms preventing penetration of powder gases between the walls of the breechblock and breech bush during firing. It comprises a gas check pad, ring, and obturator /171 spindle. The round asbestos pad soaked in ram grease enclosed in sailcloth is pressed under high pressure. The operating principle of an O. is as follows. At the moment of firing, the obturator spindle moves backwards due to powder gas pressure, pressing on the gas check pad. The latter expands in all directions, tightly pressing against the chamber walls, ruling out the possibility of powder gas penetration. The shell case will serve as O. in most contemporary pieces.

OBTYuRATsIYa [Obturation] -- hermetic sealing of the chamber (of gases) when a separately-loaded and quick fire piece is fired. O. is achieved in separately-loaded

guns by a special obturating device in the breechblock. The shell case plays this role in quick fire pieces.

OBYChNAYa AERODINAMIChESKAYa SKhEMA [Conventional Aerodynamic Design] -- normal design: airborne platform with rudders located behind the wings, in the tail portion of a missile. Aircraft and many cruise missiles are designed based on O.a.s.

OBYChNOYe ORUZhIYe [Conventional Weapon] -- term used to differentiate from weapons of mass destruction. O.o. include all types of artillery, tank, small-arms, and other weapons.

OBYChNYYe VZRYVChATYYe VEShchESTVA (VV) [Conventional Explosives] -- propellant (black and smokeless powders: pyroxyl and nitroglycerine), primer, and high explosives (fulminate, lead azide, TNRS, tetrazene, trotyl, tetryl, melinite, nitroglycerine, pyroxyl, dynamites, and others); term designating a non-nuclear explosive.

OB"YeKTIV [Lens] -- lens or lens system in an optical instrument aimed at a subject, i. e., lens (lens system) receiving rays from the examined object. An O. builds an image of the subject. O. diameter always is greater than that of the eyepiece.

OGNEVAYa ZADAChA [Fire Mission] -- destruction or suppression of enemy nuclear attack means, personnel, fire weapons, artillery and mortar batteries, destruction of his defensive structures, prohibiting the enemy from maneuvering, conducting defensive operations, or rebuilding damaged objectives.

Fire missions are accomplished by several batteries, a battery, platoon, /172 and piece (mortar, combat vehicle) depending on time available, target nature and size, and the conditions of the combat situation.

OGNEVAYa PODGOTOVKA [Preparation Fire; Firing Training] -- 1. Powerful prepared artillery and aviation strikes delivered prior to the start of an attack to suppress and destroy the most important enemy objectives not to be destroyed by nuclear weapons O.p. renders the enemy incapable of offering organized resistance to the advancing troops. 2. Subject in the training curriculum for personnel of subunits and units of the armed forces.

OGNEVAYa PODDERZhKA [Fire Support] -- Successive neutralization and destruction of the enemy by concentrated artillery fire and air attacks in the course of an offensive for the purpose of ensuring a rapid advance by the attacking troops. Fire support is conducted by various means and to the entire depth of the troops' combat mission.

OGNEVAYa POZITsIYa [Fire Position] -- terrain sector occupied or prepared for occupation by pieces (mortars, combat vehicles) for conducting fire. They are categorized as primary, temporary, and reserve.

A primary fire position is for conducting fire in coordination with missions assigned to the battery (platoon, piece). A temporary fire position is for accomplishment of individual fire missions: support to subunits defending a security zone, conducting fire against distant targets, firing at night, and so on. A reserve fire position is for making a maneuver or forced evacuation of a primary fire position. They are selected beforehand and equipped just as is a primary fire position.

OGNEVAYa SVYaZ' [Fire Coordination] -- method of mutual fire support. Fire coordination may be effected along the front and in depth, between formations, units, and subunits, and between the various weapons (tanks, artillery, combat vehicles).

OGNEVGYe VZAIMODEYSTVIYe [Mutual Fire Coordination] -- coordinated fires against the enemy achieved by target distribution among piece types, fire weapons, or subunits by determining the time and sequence for commencing and maintaining fire.

OGNEVOYe NABLYuDENIYe [Fire Suppression] -- fire with individual rounds or /173 bursts of rapid fire maintained in the intervals between intense shellfire at the same target, but with considerably less density. Its purpose is the keep the target suppressed.

OGNEVOY VAL [Rolling Barrage] -- method of artillery support for troops on the offensive, consisting of successive shifts of high-density fire from one firing line to another at a safe distance ahead of the combat formations of advancing troops.

OGNEVOY VZVOD [Fire Platoon] -- troop subunit directly serving a piece (mortar). An O.v. comprises two--three pieces or mortars with crews (or several self-propelled

artillery mounts or combat vehicles). As a rule, an O.v. accomplishes fire missions in battery composition. However, they can do so independently depending on the situation. In some cases, a fire platoon can suppress an infantry company.

OGNEVOY NALET [Concentrated Fire] -- method of conducting artillery fire for the purpose of destroying enemy personnel, weapons, and combat materiel, envisaging a high density of fire during a short interval of time. As a rule, concentrated fire begins with a burst of rapid fire with subsequent transition to deliberate fire, reckoned on the basis of expending the assigned amount of ammunition in a predetermined period of time.

OGNEVYYe VOZMOZhNOSTI ARTILLERII [Artillery Fire Capabilities] -- volume of missions that a specific amount of artillery can accomplish in a given military situation. O.v.a. are determined beforehand and are used in planning and controlling artillery fire during an engagement.

OGNESTREL'NOYe ORUZhIYe [Firearm] -- type of propellant weapon in which powder gases formed from the combustion of a powder charge is the force propelling a projectile. O.o. elements include projectile (bullet), charge, and barrel. They are categorized as artillery pieces and small arms (automatic weapons, machine guns, and so on).

ODINOChNYY YaDERNYY UDAR [Single Nuclear Strike] -- strike delivered against an objective with one nuclear weapon. It is employed in those cases when the /174 yield of a nuclear weapon ensures that the required damage will be inflicted on the target.

ODNOKOMPONENTNOYe (RAKETNOYe) TOPLIVO [Monopropellant] -- rocket propellant in which the fuel and oxidizer are found in one substance (powder, for example).

OZhIVAL'NAYa ChAST' SNARYaDA [Ogive Portion of a Projectile] -- projectile nose having an ogival form from tip to the beginning of the cylindrical portion.

OKISLITEL' [Oxidizer] -- substance comprising a sufficient amount of oxygen or other oxidizing element required for oxidation of flammable substances. Highly-flammable substances giving off free oxygen during separation are used in this role.

These include salts of nitric acid (nitrates) -- $NaNO_3$, KNO_3, Ba $(NO_3)_2$, salts of chloric acid (chlorates) -- $KClO_3$, $NaClO_3$, Ba $(ClO_3)_2$, and salts of perchloric acid (perchlorates) -- $KClO_4$, $NaClO_4$.

OKONChATEL'NAYa SKOROST' [Terminal Velocity] (v_c) -- projectile (missile) velocity at impact point.

OKONChATEL'NO SNARYaZhENNYY SNARYaD [Completely-Charged Projectile] -- projectile with screwed-in igniting or time fuze, i. e., a projectile ready for firing.

OKRASKA SNARYaDOV (SNARYaZhENNYKh) [Projectile (Charged) Paint] -- application of the appropriate color of paint (assigned to a specified type of projectile) to the outer surface to distinguish one projectile type from another and to prevent the projectile's surface against rust.

OKULYaR [Eyepiece] -- lens or lens system of an optical instrument facing the observer through which he views the image of an object formed by the lens.

OMMETR [Ohmeter] -- instrument for measurement of electrical resistance, widely used in the missile troops and shipboard turret artillery to check the resistance of electrical equipment.

OPERENIYe RAKETY [Missile Empennage] (Projectile) -- aerodynamic surfaces providin a missile sufficient static stability and controllability -- rudders, stabilizers, and so forth. O.r. can be rigid (unhinged) or movable (hinged).

OPERENNYYe REAKTIVNYYe SNARYaDY [Finned Rocket Projectiles] -- rocket /175 projectiles that achieve stabilization (stability) in flight by means of empennage (vertical and horizontal surfaces located in the projectile's tail section).

OPTIMAL'NAYa TRAYeKTORIYa [Optimal Trajectory] -- best possible trajectory which corresponds to minimal velocity at the end of the powered leg and, consequently, minimal expenditure of energy for missile launch while attaining maximum range. A missile launched to its maximum possible range will follow its optimal trajectory.

OPTIMAL'NYY UGOL BROSANIYa [Optimal Launch Angle] -- most advantageous angle

of departure at which it is possible to obtain the greatest horizontal missile flight range at a given velocity. O.u.b. is referred to as the angle of greatest range.

OPTIChESKIY VZRYVATEL' [Optical Fuze] -- variety of missile and projectile proximity fuze whose operating principle is based on use of the electromagnetic radiation of a target in the visible, IR, and ultraviolet wave band. They are categorized as active and passive, the difference being that the former has a special radiating device.

OPTIChESKIY LOKATOR [Laser Radar] -- one of the most promising instruments using a quantum generator -- a laser; intended for reconnaissance of artillery and missile targets. An O.l. can be used to determine target location and for fire control.

OPTIChESKIY FIL'TR [Optical Filter] -- device in optical (IR) seekers (tracking heads) to ameliorate the influence of background radiation. It has the property of separating the signal of that frequency to which it is tuned. This method of ameliorating background radiation is called optical filtering. Absorbent and interference filters are used in optical seekers.

OPYTNAYa TRAYeKTORIYa [Experimental Trajectory] -- projectile (missile) trajectory plotted from experimental points obtained during firing.

ORBITA [Orbit] -- path of motion of a heavenly body or artificial Earth satellite (planet).

ORGANIZATsIYa OGNYa [Fire Plan] -- conduct of a complex of measures that /176 insure subunit accomplishment of fire missions. Basic measures include reconnaissance and observation of the enemy, selection and preparation of fire positions, determinatio of resources required for destruction of the enemy, assignment of fire missions to subunits in accordance with their fire capabilities, preparation of initial data for firing, creation of requisite ammunition reserves, establishment of the procedure for requesting, commencing, and ceasing fire, and so on.

ORGANY UPRAVLENIYa AERODINAMIChESKIYe [Aerodynamic Controls] -- special devices (aerial rudders, spoilers, ailerons, trimmers, and so forth) using aerodynamic forces

to control an airborne platform in flight. O.u.a. can control a missile within the earth's atmosphere. See organy upravleniya raketoy [missile controls].

ORGANY UPRAVLENIYa GAZODINAMICHESKIYe [Gas Dynamic Controls] -- devices (control jets, tiltable wings, probes, rotating nozzles, and so forth) in which a gas stream exiting the engine nozzle and creating control forces is used to control an airborne platform. O.u.g. can control an airborne platform in the atmosphere and in airless space. They are used in airborne platforms making flights at high altitudes.

ORGANY UPRAVLENIYa KOMBINIROVANYYe [Combined Controls] -- airborne platform controls using both aerodynamic and gas dynamic control forces.

ORGANY UPRAVLENIYa RAKETOY [Missile Controls] -- devices creating control forces to control missile position in space (aerodynamic and gas dynamic rudders, systems changing direction of a gas stream). Aerodynamic rudders can be rectangular, triangular, or trapezoidal surfaces attached to the missile body in the tail section. They maintain the missile on the assigned trajectory. Ailerons and rudders control aerodynamic vehicles, with missiles usually controlled by gazovyy rul' [jet vanes] (see). Some missiles have neither air or gas vanes. Control in this event is /177 achieved by turning the engine, which is hinged, or by rotating the chamber.

ORIENTIR [Reference Point] -- clearly visible, prominent, and easily distinguishable object used to determine position. They can be natural or artificial. They are the initial points for designation, location, and determination of target range and bearing. Usually, reference points are selected in the subunit operating area along its entire front and echeloned in depth considering terrain and assigned missions. Each is assigned a sequential number, as a rule from right to left, and a conditional designator reflecting its characteristic features. For example, "reference point 1 -- tower; reference point 2 -- tree wearing a hat," and so forth.

ORIENTIROVANIYe [Orientation] -- 1. Determination of one's location (placement, direction of movement) relative to the cardinal points and surrounding terrain, relative to friendly and enemy troop dispositions. 2. Impartation to an instrument or part of an instrument of a specific position relative to the cardinal points or relative to a given bearing.

ORUDIYe ARTILLERIYSKOYe [Artillery Piece] -- type of firearm intended for destruction of enemy personnel, combat equipment, and defensive structures by means of projectiles or mortar shells.

An artillery piece is a powerful thermal machine for propelling heavy bodies great distances in a given direction. Energy of movement is imparted to the propelled body by the force of the pressure of powder gases.

An artillery piece is designed for an enormous power load during firing and is adapted for operation under the most varied conditions. The power load (average) on an artillery piece is characterized by the following magnitudes: during firing, the barrel and projectile are acted upon by powder gas pressures reaching 3,000--4,000 kg/cm^2 and a temperature of 3,000°; here up to 200,000--250,000 kg-m of kinetic energy (70--75mm pieces with 6--6.5 kg projectiles) and 750-800 m/sec initial velocity are imparted to the projectile. The power of a medium artillery piece reaches /178 900,000--1 million hp, while that of a heavy piece (exceeding 300mm) reaches 9--12 million hp. The efficiency (KPD) of an artillery piece as a machine is very high (up to 35%).

Guns, howitzers, rifled mortars, and smooth-bore mortars are considered artillery pieces. The first three have rifled barrels and fire projectiles that rotate during flight; the latter fires projectiles with a stabilizer (metal fins in the tail area), which provides stabilization during flight (to prevent the projectile from tipping over or tumbling).

Gun projectiles, as a rule, have a relatively flat trajectory, so guns are best suited for destruction of vertical targets. In comparison to other artillery pieces, the velocity of movement of a gun projectile (given identical barrel caliber) is higher, so the range of its flight is greater.

Howitzers, rifled mortars, and smooth-bore mortars, thanks to their steep trajectory, can destroy both unexposed (in foxholes, ravines, and other shelters) and horizontal targets (dugout roofs and so forth). Rifled mortars are employed rarely due to their limited firing range. They have been replaced almost completely by smooth-bore mortars. The latter, in spite of relatively limited range (about 6,000 meters for a 120mm mortar compared to 12,000 meters for a 122mm howitzer),

make up a significant share of the artillery inventory because of their low weight, simplicity, and ease in maintenance on the battlefield.

Artillery pieces are categorized by combat qualities as general-purpose pieces (destruction of enemy personnel, fire weapons, observation posts, communications centers, artillery fire positions, tactical nuclear attack resources, and other targets) and special-purpose pieces. The latter category includes tank, antitank, self-propelled, antiaircraft, aviation, rail (on rail flatcars), shipboard, coastal defense, casemate, and high power.

An artillery piece will comprise the following parts: 1) barrel used to impart to the projectile successive and rotating movement and requisite flight direction; 2) breechblock (see orudiynyy klinovoy zatvor [wedge-type breech mechanism] and /179 orudiynyy porshnevoy zatvor [slotted screw breech mechanism]); 3) breech ring to connect the barrel with the breechblock and house breechblock mechanisms; 4) protivootkatnyye ustroystva [recoil mechanisms] (see); 5) lyul'ka [cradle] (see); 6) verkhniy stanok [upper carriage] (see); 7) laying mechanisms: rotating to turn the upper carriage in the horizontal plane and elevating to rotate the cradle with barrel in the vertical plane to impart to the barrel the requisite angle of elevation corresponding to the firing range; 8) uravnoveshivayushchiy mekhanizm [equilibrator] (see); 9) nizhniy stanok [lower carriage] (see); 10) pritsel [sight] (see); 11) armored steel shield. All these parts in turn are divided into two groups: barrel with breech ring and breechblock and carriage (see lafet artilleriyskogo orudiya [artillery piece carriage]).

A special-purpose piece in design differs from a general-purpose piece mainly in the layout of the carriage and its mechanisms. Thus, an antiaircraft artillery piece has a mechanism providing a greater angle of elevation (up to 85--90°) and 360° field of fire, which allows it to be employed as a "universal" piece (when installed on ships) against aerial and maritime targets; the tank, ship, or aircraft body will serve as the lower carriage of shipboard, tank, self-propelled, and aviation artillery pieces. Casemate and coastal defense pieces are attached in a stationary position with the aid of different devices. In addition, many special-purpose artillery pieces have a cartridge feed mechanism (projectile with case and charge) on the feed line of shipboard, high-caliber antiaircraft, coastal defense, and aviation pieces; mechanism to ram cartridges into the bore of medium- and high-caliber

antiaircraft, aviation, coastal defense, and casemate pieces; fuze setters on antiaircraft pieces; mechanism for bringing the barrel to the loading angle (to a horizontal position) for high-caliber pieces, and so on.

Artillery pieces can be categorized based on breechblock design as manual, semiautomatic, and automatic. For the former, all actions concerned with firing are done manually, while opening and closing the breechblock and extraction (ejection) of cases is done automatically in semiautomatic artillery pieces by using the /180 energy of the barrel recoil. All of the aforementioned actions (including loading and firing) are done automatically in automatic artillery pieces (no human physical labor is involved). Artillery pieces can be laid on a target manually, semiautomatically (using electric or hydraulic motors, regulation of the rotating speed of which is manual), and automatically (special control instruments lay the piece on the target and regulate motor operation). Field artillery pieces are moved on the battlefield or on the march by mechanical or horse traction.

The following basic requirements are levied on artillery pieces: 1) range (altitude for antiaircraft pieces), which is provided by high initial velocity and streamlined form of the projectile as well as by impartation to the barrel of the requisite angles of elevation (up to 45° for firing at ground-based and 90° for aerial targets; 2) accuracy, i. e., least possible trajectory dispersion achieved by stabilized movement of projectiles in the air, precision in barrel, projectile, and charge manufacture, identical loading and laying conditions, and artillery piece stability during firing; 3) rate of fire, provided by absorption during firing of the recoil force by the recoil mechanism (as a result, only the barrel recoils and counterrecoils, while the carriage remains in place), as well as automation of the loading, laying, and firing processes; 4) design stability; 5) barrel life, i. e., increase in duration of its use until fully worn out by use of high-quality materials, rational bore design, projectile guiding parts, selection of the appropriate charge, and adherence to a safe firing regime; 6) fire flexibility, i. e., capability for broad fire maneuver without changing the location of the artillery piece in the fire position. This is insured by appropriate design of the upper and lower carriages, laying mechanisms, and equilibrator. 7) maneuverability or mobility on the battlefield and on the march. This is achieved by decreasing artillery piece weight through appropriate design of wheels and axles (with suspension) and use of traction providing high movement speed and passability off the roads; 8) fast /181

transition from travel to combat configuration. Artillery piece operating requirements include safe and convenient maintenance in combat, ease in operating all mechanisms, and design simplicity to insure easy care (cleaning, lubrication, inspection, and so on).

ORUDIYe RAZDEL'NOGO ZARYaZhANIYa [Separately-Loaded Piece] -- piece whose loading is done separately in two routines: first, the projectile is inserted into the piece's bore, followed by the charge in a case or bag. Quick fire separate loading is used in medium-caliber pieces, while bag loading is used for high-caliber and some long-range medium-caliber pieces.

ORUDIYNAYa PANORAMA [Panoramic Telescope] -- periscopic optical instrument with rotating head and bearing scale. The latter comprises a rotating ring with 60 graduations and micrometer divided into 100 parts. One bearing scale graduation equals 100 mils. An O.p. is a component of a telescope mount for laying the piece and noting its relative aiming point.

ORUDIYNOYe VREMYa [Piece Time] (τ_{op}) -- time interval between the moment of the command for the next setting for the piece and the moment of piece's readiness to fire.

ORUDIYNYYe STANKI [Piece Mountings] -- term used for each device on which a piece is mounted and attached with the aid of recoil devices. They are a basic part of the carriage and will serve for convenient placement of all piece parts and mechanisms and for maintenance of safe, rapid, and accurate firing. Mobile artillery piece mountings, as a rule, comprise an upper and lower carriage.

ORUDIYNYYe STANKI KORABEL'NOY ARTILLERII [Shipboard Artillery Piece Mountings] -- special devices on which are mounted artillery pieces on the ships of the fleet for maintenance of safe, rapid, and accurate firing.

ORUDIYNYYe ChEKhLI [Piece Covers] -- specially-sewn dense sailcloth coverings for artillery mounts protecting the equipment against rain, snow, sand, and dust.

ORUDIYNYY ZIP [Piece Spares] -- artillery piece (mortar, and so on) spare parts, tools, and accessores. They are intended to insure normal piece (mortar, and /182

so on) operation during operation and repair. ZIP [spare parts, tools, and accessori will be maintained on or in special cartons at the piece or in special subunit buildings.

ORUDIYNYY KLINOVOY ZATVOR [Piece Wedge-Type Breechblock] -- portion of an artill piece intended for final ramming of the cartridge into the chamber, locking the piece's bore during firing, firing the shot, and ejecting the expended case when the breechblock is opened following the shot.

A wedge-type breechblock will comprise a wedge and several mechanisms and accessories: locking mechanism, striking mechanism (for firing the shot), extractor mechanism (for extracting the expended case from the barrel), travel safety, safety preventing opening the breechblock if no shot occurred (in the event of misfire and hangfires). In addition, wedge-type breechblocks have automatic or semiautomatic devices for automatic opening of the breechblock after piece recoil following a shot and closing it after loading. Most modern pieces have wedge-type breechblocks.

ORUDIYNYY PORShNEVOY ZATVOR [Slotted Screw Breech Mechanism] (Breech-Loading Piece) -- portion of an artillery piece (mechanism) for locking the piece's bore during firing, firing the shot, obturating gases, and extracting an expended electric or percussion tube. A slotted screw breech mechanism will comprise a breech screw with threaded and smooth sectors which, with the aid of a lever, are moved into the barrel and then rotated so that the breech screw threads engage the threads of the breech ring's breech bush, thus locking the piece's bore. Two- and three-stag breech screws are used in the breechblocks of high-caliber pieces. Staged breech screws increase the density of breechblock engagement, decreasing breech screw length A slotted screw breech mechanism has several mechanisms and accessories: locking mechanism, firing mechanism, striking mechanism (firing the shot), extracting mechani (extracting the expended percussion or electric flash tube), safety preventing the breechblock from being opened until the round is fired, and obturator preventing the penetration of powder gases between the walls of the breechblock and the /183 breech ring during firing.

ORUDIYNYY PORShNEVOY ZATVOR [Slotted Screw Breech Mechanism] (Quick Fire and Fixed Loading Piece] -- will serve for final ramming of a cartride into a chamber, locking the piece's bore during firing, firing the shot, and extracting the expended

case. In design, the breechblock differs little from a separately-loaded piece's slotted screw breech mechanism, but they do not have obturators. The case fulfills this role. The extractor on this breechblock type usually is fastened on the breech screw's lateral surface. The forward portion of the breech screw is smooth, with an open aperture in the center for the striker and screwing in of the firing hole bush with an aperture for passage of the firing pin during firing. The remainder of the mechanisms are the same as those enumerated for the separately- loaded piece's slotted screw breech mechanism.

ORUDIYNYY RASChET [Piece Crew] -- smallest combat subunit in artillery serving an artillery piece. It will comprise a piece commander and crew members (soldiers, seamen) fulfilling specific responsibilites.

ORUDIYNYY UChEBNYY STANOK ZARYaZhANIYa [Piece Loading Training Stand] -- special device representing part of a barrel with breech ring and breechblock for training the piece crew in loading drills and developing automatic responses during the loading process. The stand's caliber equates to the caliber of the weapon the crew serves. The training projectiles that go with the stand are the same caliber and weight as the projectile of the given piece. A lift mechanism is used to impart angles of elevation to the stand and to train the piece crew in loading the piece at various angles of elevation.

ORUZhIYe [Weapon] -- means of defense and attack. Having appeared in ancient times as hunting gear, they began to be employed for military purposes during the process of corruption of the primitive social structure and appearance of classes and states. They are categorized as cold or fire weapons, with the former intended exclusively for hand-to-hand combat. They are subdivided into cutting (sabers, swords), thrusting (bayonet, dagger), and cut and thrust (broadswords). A fire weapon is a propellant weapon in which powder gases formed from combustion of a powder charge are the force which expulses a projectile (bullet). The basic /184 elements of a firearm are barrel, projectile (bullet), and propellant charge. A firearm can be subdivided into two main groups: artillery pieces and hand-held firearms.

ORUZhIYe TERMOYaDERNOYe [Thermonuclear Weapon] -- new more powerful (than an atomic) explosive weapon of mass destruction. A thermonuclear weapon is based on

the use of the thermonuclear reaction of the synthesis of nucleii of light elements of deuterium and tritium (hydrogen or thermonuclear weapon). Thermonuclear weapons exist in the form of aviation bombs, missiles, torpedoes, and the like primed with a thermonuclear charge.

ORUZhIYe YaDERNOYe [Nuclear Weapon] -- see atomnoye oruzhiye [atomic weapon].

OSADNAYa ARTILLERIYa [Siege Artillery] -- artillery intended for destruction of exterior lines and walls and interior structures of a fortress, for destruction of artillery and its defenders. In ancient times, propelling and battering machines were employed during a siege: ballistas, catapults, rams, and so on. High-caliber pieces with a steep trajectory mainly began to enter the siege artillery inventory as artillery developed.

OSADNAYa TEKhNIKA [Siege Equipment] -- resources employed during the siege of fortified cities and fortresses for covering siege forces approaching defended structures and for storming and destroying fortress walls. Varied siege equipment was employed even in antiquity, with some types encountered in the Middle Ages.

As the siege troops approached the walls, they employed transportable or mobile (on wheels) shields, which protected the troops from the front, as well as viney and tortoises (providing wheeled cover) protected on top and from the sides. Viney walls and roofs were made of boards or wicker and covered with untanned hides to prevent their catching on fire.

Fortress walls were surmounted with the aid of mobile wooden towers several stories high on which archers stood. As fire weapons evolved, light pieces also were emplaced on these towers.

OSVETITEL'NYYe SREDSTVA [Illuminants] -- resources employed to illuminate targets and terrain at night. They include illumination artillery projectiles, aviation /185 bombs, cartridges, missiles, and rifle grenades. Their basic ingredients are fuel substances and oxidizer. Examples are 30% magnesium, 66% barium nitrate, and 4% Iditol or shellac or 45% magnesium, 48% sodium nitrate, and 7% hardeners.

OSVETITEL'NYY SNARYaD [Illumination Projectile] -- specially-designed projectile

for illumination of a target or terrain at night. They are categorized by design as free-fall and parachute projectiles. There are 24 illuminating segments (stars) housed in the body of a free-fall projectile. Upon detonation, the stars, falling slowly, illuminate the terrain over an area of 1 square kilometer for 20--30 seconds.

A burning charge (illuminating star) and a parachute are housed in the body of a parachute illuminating projectile. The parachute opens when the projectile detonates and the burning star descends at a rate of about 5 m/sec. The terrain is illuminated for 50--60 seconds, with the diameter of the illuminated sector reaching about 1 kilometer. The amount of light will approximate 400,000 candlepower.

OSECHKA [Misfire] -- phenomenon observed during firing when the piece is triggered but there is no shot. This can be caused by human error due to equipment or ammunition malfunction. Opening of the breechblock when a misfire occurs is permitted on after an established time interval has passed. Military instructions outline procedures to follow in case of a misfire.

OSKOLOCHNOYe DEYSTVIYe SNARYaDA [Projectile Fragmentation] -- destructive effect caused by shrapnel from an exploding projectile (grenade, mortar shell) characterized by: 1) quantity of lethal shrapnel; 2) its distribution over the area of destruction (for surface-to-surface artillery) or spatial area (for antiaircraft artillery); 3) radius of destruction by the shrapnel. The term lethal applies to pieces of shrapnel (weighing at least 4-5 grams) capable of putting a person out of action.

Their quantity will depend upon the thickness of the walls of the projectile's (mortar shell's) body, mechanical properties of the body metal, weight and properties of the explosive making up the projectile's bursting charge, nature of the bursting charge's detonation, and shrapnel flight velocity. Today's best fragmentation projectiles create up to 50--55 lethal and 100--150 small, not lethal, pieces /186 of shrapnel for each kilogram of metal in the body of the projectile (mortar shell). The fragmentation pattern during percussion fire in great measure will depend on the ugol padeniya [angle of descent] (see). Area of destruction increases with an increase in angle of descent. At slight angles of descent, the main mass of destructive shrapnel spreads outwards in two sheaves approximately perpendicular to the direction of fire; a third sheaf, significantly dispersed compared to the lateral sheaves, is directed forward. Only minor fragments fly backwards. The

number of fragments in the lateral patterns barely change with an increase in angle of descent, while the amount flying forwards and backwards increases. Almost unifor circular destruction results at angles of descent exceeding 75°. During percussion fire of fragmentation projectiles, the more rapidly the fuze activates and the harde the ground the better, i. e., the smaller the crater from the projectile's detonatic since most of the shrapnel remains in a large crater. Fragmentation projectiles are considerably more powerful when detonated in the air following a ricochet (burst height no greater than 20 meters); it provides effective destruction of personnel in the open as well as targets located in foxholes.

OSKOLOChNO-FUGASNYY SNARYaD [High Explosive-Fragmentation Projectile] -- artil projectile (grenade, mortar shell) employed in surface-to-surface medium-caliber artillery (pieces, mortars) for destruction of live targets and equipment (weapons, combat equipment, and so forth), for forming passages in barbed wire entanglements and minefields; destruction of field defensive structures, and so on. This type of projectile will inflict destruction with shrapnel from the body and the force of gases and the shock wave formed when the bursting charge detonates. The nature of the projectile's action during percussion firing is determined by the fuze setti and firing conditions. When the fuze is set for fragmentation, the projectile upon encountering an obstacle detonates instantaneously and destroys exposed targets (with shrapnel primarily). The fuze in the projectiles is set for delayed action to destroy field-type shelters and structures and for ricochet fire.

OSKOLOChNYY SNARYaD [Fragmentation Projectile] -- artillery projectile (grenad mortar shell) employed in small- and medium-caliber pieces and mortars fired: /187 in surface-to-surface artillery against enemy personnel and equipment exposed and in light shelters and to make passages in barbed wire entanglements and minefields; in antiaircraft artillery against aerial targets. The basic action is shrapnel formed when the bursting charge detonates. High-explosive action due to the limite bursting charge weight is significant mainly only when fired at aircraft. Basic fragmentation projectile requirements are formation during detonation of the maxim amount of shrapnel possessing lethal energy required to destroy ground-based or aerial targets, with the maximum radius of destruction. Firing can be percussion, with the fuze set at fragmentation or high-explosive action, or time, depending on artillery type and caliber, firing conditions, and projectile charged with a particular fuze type. The fragmentation fuze setting only is used when firing at aerial targets.

OSNOVANIYa USTROYSTVA MATERIAL'NOY ChASTI ARTILLERII I BOYePRIPASOV [Fundamentals of Artillery Equipment and Ammunition Design] -- branch of artillery science which facilitates the most correct and advisible solution of problems concerning the design of missiles, artillery pieces, barrels, breechblocks, carriages, sighting devices, mechanisms for firing mechanization and automation, and various artillery instruments depending on tactical and technical requirements levied on a particular type of piece (mortar) and multiple rocket launcher. The fundamentals of ammunition design examine problems of the most rational planning and layout of artillery and missile projectiles, fuzes, charge igniters, and so on.

OSNOVOYe NAPRAVLENIYe [Base Line] -- single bearing for orientation of pieces and instruments of several artillery subunits (units). In artillery, the grid azimuth provides the base line.

OSNOVNOYe ORUDIYe [Base Piece] -- piece to which the base line for firing is imparted. Any piece in the battery can be so designated.

OSNOVNOY UGLOMER [Zero Line] -- bearing scale setting at which the barrel /188 of a piece in the horizontal plane bears on the base line.

OSNOVNYYe USTANOVKI [Base Settings] (Nil Readings) -- readings from which calculations are made (examples: 0 (zero) on the sight mil scale, 30-00 on the bearing scale, 30-00 on the level, and so on).

OS' GOLOVKI SAMONAVEDENIYa (KOORDINATORA TsELI) [Seeker (Tracking Head) Axis] -- imaginary line passing through the sensing element of a seeker. At one point on this line, signals at the seeker output for a stationary target equal zero, i. e., the target image coincides with the center of the focal plane through which the optical axis passes.

OS' KANALA STVOLA ORUDIYa [Piece Bore Axis] -- imaginary straight line connecting the centers of a piece's muzzle and breech faces.

OTDAChA ORUDIYa [Piece Kick] -- action of powder gases formed during combustion of a charge at the moment of firing impelling the recoil mechanisms backwards is called kick, while the motion itself of the barrel is called recoil.

OTKATNYYe ChASTI [Recoil Mechanisms] -- a piece's barrel and its individual connected components (parts) which, during firing, make specific coincident natura movements (recoil and counterrecoil) on the piece itself.

OTKAT ORUDIYa [Piece Recoil] -- kick or movement of the barrel and recoil mechanisms backwards during a shot due to the action of the recoil energy. It beg the moment the projectile shifts in the piece's barrel. Its velocity increases as the projectile's velocity increases. Recoil velocity equals several meters per second (from 2 to 5 m/sec, depending on piece model) at the moment the powder gas pressure in the bore reaches its maximum level, increasing to 7--12 m/sec at the moment the projectile leaves the piece muzzle. At this moment, powder gases are expelled at great velocity from the barrel, engulfing the projectile and pushing it. A reactive force is created as a result of expulsion of the gases. This force acts backwards against the bottom of the bore, increasing recoil mechanism movement velocity (by about 25--30%). Thus, piece recoil mechanisms acquire the greatest recoil velocity when the projectile is several meters (about 10) ahead of the /18 piece's muzzle face.

OTKRYTAYa BATAREYa [Exposed Battery] -- battery in an exposed position on the terrain or on the upper deck of a ship.

OTKRYTAYa OGNEVAYa POZITsIYa [Exposed Fire Position] -- position in which piec are not protected against enemy ground-based observation or, being sheltered, will expose themselves when firing.

OTMECHANIYe ORUDIYeM [Registration with a Piece] -- determination of piece sighting device settings which correspond to a piece's given position in the fire position relative to a selected point (points).

OTMECHANIYe STREL'BY [Witness Point Procedure] -- registration fire forming the basis for subsequent fire control.

OTNOSITEL'NAYa VLAZhNOST' [Relative Humidity] -- ratio of the weight of water vapor contained in the air (i. e., of the absolute humidity) to the weight of the water vapor saturating a space at a given temperature. It is expressed in percents

(from 0 to 100%) and equals 0 in completely dry air. Air completely saturated with water vapor has a relative humidity of 100%.

OTNOSITEL'NAYa DLINA SNARYaDA (V KALIBRAKh) [Projectile Relative Length (In Calibers)] -- projectile length expressed in calibers of a given piece. If one says a projectile is five calibers long, this signifies that the caliber of the piece goes into the length of the projectile five times.

OTNOSITEL'NAYa DLINA STVOLA V KALIBRAKh [Barrel Relative Length in Calibers] -- length of an artillery barrel expressed in calibers of a given piece. For example, if one says a barrel is 60 calibers long, this signifies that the length of the barrel equals 60 diameters of this piece's bore.

OTNOSITEL'NAYa DLINA KhODA NAREZOV U "DULA" [Relative Rifling Lead at the "Muzzle"] (In Calibers) (h_o) -- distance in calibers over the length of which a spiral with an angle of slope equalling the angle of twist at the "muzzle" of a barrel makes a full revolution.

OTNOSITEL'NAYa SKOROST' SNARYaDA [Projectile Relative Velocity] (v) -- variable magnitude -- velocity of the successive movement of the "bottom" of a projectile during its displacement relative to the bore.

OTNOSITEL'NYY VES ZARYaDA [Charge Relative Weight] -- charge-projectile weight ratio.

OTNOSITEL'NYY VES RAZRYVNOGO ZARYaDA SNARYaDA [Relative Weight of a Projectile's Bursting Charge] -- ratio of the weight of a bursting charge in kilograms to the cube of the caliber of a given projectile in decimeters. /190

OTNOSITEL'NYY VES RAKETY [Missile Relative Weight] -- missile launch weight-payload ratio.

OTNOSITEL'NYY VES SNARYaDA [Projectile Relative Weight] -- ratio of the weight of a projectile to the weight of a piece's recoil mechanisms.

OTNOSITEL'NYY PUT' SNARYaDA [Projectile Relative Path] (l) -- variable magnitude

-- successive displacement of the "bottom" of a projectile relative to the bore computed from the position of the "bottom" at initiation of movement.

OTRAZhATEL' FAKELA (GAZOOTRAZhATEL') [Jet Deflector (Gas Deflector)] -- launchi mount device to deflect the plume of flame during vertical launch of a missile. It is housed beneath the launching mount. The plume of flame expelled from the engine nozzle during missile launch strikes the deflector and is displaced sidewards

OTSEK OTDELYaYuShchIYSYa (sbrasyvayemyy) [Separating (Detachable) Section] -- section housing the payload, which, after a certain period of time, detaches (separates) with a scientific research package and safety parachute system. The section has a rescue system providing extended flotation in the event of landing in the water. The section returns to Earth on a large parachute.

OTSEK PEREDNIY [Forward Section] -- forward detachable section of a missile; missile reentry vehicle. The reeentry vehicle contains an explosive charge if the missile has a military role or a container with scientific research package and radio transmitter if the missile is for research purposes. Separating reentry vehi are equipped with their own stabilizers.

OTSEK TOPLIVNYY [Propellant Section] -- section of propellant tanks with their reinforcement. They are categorized as integral and external. In designs with integral tanks, the walls of the propellant tanks function simultaneously as the missile body and are the walls of the combustion chamber in solid-propellant missil Propellant tanks usually occupy 3/5 of the missile's length. Propellent in tanks makes up 70--90% of total missile weight.

OTSEK KhVOSTOVOY [Tail Section] -- rear portion of a missile (fairing) /191 having the form of a cylinder or truncated cone supporting the empennage in which are housed the power plant with engine feed and control system, associated rudder machinery and drives, and other devices.

OTSEK TsENTRAL'NYY [Center-Body Section] -- conditionally understood to mean the central portion of a missle.

OTSEChKA [Cut-Off] -- shutting down an engine (ZhRD) by closing cut-off valves

stopping the supply of propellant components to the combustion chamber. Propellant reaching the combustion chamber from piping between cut-off valves and injectors after the engine stops (cut-off) is expelled by compressed gas from the chamber.

OTSECHKA PODACHI TOPLIVA [Propellant Cut-Off] -- engine shut-down; cessation of the supply of propellant to the combustion chamber by closing cut-off valves which shut off propellant component access to the combustion chamber. See otsechka [cut-off].

OTKHOD [Departure] (d) -- projection of the base between pieces and the observation post to the vertical plane containing the observing line.

OKHLAZHDENIYe VNUTRENNEYe [Internal Cooling] -- cooling the combustion chamber of a liquid-propellant rocket engine by bathing the internal surface of the chamber with one of the propellant components or due to a considerable deviation in the ratio of the components from the stekhiometricheskoye sootnosheniye komponentov [stoichiometric ratio] (see) in the wall layer, which is achieved by appropriate injector placement. If the aim during external cooling is to remove heat reaching the chamber walls from gases, internal cooling results in creation of a wall layer with a lower temperature, which reduces heat fluxes from the gases to the chamber walls.

Components (fuel, as a rule) are supplied to bathe the interior walls of the chamber via special ringed bands with spray or slotted injectors. Arriving liquid under the influence of the high-velocity flow of combustion products spreads in a very fine film over the chamber walls and evaporates. Two protective layers result, a liquid and a vapor curtain. Internal cooling due to the deviation in the wall layer of the fuel component from the stoichiometric ratio occurs due to the /192 presence of fuel along the periphery of the injector heads. Products of incomplete combustion with a lower temperature are formed due to the excess of fuel in the wall layer, which lowers the heat transfer from gases to the wall.

OKHLAZHDENIYe NARUZHNOYe [External Cooling] -- cooling of the combustion chamber of a liquid-propellant rocket engine. The simplest scheme involves supplying a coolant to a cooling passage formed by the external and internal walls of the combustion chamber. Moving through the cooling passage, the liquid cools the chamber walls,

being heated up itself at the same time. External cooling is categorized as flow-through or circulating.

OKhLAZhDENIYe NARUZhNOYe PROTOChNOYe [Flow-Through External Cooling] -- type of cooling for the combustion chamber of a liquid-propellant rocket engine. The chamber is cooled by propellant components which, after heating up in the cooling passage, are supplied to the head and, from it, via the injectors into the combustion chamber. The propellant component capable of absorbing the most heat is used as the coolant. The component having the highest heat capacity and highest boiling point will absorb the most heat. This is the most widespread and economic type of cooling. One component cools the combustion chamber and the other the nozzle when both propellant components are used for cooling.

OKhLAZhDENIYe NARUZhNOYe TsIRKULYaTsIONNOYe [Circulating External Cooling] -- type of cooling of the combustion chamber of a liquid-propellant rocket engine using a special coolant. The coolant after heating up in the space behind the cooling jacket reaches a condenser, then is returned to the cooling passage. A rocket engine with a circulating cooling system must have a special coolant (usually water).

OKhLAZhDENIYe PORISTOYe [Sweat Cooling] -- variation of internal cooling; cooling via a porous inner chamber wall. The engine is cooled by a coolant passing into the chamber via pores in the inner wall, thereby creating a vapor curtain layer. In this case, inner chamber walls are made of a porous material.

OKhLAZhDENIYe REGENERATIVNOYe [Regenerative Cooling] -- flow-through cooling /193 of the walls of the combustion chamber of a liquid-propellant rocket engine using propellant components in which the heat transmitted from the combustion chamber by the coolant again returns almost completely to the combustion chamber in the form of the heat of the warmed liquid, which eliminates heat losses to the engine walls.

OKhLAZhDENIYe SMEShANNOYe [Composite Cooling] -- system of cooling a liquid-propellant rocket engine combining two types of cooling, external and internal. It is employed in those cases when one of the possible cooling methods (external or internal) does not solve the problem of combustion chamber cooling.

OTsENKA EFFEKTIVNOSTI STREL'BY [Firing Effectiveness Evaluation] -- evaluation of the magnitude of damage which can be inflicted (or already has been inflicted) on an enemy. Evaluation of firing effectiveness prior to firing means determination of the damage that can be inflicted on the enemy under the given conditions. Evaluation after the fact means establishing the degree to which firing results correspond to the assigned fire mission.

Firing effectiveness is evaluated in order to:

-- substantiate rational methods of determining settings for firing for effect;

-- substantiate the most advantageous method of shelling a target;

-- substantiate rational requirements levied on an artillery weapon system (pieces, mounts, ammunition, instruments, and so forth).

OShIBKA-VEKTOR [Error-Vector] -- error whose value is determined both from the absolute magnitude and the bearing. Geometrically, an error-vector is described in the form of a segment of a straight line of specific length and specific bearing with designation of the beginning and end (arrows).

OShIBKA (ISMERENIYa ILI RESUL'TATA) [Error (in Measurement or Result) (δ or Δ) -- difference between the obtained value of a measured magnitude and its true value.

OShIBKA INSTRUMENTAL'NAYa [Instrument Error] -- error in measurement, of a control system, caused by imprecision in orientation, regulation, and operation of control instruments themselves (for example, imprecision in the orientation of instruments, antenna alignments, instrument graduations, and so on). /194

OShIBKA STREL'BY [Firing Error] (of a Shot) -- deviation of the point of burst (detonation, explosion) of a projectile (mortar shell, missile) or center of a grouping of points of burst (detonations, explosions) of several projectiles (mortar shells, missiles) from the aiming point (target) in range, bearing, and altitude when firing with a piece (mortar, combat vehicle) of a battery, battalion. A deviation resulting from the action of all accidental causes which leads to projectile (mortar shell, missile) deviation from the planned flight trajectory.

PALUBNAYa STARTOVAYa ARTUSTANOVKA [Deck Mounting] -- missile launcher (artillery piece) in an exposed location on a ship's upper deck.

PALUBNO-BAShENNYYe ARTUSTANOVKA [Deck Turret] -- installed on destroyers, cruisers, and battleships as dual-purpose artillery and comprising fighting and ammunition compartments. A fighting compartment is protected by open bulletproof and shrapnel-proof armor. It is a rotating part of the mount, while the ammunition compartment is fixed.

PARABOLIChESKAYa SKOROST' [Parabolic Velocity] -- second cosmic velocity equal to 11.2 km/sec; velocity at which the trajectory of a body's movement has the form of a parabola. Sometimes, parabolic velocity, i. e., second cosmic velocity, is called escape velocity. A body propelled from the earth at velocity V, equal to or greater than second cosmic velocity, does not return to earth. P.s. is the minim velocity required to surmount the field of gravity so that a body with that velocity can move out to any desirable distance from the attracting center.

PARAMETR [Parameter] -- magnitude characterizing a certain extant property of a physical process. Absolute temperature and absolute pressure at nozzle entry are examples.

PARAMETRY DVIZhUShchEYSYa TsELI [Moving Target Parameters] -- magnitudes determining target bearing and speed of movement.

PARAMETRY GAZOV NA VKhODE SOPLA [Gas Parameters at Nozzle Entry] -- physical /1 magnitudes characterizing the extant property of a gas flow (exhaust) at nozzle entry. The main parameters of gases at nozzle entry are absolute temperature (T), absolute pressure (P), gas constant (R), and exhaust velocity (u). Gas flow paramet change as the gas moves about the nozzle.

PARK (ARTILLERIYSKIY) [Pool (Artillery)] -- place (building) where artillery and mortar equipment are stored in troop units. They can be closed (in a building) open (in a shed, in the open), permanent, and temporary (field). Temporary pools are set up under fielu conditions and during exercises and maneuvers.

PARKOVYY DEN' [Maintenance Day] -- day envisioned in the combat training plan and held in artillery (missile) units for inspection and presentation of servicable equipment and for maintenance and sprucing up of equipment pools.

PAROGAZ [Steam and Gas] -- mixture of oxygen and water vapor heated to a high temperature under specific pressure formed during separation of high-test hydrogen peroxide in a ZhRD steam generator.

PAROGAZOGENERATOR [Steam Generator] -- device in which hydrogen peroxide is used for gas generation. It is used in a ZhRD to place a turbopump unit into action.

PASSIVNAYa GOLOVKA SAMONAVEDENIYa (KOORDINATOR TsELI) [Passive Seeker (Tracking Head)] -- radioelectronic sensing device installed in a guided missile to guide it to its target. Energy continually radiated by the target itself without its being illuminated externally is used in a passive seeker. The latter, receiving radiation (signals) from the target, detect it, while computers form commands and transmit them to actuators controlling missile guidance. A passive seeker reacts to radiation coming from a target in the form of thermal energy, radio waves, and so on. They are employed against targets continually radiating electromagnetic energy.

PASSIVNAYa SISTEMA SAMONAVEDENIYa [Passive Seeker System] -- method of guiding a missile to a target in the final leg of the trajectory using a passive seeker.

PASSIVNYY UChASTOK TRAYeKTORII [Trajectory Passive Leg] -- trajectory leg /197 in which a missile completes its flight as a freely-flying body with engine shut down.

PATRON [Cartridge] -- artillery charge for a quick fire piece. It will comprise a case containing a black powder charge with igniter. A primer cup is screwed into the base of the case. The cartridge is closed at the top by a conventional and a reinforced cap.

PATRONIROVANIYe VYSTRELOV [Packing in Cartridges] -- joining a prepared projectile to a primed case.

PATRONNIK [Chamber] -- piece chamber, the form and dimensions of which correspor to the form and dimensions of the cartridge (quick fire cartridge) and intended to house the projectile in the cartridge or quick fire round.

PATRONNYYe ORUDIYa [Quick Fire Pieces] -- artillery pieces that have the charge housed in a case. The artillery round for a quick fire piece will comprise a projecti and cartridge separate from the projectile.

PEDAL' [Pedal] -- foot lever gun layers use to fire a shot in an electrical or mechanical firing circuit. In shipboard turret artillery, the gun layer fires the shot upon receipt of the signal by simultaneously pressing two pedals. If one gun layer is laying the piece (in the vertical, for example) and presses the pedal, no shot will occur until the second gun layer lays the piece (in the horizontal) and presses his pedal.

PEMZA [Pumice] -- porous igneous rock. It is used to clean burrs and spots on artillery equipment components.

PENAL [Small Container] -- cylindrical case with deep cover made of galvanized sheet steel. It is used to store artillery bag charges.

PENTAPRIZMA [Pentaprism] -- five-sided prism which bends a ray 90°. They are used as final reflectors in optical rangefinders and other optical instruments.

PEREDACHA [Transmission] -- device to transfer mechanical energy from one mechan to another. Transmissions are categorized as belt, gear, friction, hydraulic, chain, and so forth.

PEREDOK ORUDIYNYY [Piece Limber] -- supplementary running gear (spring-mounted or non-spring-mounted axle with wheels) of a field artillery piece which supports /19 the trail when underway with a wheeled or tracked carriage. The limber has shock-absorbing traction equipment in front used to connect to the tug and a hook (pintle) in the rear for connection with the piece's trail (lunette).

PERELET [Over] -- projectile burst beyond the target, designated with a plus sign (+).

PEREMENNYY ARTILLERIYSKIY ZARYaD [Variable Artillery Charge] -- charge comprising one basic packet or two sub-packets and supplementary variable-weight or equiponderant bundles. The explosive charge in high-caliber surface-to-surface artillery is divided into two charges, a full variable and decreased variable charge. Variable artillery charges are used in rounds for separately-loaded pieces (mortars).

PERENOS OGNYa [Lifting of Fire] -- firing for effect at a target without registration using data from a registration or other target. The firer, determining sight settings for target destruction, considers registration corrections based on other targets (referring targets) when it is impossible to register a target (unobserved target) or target registration is inadvisible (in the interests of surprise). Thanks to this, meteorological and ballistic (partially) firing conditions will be considered to a considerable degree. As a rule, fire will be lifted from a surface (actual or fictious) or an aerial registration target when geodetic bases are available. The surface registration target also can be an audible target. Geodetically-based lifting of fire is employed when the coordinates of the registration target and actual target are known. Lifting of fire must follow as close as possible on the heels of registration fire.

PEREKhVAT RAKETY [Missile Intercept] -- destruction or damage to a missile in flight at a safe distance from the defended target. Antimissile missiles whose velocity will exceed the speed of sound, with modern control and seeker systems, are used for missile intercept.

PERIOD POSLEDEYSTVIYa GAZOV [Gas Aftereffect Period] -- time interval from the projectile's departure from a barrel until cessation of the action of the gases on the projectile. It has been established that the action of powder gases on a projectile after departure does not cease immediately. The gas stream, escaping /199 from the bore, continues to push the projectile and to impart to it acceleration in the air over a distance of several meters.

PERIODY VYSTRELA [Shot Periods] -- although the phenomenon of an artillery shot is computed in thousandths or hundredths of a second, all processes making up a shot occur in a strict sequence. The phenomenon is subdivided into four periods: preliminary, first (basic), second, and gas aftereffects period. The preliminary period is combustion of the charge in a constant volume. It will last from the onset of ignition of the charge until the projectile begins to move. The first

period is combustion of the charge in a rapidly-changing volume. It will last from the moment the projectile begins to move until complete combustion of the charge. At that time, the pressure in the bore reaches its greatest magnitude (3,000--4,000 kg/cm^2). Then, as a result of the rapid increase in the volume of the space behind the projectile, the pressure begins to drop. The second period is when the projecti acquires acceleration due to expansion of the constant quantity of strongly compress and heated gases. This period ends with the projectile's departure from the barrel. At this point, powder gases continue for a certain amount of time to act upon the projectile, this referred to as the gas aftereffects period.

PERIOD STREL'BY [Firing Period] -- firing will comprise two periods, registrat and firing for effect.

PERISKOP [Periscope] -- optical instrument used for observation from inside a shelter.

PERISKOPICHESKIYe PRIBORY [Periscopic Instruments] -- optical instruments maki it possible to observe from within a shelter.

PERISKOP RAZVEDCHIKA [Scout's Periscope] -- periscopic optical instrument used for reconnoitering the enemy and making it possible to observe (measure angles) from inside a shelter. A scout's periscope has a periscopicity of 400mm and 4- to 8-power enlargement.

PIKRINOVAYa KISLOTA (TRINITROFENOL, MELINIT) [Picric Acid (Trinitrophenol, Melinite)] -- aromatic nitrocompound, powerful high explosive. Picric acid is a derivative of the nitration of phenol with a mixture of nitric and sulphuric acids. It is a light-yellow solid crystallized substance sour to the taste. It is known in technology by various names, melinite in the USSR, lyddite in England, and shimo in Japan. It has a density of 1.8 g/cm^3, fusing temperature of 122.5° C, /200 solidification temperature of 121.5° C, and flash point of 300--310° C. Its detona velocity is 7,100 m/sec and a heat of explosion of 1,000 kcal/kg. It exceeds troty in explosive properties by 5--10% and, prior to the appearance of trotyl, was used to prime artillery projectiles. At present, picric acid in pure form and in fusion with other explosives is used to prime mortar shells, aviation bombs, and in the manufacture of detonation charges, antitank mines, and fougasses.

PIROKSILIN (NITROTsELLYuLOZA, NITROKLETChATKA PIROKOLLODIY [Pyroxylin (Nitrocellulose, Nitrocellulose Collodion)] -- explosive obtained through nitration of cellulose. It is subdivided into soluble and insoluble in a hydroxyether mixture. Pyroxylin is not used at the present time as an explosive, but goes exclusively for manufacture of smokeless powders. It was the first explosive used in Russia for priming high-explosive and armor-piercing projectiles, naval mines, and torpedoes.

PIROTEKhNIKA [Pyrotechnics] -- branch of technology occupied with the manufacture of illuminating, signalling, tracer, incendiary, and smoke compositions, as well as charging articles (projectiles, cartridges, missiles, fireworks) with them.

PIROTEKhNIChESKAYa SISTEMA ZAZhIGANIYa [Pyrotechnic Ignition System] -- rocket engine ignition system using powder charges ignited by an electric blasting cap to ignite the liquid propellant.

PIROTEKhNIChESKIYe SOSTAVY [Pyrotechnic Compcsitions] -- illiminating, incendiary, tracer, and signalling compositions used to charge illuminating and incendiary artillery projectiles, tracers, and illuminating and signalling cartridges and missiles.

PIShchAL' [Arquebuse] -- ancient firearm comprising a long barrel, breechblock, and stock with attachment. In Russia, there were arquebuses with a wedge-type breech mechanism and with a screw-type breech mechanism -- the prototype of the contemporary slotted screw breech mechanism.

PLAZMATRON [Plasmatron] -- device in plasma rocket engines in the form of an electric arc with cooling system. A plasmatron generates plasma for the missile's plasma engine.

PLAZMENNAYa RAKETA [Plasma Rocket] -- rocket whose thrust is created by /201 a plasma engine (electric rocket engine). A plasma rocket sometimes is called an electric rocket system. They are supposed to have a reactor with steam or gas turbine, generator, plasma chamber, electric arc, and nozzle. A plasma rocket can move independently only if it is placed in space with the aid of more powerful engines such as chemical engines. Such a rocket must be assembled and launched in space. Theoretically, a plasma rocket is looked upon as a means for interplanetary flights.

PLAZMENNYY DVIGATEL' [Plasma Engine] -- rocket engine in which thrust is provided

by the reaction of a stream of ions expelled from a nozzle in the direction opposite to the flight direction. Liquid oxygen is the propulsive mass in a plasma engine and is heated by an electric arc of high-density current to a very high temperature (above 10,000° absolute), at which complete ionization of particles falling into the arc's active zone occurs, and plasma is created. Plasma, a heavily-ionized gas, possesses the high energy of its component particles and makes it possible to obtain very high specific thrust. According to the foreign press, a plasma engine can develop a specific thrust of 1,000—1,200 kg/sec/kg at an efficiency of 50%.

PLAMEGASITEL' [Fire Reducer; Flash Inhibitor] — 1. Steel bell in the form of a cone, with the narrow portion attached to the muzzle face, which reduces a flame. Flash reducers often are incorporated in the muzzle brake. 2. Substances inhibiting ignition of fuel gases and flash inhibiting substances made of the mineral salts of alkaline metals. Calcium usually is added to powder charges to decrease the blinding flash of the flame expelled from the barrel when a shot is fired. Inert organic substances such as vaseline, dinitrotoluol, and dibutyl phthalate are used in some cases to inhibit flame. In artillery, muzzle flash and back-flash are very harmful, since they reveal a firing piece and blind its crew.

PLANER KRYLATOY RAKETY [Cruise Missile Glider] — cruise missile design compris a fuselage (body) housing a sustainer engine, warhead and control system, and /202 aerodynamic surfaces: wings, stabilizer, and fin. The fuselage of a cruise missile usually is cigar-shaped and comprises several parts: nose, center-body, and tail.

Wings (bearing surfaces) create lift and, as a rule, are slightly extended and arrow-shaped. There are ailerons on the wingtips. When the ailerons are moved, they deviate from the plane of the wings and change the magnitude of their lift.

The stabilizers are like the wings in form and design, but are smaller. The fin is a vertical stabilizer located above the fuselage.

PLASTIFIKATORY [Flexibilizers] — substances capable of increasing the plasticit of a solid rocket propellant. Vaseline, wax, and other substances are used in this role in rocket powders.

PLASTIChNOST' OPTIChESKOGO PRIBORA [Optical Instrument Plasticity] — property

of an optical system allowing an observer to sense the depth and relief of the space examined through the instrument.

PLEChO DINAMIChESKOY PARY [Arm of Couple] (e) -- projection of the distance from the center of gravity of recoil mechanisms to the bore axis to the vertical plane passing through the bore axis.

PLOSKOST' BROSANIYa [Plane of Departure] -- vertical plane (XOY) passing through the initial velocity vector (line of departure).

PLOSKOST' VYSTRELA (PLOSKOST' STREL'BY) [Plane of Fire] -- vertical plane passing through the line of elevation.

PLOSKOST' KURSA TsELI [Target Course Plane] -- vertical line passing through the target course.

PLOSKOST' MESTA TsELI [Target Location Plane] -- plane passing through the gun-target line and perpendicular to the plane of position.

PLOSKOST' NABLYuDENIYa [Observer-Target Plane] -- vertical plane passing through the observer-target line.

PLOSKOST' NABLYuDENIYa MESTA TsELI [Observer-Target Plane of Target Location] -- plane passing through the observer-target line and perpendicular to the observer-target plane.

PLOSKOST' NAVODKI (ORUDIYa) [Piece Aiming Point Plane] -- vertical /203 plane passing through the piece-aiming point line.

PLOSKOST' PRITsELIVANIYa [Sighting Plane] -- plane passing through the line of aim and perpendicular to the azimuth circle plane.

PLOSKOST' RAZRYVA [Piece-Target Plane] -- vertical plane passing through the piece-target line.

PLOSKOST' RASSOGLASOVANIYa [Plane of Error] -- plane passing through the seeker (tracking head) optical axis and the missile--target line. The position of the

plane of error in optical (IR) seekers is determined by the dihedral angle relative to a certain plane linked with the seeker and the axis passing through it.

PLOSKOST' UGLOMERA [Azimuth Circle Plane] -- plane of measurement of angles for laying by deflection perpendicular to the axis of rotation of the angle-measuring instrument.

PLOSKOST' TsELI [Target Plane] -- vertical plane passing through the piece-target line.

PLOTNOST' ARTILLERII [Artillery Density] -- quantity of pieces, mortars, and multiple rocket launcher vehicles per kilometer of front allocated for an engagement. It is established in each individual case based on the nature of the enemy defenses, number of nuclear and aviation strikes allocated in a given sector, as well as by the number of missions to be accomplished by artillery.

PLOTNOST' VOZDUKhA NA VYSOTE Y [Air Density at Altitude Y] (n) (Given Any Atmospheric Conditions) -- weight of 1 cubic meter of air at altitude Y.

PLOTNOST' ZARYaZhANIYa [Propellant Density] (Δ) -- ratio of charge weight in kilograms to cavity volume in cubic inches.

PLOTNOST' OGNYa (ARTILLERII) [Density of Fire (of Artillery)] -- quantity of projectiles (mortar shells) of a given caliber expended per hectare in 1 minute (if fire is conducted by sector) or the quantity of projectiles (mortar shells) fired in 1 minute per 100 meters of target frontage.

PLOTNOST' OShIBKI [Error Density] -- value of the function of the law of errors corresponding to a specific error magnitude.

PLOShchAD' RASSEIVANIYa (SNARYaDOV) [Area of Dispersion (of Projectiles)] -- area in which are found the impact points of projectiles (bullets) fired from the same piece at the same settings with closest possible adherence to uniform firing /2(conditions. The area of dispersion will form an ellipse and is referred to as the dispersion ellipse. The point around which projectile impacts are grouped with the greatest probability usually coincides with the center of the dispersion ellipse

and is called the center of dispersion or average impact point. Projectile dispersion is infinite, symmetrical, and uneven. Three bearings (range, altitude, and lateral) are used to measure the magnitude of dispersion.

PNEVMATIChESKIY NAKATNIK [Pneumatic Recuperator] -- recuperator in which the energy for piece recoil is accumulated by means of compressed air. It will comprise a cylinder filled with compressed air (at a pressure of 45 atmospheres or more), rod with piston, and hydraulic seals. Air in a pneumatic recuperator is compressed directly by the piston. Specially-designed hydraulic seals prevent air leakage from the recuperator cylinder. Pneumatic recuperators previously were used in heavy artillery, but have limited contemporary use.

POVERKhNOST' NESUShchAYa [Bearing Surface] -- missile surface which creates lift. It includes wings, empennage, spoilers, and so forth.

PROVERKhNOST' UPRAVLENIYa [Control Surface] -- missile surface which creates control forces (rudders, ailerons, elevons, and so on).

PODVIZhNAYa ZAGRADITEL'NAYa OGON' (PZO) [Creeping Barrage Fire] -- type of artillery fire. PZO is conducted by successive employment of a powerful curtain of fire in preplanned observed lines. PZO is employed to repulse an enemy tank offensive (attack). Artillery firing from indirect fire positions is allocated to deliver PZO.

PODVODNYY YaDERNYY VZRYV [Underwater Nuclear Explosion] -- explosion carried out at a varied depth beneath the water's surface.

PODGOTOVKA ISKhODNYKh DANNYKh DLYa PUSKA RAKET [Preparation of Missile Initial Launch Data] -- determination of the required settings for guidance and control instruments to ensure a given direction and range of missile flight.

PODGOTOVKA ISKhODNYKh DANNYKh DLYa STREL'BY ARTILLERII [Preparation of Artillery Initial Firing Data] -- selection of projectile, charge, fuze, sheaf, and type of trajectory, in accordance with the nature of the target and determination of sight settings, taking all corrections (ballistic, topographic, meteorological, and so forth) into account. /205

PODGOTOVKA KARTY [Map Preparation] -- trimming the sheets, gluing, highlighting kilometer grid designations and terrain feature depictions most important in the given situation, and folding the map for convenient use.

PODDERZhIVAYuShchAYa ARTILLERIYa [Supporting Artillery] -- artillery which, while remaining subordinate to the senior artillery commander, accomplishes fire missions assigned by the commander of the combined-arms formation (unit) being supported. Artillery temporarily allocated from second echelons to support combat operations of first echelon units or formations also is regarded as supporting artil in relation to such units and formations.

PODZEMNOYe STARTOVOYe USTROYSTVO [Underground Launcher] -- underground launch shaft (silo) containing a fully-assembled missile installed vertically on a launch pad with attendant underground shelters (for the missiles), support equipment, auxi equipment, and support personnel.

PODZEMNYY YaDERNYY VZRYV [Underground Nuclear Explosion] -- nuclear explosion which takes place beneath the earth's surface.

PODKALIBERNYY BRONEBOYNYY SNARYaD [Subcaliber Armor-Piercing Projectile] -- projectile with a durable metal armor-piercing core with a caliber less by a factor of 2--2.5 than the caliber of the piece. This gave rise to the name subcaliber. The projectile does not have a bursting charge. The armor-piercing core will serve as the destructive element. The core is made of a hard alloy (cermet alloy), simil to a diamond in hardness, with the conventional steel case serving as its guide. A subcaliber armor-piercing tracer projectile is used for firing at tanks 1,000 meters away. The projectile body is destroyed upon impact with the armor, but the

hard core penetrates armor thicker by a factor of almost 2 than does a conventional armor-piercing projectile. The projectile's shortcoming is its rapid loss of velocity due to light weight and poor ballistic shape (spool shape). The inden- /206
tation in the body of such projectiles is filled with light alloy, while the tip has a longer and ogival shape. Retired Russian non-commissioned officer Nazarov invented the subcaliber projectile in 1912.

PODNOSChIKI [Bearers] -- rank-and-file soldiers (seamen) in a piece crew who will prepare and carry ammunition to the piece; in shipboard deck artillery, they are the ones who bring the ammunition from the elevators to the pieces. For separately-loaded pieces, one bearer is called the ammunition bearer and the other the charge bearer. The former prepares and carries projectiles to the pieces, wipes the oil off, and checks them. The latter prepares and carries charges to the piece.

PODShIPNIK [Bearing] -- support for shafts and rotating axles in artillery mounts. They are categorized as bearings with sliding friction and rolling friction. A sliding bearing, the sliding surfaces of which slide against one another, will comprise a steel body with a non-ferrous metal inner liner; the shaft neck rotates in it. The liner often is made of two halves, called bushings, to facilitate assembly and disassembly. Roller friction bearings are categorized as ball, roller, and needle bearings. They further are categorized by purpose as radial, thrust, and radial thrust bearings. All types are used widely in artillery.

POD"YeM KARTY [Map Highlighting] -- accentuating contour lines and colors of the conventional symbols on maps and plans to enhance their clarity. Highlighting is especially important in the case of black-and-white maps. Pencils used for color intensification should conform to the color conventions adopted for topographic maps, namely: brown and red for roads; green for vegetation; dark blue and light blue for hydrographic symbols; and black for building contours and inhabited localities. Under field conditions, only those parts of a map relevant to a given mission are highlighted.

POD"YeMNAYa SILA [Lift] -- projection of the full aerodynamic force perpendicular to the direction of the velocity vector (direction of movement). Lift is directed

vertically upwards and is the sum of the forces of the pressure of the air as it flows around a missile flying at a slight angle of attack. The missile's airframe creates lift and the angle of attack determines its magnitude. It /207 will be determined by the angle of attack, air density, square of the airspeed, airframe area, and other causes. The lift of a wingless airborne platform is created by the body and empennage of the missile (gas jets and so on).

POYeZD [Piece Plus Prime Mover] -- tracked or wheeled tug with towed piece.

POKAZATELI EFFEKTIVNOSTI STREL'BY [Firing Effectiveness Indicators] -- numerical characteristics used to evaluate the result (or possible result) of firing.

POLEZNAYa RABOTA POROKhOVYKh GASOV [Powder Gas Efficiency] (of an Artillery Charge) -- work that powder gases do to expel and to impart velocity to a projectile and its rotation in the piece's bore.

POLEZNYY GRUZ RAKETY [Missile Payload] -- payload that a missile can carry to a target. For a military missile, as a rule, the warhead; for scientific research rockets, research package and radio transmitters. Space vehicles, artificial Earth satellites, and so on are considered space rocket payloads. Each missile has a section housing the payload.

POLE ZRENIYa (OPTIChESKOGO PRIBORA, OPTIChESKOY SISTEMY) [Field of View (of an Optical Instrument, Optical System)] -- portion of space (terrain) visible through an instrument without moving it. It is measured by an angle or linear distance. For example, 6-power binoculars have a field of view of 8.5° (1-41 mils).

POLET NEUPRAVLYaYeMYY [Unguided Flight] -- rocket (projectile) flight without an onboard control system. The flight of such rockets is unguided in its entire trajectory. The launcher guide's horizontal guide angle and angle of elevation impart flight direction and range. Several types of antiaircraft, antitank, and other rockets are unguided. The flight of guided missiles will become unguided when control ceases, as in the case of ballistic missiles after engine shutdown.

POLIGON [Range] -- sector of terrain or sea equipped for conducting of artillery fires and tests of army and navy combat equipment. They are categorized as training, plant proving grounds, and scientific research or, based on type of equipment /208 tested, as atomic, artillery, mortar, torpedo, antiaircraft, and aviation.

POLKOVAYa ARTILLERIYSKAYa GRUPPA (PAG) [Regimental Artillery Group] -- artillery consisting of more than one artillery battalion directly subordinate to a regimental commander assigned during an engagement to accomplish missions on behalf of the regiment and unified by a common command. A PAG uses the regimental numerical designator.

POLKOVAYa ARTILLERIYa [Regimental Artillery] -- artillery organizationally included in infantry and mechanized regiments to accompany infantry and tanks and to battle enemy tanks. It will comprise subunits of antitank guns, mortars, light self-propelled artillery mounts, and recoilless antitank pieces. Regimental artillery was introduced for the first time in Russia by Ivan the Terrible who, in 1547, instituted archer regiments and included artillery in their composition, doing so 50 years ahead of the rest of Europe. Horse artillery providing constant support to cavalry and infantry was created for the first time in history by Peter I. In the early 19th century, regimental artillery was abolished due to further light field artillery development and improvement. In 1902, the renowned Russian 3-inch gun (M1902 field gun) was created and it entered the field artillery inventory. The First World War again revealed the requirement for regimental artillery. Mountain guns and the M1913 76mm gun were employed for infantry accompaniment during the war. The 37mm and 57mm naval anti-assault guns were employed against tanks. Regimental artillery again became widespread in the Ground Forces in the form of batteries following the war. The M1927 76mm regimental gun entered the Soviet Army inventory in 1927. Regimental artillery was employed during the Great Patriotic War for accompaniment of infantry and tank attacks and for suppression of fire points in the depth of the enemy defense that survived artillery preparation. Armor-piercing projectiles capable of penetrating more than 100mm of armor were introduced into the unit of fire of the 76mm regimental gun for employment against tanks.

POLNAYa GORIZONTAL'NAYa DAL'NOST' [Base of Trajectory] (X or X_c) -- X-axis of a projectile's impact point, i. e., range along the horizontal at the muzzle.

POLNAYa DERIVATsIYa [Drift in Point of Fall] (Z) -- drift at the impact point.

POLNAYa SILA AERODINAMIChESKOGO SOPROTIVLENIYa [Total Aerodynamic Drag] /209 — resultant of all forces of an airborne platform's interaction (friction and pressure with the air environment during its flight.

POLNOYe VREMYa POLETA [Total Flight Time] (T) — flight time to the impact point. A projectile's total flight time in a vacuum will depend only on the height of the trajectory and is determined from the formula

$$T=\sqrt{\frac{8}{g}\cdot Y}=\sqrt{\frac{8}{9.8}\cdot Y}=0{,}903\sqrt{Y},$$

where Y is trajectory altitude.

POLNYY PUT' SNARYaDA [Total Projectile Travel] (l_g) — relative path a projectile has travelled at the moment of departure.

POLUAVTOMATIKA [Semiautomatic Breech Mechanism] — mechanism used in wedge-type breech mechanisms for opening the breechblock following the shot with extraction of the expended case and closing it at the moment the cartridge is rammed into the chamber. It can be mechanical, inertial, or inertial-mechanical. The mechanical type, comprising opening and closing mechanisms, is the simplest and most reliable. A semiautomatic breech mechanism operates at the end of the piece's recoil. They are installed on the M1943 57mm antitank gun; M1942 76mm gun; M1944 85mm gun, and several others. The first semiautomatic breech mechanism was designed by Russian artilleryman Engineer F. Lender in 1908.

POLUAVTOMATIChESKIYe ORUDIYa [Semiautomatic Pieces] — artillery pieces in which opening and closing of the breechblock and extraction of the expended case are done automatically by the energy of the piece's recoil.

POLUAKTIVNAYa GOLOVKA SAMONAVEDENIYa (RADIOLOKATsIONNYY KOORDINATOR) [Semiactive Seeker (Radar Tracker)] — special radioelectronic receiver located in the nose of a missile to guide it to the target in the final leg of the trajectory. The target is illuminated by a source external to the missile (on the ground, in /210 an aircraft, aboard ship). Radio waves reflected from the target are received by

the seeker receiver, where they are processed and appropriate commands generated for control units, and the missile automatically will be guided to the target.

POLUAKTIVNAYa SISTEMA SAMONAVEDENIYa [Semiactive Seeker System] -- system for guiding a missile in the final leg of the trajectory by means of a poluaktivnaya golovka samonavedeniya [semiactive seeker] (see).

POLUAKTIVNYY METOD SAMONAVEDENIYa [Semiactive Seeker Method] -- see preceding entry.

POLUBRONEBOYNYY SNARYaD [Semiarmor-piercing Projectile] -- artillery projectile having an intermediate property between armor-piercing and high-explosive projectiles. They are employed in shipboard artillery.

POLUZAKRYTAYa OGNEVAYa POSITsIYa [Defiladed Position] -- fire position in which the piece is sheltered from enemy ground-based observation until artillery fire is delivered. During firing, the enemy can observe flash, dust, and smoke from shots. A piece conducts fire from a P.o.p. in the same manner as it does from an indirect fire position.

POLUPRYaMAYa NAVODKA [Case II Laying] -- see navodka [laying].

POMPA [Pump] -- hydraulic pump for filling the recoil absorber and recuperator with brake fluid.

PONIZhENNO-BOYeVYYe ZARYaDY [Reduced Charges] -- charges (predominently for shipboard artillery) weighing 2/3 that of explosive charges. They are employed for firing semiarmor-piercing, high-explosive, and high-explosive-fragmentation projectiles at targets at medium ranges in order to preserve piece barrel life.

PONIZHENIYe SNARYaDA [Projectile Drop] -- distance to which a projectile is launched under the influence of the force of gravity during its flight through the air. Projectile drop in a vacuum is determined from the formula for free fall of bodies

$$h = \frac{gt^2}{2},$$

where h -- projectile drop.

g -- acceleration of the force of gravity equalling 9.81 m/sec;

t -- time in seconds.

POPERECHNAYa NAGRUZKA SNARYaDA [Projectile Sectional Density] -- ratio of projectile weight (in kilograms) to the projectile's greatest cross section (in square centimeters).

POPERECHNOYe SECHENIYe KANALA STVOLA [Bore Cross Section] (s) -- area of /211 the bore cross section in the sector where the rifling has a full profile (considering the rifling).

POPERECHNOYEe SECHENIYe RAKETY [Missile Cross Section] -- area of the section perpendicular to the oncoming stream of air or the missile's longitudinal axis. A simple section and the greatest cross section area are differentiated. The smaller the cross section area, the easier it is for the missile to surmount air resistance. Aerodynamic force decreases in the amount of cross section area decrease.

POPRAVKA [Correction] -- change in input data or settings made on the basis of firing conditions and results.

POPRAVKA BUSSOLI [Declination Constant] (ΔA_m) -- difference between the grid declination and magnetic declination of a given location.

POPRAVKA NA SMESHCHENI[illegible]'PS) [Target Offset] -- angle at the target between the bearings to the observation post and to the fire position.

PORAZHAYeMOYe PROSTRANSTVO [Danger Area] -- sector of terrain in which a target (obstacle) can be destroyed by a direct hit from a projectile (besides shrapnel, and so forth) when firing from a given fire position.

PORAZHENIYe [Effect] -- period of firing when one will strive to inflict the greatest damage on the enemy with the highest rate of fire based on data obtained from registration insuring that the average trajectory passes through the target. Transition to firing for effect also can occur without registration (if the deliberate fire preparation method is used for the settings for firing for effect) or by lifting

of fire. Availability of modern fire control instruments and radar make it possible to fire for effect without registration.

POROKhA [Powders] -- explosives used in firearms to impart energy of movement to a projectile (bullet). They include mechanical mixtures (black powders) and chemical compounds (smokeless pyroxylin and nitroglycerine powders). Smokeless powders mainly are used for artillery propulsive charges, while black powders are used in bursting charges for special projectiles such as illuminating, incendiary, /212 and so on. In addition, black powders are used to prime igniters and time fuses.

POROKhOVAYa MYaKOT' [Black Blasting Powder] -- mealed black powder sifted through a fine sieve. It is used for time compositions and fuses.

POROKhOVOYe ZERNO [Powder Grain] -- individual element of a powder charge (strip, perforated train, stick, block, and so forth).

POROKhOVOY ZARYaD (BOYeVOY ZARYaD) [Powder Charge (Explosive Charge)] -- charge insuring receipt of specific velocities of projectile movement in the bore.

POROKhOVOY REAKTIVNYY DVIGATEL' (PRD) [Powder Rocket Engine] -- engine operating on solid propellant (powder) developing velocity by rearward expulsion of the products of powder combustion. Propellant combustion in a PRD is accomplished independent of the external atmosphere. A PRD can operate at very high altitudes, in a vacuum, and even under water. Black powder with a constant combustion surface (ballistite and cordite) in the form of sticks, packets, rings, and so on mainly are used as propellant in PRD. An igniter is used to detonate the propellant. Gases with a pressure of 200--300 atmospheres and a temperature of 2,000--3,000° are formed in the chamber as the powder burns and they are expelled through the nozzle into the atmosphere at velocity of 2,000 m/sec and more. PRD are used for unguided rocket projectiles, guided antiaircraft and aviation rocket projectiles, as boosters in aviation to facilitate take-off, and as accelerators during take-off in aerodynamic projectiles and missiles.

POSLEDOVATEL'NOYe SOSREDOTOChENIYe OGNYa (PSO) [Successive Fire Concentration] -- type of artillery fire employed in artillery support of advancing troops, comprising successive suppression by artillery fire of enemy weapons, personnel, tanks, and

other combat equipment along the fr nt and on the flanks of advancing motorized rifle and tank units. PSO is delivered against previously-detected sectors of suppression, each of which includes one or more previously-reconnoitered targets.

POTENTsIAL'NAYa ENERGIYa ARTILLERIYSKOGO ZARYaDA (POTENTsIAL ZARYaDA) [Artillery Charge Potential Energy (Charge Potential)] -- hidden energy that a charge possesses, which can be computed from the formula

$$E_{пот} = 427\omega Q \qquad \text{kg-m},$$

where $E_{пот}$ -- potential energy of an explosive charge in kilograms;
427 -- mechanical equivalent of heat; as is known, each kilocalorie corresponds to 427 kilograms of technical energy;
ω -- explosive charge weight in kilograms;
Q -- number of calories released during combustion of 1 kilogram of powder.

PRAKTIChESKIYe SNARYaDY [Training Projectiles] -- artillery projectiles for use in practical training firings and piece range tests. They correspond in weight and shape to the overall dimensions of explosive charges, but are a simplified design made of cheaper materials, and have an empty inner cavity.

PREDVARITEL'NAYa PODGOTOVKA STREL'BY [Preliminary Preparation for Firing] -- aggregate of preplanned measures directed at successful accomplishment of artillery fire missions.

Preliminary preparation for firing includes reconnaissance of targets and study of the terrain in the enemy disposition; preparation of instruments, pieces, and ammunition; determination of the coordinates of targets and of friendly artillery subunit fire positions and observation posts (see topograficheskaya podgotovka [artillery survey]; determination of ballistic and meteorological firing conditions; initial firing data preparation (complete, limited, or visual, depending on the situation).

PREDEL'NYY UGOL USTOYChIVOSTI ARTILLERIYSKOGO ORUDIYa [Artillery Piece Stability Factor] ($\varphi_{пр}$) -- minimum angle of elevation at which an artillery piece still remai stable, i. e., immobile, when fired. A piece is least stable when fired at angles

of elevation close to zero. Due to recoil, piece stability decreases. $\varphi_{np}=0$ in contemporary antitank pieces and is $\varphi_{np}>0$ for long-range guns and howitzers.

PREDOKhRANITEL' [Safety] (In the Event of Misfires) -- inertial-action mechanical device primarily preventing opening the piece breechblock when a misfire or /214 hangfires occur. Its basic element is a massive body (inertial body) located in the breechblock or in the breech ring which, when the breechblock is opened, displaces, linking (connecting mechanically) the breechblock with the breech ring so that it cannot be opened unless a shot is fired. The safety trips during a shot at the end of the recoil cycle due to the force of inertia (the recoil), separating the breechblock from the breech ring. If there is no shot (hangfire or misfire), there consequently will be no recoil and the breechblock remains joined to the breech ring. If the assistant gunner, trained to react automatically, attempts to open the breechblock, it will not open. The safety must be pushed to effect this.

PREDOKhRANITEL'NOYe USTROYSTVO RAKETY [Missile Safety Device] -- fuse element that is an intermediate part between the fuse and explosive charge to prevent premature detonation of the missile at a distance dangerous to : oport personnel and friendly troops.

It is cut in upon command from the control system or from the fuse. Mechanical, electrical, and other types of safety devices are used.

PRIBOYNIK (DOSYL'NIK) [Loader (Rammer)] -- 1. Wooden pole with cylindrical leather or rubber absorber (pad) at the end used to ram a projectile in the piece chamber during manual loading. The loader rams the projectile with sufficient force so that one hears the characteristic metallic sound of the guide ring striking the steel rifling. 2. Special device for ramming a projectile into the chamber of pieces with a ramming mechanism (rammer).

PRIBOYNICHIY [Rammer] -- piece crew member who uses the loader to ram a projectile into the chamber as a piece is loaded. In some piece crews, the assistant loader or assistant trail gunner rams the projectile.

PRIBORNOYe VREMYa [Instrument Interval] ($\tau_п$) -- time interval between the initial moment and the moment that transmission of data from the instrument to the piece concludes.

PRIBORNYY OTSEK [Instrumentation Section] -- section in which missile /215
control instruments are located. Placement will depend on missile design and purpos
The instrumentation section can be located in various parts of a missile's casing.

PRIBORY OPTICHESKIYe [Optical Instruments] -- instruments in which lenses, prisms, and mirrors are used.

PRIBORY UPRAVLENIYa ARTILLERIYSKIM OGNEM (PUAO) [Artillery Fire Directors] -- complex of computers for solving the target engagement problem. PUAO during the firing process determine target present coordinates and work out fields of fire, fuse setting, and other magnitudes, taking target movement characteristics and firin conditions into account. The variety of targets at which artillery is called upon to fire demands availability of various fire directors. PUAO are subdivided into ground-based, shipboard, antiaircraft (PUAZO), coastal defense, aviation, and others The simplest firing instrument in surface-to-surface artillery is the firing chart used to determine survey data for firing and target designation data. Shipboard artillery PUAO continuously determine target coordinates and develop complete piece fields of fire, taking target movement into account. An antiaircraft artillery fire director (PUAZO) continuously solves the aerial target engagement problem.

PRIVEDENNAYa DLINA KAMORY [Corrected Chamber Length] (l_0) -- length of a straig cylinder whose volume equals that of the breech chamber, and whose area equals that of the bore cross section.

PRIVOD RULEY SILOVOY [Control Actuator] -- actuators, along with control surfac comprise a control actuator which displaces controls to the magnitude proportional to the received signal. It is the actuating element in a missile control system. Signals formed by amplifiers control the operation of the steering gear. Electric, electrohydraulic, or electropneumatic drives can be used in missiles.

PRIVOD ELECTRICHESKIY [Electric Drive] (Electrodrive) -- device comprising an electric motor, transmission of movement to mechanisms (artillery drive, /216 missile actuator, wind tunnel drive, and so on), and control equipment.

PRIVYaZKA POZITsIY RAKETNYKh VOYSK I ARTILLERII [Missile and Artillery Unit Site Survey] -- part of topogeodetic firing preparation in missile units and an

artillery site survey. A site survey for missile units comprises determination of the coordinates of the launcher location and bearing angles of the zero line and the control line. Depending on the situation, a site survey can be done on a geodetic basis or from a map (aerial photograph). An artillery site survey comprises determination of the battery's main piece, registration pieces, and other elements of the combat formation. It is conducted on a full geodetic basis or from a map (aerial photograph).

PRIDANNYYe ARTILLERIYSKIYe PODRAZDELENIYa (ChASTI) [Attached Artillery Subunits (Units)] -- artillery subunits (units) fully subordinate to the commander of a combined-arms (tank) subunit (unit) for the period of accomplishment of a specific combat mission. During this period, attached artillery subunits (units) no longer are subordinate to their direct chiefs.

PRIYeMNIK LUChISTOY ENERGII [Radiant Energy Receiver] -- instrument for reception and conversion of radiant energy into electrical energy. They are categorized as thermoelectric (bolometers, thermisters, thermopiles) and photoelectric (photoconductive cells, photodetectors, photodiodes). They are used in missile seekers (tracking heads).

PRINADLEZhNOST' ARTILLERIYSKIKh ORUDIY [Artillery Piece Accessories] -- objects (accessories) intended for loading a piece, preparation of recoil mechanisms for firing, sight collimation and adjustment, bore cleaning, washing, swabbing, and lubrication, as well as artillery system maintenance. These accessories include the rammer, bore cleaner with rooter and with brush, wooden swabs, lubricators, tub, pump, and other objects.

PRISLUGA ORUDIYa [Piece Crew] -- old term for orudiynyy raschet [piece crew].

PRISTRELKA [Registration] -- method in which settings suitable for target destruction are sought by firing. Firing at an observed target, as a rule, /217 includes registration and firing for effect; a target may be destroyed during registration, while, during firing for effect, corrections (if required) can be introduced to refine sight settings. Registrations will be made from measured deviations or the sign of observed bursts. The essence of the former is that instruments are used to measure the magnitude of the deviation of a burst or of

the center of a group of bursts from the target, which makes it possible to compute sight setting corrections for approximation of the srednyaya trayektoriya [trajecto to the mean point of impact] (see). Registration from observation of burst signs is based upon determination of burst signs (plus (over) or minus (short)), with determination where possible of the magnitude of the over (short) in meters. Depen on firing conditions and results from observing bursts, transition from one registr to another may occur. Registrations are made as rapidly as possible, especially when human targets are involved.

PRISTRELYaNNAYa DAL'NOST' [Adjusted Range] ($Д_п$) -- adjusted range obtained by registration.

PRISTRELYaNNYYe DANNYYe ILI PRISTRELYaNNYYe USTANOVKI [Adjusted Data or Adjust Settings] -- data or settings obtained from a registration target or registration fire.

PRITsEL DNYa [Fired Correction of the Moment] -- computed correction to a sig for meteorological conditions at a given moment. This is a preplanned correction computed prior to appearance of the target.

PRITsELY (PRITsEL'NYYe PRISPOSOBLENIYa) [Sights (Sighting Devices)] -- mechan or optical-mechanical instruments of a firearm (carbines, machine guns, mortars, artillery pieces) for guiding it to the target. Piece sights are installed (for field pieces) on a bracket on the upper carriage or attached to the carriage (mount just like on special-purpose pieces, and are connected to the barrel by the piece's rotating parts.

The simplest sighting devices are a front sight and wind gauge used in a smal weapon. Smooth-bore pieces had these kind of sights until the mid-19th century. A new sight with a scale graduated in sazhins [2.134 meters] was designed in 1839. In subsequent years, sights were improved as artillery developed. In the latter / part of the 19th century, a straight sight, which considered drift and comprised a movable peg with a wind gauge which moved in the horizontal plane, was introduce An optical panorama was introduced into the Russian artillery inventory in 1906. Today's telescope mount is a complex optico-mechanical instrument insuring maximum piece laying precision. Artillery panoramic telescopes -- optical telescope viewi

devices -- are used for indirect laying. Sights are categorized as follows: dependent upon the piece (if the sight rotates when the elevating gear is rotated); with an independent line of aim (if the position of the sight's optical axis does not change when the elevating gear is operated); with a semi-independent line of aim (if the optical axis remains fixed, with only the sight pointer turning. The entire sight displaces when the angle of site is set and the position of the panorama's optical axis changes). There are precise optico-mechanical sights with great magnification and field of view insuring highly-accurate firing in the modern artillery inventory. Sights are categorized by purpose as piece (for general-purpose pieces), shipboard (for shipboard artillery pieces), self-propelled and tank artillery, mortar, multiple rocket launcher, antiaircraft sights, and so on.

PRITsEL'NAYa DAL'NOST' [Sighting Range] ($Д_п$) -- range expressed in piece sighting device graduations in accordance with given firing conditions.

PRITsEL'NYY UGOL [Tangent Elevation] (δ) -- angle in the vertical plane between the line of aim and the line of elevation.

PROBIVNAYa SPOSOBNOST' SNARYaDA [Projectile Penetrating Ability] -- ability of an artillery projectile to penetrate an obstacle or enter it to a specific depth. Armor-piercing, shaped, subcaliber, concrete-piercing, and high-explosive projectiles have penetrating ability. The penetrating ability of a projectile will depend on:

-- kinetic energy determined from formula

$$E = \frac{qv^2}{2g},$$

where q -- projectile weight in kilograms;

v -- projectile velocity when encountering the obstacle in meters per second;

g -- acceleration of the force of gravity equalling 9.81 meters per square second;

-- angle of impact, projectile strength and design, fuse type, and strength and design of the armor (obstacle). Projectile penetrating ability will differ depending on projectile design and armor quality. Given sufficient projectile strength and energy, penetration will occur at the instant of impact with homogeneous armor (uniform in its design), followed by dislodgement of plugs whose diameter equals the caliber of the projectile, while the front and rear portions spall. The hole

can have the character of a split with formation of large cracks when heterogeneous (case-hardened) armor is struck. The penetrating ability of an armor-piercing projectile is determined experimentally. An empirical formula can be used to determine the depth to which a projectile or mortar shell penetrates an obstacle

$$L = K \frac{q}{d^2} v_c \sin \mu,$$

where L -- penetration depth into an obstacle in meters based on projectile specifications;

K -- factor, which depends on the properties of the environment and equals: 0.000013 for freshly-spread earth; 0.0000065 for normal soil; 0.0000045 for sand; 0.000001 for concrete.

q -- projectile weight in kilograms;

d -- projectile caliber in meters;

v_c -- projectile velocity when it encounters the obstacle in meters per second;

μ -- angle of impact.

The penetrating ability of a shaped-charge projectile is determined by the power of the high explosive, bursting charge quantity and design, and fuse.

PROGRAMMA POLETA RAKETY [Missile Flight Program] (Law) -- specific sequence of commands which programming instruments aboard the missile must accomplish in accordance with given flight conditions.

PROGRAMMIROVANIYe [Programming] -- process of compilation and loading of a given program (missile flight conditions) into computers (missile programming /220 instruments).

PROGRAMMIROVANIYe AVTOMATIChESKOYe [Automatic Programming] -- programming done by computers.

PROGRAMMIRUYuShchEYe USTROYSTVO [Programmed Device] -- programmed mechanism accomplishing a series of given operations.

PROGRAMMNUYe UPRAVLENIYe [Programmed Control] — automatic control (with the aid of instruments on board a missile) accomplished in a specific time sequence based on a preassigned law (program).

PROGRAMMNYY REGULYaTOR [Programmed Regulator] — device used to change, over time, parameters of a regulated process of movement of a controlled airborne platform based on an assigned program.

It is used in programmed guidance systems (inertial, astronavigational, gyroscopic, and others) aboard guided missiles.

PROGRAMMNYY TOKORASPREDELITEL' (PTR) [Program Current Distributor] — dc electric motor to supply control commands in a specific sequence to control instruments aboard a missile. The electric motor is connected by reduction gearing with the program (toothed) shaft, which, rotating in a specific sequence, closes contacts corresponding to the appropriate commands.

PROGRESSIVNYYe POROKHa [Progressive Powders] — powders in which the influx of gases per unit of time increases due to combustion of the grains, i. e., those in which the overall surface increases due to combustion of the grains. An example is a grain of powder in the form of a train with seven grooves.

PRODOLZhITEL'NOST' NAKATA [Time of Counterrecoil] ($t_н$) — time interval from the beginning of counterrecoil until its conclusion.

PRODOLZhITEL'NOST' OTKATA [Total Time of Retarded Recoil] ($t_{отк}$) — time interval from the beginning of retarded recoil until its conclusion.

PRONIKAYuShchAYa RADIATsIYa [Penetrating Radiation] — stream of invisible and imperceptible gamma rays and neutrons formed at the moment of an atomic burst and possessing the capability of penetrating great thicknesses of different materials. It is harmful to human and animal organisms. The enormous energy of an atomic /221 burst is distributed approximately as follows: 35% for formation of the shock wave, 35% for luminous radiation, 5% for penetrating radiation; 15% will be imparted by the burst to the upper layers of the atmosphere and 10% is released considerably later as a result of the radioactive radiations of the products of the nuclear burst.

PROPORTsIONAL'NOYe SBLIZhENIYe [Proportional Closure] -- homing whereby the angular velocity of a missile's rotation in the trajectory is proportional to the angular velocity of the missile-target line's rotation.

PROTIVOVOZDUShNAYa OBORONA (PVO) [Air Defense] -- system of measures taken to defend the armed forces, population, and various military and economic installation against enemy air attack. PVO is accomplished by special troops (Air Defense Troops), missile units, antiaircraft artillery, fighter aviation, radiotechnical resources, camouflage, and other resources.

PROTIVOLODOChNYYe REAKTIVNY e BOMBY [Rocket-Propelled Antisubmarine Bomb] -- shipboard unguided weapon variant employed against submerged submarines. An antisubmarine bomb launcher is a shipboard single- or multi-barrel fixed muzzle-loading launcher firing rocket-propelled depth charges. The depth charge has a rod which is inserted in the launcher's short barrel. The rocket-propelled charge, which imparts the requisite velocity to the bomb, is ignited by an electric detonator. Launcher barrels can be laid remotely both horizontally and vertically. Firing occurs singly (with a short interval between rounds) or in a volley. The depth bomb detonates under water.

PROTIVOMINNAYa ARTILLERIYa [Antimine Artillery] -- medium-caliber artillery for ship self-defense against enemy small surface vessels and submarines, as well as to repulse torpedoes fired at it. The antimine artillery unit of fire included, besides conventional high-explosive and fragmentation-high-explosive projectiles, /22 diving projectiles for employment against submerged submarines and fired torpedoes underwater. The term antimine artillery now is obsolete. Appearance and development of new types of weapons and combat equipment elicited in many countries basic changes in the trend of shipbuilding overall and in individual ship classes. The tendency towards decreasing the number of tubes in artillery weapons and torpedo launchers and resultant upgrading of antiaircraft and antisubmarine warfare is characteristic, for example, of American destroyer development. Thus, these ships are designated for accomplishment of antisubmarine warfare and antiaircraft defense missions rather than an artillery torpedo strike. At the present time, based on foreign press data, antisubmarine warfare ships, rocket-propelled weapons, depth charges, and dual-purpose automatic shipboard artillery will accomplish antimine artillery missions.

PROTIVOOTKATNYYe USTROYSTVA [Recoil Mechanisms] -- recoil absorber and recuperator to absorb the energy of movement of recoiling parts during firing, to return them to the initial position, and to maintain them in this position at all angles of elevation.

PROTIVOPOLOZhNYYe SOBYTIYa [Opposite Events] (Theory of Probabilities) -- two uniquely possible and incompatible events. An example is a hit and a miss with one shot.

PROTIVOPUL'NAYa BRONYa [Bullet-Proof Armor] -- special thermally-processed sheet steel 4--30mm thick to protect personnel and mechanisms from small-arms and machine gun fire and small projectile shrapnel. It is used in artillery for manufacture of armor shields and artillery mount protective devices.

PROTIVORADIOLOKATsIONNYY SNARYaD (RAKETA) [Antiradiation Projectile (Missile)] -- means of combating radar stations. Three types of projectiles are employed: a) projectiles (mortar shells) or missiles loaded with antiradiation reflectors to create passive interference with variable-purpose radar stations; b) decoy missiles with corner and other reflectors for diverting "surface-to-air," "ship-to-air," /223 and "air-to-air" missiles from aircraft, ships, cruise missiles, and ballistic missile warheads; c) missiles homing in on radiation emitted from operating enemy radio-technical stations.

PROTIVORAKETNAYa OBORONA [Antimissile Defense] -- component part of air defense. It is intended for detection and destruction of enemy ballistic missiles on their flight trajectories, and for subjecting them to electronic countermeasures. Antimissile missiles and special electronic countermeasures are basic antimissile defense means.

PROTIVORAKETNYY SNARYaD [Antimissile Projectile] -- projectile (missile) intended for destruction of incoming enemy intercontinental ballistic missiles in the descending leg of their trajectory. An antimissile projectile has great range and altitude capability, high maneuverability, and constant readiness for action. They are primed with a conventional or nuclear high explosive and are guided during the entire flight until they engage the target.

PROTIVOSNARYaDNAYa BRONYa [Cannon-Proof Armor] -- will protect against the

action of projectiles during direct hits. It is rolled, cast, homogeneous, and heterogeneous armor manufactured from armor steel in the form of plates 30--400mm or more thick. Rolled and cast homogeneous armor of high, medium, and low hardness and heterogeneous, case-hardened, and noncase-hardened unilaterally tempered to a depth of 15--40% of its thickness are used most widely (see geterogennaya bronya and gomogennaya bronya [heterogeneous and homogeneous armor]). It is used to protect warships, medium and heavy tanks, self-propelled artillery mounts, defensive structure and fortifications. Chromium-nickel-molybdenum steel is used in manufacture of very thick cannon-proof armor.

PROTIVOTANKOVAYa ARTILLERIYa (PTA) [Antitank Artillery] -- special element of surface-to-surface artillery for combating enemy tanks and other armored targets. The PTA inventory includes special antitank guns with armor-piercing, subcaliber, and shaped-charge projectiles, self-propelled artillery mounts (SAU), and antitank recoilless pieces organizationally part of antitank artillery units and formations (regiments, brigades). /224

PROTIVOTANKOVAYa OBORONA [Antitank Defense] -- aggregate of antitank fire resour and obstacles employed to repulse enemy tank attacks and for their destruction.

Antitank defense includes company strong points with their antitank resources (tanks, self-propelled artillery mounts, antitank guided missiles and pieces); artill disposed in probable sectors of tank approach; antitank reserve deployment lines; antitank reserves; antitank obstacles; and other resources. Antitank defense in modern combat is the foundation of combined-arms subunit and unit defense.

PROTIVOTANKOVAYa PLOTNOST' [Antitank Density] -- in a defense, the number of antitank guided missile launchers, pieces, self-propelled artillery mounts, and tanks per kilometer of front.

PROTIVOTANKOVAYa PUShKA [Antitank Gun] -- artillery piece intended for destructi of tanks and other mobile armored targets. They are employed in 37, 45, 57, 100mm caliber and larger. Antitank guns usually have a high rate of fire, are semiautomati and use a quick fire cartridge. Their carriages have a maximum traverse, 60--360°, and a low line of fire. They have a direct-laying sight insuring rapid and accurate piece laying against a visible fast-moving target. The antitank gun unit of fire

includes armor-piercing, armor-piercing-tracer, all-metal shaped-charge, and subcaliber projectiles with high armor-piercing ability. Antitank guns are relatively low in weight, making them very maneuverable and mobile on the march and in combat.

PROTIVOTANKOVOYe NEUPRAVLYaYeMOYe RAKETNOYe ORUZhIYe [Antitank Rocket Launcher] -- combat rocket type employed by infantry against tanks and other armored targets. They include shaped-charge and high-explosive-fragmentation rockets (grenades) and antitank rocket launchers. They are subdivided into light, transportable by /225 one person, medium, and heavy, launched from special mounts or armored personnel carriers.

PROTIVOTANKOVYYe UPRAVLYaYeMYYe REAKTIVNYYe SNARYaDY (PTURS) [Antitank Guided Missiles] -- powerful means in the inventory of Ground Forces units for combating tanks. PTURS possess great penetrating ability and are fired from combat vehicles and portable direct-laying mounts.

PROTIVOTANKOVYY REZERV [Antitank Reserve] -- portion of antitank resources (pieces, PTURS, and so on) not included in company strong points and directly subordinate to the unit (formation) commander. It must be very maneuverable. It is intended for destruction of enemy tanks which break through in any of the sectors in the combined-arms unit (formation) zone of operations.

PROTIRNIK [Pull-Through] -- accessory for care and maintenance of an artillery barrel. It is a wooden cylinder with screw-shaped grooves on the sides for winding cloths and with openings to hold a hemp cord along the axis used for pulling the swab through the piece's bore. It is used to clean and wipe off oil from the bore prior to firing. A pull-through must be 1 cm less in diameter than the caliber of the bore and about 2 calibers long.

PROTON [Proton] -- elementary nuclear particle having a positive charge and infinitely-small mass, equalling 0.000000000000000000001672 grams. The weight of a proton is greater by a factor of approximately 2,000 than that of an electron, while the magnitude of its charge equals that of an electron. Protons, electrons, and neutrons are the "components" from which atoms are formed.

PROTRAVNIK [Vent Bit] -- accessory for the breechblock of separately-loaded

pieces used to remove the expended case from the spindle plug's vent hole in the event the case bulges or the extracting lug breaks.

PROKhODIMOST' ARTILLERIYSKOY SISTEMY [Artillery System Passability] -- ability of a piece to be moved by a tug on highways, roads, and off the road in broken /226 terrain. It will depend mainly on the system's footprint and clearance.

PROFIL' KRYLA (OPERENIYa) [Wing (Empennage) Section] -- contour, form of its cross section. Examples are wedge, double-wedge, and biconvex.

PRYaMAYa NAVODKA [Direct Laying] -- type of piece laying performed by sighting at the target. Direct fire is delivered from exposed fire positions and from tanks against stationary or moving targets. Direct fire is delivered at short range and is distinguished by high accuracy and the speed at which the assigned fire mission can be accomplished.

PRYaMOY VYSTREL [Grazing Shot] -- shot which destroys the target from the point of origin to the impact point in which the projectile flight trajectory does not rise above the target. A grazing shot can destroy the target without changing the sight within range limits, which will depend on target height and the slope of a given piece's trajectory. The higher the target and the more slope to the trajectory, the greater the range of a grazing shot and the greater the distance from the piece a target can be destroyed without changing the sight, i. e., with one sight setting.

PRYaMOTOChNYY VOZDUShNO-REAKTIVNYY DVIGATEL' (PVRD) [Ramjet Engine] -- rocket engine in which oxygen from atmospheric air passing through the intake channel is used for fuel combustion. The pressure in the combustion chamber is created due to the velocity head of the air. A PVRD operates in the relatively-dense layers of the atmosphere. Basic engine parts include intake diffusor, combustion chamber, output nozzle, and propellant supply and ignition. PVRD are employed in aviation, antiaircraft projectiles, and as sustainer engines in several rocket projectiles. In the USA, PVRD are used in Bomarc and Talos antiaircraft projectiles and Snark aerodynamic projectiles.

PSIKhROMETR [Psychrometer] -- precision instrument measuring air temperature and humidity in artillery magazines and dumps.

PUAZO [Antiaircraft Fire Director] -- complex of computers and instruments for determination of initial data and solution of the target engagement problem /227 when firing at aerial targets. During the firing process, the PUAZO continuously determines present position data (future position) of a moving aerial target, computes settings for the pieces (azimuth, angle of elevation, and fuse setting), and automatically transmits them to receivers on the pieces. In some antiaircraft artillery systems, these data also are sent to piece remotely-controlled guidance mechanisms. A PUAZO will comprise a central instrument, a computer complex automatically solving the target engagement problem; receivers on the pieces; instruments for detection and tracking of an aerial target (radars, optical rangefinders) and instruments for synchronous transmission, which transmit (instantaneously and precisely) to the pieces computer-generated values for predicted azimuth, angle of elevation, and fuse setting; and an electric power unit feeding the central post and a synchronous transmission unit. PUAZO are categorized as ground-based and shipboard, with the latter more complex in design.

PUL'SIRUYuShchIY VOZDUShNO-REAKTIVNYY DVIGATEL' (PuVRD) [Pulse-Jet Engine] -- ramjet (compressorless) rocket engine in which oxygen from atmospheric air (compressed by velocity head) reaching the combustion chamber periodically, in pulses (cyclically), is used for propellant combustion. Main PuVRD parts are diffusor (intake device), combustion chambers, and nozzle. The operating principle is as follows: air entering under pressure from the atmosphere opens valves and fills the combustion chambers. Fuel is sprayed simultaneously into the combustion chamber. The mixture formed is ignited by the fuel gases (initially by an electric spark). Combustion products are expelled through the nozzle into the atmosphere, pressure in the combustion chamber again drops, and a fresh stream of air opens the valves and fills the chamber. Thus, the engine's cycle is repeated. A PuVRD accomplishes about 3,000 cycles per minute, expending 3--4 kilograms of fuel per kilogram of thrust per hour. It develops a speed of 700--900 kilometers per hour, insuring a projectile flight range of several hundred kilometers. The V-1 aerodynamic /228 vehicle had a PuVRD. According to foreign press data, the French aerodynamic vehicle Arsenal 5-501 for employment against ground-based targets is equipped with a PuVRD.

PUSKOVAYa KAMERA SGORANIYa [Igniter Combustion Chamber] -- igniter chamber, precombustion chamber in which reliable ignition of the fuel mixture will occur, insuring ignition of the mixture in the main combustion chamber.

PUSKOVAYa USTANOVKA (PU) [Launcher] -- complex of devices and mechanisms intended for launching of a missile and imparting specific flight direction to it. They are categorized by location as ground-based, shipboard, and aviation. Ground-based launchers are subdivided into fixed and mobile. Depending on missile type, PU can be for launch of ballistic, cruise, and aviation missiles.

PUSKOVYYe USTANOVKI BALLISTIChESKIKh RAKET [Ballistic Missile Launchers] -- launching pads and launchers fixed or mobile (tracked or wheeled drive, rail car, and so forth). They can launch missiles in a strictly vertical or in a slanting position. Slanted launchers have guides and are designed for the launching of certain solid-propellant ballistic missiles. Most ballistic missiles are launched from devices without guides, with the missile placed in a vertical position on the launch pad. Such PU can be in silos, which will serve to store and prepare the missile for launch.

PUSKOVYYe USTANOVKI PTURS [Antitank Guided Missile Launchers] -- mounts for launching antitank guided missiles. They can be installed on the ground, vehicle, tank, armored personnel carrier, aircraft, and helicopter. When they are launched from these places, PTURS will travel a small portion of their path along guides, which will impart the requisite angle of elevation to them.

PUTEVAYa SKOROST' ZENITNOY TsELI [Overhead Target Ground Speed] -- speed at which a target travels relative to the ground.

PUT' NAKATA [Length of Counterrecoil] (l_n) -- magnitude (variable) of the displacement of the recoil parts during counterrecoil relative to the guides along which these parts will travel.

PUT' SVOBODNOGO OTKATA [Length of Free Recoil] (L) -- magnitude (variable) /229 of the displacement of the recoil parts during free recoil.

PUT' TORMOZhENNOGO OTKATA [Length of Retarded Recoil] (X) -- magnitude (variable of displacement of the recoil parts during retarded recoil relative to the guides along which these parts will travel.

PUShECHNAYa BRONZA [Gun Metal] -- tin bronze, alloy of copper with tin (90%

copper (Cu) to 10% tin (Sn)), used until the mid-19th century to make piece barrels. It now is used to cast components of complex design for artillery breechblocks and other mechanisms.

PUShECHNAYa SMAZKA (PUShSALO) [Gun Lubricant (Gun Grease)] -- lubricant used for lubrication of the bore, breechblock, and laying mechanisms, piece ZIP, and other piece parts and mechanisms at temperatures below -10°C.

PUShECHNYY DVOR [Cannon Foundry] -- central foundry in which all kinds of guns were manufactured, with bells cast there later on. The foundry was the first state enterprise producing pieces in 15-17th century Russia. The Great (central) Cannon Foundry was created for the first time in Moscow in 1488 on the Neglinnaya River. There also were cannon foundries in Novgorod, Pskov, Tver', Ustyuzhne-Zheleznopol'skiy (400 kilometers from Novgorod), and other places. They were built on the foundations of "cannon huts" -- foundries producing guns organized in the mid-15th century by grand prince Ivan III. At the end of the 15th century, grand prince Ivan III united the separate Russian principalities into a single state and, in 1479, organized a "cannon hut" in Moscow, which evolved into the Cannon Foundry. In the 14-15th centuries, Moscow was the center of the birth and production of propellant artillery in Rus'. Such renowned Russian masters of gunnery affairs as Yakov, Ignatiy, Bogdan, Andrey Chokhov, who cast the gigantic Tsar-Pushka which now stands in the Moscow Kremlin, Fedorov, Petr Pushechnik, and others worked at the Moscow Cannon Foundry. Surviving models of pieces manufactured at the Cannon Foundry give witness to the high mastery of Russian masters of gunnery affairs. In the early 18th century, the significance of the Cannon Foundry diminished with development of metallurgy and weapons plants. Production was shifted from the Moscow Cannon Foundry to the Bryansk Arsenal. The Moscow Cannon Foundry became a repository of weapons and /230 standards, which were transferred to the Kremlin in 1802. The Moscow Cannon Foundry was torn down.

PUShKA [Gun] (old Russian word) -- long-barrel artillery piece with great projectile initial flight velocity and renge. A gun has a long barrel (up to 75 calibers), sloping trajectory, and a relatively heavy projectile. It is used for low-trajectory fire at great ranges against targets located on the earth's surface. Only guns are employed in shipboard artillery.

PUShKA ATOMNAYa [Atomic Cannon] -- long-range tube rifled artillery piece intend for delivering an atomic projectile against land-based and maritime targets. The projectile is fired from a gun with a conventional powder charge. A 280mm atomic cannon with a range of 30-35 kilometers is in the US Army inventory. It is a separately-loaded gun with a slotted screw breech mechanism and electrical striker-ty striking mechanism. The unit of fire for an atomic cannon will comprise an atomic projectile (weighing 450 kilograms) and a conventional high-explosive-fragmentation charge (weighing 360 kilograms). The destructive force of an atomic projectile is equivalent to 15,000 tons of TNT. Piece loading and laying is mechanized and it can fire one round every 4 minutes (some data claim every 15 minutes). The cannon weighs 75 tons and has a 15-man crew. It is transported by two wheeled tugs at a speed of 56 kilometers per hour. Its enormity and large amount of transport to move it are serious shortcomings. Work is underway in the USA to create atomic cannon of smaller caliber, such as 105, 155, and 175mm.

PUShKA BARANOVSKOGO [Baranovskiy Cannon] -- a 2.5-inch landing gun employed by the Russian fleet.

PUShKA GOTChKISA [Hotchkiss Cannon] -- artillery piece employed in the Russian Navy prior to the Russo-Japanese War, named for its inventor. The most prevalent models were five-barrel 37mm and 47mm pieces and a single-barrel 57mm piece. These cannon are not employed at the present time.

PUShKA DROBOVAYa [Shot Cannon] -- sailing fleet artillery piece employed during boarding operations by the Russian Navy. It was loaded with grape shot or pieces of iron.

PUShKA KURShEYNAYa [Kurshey Cannon] -- ancient sailing fleet piece installed /2 in galleys on the ship's centerplane on a kurshey [Translator's Note: word unknown, but probably a pedestal mount of some sort located in a fixed position forward of the rowers].

PUShKA REVOL'VERNAYa [Revolver Cannon] -- rapid-fire 37 and 47mm Hotchkiss artillery piece employed in the Russian Navy at the end of the last century.

PUSHKARI [Cannoneers] -- ancient name for Russian artillerymen. In 1547, Ivan the Terrible instituted archer regiments and introduced artillery (artillerymen)

to their ranks. The first cannoneers were called cannon foundrymen who simultaneously also were artillerymen who maintained a piece during firing. In the 16th century, cannoneer service in Rus' became hereditary and passed from father to son. In the 14th century, a chest badge was instituted for Russian cannoneers. It was an embossed round metal plate with the depiction of the head of a lion with a shield in its teeth. Later, rank-and-file artillerymen in Russia and other countries began to be called cannoneers.

PUSHKARSKIY PRIKAZ [Cannoneer's Administration] -- state establishment in Russia in the late 15--17th centuries operating "cannon foundries", powder plants, managing manufacture and employment of artillery, ammunition, and so forth. From 1479 to the 1670's, it was called the "cannoneer's hut," and the "cannoneer's administration" from the early 16th until the end of the 17th centuries. It was renamed the artillery administration after 1701.

PUSHKARSKIY USTAV [Cannon Regulations] -- regulations covering military, cannon, and other affairs involving military science. Collection of rules for military affairs which laid the foundation for artillery literature in Russia written by Ustyuzhensk deacon Onisim Mikhaylov in 1617--1621. Unfortunately, the manuscript of Mikhaylov's "Regulations" lay in a storeroom in the Moscow Weapons House and was not published until 1777. The regulations examined problems of artillery manufacture and employment, powder making, engineer troops, infantry march and combat formations, and so on.

PYZh [Wad] -- covering (obturator) made of felt (cardboard) used to secure a powder charge at the bottom of a cartridge case and covering it in a shell (case) or separating the charge from the projectile (bullet) to hermetically seal it (i. e., for complete retention of powder gas energy for propelling the projectile).

RABOTNOYe VREMYa [Dead Time] ($\tau_р$) -- time interval between the initial moment and firing of the round.

RAVNOSIGNAL'NYY METOD UPRAVLENIYa RAKETOY [Equisignal Missile Control Method] -- method of missile radio control whereby a radar station at the guidance post automatically tracks the target throughout the equisignal zone. The missile also moves within the equisignal zone with the aid of special onboard equipment and will be guided to the selected target. The missile control signal generates a command when the missile deviates and transmits this command to actuators, which place the missile back in the equisignal zone and maintain it in the direction indicated by the radar station.

RADIATsIONNAYa RAZVEDKA [Radiation Reconnaissance] -- type of reconnaissance conducted for the purpose of taking timely measures to protect personnel from harmfu radioactive substances. Radiation reconnaissance is one of the measures in antinucl protection for the troops. Its main missions are timely detection of radioactive contamination; warning the troops of the contamination; measurement of radiation levels on the terrain contaminated by radioactive substances and erection of warning signs delimiting radioactive contamination boundaries; finding ways to detour arounc contaminated sections or sectors and surmounting them; determining the degree of contamination of combat equipment, weapons, water, foodstuffs, and other objects. /2 Radioactive reconnaissance is conducted from observation posts and by reconnaissance patrols equipped with dosimeters. Commanders use results from radioactive reconnaissance to determine specific measures for protection against radioactive poisonin and elimination of the aftereffects of an atomic attack.

RADIOAKTIVNOYe ZARAZhENIYe [Radioactive Contamination] -- contamination of the terrain, air, water, foodstuffs, as well as personnel and other objects, by radioactive substances harmful to organisms. Radioactive contamination is observed during atomic bursts and when military radioactive substances (VRV) are employed.

Radioactive contamination is created during an atomic burst due to radioisotope -- products of the fission of the nuclei of the atoms of radioactive isotopes formec due to the effect of neutrons emitted during the burst as well as due to the unreact

portion of the nuclear fuel. Radioactive contamination of the terrain is observed both in the area of the atomic burst as well as along the path of movement (along the "track") of the radioactive cloud of smoke formed during the burst. The degree of radioactive contamination of the terrain during an atomic burst and the overall dimensions of the contaminated zone will depend on the type of burst (air, ground, underground, underwater), its yield, and meteorological conditions.

Radiation sickness will occur during the action of large doses of radiation on living organisms or when large amounts of radioactive substances enter an organism. Radioactive substances may be observed with the aid of dosimeters.

RADIOAL'TIMETR (RADIOVYSOTOMER) [Radio Altimeter] -- radar-based instrument for determination of flight altitude.

RADIOASTROINERTsIAL'NAYa SISTEMA NAVIGATsII [Radio Astro-Inertial Navigation System] -- orientation in space with the aid of a complex of radiotechnical (radio sextant) and inertial navigation equipment. It is used mainly in medium- and long-range ballistic missiles.

RADIOASTRONAVIGATsIONNAYa SISTEMA UPRAVLENIYa [Stellar Radio Navigational Control System] -- variation of a celestial navigational control system using astrotrackers. The Sun, Moon, and certain stars are used in this system as sources of radio /234 emissions (stellar radio reference points). Astrotrackers capable of receiving radio signals emitted by heavenly bodies are used in stellar radio navigational systems for airborne platform flight control. An astrotracker is a sensitive element used automatically to determine deviation from the assigned course and, with great precision, to guide the airborne platform in accordance with a computed trajectory, regardless of the time of day and meteorological conditions. Prior to airborne platform launch, the computed course is loaded into a computer. The airborne platform is launched, directed to the initial computed point with the aid of remote control, and placed on the assigned course. Further control is accomplished with the astrotracker directed at the assigned heavenly body. The selected heavenly body's image continually is maintained between parallel light-sensitive strips. The computer generates a command signal when the image displaces to one of the strips. This signal, acting upon control surfaces, with the aid of the autopilot returns the airborne platform to the initial position. A stellar radio navigational control

system is completely autonomous and jam-resistant. It is used for airborne platform long-range long-duration flight.

RADIOASTRONAVIGATsIYa [Radio Astronavigation] -- see astroradionavigatsiya [stellar radio navigation].

RADIOASTRONOMIChESKAYa NAVIGATsIYa [Celestial Radio Navigation] -- radio navigational system in which celestial radio equipment is used for orientation in space.

RADIOVZRYVATEL' [Radio Fuse] -- proximity fuse built on the following principle A radio transmitter begins to emit radio signals after minute tubes heat up. Having encountered a moving target en route, the radio signal is reflected from it. Being amplified due to target closure, it trips the detonator. These fuses are employed in antiaircraft artillery projectiles and in surface-to-surface artillery fragmentat projectiles.

RADIOVYSOTOMER [Radio Altimeter] -- special radar for automatic measurement of the true altitude of an airborne platform (aerodynamic projectile, aircraft, /23: and so on). A radio altimeter will comprise a transmitter, receiver, and downward-directed antenna. At present, two basic radio altimeter types are used, pulse and frequency modulated. The former is used to determine high altitudes, while the latter is used for low altitudes.

RADIOZOND [Radiosonde] -- meteorological instrument which automatically determi weather elements in the free atmosphere: air temperature and humidity, atmospheric pressure, and so forth, as well as which codes the measured magnitudes and transmits them in the form of radio signals to the earth. A radiosonde is put aloft on a special oxygen-filled balloon. Balloons and radiosondes are launched in free flight and do not return.

RADIOLOKATOR [Radar] -- device for determination of the precise location of remote objects with the aid of radio waves under any visibility conditions. Its action is based on the reflection of emitted electromagnetic waves from the detected target.

RADIOLOKATsIONNAYa GOLOVKA SAMONAVEDENIYa (AKTIVNOGO TIPA) [Radar Seeker (Active)] -- special radioelectronic device installed in guided missiles. Its operating principle is based on differentiation in the reflection by a target and by a background of electromagnetic oscillations, primarily in the centimeter band. Influenced by signals received, a radar seeker obtains information about the target, based on which it generates commands and transmits them to the appropriate elements controlling missile guidance.

RADIOLOKATsIONNAYa KARTA MESTNOSTI [Terrain Radar Map] -- radar image of the terrain observed on a radar plan-position indicator aboard an airborne platform.

RADIOLOKATsIONNAYa RAZVEDKA [Radar Reconnaissance] -- reconnaissance method whereby data on targets (enemy installations) are obtained by radar stations. Radar reconnaissance makes it possible to detect areas containing launch and fire positions, determine their coordinates, fix the epicenters of nuclear bursts, determine projectile and missile present coordinates in a flight trajectory, and so forth.

RADIOLOKATsIONNYY VZRYVATEL' [Radar Fuse] -- proximity fuses using radar /236 operating methods. A radar fuse transmitter emits into space radio waves, which are reflected from a target, received by the receiver, amplified, and cause the radio fuse to trip at a specific distance from the target. Radar fuses are used in missiles, artillery projectiles, aviation bombs, and so on.

RADIOLOKATsIONNYY PRITsEL [Radar Sight] -- complex of instruments comprising a radar rangefinder, optical sight, and computer for observing the target, determining its coordinates, and generation of data required for firing small-caliber antiaircraft artillery. A radar sight is categorized as ground-based, aircraft, and shipboard depending on its location.

RADIOLOKATsIYa [Radar] -- aggregate of equipment and methods of detection and determination of the location of different objects with the aid of radio waves.

RADIONAVIGATsIYa [Radio Navigation] -- method of orientation in space with the aid of radiotechnical equipment used for control of certain pilotless airborne platforms. A moving airborne platform automatically determines its location relative to the target and other navigational movement elements with the aid of radio navigation.

RADIOPILOT [Radio Pilot] -- free-flight hydrogen-filled rubber sphere equipped with a target for reflection of radio waves. The position of a radio pilot is determined with the aid of a radar, which also makes it possible to determine wind direction and velocity in and beyond the clouds.

RADIOSEKSTANT [Radio Sextant] -- sensitive special radio receiver for determination of the location of a moving object (aircraft, ship, aerodynamic vehicle) by means of directional reception of radio emissions from the Sun, Moon, and other heavenly bodies. They can operate in any meteorological conditions and at night at various altitudes. A radio sextant is used in a missile flight control stellar radio navigational system.

RADIOTELEUPRAVLYaYeMAYa RAKETA [Radio Remote Controlled Missile] -- see next entry.

RADIOUPRAVLYaYeMAYa RAKETA [Radio Controlled Missile] -- missile controlled /237 with the aid of command signals transmitted by radio from a control command post located on the ground, in an aircraft, or aboard a ship. Command signals transmitted by radio are received by the missile's radio receiver and, after conversion, control the operation of the actuators controlling its flight, thereby guiding the missile to the target.

RADIOELEKTRONIKA [Radioelectronics] -- branch of science and technology based upon use of various electronic devices for transmission and reception of electromagnetic oscillations at a distance. Radioelectronics is used widely in missile control. Modern radioelectronics is subdivided into radar, radio communications, radio broadcasting, radio navigation, television, radio meteorology, infrared beam technology, electronic computers, and so on.

RADIUS DEYSTVITEL'NOGO PORAZhENIYa [Effective Destruction Radius] -- radius of the circle within which at least 50% of targets will be destroyed by the burst of a single projectile (mortar shell).

RADIUS SPLOShNOGO PORAZhENIYa [Complete Destruction Radius] -- radius of the circle within which at least 90% of targets will be destroyed by the burst of a single projectile (mortar shell).

RAZARRETIROVANIYe [Uncaging] -- releasing the caging mechanisms in gyroscopic systems.

RAZVEDKA ARTILLERIYSKAYa (RAKETNO-ARTILLERIYSKAYa) [Artillery (Rocket Artillery) Reconnaissance] -- aggregate of measures artillery commanders and staffs employ to acquire and process information on the enemy, terrain, and state of the atmosphere required to insure successful employment of missile units and artillery in an operation (engagement).

RAZVEDYVATEL'NYYe ISKUSSTVENNYYe SPUTNIKI ZEMLI [Reconnaissance Satellites] -- artificial Earth satellites carrying special equipment (photographic, television, infrared) for conduct of military reconnaissance from space.

RAZDEL'NAYa NAVODKA ORUDIYa [Separate Piece Laying] -- laying whereby two control lines are employed to lay the piece. The optical axis of the panoramic telescope's bearing scale or of a collimator is used in laying for deflection, while the axis of the longitudinal level is employed in laying for elevation. /238

RAZMEDNITEL' [Decoppering Agent] -- chemical element (lead or tin) forming a fusible alloy with copper. It is used to remove the particles of copper remaining on the surface of the bore as a result of the friction of a projectile's copper driving band against the rifling. A decoppering agent is a lead or tin wire ring weighing 50--70 kilograms placed under the normal cap (in a fixed propelling charge) or on the upper powder bundles (in a variable propelling charge).

RAZNOBOY ORUDIY [Spread] -- phenomenon in which the mean trajectories of pieces delivering fire from the same fire position at the same target, given identical sight and level settings, pass through different ranges. Spread results from different initial velocities (different piece wear, varied charge temperature, and so forth) or sight and instrument errors. Spread always is computed relative to the base piece.

RAZRYV [Burst] (R) -- point in a trajectory in which the projectile's burst will occur.

RAZRYVNOY ZARYaD [Explosive Charge] -- specific amount of high explosive housed

in an artillery projectile (mortar shell, grenade, aviation bomb, missile warhead, and so forth) for its burst in the target area.

RAZRYaDNIK [Bell Rammer] -- artillery mount accessory for removing a practice projectile (drill rounds) from a loaded piece and clearing the wad as the bore is cleaned.

RAKETA VOZDUSHNOY RAZVEDKI [Aerial Reconnaissance Missile] -- guided missile for conducting aerial reconnaissance. An aerial reconnaissance missile is equipped with automatic reconnaissance equipment for day and night aerial photography and instruments for detecting enemy radio stations. They are designed like an aircraft and are supersonic.

RAKETA GEOFIZICHESKAYa [Geophysical Rocket] -- powerful rocket with a container in the nose housing geophysical instruments for integrated research on the upper layers of the atmosphere and near-earth space.

RAKETA ZhIDKOSTNAYa [Liquid-Propellant Rocket] -- rocket equipped with /239
a liquid-propellant engine. A liquid-propellant rocket is considerably more complex than a powder rocket. It must have an especially-strong combustion chamber.

RAKETA KRYLATAYa [Cruise Missile] -- see krylataya raketa.

RAKETA MEZHKONTINENTAL'NAYa BALLISTICHESKAYa [Intercontinental Ballistic Missile] -- see mezhkontinental'naya raketa [intercontinental missile]. The stages of an intercontinental ballistic missile expend propellant (sequentially) in order, one after another, beginning with the first (lower) stage.

Stages separate as propellant is expended, imparting enormous velocity to the final stage. The missile, having obtained the requisite movement velocity, will fly the computed ballistic curve when the final stage's engine ceases operating.

An extremely-powerful intercontinental ballistic missile was launched successfully in the Soviet Union on 27 August 1957.

RAKETA MNOGOSTUPENCHATAYa [Multistage Rocket] -- multistage rocket comprising

several (two or more) stages with sequential, parallel, and combined interconnection. A stage is a conventional (single-stage) rocket without payload. The payload (propelling charge, cabin for personnel or container for scientific research equipment) is located in the final stage, which is the upper stage. Stages operate in sequence in flight. Several multistage rocket designs comprise several rockets operating in parallel, i. e., simultaneously. Such a multistage rocket is called a cluster or a bundle. Velocities achieved with the aid of each stage are cumulative and, in the final analysis, the full velocity of the rocket's final stage is significantly greater than the velocity of a conventional (single-stage) rocket with the same launch weight. This is explained by the fact that the individually-separating stages no longer are dead weight and do not restrict acceleration, as is the case in a single-stage rocket. K. E. Tsiolkovskiy proposed the idea of the multistage rocket. A multistage rocket is intended to achieve high velocities and flight range. As a rule, space rockets, strategic ballistic missiles, and global missiles are multistage.

RAKETA-NOSITEL' [Launch Vehicle] -- multistage rocket used to launch earth /240 satellites, interplanetary stations, space ships, and so on.

RAKETA-PAKET [Cluster Rocket] -- multistage rocket with parallel stage connection. Side rockets (stages) in a cluster are placed in parallel around the basic rocket. The engines of the side and main rockets are connected in parallel. Rockets with mixed stage connection exist. In this case, one part of the stages is connected in series, as in a conventional multistage rocket, while another is connected in parallel. Each stage of a multistage rocket with parallel and mixed connection includes all elements of a single-stage rocket, with the exception of a payload, which is housed in the main rocket.

RAKETA POROKhOVAYa [Powder Rocket] -- rocket with a powder rocket engine. It is a combustion chamber filled with solid propellant (black powder) and a jet nozzle. Short-range powder rockets are the most common and considerably simpler than all others. Powder rockets are subdivided by type into antiaircraft, antitank, aviation, torpedo, multiple rocket, and hand-launched.

RAKETA S KOMBINIROVANNOY SISTEMOY NAVEDENIYa [Missile With Combined Guidance System] -- missile carrying two (three) control units constructed as one (for example, remote guidance and active homing).

RAKETA S NESUShchIMI BAKAMI [Rocket With Integral Tanks] -- rocket with a liquid-propellant rocket engine (ZhRD) in which the propellant tank walls will serve simultaneously as a load-bearing element sensing axial compressive forces, longitudinal forces, and flexing moments.

RAKETA S PODVESNYMI BAKAMI [Rocket With External Tanks] -- rocket with a liquid-propellant rocket engine in which the propellant tanks freely are suspended outside the load-bearing body.

RAKETA SO SMESHANNYM SOYeDINENIYeM STUPENEY [Rocket With Mixed Stage Connection] -- rocket in which a certain portion of the stages is connected in series and another in parallel.

RAKETA UNIVERSAL'NAYa [General-Purpose Missile] -- military guided missile which can be employed by the most varied carriers (aircraft, ships, ground-based launchers) against the most varied targets (surface ships, submarines, aircraft, /241 ground-based targets and guided missiles).

RAKETNAYa BAZA [Missile Base] (Foreign) -- specially-equipped area allocated for disposition of missiles, resources to control them in flight, technical equipment to prepare them for launch, and storage facilities.

RAKETNOYe ORUZhIYe [Rocket and Missile Weapons] -- guided missiles and unguided rockets with conventional and nuclear explosive charges, ground-based equipment, launchers, and control and guidance systems. They are categorized by role as tactical, operational-tactical, and strategic, and by launch area and target character into classes: "surface-to-surface," "surface-to-air," "air-to-surface," and "air-to-air."

RAKETNO-TEKhNIChESKOYe OBESPEChENIYe [Missile Support] -- aggregate of measures to supply troop units with missiles, repair and technical servicing of stored reserves, repair, and evacuation.

RAKETNO-YaDERNAYa VOYNA [Nuclear Missile Warfare] -- warfare in which the decisive means of attaining victory in an engagement, operation, and in an armed confict as a whole is the nuclear missile, used without restraint by all services of the armed forces and, above all, strategic nuclear weapons.

Moreover, final victory, even in nuclear missile warfare, is achieved by the united efforts of all services of the armed forces employing conventional means of armed conflict as well.

RAKETNO-YaDERNOYe ORUZhIYe [Nuclear Missiles] -- missiles with nuclear or thermonuclear charges equipped with a complex of equipment, launchers, and guidance systems.

RAKETNO-YaDERNYY UDAR [Nuclear Missile Strike] -- strike inflicted by missile formations and units employing nuclear missiles to cause heavy casualties on an operational grouping of enemy troops and installations in enemy operational or deep rear areas. Nuclear missile strikes may be massed, grouped, or individual.

RAKETNYYe VOYSKA STRATEGIChESKOGO NAZNAChENIYa [Strategic Missile Forces] -- main service of the USSR Armed Forces intended to accomplish vital strategic missions in a nuclear missile war. In the USA and England, strategic missiles are part /242 of the Air Force inventory.

RAKETNYYe TOPLIVA [Rocket Propellants] -- chemical substances employed to run rocket engines and comprising one or several components capable of burning, releasing a considerable amount of heat and gases in so doing. Rocket propellants are categorized as liquid, solid, and mixed, one component of which is liquid and the other solid. Rocket propellants are subdivided by number of components into monopropellant, bipropellant, and tripropellant. They are classifed by ignition method as hypergolic and nonhypergolic. Bipropellants are used most widely in rocket technology. Nuclear propellant is a promising rocket propellant.

RAKETNYY DVIGATEL' [Rocket Engine] -- thermal rocket engine in which fuel and oxidizer transported by the airborne platform are used for propellant combustion. High-temperature and high-pressure combustion products, which, being expelled through the nozzle, create a reactive force pushing the engine and the rocket forward (in the direction opposite to the efflux of gases) are formed in the chamber during combustion of the propellant. Rocket engines are subdivided into solid-propellant (RDTT), liquid-propellant (ZhRD), and powder (PRD) engines. Rocket engines can operate in air, in a vacuum, and under water. They are used widely as power plants for guided and unguided rockets of various classes and roles.

RAKETNYY KATER [Missile Boat] -- military surface vessel having missiles on board.

RAKETNYY SPASATEL'NYY DVIGATEL' [Escape Rocket Engine] -- engine intended to separate a space ship from the launch vehicle to save the crew in the event of an accident during launch.

RAKETNYY TORMOZNOY DVIGATEL' [Retrorockets] -- engine to decrease or control an airborne platform's motion speed to landing velocity. Braking as an airborne platform descends is achieved by directing retrorocket thrust in the direction opposite to its direction of movement. One or more retrorockets operating in series may /243 be installed on an airborne platform. Retrorockets are used to bring space ships from orbital flight into a descent trajectory.

RAKETNYY USKORITEL' [Booster] -- auxiliary powder or liquid-propellant rocket engine used in long-range missiles for rapid acceleration and in aviation for launch and insuring (facilitating) aircraft take-off. After the propellant has been expended, a booster usually is jettisoned in the air.

RAKETONOSTSY [Missile Carriers] -- military surface vessels, submarines (including nuclear submarines), and aircraft having missiles on board.

RAKETOPLAN [Rocket-Propelled Aircraft] -- aircraft-shaped piloted airborne platform (orbiting aircraft) for flights over a broad range of speeds from maximum supersonic to minimum subsonic. A rocket-propelled aircraft is accelerated by a rocket engine and then will fly due to acquired kinetic energy, spending a significant portion of its path in the upper layers of the atmosphere. It may temporarily go into orbit, return from orbit, and return to earth. Its flight altitude can reach 60--150 kilometers.

RAKETO-TORPEDA [Rocket-Assisted Torpedo] -- antisubmarine missile which is a combination of a conventional acoustical torpedo and booster with a solid-propellant rocket engine. A rocket-assisted torpedo is employed in antisubmarine warfare. The torpedo separates from the launch vehicle at a short range from the assumed location of the submarine and, with the aid of a brake chute, enters the water. The chute separates in the water, the torpedo engine simultaneously cuts in, and,

at a specific depth, the seeker goes into action. An underwater burst of the propelling charge destroys the submarine. Surface vessels and submarines are equipped with rocket-assisted torpedoes. Aircraft and helicopters equipped with rocket-assisted torpedoes can be employed to destroy submerged submarines.

RAKETY [Missiles] -- principal means of delivering nuclear charges to the objects to be destroyed; missiles are unmanned airborne platforms, either guided or unguided in their trajectory, and moved by reactive force. According to role, missiles are subdivided into the following classes: "air-to-air," "air-to-surface," "surface- /244 to-surface," "ship-to-surface," and so forth. "Air-to-air" missiles are armed missiles installed on airborne platforms and employed against aerial targets. According to their guidance systems, "air-to-air" missiles are categorized as guided or unguided, with the former employing autonomous guidance, remote control, homing, or a combination of these. "Air-to-surface" missiles are armed missiles launched from airborne platforms and are intended to destroy ground-based targets. According to design, "air-to-surface" missiles are categorized as cruise and ballistic. "Air-to-ship" missiles are armed missiles launched from airborne platforms and intended to destroy warships. "Surface-to-surface" missiles are classified as strategic, operational-tactical, and tactical and are intended to destroy surface targets from the surface. "Ship-to-air" missiles are armed missiles launched from shipboard launchers to destroy enemy aerial targets. "Ship-to-surface" missiles are ballistic or cruise missiles fired from submarines and surface ships to destroy enemy coastal installations. "Ship-to-ship" missiles constitute the armament of missile-equipped vessels (submarines and surface vessels) and are employed to destroy enemy warships and merchant vessels. "Ship-to-ship" missiles have seekers and sometimes also are employed to destroy coastal installations.

RAKETY OPERATIVNO-TAKTICHESKOGO NAZNACHENIYa [Operational-Tactical Missiles] -- "surface-to-surface" combat missiles in the inventories of the operational field forces and formations of the services of the armed forces and intended for accomplishment of operational and tactical missions.

RAKETY STRATEGICHESKOGO NAZNACHENIYa [Strategic Missiles] -- armed medium-range, intercontinental, and global missiles capable of destroying installations of /245 strategic importance in the enemy deep rear area.

RAKETY TAKTIChESKIYe [Tactical Missiles] -- armed missiles employed by combined-arms formations to destroy objectives at tactical and operational depth.

RAMA ORUDIYNOGO ZATVORA [Piece Breechblock Carrier] -- portion of a piece's breechblock (steel or bronze), rotating on an axis, attached to the breech ring. It is intended for positioning all breechblock mechanisms.

RASPATRONIROVANIYe [Cartridge Disassembly] -- separation of loaded quick fire case from the projectile during loading or unloading.

RASSEIVANIYe RAKET (REAKTIVNYKh SNARYaDOV) [Missile (Rocket Projectile) Dispersion] -- phenomenon of scattering of missiles (projectiles) when launched (fired) under identical conditions. Dispersion occurs for various reasons: deviations from the nominal weight and designed shape of the missile (projectile), propellant temperature variation; aiming errors; changes in air resistance; and so on. Dispersion obeys a recognized law called the law of dispersion.

RASSEIVANIYe SNARYaDOV [Projectile Dispersion] -- scattering of artillery projectiles (mortar shells) relative to the target when firing from one piece (mortar) with adherence here to maximum uniformity in firing conditions (identical projectiles and charges, identical sighting). Each projectile flies its own trajectory. The limits of the area of projectile dispersion are infinite. Given a significant number of rounds, these limits are restricted to a dispersion ellipse with semiaxes equal to four or five probable errors. Dispersion is referred to as piece dispersion when firing one piece. It is called battery dispersion when a battery fires at one point. Accepted designations for probable errors are: $B_д$ -- range probable error; $B_б$ -- deflection probable error; $B_в$ -- vertical probable error. Dispersion of trajectories during time firing will occur in space according to an ellipsoidal law. It will depend on dispersion of trajectories and nonconformity of fuse action due to nonuniform combustion of the time composition. Burst probable errors during time firing are designated: $B_{pв}$ -- height of burst probable error; $B_{pд}$ -- range /246 probable error; $B_{pб}$ -- burst deflection probable error. The causes of projectile dispersion may be stipulated by variety in initial velocities, angles of departure, and projectile flight conditions.

RASTREL ORUDIYa [Piece Wear] -- erosion of the inner surface of a barrel resulting

from a large number of rounds fired from a given piece. The volume of the breech chamber increases as a result of the erosion of the bore at the beginning of the rifling and beyond, loading density decreases, resulting in a decrease in initial velocity.

RASKhOD BOYePRIPASOV [Ammunition Expenditure] -- number of projectiles (bombs, mortar shells, bullets) alloted for or actually expended in accomplishment of a particular fire mission. Ammunition expenditure is expressed in units of fire for a considerable number of fire missions accomplished in a specified period of time (in the course of aerial bombardment, fire preparation, a day of combat, for example).

RASChETNAYa TRAYeKTORIYa [Computed Trajectory] -- projectile (missile) trajectory computed theoretically given any fully-specified conditions characterizing projectile (missile) motion.

REAKTIVNAYa ARTILLERIYa [Multiple Rocket Launcher Artillery] -- type of artillery intended for firing rocket projectiles (mortar shells); guides impart direction of motion to the projectiles. Multiple rocket launchers are installed on tanks, armored personnel carriers, and cross-country vehicles. Multiple rocket launcher artillery is intended to destroy personnel and combat equipment in concentration areas and defensive structures.

REAKTIVNAYa SILA [Reactive Force] -- resultant of the forces of the pressure of the products of combustion acting upon the inner surface of a rocket engine's combustion chamber. Reactive force is directed along the chamber's axis.

REAKTIVNOYe VOORUZhENIYe [Missiles] -- complex of missile items, including resources required for transportation, installation, checkout, and launching of rocket projectiles, and other instruments and accessories to support the firing of multiple rocket launcher artillery.

REAKTIVNOYe DVIZhENIYe [Jet Propulsion] -- motion of a system with a /247 propellor (engine) under the influence of the force of a direct reaction.

The force arising during expulsion of a propulsive mass from the engine's nozzle imparts velocity to the missile: the products of combustion of a solid or liquid propellant or the products of nuclear reactions.

Displacement of the missile will occur by means of the expulsion of a certain mass of these products in the direction opposite to its motion.

REAKTIVNOYe SOPLO [Jet Nozzle] -- funnel forming part of a rocket engine in which the thermal energy of gases is transformed into kinetic energy of missile motion. Gases with a high temperature (3,000--3,500°) and pressure (200--300 kg/cm^2 in a PRD) are formed in the combustion chamber as the propellant burns. Expulsion of gas from the nozzle at high velocity (1,000--25,000 m/sec) will occur as a result of the pressure differential (drop in temperatures) in the combustion chamber and external environment, thereby causing the reactive force (thrust) of motion. A nozzle has a special form, usually converging-diverging (the de Laval nozzle).

REAKTIVNYY DVIGATEL' [Jet Engine] -- thermal machine in which the chemical energy of a propellant is transformed into kinetic energy of a gas stream expelled from the engine. The force of the reaction expelling the stream is used as motive force -- thrust. Here, the reative force created will move the airborne platform in a direction opposite to that of the expulsion of gases. A jet engine is a high-velocity, high-altitude, long-range engine. Modern jet engines are divided into two basic groups, raketnyy dvigatel' [rocket engine] (see) and vozdushno-reaktivnyy dvigatel' [air-breathing engine] (see). Jet engines are used widely in modern aviation, in rocket projectiles, and pilotless airborne platforms.

REAKTIVNYY SNARYaD [Rocket Projectile] -- self-propelled projectile whose motion is based upon the reactive action of the gases of a burning powder charge housed within the projectile. A rocket projectile will comprise a nose and tail section. The nose is a high-explosive-fragmentation or high-explosive projectile with a nose impact fuse. The nose is connected with a tail thread. The tail section has a rocket chamber charged with black powder, nozzle, and empennage (sta- /248 bilizer). The rocket projectile's powder charge is ignited by an electric fuse with the aid of a pyrotechnic cartridge. The gases formed as the powder burns are expelled through the nozzle rearwards, they create a reactive force, and the projectile moves forward. The charge does not burn very long -- within a half-second to several seconds. After the charge has burned, the rocket projectile will fly by inertia. The stabilizer insures that it flies correctly through the air. Rocket projectiles are categorized as spin-stabilized (stabilized by rotation), finned (stabilized by empennage), and guided projectiles equipped with an automatic stabilization system.

A spin-stabilized projectile has several inclined nozzles located along the bottom edge of the projectile and imparting rotation to it along its axis.

REAKTOR ATOMNYY (REAKTOR YaDERNYY, ATOMNYY KOTEL) [Atomic Reactor (Nuclear Reactor, Atomic Boiler)] -- device in which a controlled chain reaction of the fission of heavy elements occurs. An atomic reactor is contained in an exceptionally strong structure and is enclosed in a concrete wall, whose thickness holds in gamma rays.

REAKTsIYa [Reaction] -- (in French, reaction, in German reaktion; from the Latin prefix re-, here signifying counteraction and actio -- action) -- reverse action arising as a result of a specific action. The phenomenon of a reaction is explained easily by Newton's third law: every action causes an equal and opposite reaction. The phenomenon of reaction is used widely in modern artillery and missile technology. In artillery, it is the partial absorption of the energy of a piece's recoil by an inertia muzzle brake; full absorption of recoil energy in recoilless pieces; imparting of motion to projectiles (mortar shells). In missile technology, it is placing missiles (projectiles) in motion.

REVERSIROVANIYe TYaGI [Thrust Reversal] -- creation of negative thrust, i. e., thrust directed opposite to flight direction by changing the direction of a reaction jet. Engine reverser assemblies provide thrust reversal. It is also achieved by separation of the reaction jet beyond the nozzle with a rotation of 90° to the missile's longitudinal axis by means of special devices -- spoilers. The latter can bring engine thrust to zero. Thrust reversers are used in those instances when it is /249 necessary to cease the thrust's action on the missile (when the engine is shut down), as well as in retrorockets.

REVUN [Siren] -- electric piece signalling instrument used in fire directors to transmit the command "Fire" ("Volley") from a central fire director to a piece. The gunlayer fires the round upon the sound of the siren.

REDUKTOR [Reduction Gear] -- system of toothed cylindrical and conical transmissions, usually closed, built in the form of a separate aggregate or built into a machine, which changes the number of revolutions (until the requisite number is reached) of an output shaft. Reduction gear are used in ground-based equipment aggregates.

REDUKTOR GASOVYY I ZhIDKOSTNYY [Gas and Liquid Regulator] -- device for regulation of a gas or liquid simultaneously fulfilling the function of a safety or stop valve and so on. A regulator will serve to lower the pressure of gas (air) or liquid expelled from a reservoir with a higher pressure to a pressure at which gas or liquid is expended and to maintain operating pressure at a constant level regardless of its oscillation in reservoirs from which expended gases or liquids are replenished. A reducing valve is the primary part of a regulator. They are categorized by operating principle as direct or reverse, by number of chambers as single- or two-chamber, and by role as air, oxygen, water, and so forth. Gas and liquid regulators found wide use in modern missile complexes.

REZhIM OGNYa [Rate of Fire] -- number of rounds per piece established (obtained) for a given time interval. A rate of fire is required to preserve equipment, the barrel mainly, from premature wear. Rate of fire will depend on caliber, piece system, firing duration, and weight of the artillery powder charge.

REPER [Check Point] (R) -- auxiliary point registered for subsequent lifting of fire to the target. A check point may be real or fictitious, aerial, and aural.

REFRAKTsIYa [Refraction] -- refraction of light rays in the atmosphere due to the latter's hetrogeneity as a medium. The atmosphere (the Earth's gaseous /250 envelope) is a heterogeneous medium consisting of air, suspended particles of organic and inorganic origin, as well as water in all its forms (states).

RIKOShET [Ricochet] -- phenomenon of the reflection of a solid body from the surface of an obstacle. An artillery projectile with a delayed-action fuse at low angles of impact, striking the ground, usually will slid along it, making a furrow 1--2 meters deep on the surface, then continues its flight in the air 15--20 meters, and explodes at a height of 3--5 meters. The destructive action of a fragmentation shell after ricochet is considerably greater than during detonation on the ground.

RIKOShETNAYa ARTILLERIYSKAYa STREL'BA [Ricochet Artillery Fire] -- artillery fire whereby target destruction is achieved by projectile burst following a ricochet. Ricochet artillery fire is recommended against exposed (moving and prone) living targets, exposed fire points (machine guns, mortars, pieces), and personnel in exposed foxholes. Fire is delivered with a fragmentation shell with a delayed-action fuse.

Ricochet artillery fire is employed at short and average ranges at angles of impact less than 18—22°.

ROLLERON [Rolleron] -- device comprising a rate gyro mounted at the end of the wing cantilever for stabilization of the bank of aviation homing missiles. The gyro rotor spins from the oncoming air flow and reaches several tens of thousands of rpm. The rolleron deviates if the missile begins to turn relative to the longitudinal axis because of an external influence. A certain amount of torque results and is opposite to the torque caused by the turn, thereby insuring that the missile returns to the assigned flight trajectory.

RUBEZh BEZOPASNOGO UDALENIYa [Safety Line] -- hypothetical line determining the safe distance at which friendly subunits (units) must remain from intended nuclear burst epicenters. Safe distance includes the minimum distance protecting personnel against destruction by the shock wave and by luminous and penetrating radiation, plus the distance to which a nuclear burst epicenter may deviate from the planned ground zero.

RUBEZh OGNYa [Fire Line] -- strip of terrain along which fire weapons deliver fire in accordance with the assigned mission. An example is the line of fixed or creeping barrage fire.

RULEVYYe MAShINY [Servo Units] -- power servos for rotating missile controls in the required direction and to the requisite magnitude in accordance with an incoming signal from control system instruments.

RULI NAPRAVLENIYa [Rudders] -- control surfaces of a missile's vertical tail.

RUL' VYSOTY [Elevator] -- surface controlling a missile's (aircraft) flight altitude. The elevator, along with the rudder, provide missile control in the horizontal and vertical planes, i. e., it makes it possible to make any maneuvers in space. An elevator is used in missiles with an aircraft (aerodynamic) design.

RYM [Lifting Eye] -- elliptical steel ring passed through the butt of a piece's mounting to hold a cable when a piece is hoisted, transported, and towed.

RYSKANIYe RAKETY [Missile Yaw] -- see ugol tangazha.

SAL'NIK [Packing] -- sealing device which hermetically seals the gap between a fixed and movable part. Packing will comprise U-leather packing, stuffing box hemp or asbestos packing soaked in an oily substance (75% ceresin, 15% vaseline and various oils with graphite additive), ring, springs, and hooks. Packings are used widely in artillery system recoil mechanisms. They retain fluids in the cylinders of buffers and hydropneumatic recuperators that undergo pressure differentials.

SAMOLET-SNARYaD [Aerodynamic Projectile] -- see krylataya raketa [cruise missile].

SAMOLIKVIDATsIYa RAKETY (SNARYaDA) [Missile (Projectile) Self-Destruction] -- detonation of an antiaircraft missile (projectile) in the air after a specific period of time has elapsed following launch (firing) in the event the aerial target is not hit. This is accomplished by a special device (self-destruction device) so that the unexploded missile (projectile) does not hit the ground, thereby preventing destruction of friendly troops and installations. Modern antiaircraft missiles and artillery projectiles carry fuses with self-destruction devices.

SAMONAVODYaShchAYaSYa PROTIVOLODOChNAYa REAKTIVNAYa TORPEDA [Antisubmarine Rocket-Assisted Homing Torpedo] -- steel cigar-shaped projectile equipped with a rocket engine and a seeker for movement in the water. This torpedo will comprise a body housing a high-explosive warhead and proximity fuse (passive or active); /253 jet engine; control instruments with rudders and drives. The seeker usually is housed in the nose section of the torpedo in front of the high-explosive charge. Liquid-jet, solid-propellant, or hydrojet engines are used in these torpedoes. Autonomous control, remote control, and homing systems can be used to control this torpedo, just as is the case for missiles. Antisubmarine rocket-assisted homing torpedoes are carried by submarines, surface combatants, and aircraft and are employed against submerged and surface vessels.

SAMONAVEDENIYe [Homing] -- method of missile guidance whereby reception and processing of information coming from the target and generation of commands for missile guidance to a target are done on board the missile by special radioelectronic devices. Homing can be the only method of guiding a missile to a target or used only in the terminal leg of the trajectory. Homing can be active, passive, and semiactive. See golovka samonavedeniya [seeker].

SAMOKhODNAYa ARTILLERIYSKAYa USTANOVKA (SAU) [Self-Propelled Artillery Mount] -- armored (partially or completely) artillery system mounted on a tracked or wheeled vehicle. SAU have powerful artillery weapons, excellent mobility and passability, and constantly are combat ready. They are employed mainly for destruction of enemy tanks, fire weapons, and personnel and to support infantry and armor. SAU can be allocated for suppression and destruction of field defensive structures and are categorized as light (up to 20 tons), medium (up to 40 tons), and heavy (over 40 tons). SAU are categorized based on armament as gun, howitzer, mortar, antiaircraft, and multiple rocket. Antiaircraft SAU are assigned to deliver fire against aerial targets at angles of elevation up to 90°. Small-caliber antiaircraft SAU are paired (multibarrel) and are armed with artillery systems of 37mm and larger. They also can deliver direct fire at ground-based targets. Multiple rocket SAU (recoilless) recently have become very widespread in several foreign armies. They are quite /254 light, have increased maneuverability, and deliver a shaped-charge projectile of high armor-piercing ability. Multiple rocket SAU are armed with 105--150mm recoilless pieces. The first self-propelled piece was designed in Russia in 1915, this being a 76mm antiaircraft piece mount on an automobile. Modern SAU date to 1930 and to the appearance of the armored troops. The first Soviet SAU was created in 1932 based upon extant tanks. Modern SAU also are created on the same basis. As opposed to tanks, they usually do not have a rotating turret and have more powerful artillery weapons.

SAMOKhODNAYa ARTILLERIYa [Self-Propelled Artillery] -- artillery element equipped with self-propelled artillery mounts.

SAMOKhODNAYa ATOMNAYa USTANOVKA [Self-Propelled Atomic Mount] -- rifled artillery piece installed on a combat vehicle and firing atomic projectiles.

SAMOKhODNAYa PUSKOVAYa USTANOVKA [Self-Propelled Launcher] -- tracked or wheeled mobile transporter intended for missile transportation and launch. Self-propelled launchers mounted on trucks, armored personnel carriers, or special combat vehicles are used for launching surface-to-surface unguided projectiles (rockets). The launchers can be single or multiple and employed to launch surface-to-air missiles and tactical, operational-tactical, and strategic missiles.

SBLIZhENIYe MERIDIANOV [Grid Declination] (Y) -- angle between the northerly

bearing of the true meridian and the vertical line of a map grid system. The grid's vertical lines do not coincide with the bearing of the true (geographic) meridian, but form a certain angle with it, referred to as grid declination. Grid declination on USSR topographic maps does not exceed 3°.

SVERKhDAL'NOBOYNAYa ARTILLERIYa [Super Long-Range Artillery] -- artillery with a maximum firing range exceeding 100 kilometers. When super long-range artillery is fired, the projectile is propelled into the stratosphere, where the air density is very low and pressure is close to zero. The projectile does not surmount /255 the amount of resistance found in the air. Russian artilleryman S. A. Pogrebnyakov delivered super long-range artillery fire for the first time in Russia. He proposed that a 76mm projectile with sabot be fired from a 152mm gun. This made it possible to increase projectile initial velocity by a factor exceeding two and to obtain a firing range exceeding 100 kilometers. Later, on 23 March 1918, the Germans succeeded in shelling Paris from a range of more than 100 kilometers with their 210mm gun called Big Bertha. Super long-range artillery is characterized by great projectile dispersion, which reaches 15% of firing range. Rotation of the Earth, its curvature, the change in the force of gravity, and other elements are considered when firing at long ranges. Super long-range artillery did not have utility and its development followed the path of rocket and missile weapons.

SVERKhZVUKOVAYa UPRAVLYaYeMAYa MIShEN' [Supersonic Guided Target] -- guided aerial target in the form of an airborne platform simulating aerial attack resources for training personnel, checking the readiness and effectiveness of PVO systems, and to test new missile weapons. Supersonic guided targets are launched from a carrier aircraft or ground-based launcher. They are categorized a one-time and multiuse targets.

SVETOVOYe IZLUChENIYe [Luminous Radiation] -- destructive factor from a nuclear burst. An atomic air burst is accompanied by a blinding flash which lights up the skies and terrain for dozens of kilometers. A bright fireball -- the luminous radiation source -- is observed in the burst area for several seconds immediately after the flash. The diameter of the fireball after an air burst of a 30,000-ton nuclear weapon reaches 600--700 meters and is larger in the case of thermonuclear bursts. Some 30--40% of the burst's energy is expended on formation of luminous radiation. Exposure time for luminous radiation during a nuclear burst lasts 3

seconds and lasts up to 20 seconds during a thermonuclear burst. The destructive capability of luminous radiation mainly is determined by the magnitude of the svetovoy impul's [light pulse] (see). Rapidly increasing in overall dimensions, the fireball dims, the glow diminishes, and then it ceases about 10 seconds after the burst. Luminous radiation, in spite of the temporary nature of its effect, can ignite /256 various objects, burn bodies, cause forest fires, burn populated locales, and so forth. The effect of luminous radiation during a nuclear ground burst over an identical distance is less by a factor of 1.5--2 than during an air burst. Luminous radiation essentially has no significance as a destructive factor during underground and underwater nuclear bursts.

SVETOVOY IMPUL'S [Light Pulse] -- amount of energy of a nuclear burst's luminous radiation falling on 1 square centimeter of an illuminated surface perpendicular to the direction of distribution of luminous radiation during the entire period of fireball glow. A light pulse is expressed in calories per square centimeter (cal/cm^2). The magnitude of a light pulse will depend on the yield and type of the nuclear burst, distance to the point of burst, and the meteorological conditions in which the burst occurred (transparency of the atmosphere). Reflection of luminous radiation from clouds, the earth's surface, and various local objects also can impact upon the magnitude of the light pulse.

SVETOSILA OPTIChESKOGO PRIBORA [Optical Instrument Aperture Ratio] -- optical magnitude characterizing the illumination intensity provided by the lens of an optical instrument (optical system), i. e., ratio of the illumination intensity of the image observed through the instrument to the illumination intensity of the same subject observed without the instrument. The aperture ratio is easy to determine by measuring the diameter of the lens (in millimeters) and squaring the result.

SVETOFIL'TRY [Color Filters] -- transparent medium changing the spectrum and magnitude of the light rays passing through it. They usually are a plate of mirror glass colored yellow, orange, smokey, or other color, or an optical attachment.

SVETYaShchEYe YaDRO (SVETLOYe YaDRO) [Star Shell (Illuminating Shell)] -- round projectile with apertures that is filled with an illuminating charge. The latter is ignited when fired and lights up the terrain in flight. Star shells were fired with small charges from a fortress during a siege at night, illuminating the terrain, trenches, enemy excavation work underway, or enemy approaching the fortress.

SVOBODNAYa TRUBA [Loose Barrel] -- thick-walled barrel with rifled bore and breech chamber of an artillery barrel that is not attached along its entire /257 length. See artilleriyskiy stvol so svobodnoy trubcy [loose artillery barrel].

SVOBODNYY OTKAT [Free Recoil] -- motion of recoil parts in the direction of the bore's axis with the stipulation that no forces other than those arising in the bore act upon the recoil parts during firing.

SVYaZANNAYa SISTEMA SAMONAVEDENIYa [Coupled Seeker System] -- homing of a missile on a target with the aid of a seeker whose axis is coupled rigidly to the missile's longitudinal axis. Displacement angle equals zero given precise guidance of the missile's longitudinal axis, and, correspondingly, the seeker's axis, to the target. An error signal is generated if the missile's axis deviates from the target direction and a booster and control surfaces return the missile to the intitial position.

SEKSTAN (SEKSTANT) [Sextant] -- astronomical measuring instrument used for measuring the azimuth and altitude of heavenly bodies. They are categorized as optical and radio sextants and are used in missile stellar navigational control systems.

SEKTOR NABLYuDENIYa [Zone of Observation] -- sector of terrain within which observation is made and limited from right to left by two orientir [reference point] (see).

SEKTOR OBSTRELA [Arc of Fire] -- sector of terrain limited from right to left by two orientir [reference point] (see) within which is envisioned destruction of the enemy by the fire of direct fire guns, SAU (see), and PTURS (see). A primary and a secondary arc of fire are designated when organizing a sistema ognya [fire plan] (see) on the defensive and on the attack. A primary arc of fire is designated for firing in the most important sectors and adjoins the limits of arcs of fire of adjacent units. A secondary arc of fire encompasses secondary sectors.

SEKTOR POD"YeMNOGO MEKhANIZMA [Elevating Arc] -- massive component of a piece's elevating gear having the form of a toothed quadrant. Some pieces have two toothed quadrants. Toothed quadrants sometimes will be attached to the cradle, with the elevating pinnion axis fastened to the upper carriage. Sometimes the reverse is

true. Rotating the elevating handwheel, the elevating pinnion axis also will /258 rotate, which, rolling along the toothed quadrant, imparts angle of elevation or depression to the cradle with barrel.

SEKUNDA [Second] -- 1. Unit of angular measurement equalling 1/3600 of a degree. 2. Unit of time measurement.

SEKUNDOMER [Stopwatch] -- clock-type instrument for measuring small increments of time (from fractions of minutes to an hour) with an accuracy up to tenths of a second. Stopwatches have one or two second hands for measurement of one or two time increments. A mechanism controlling the hands is used to start, stop, and reset the hands to zero. The second hand jumps every 0.1 or 0.2 seconds when operating, while the hour hand (of the small dial) makes one full revolution every 30 or 60 minutes. One full revolution of the second hand on the large dial corresponds to one graduation (1 minute) of the counter. Stopwatches are built in the form of pocket watches, wrist watches, table clocks, and clock-stop watches. Stopwatches are used in artillery during training, working out norms, during firing, and so forth.

SEPARATOR [Separator] -- metal ring with apertures for balls or rollers separating balls from one another. They are used in turret mounts, shipboard artillery system laying mechanisms, in fixed launchers, ball bearings, and other mechanisms.

SERVOPRIVOD [Servo] -- auxiliary power device for actuator remote guidance and control. Servos can operate in forward and reverse and provide any velocity, from the lowest to the highest. A servo is used in laying mechanisms for shipboard artillery systems for remote control of piece traversing and elevating gear and in other artillery mounts and mechanisms.

SIGNAL UPRAVLENIYa [Control Signal] -- command used to activate a missile actuator.

SIGNAL'NYYe SOSTAVY [Signal Compositions] -- special compositions used to manufacture night- and day-action signals. They will comprise a fuel substance, oxidizer, hardener, and a special additive (dye) imparting a specific color to the flame (smoke). The following are used in the latter capacity: ultramarine, /259 which provides a blue flame, soot to impart black, strontium salts for red, sodium salts for yellow, and barium salts for green.

SILA DEYSTVIYa POROKhOVYKh GASOV NA STVOL [Powder Gas Action on the Barrel] (Variable) — projection to the direction of the bore's action of the resultant of all forces arising during a shot in the bore and acting on the barrel.

SILA NAKATNIKA [Force of Counterrecoil] (Variable) — force of counterrecoil caused only by the pressure of the gas in a hydropneumatic (pneumatic) recuperator or the tension of springs in a spring recuperator.

SILA POROKhA [Powder Force] — qualitative characteristic of powder determined by formula

$$f = \frac{P_1 W_1}{273} T,$$

where P_1 — one physical atmosphere;

W_1 — volume occupied by gases during combustion of 1 kilogram of powder at 0° C and 760mm of mercury;

T — combustion temperature (explosive conversion) of powder computed from 0° K (absolute scale).

SILA TYaGI (REAKTIVNOGO DVIGATELYa) [Thrust (of a Jet Engine)] — full reactive force a jet engine (rocket projectile) develops under the action of which a rocket (missile) will move. Thrust is the characteristic of a rocket engine as the power plant of a rocket (airborne platform). It is the axial resultant of the forces of pressure distributed along the entire surface of an engine chamber. Thrust is the product of two basic components: the resultant of the force of the pressure of combustion products (see reaktivnaya sila [reactive force]) acting upon the inner surface of an engine and the force of the pressure acting on the external surface of s rocket as a result o. the pressure differential at the nozzle face. The overwhelming majority of thrust goes for reactive force, the basic component of thrust. As a rocket flies, thrust is not constant. As altitude increases, atmospheric pressure decreases and engine thrust increases. This is determined for a rocket /260 engine by the formula

$$P = \frac{m_{сек}}{g} U_e + S_a (P_a - P_н),$$

where P -- rocket engine thrust in kilograms;

$\omega_{сек}$ -- fuel flow rate;

U_a -- gas exhaust velocity;

S_a -- nozzle outlet area;

P_a -- pressure of ejected gases at the nozzle face;

$P_н$ -- atmospheric pressure.

Given a slight difference in pressures at the nozzle face (P_a) and atmospheric pressure ($P_н$), rocket engine thrust is determined from the formula

$$P = \frac{\omega_{сек}}{g} U_a.$$

For determination of VRD thrust, the formula has the following form:

$$P = \frac{\omega_{сек}}{g} (U_a - v),$$

where v -- flight velocity.

SILOVOY KORPUS RAKETY [Rocket Main Body] -- main body portion of a rocket connecting all sections of the airborne platform into one and receiving internal and external forces during motion due to interaction of air with the surface of a moving rocket. The main rocket body in some instances plays the role of propellant tank or combustion chamber wall, as is the case with solid-propellant rockets.

SISTEMA AVTOMATIZIROVANNOGO UPRAVLENIYa OGNEM [Automated Fire Control System] -- complex of electronic computers and technical equipment to control artillery fire during combat operations.

SISTEMA ZAMKNUTAYa [Closed System] -- automatic system of regulation with feedback between system input and output. An automatic system with feedback is referred to as a system of automatic regulation. Homing of a missile to a target is a process of automatic regulation.

SISTEMA NAVEDENIYa PUSKOVOY USTANOVKI [Launcher Guidance System] -- system /261 whereby a launcher is laid to a given bearing and angle of site. Such a system can be automatic or nonautomatic.

SISTEMA OGNYa V OBORONE [Defensive Fire Plan] -- combination of preplanned fire strikes on the approaches to a defense, and creation of zones of continuous multitiered fire of all types ahead of the forward edge, on the flanks, and in the depth of the defense, as well as concentration of fire in brief periods of time on any threatened axis or sector. A defensive fire plan is formulated in accordance with the concept of the operation (engagement), taking into account nuclear strikes, in close coordination of fire of all types of weapons and air strikes, in conjunction with an obstacle plan and natural barriers.

SISTEMA PODAChI PUSKOVAYa [Launch Feed System] -- feed system insuring the supply of fuel to the combustion chamber during the starting of a ram-jet engine. It cuts out after engine start.

SISTEMA PODAChI TOPLIVA [Propellant Feed System] -- system of devices used to feed propellant components from tanks to a rocket engine combustion chamber with the requisite fuel flow rate under the required pressure. A fuel feed system usually includes assemblies creating the propellant component feed pressure (turbopump assembly, compressed air cylinders, and so forth) and a system of piping, valves, regulators, and other elements supporting normal engine operation. Fuel feed systems will be divided into two groups, pressure-fed and pump-fed.

SISTEMA PODAChI TOPLIVA VYTESNITEL'NAYa [Pressure-Fed System] -- system of feeding propellant components from tanks to the combustion chamber by expulsion of high-pressure gases. A pressure accumulator is a mandatory assembly in a pressure-fed system, with gas, powder, and liquid accumulators used. High-pressure gas at 250--300 kg/cm^2 (air, nitrogen, helium, or any other gas) is used to create pressure in the tanks, which must exceed the pressure in the combustion chamber, and to expulse propellant from the tanks. Gas is housed in a high-pressure cylinder in a gas accumulator. Propellant components in a system with a powder accumulator are expulsed from the tanks by the products of powder combustion, while in a liquid pressure accumulator system, they are expulsed by the combustion products or /262 decomposition of substances.

SISTEMA PODAChI TOPLIVA NASOSNAYa [Pump-Fed System] -- feed system in which propellant components are supplied from tanks to the combustion chamber by pumps creating the requisite pressure. Pump systems are used mainly in liquid-propellant

rocket engines with relatively high thrust and long operating time, i. e., in engines with large tanks.

Specific pressure is created in the propellant tanks by pressurization of the tanks required to insure normal pump operation. Fuel pumps will impel a gas turbine to rotate. The turbine and pumps are housed in one assembly, the turbopump. The turbine turns pumps sitting on a common shaft with it and the pumps supply oxidizer and fuel to the combustion chamber.

SISTEMA PROTIVOTANKOVOY OBORONY [Antitank Defense System] -- aggregate of measures of all troop elements to repulse enemy massed tank attacks. Antitank defense comprises the foundation of combined-arms subunit and unit defense. It includes subunit strong points containing pieces, tanks, PTURS, and antitank grenade launchers, antitank reserve positions and deployment lines, and tank traps. Organization of antitank defenses is one of the vital responsibilities of all commanders.

SISTEMA RAZOMKNUTAYa [Open System] -- system of automatic regulation without feedback between system input and output. Program regulation systems operate as open systems.

SISTEMA SAMONAVEDENIYa RAKET [Missile Homing System] -- system for guiding a missile to a target and control of its motion in the final leg of the flight trajectory with the aid of a device aboard the missile. Any type of luminous energy which is emitted by the target or is reflected from it is used in these systems, thanks to which the target will have contrast relative to the background of objects surrounding it and it will stand out. This, with the aid of a golovka samonavedeniya [seeker] (see), also makes it possible to determine the position of the missile /263 relative to the target and automatically to generate control command signals to change flight direction and accomplish homing to the target. Homing is subdivided into active, passive, and semiactive. Active homing is when the target is painted by a radar on the missile itself. The target's own radiation is used in passive homing, while energy reflected from a target painted by an external source outside the missile (on the ground, aircraft, ship, and so forth) is used in semiactive homing. A missile homing system is completely autonomous and does not require control posts. All its equipment is installed right on the missile. A missile homing system mainly is employed when firing at a fixed target, when high accuracy and a relatively

small area of destruction are required, as well as in the capacity of basic systems on antiaircraft and aviation missiles (projectiles) and as an auxiliary system on aerodynamic projectiles.

SISTEMA TELEUPRAVLENIYa RAKETAMI [Missile Remote Control System] -- complex of equipment for guidance of a missile to a target by determination, from the command post, of the relative location of the missile and the target and transmission of appropriate commands to the missile. As a rule, a missile remote control system will comprise radar stations, computers and control devices, and command transmission lines (radio or wire communications).

The operating principle is as follows. A computer, based on radar station data, determines the mutual position of the missile and the target. These positioning data are transmitted to a command post control station. Command signals are transmitted via communications lines (radio or telephone) to the missile from the command post on the ground (on a ship or aircraft). These signals (commands) act upon missile controls and prevent it from deviating from the optimal trajectory. Missile remote control systems are subdivided as command, radionavigational, and beam. They are used to control "surface-to-air," "air-to-air,", and "air-to-surface" missiles, and can be used to guide ballistic missiles in the initial leg of the trajectory. The radionavigational system can be used to guide long-range guided missiles. /264

SISTEMA UPRAVLENIYa RAKETOY (REAKTIVNYM SNARYaDOM) [Missile (Rocket Projectile) Control System] -- complex of equipment operating jointly to determine missile (projectile) deviations from an assigned trajectory, generation of command signals, and action upon controls. The complex includes equipment installed on the missile itself, as well as at a command post. Missile control systems are categorized by operating principle into four basic groups: autonomous control systems, telecontrol (remote-control) systems, homing systems, and combined systems.

SKAChOK UPLOTNENIYa [Shock Wave] -- phenomenon of a sudden increase in density and pressure of the air which increases spasmodically to a large magnitude in front of a missile (projectile) moving at supersonic speed. The shock wave radically increases the projectile's drag, causing the projectile's nose to heat up. The spherical surfaces of densification formed is a rounded surface in the form of a cone, with the projectile located in the apex. This cone is called the Mach cone

and the ratio of the projectile's velocity (v) to the speed of sound (a_0) the Mach number, or M-number ($M = \frac{v}{a_0}$). Waves of increased pressure are categorized as normal, oblique, and curved.

SKLONENIYe MAGNITNOY STRELKI [Magnetic Declination] (δ) -- angle between the geographical and magnetic meridians at a given point on the earth's surface. It is east (+ sign) if the northern end of the magnetic needle deviates to the east and west (- sign) if it deviates to the west. The magnitude of magnetic declination is subjected to infinitesimal -- daily, significant -- annual, and very significant -- centennial fluctuations, as well as temporary fluctuations caused by magnetic storms. Magnetic declination (its annual changes) are indicated on topographic and nautical maps and charts.

SKOROPALITEL'NYYe SVECHI [Fast-Burning Candles] -- small paper fuses charged with black blasting powder. They were used in smooth-bore artillery for high-speed firing. Fast-burning candles ignited a piece primer faster than a lit wick did. /265

SKOROSTNOY NAPOR [Velocity Head] -- difference in the pressures of the force of air resistance on the nose and bottom portions of an artillery projectile as it flies through the air.

SKOROSTREL'NOST' ORUZHIYa [Weapon Rate of Fire] -- number of shots fired from a given piece per time unit (1 minute). Rate of fire is determined by the speed of delivery, loading, and laying. Rate of fire is one of the basic qualities determining a weapon's combat characteristics and is categorized as technical and combat. Technical rate of fire is determined by the time interval required to load pieces and fire a round (with piece recoil and counterrecoil). Combat rate of fire is determined by the number of shots fired in 1 minute, considering time for loading, laying the piece, and firing the round. The combat rate of fire is less than the technical rate of fire and will depend on piece caliber, loading method, breechblock design, piece stability during firing, and piece crew teamwork. The rate of fire of modern high-caliber guns (203mm) reaches 2--3 rounds per minute. Rate of fire increases as caliber decreases. It will reach 100 rounds per minute and more for automatic guns.

SKOROST' VETRA [Wind Velocity] -- rapid motion of air is called wind. Wind

is characterized by two elements, direction and velocity. Wind velocity is measured in meters per second and in balls. One ball equals 2.5 meters per second. The term wind direction is understood to mean the direction from which the wind is blowing. For instance, a northerly wind is that which is blowing from the north, and so on. Wind direction is determined by a windvanes, while velocity is measured by anemometers, windvanes, pilot balloons, and other means. An anemometer is a precision instrument measuring wind velocity, while a windvane is the simplest instrument for wind direction and velocity determination. A windvane will comprise arms and an indicator plate rotating on a metal rod.

SKOROST' VTORAYa KOSMIChESKAYa [Escape Velocity] -- motion of a body with a velocity of 11.2 kilometers per second along a parabolic trajectory. Such a body, released from the effect of the Earth's gravity, will not return to its initial /266 point and will enter outer space. Sometimes, escape velocity is called second cosmic velocity or release velocity.

SKOROST' GORENIYa POROKhA [Powder Burning Rate] (Variable) -- linear velocity of the distribution of the reaction of the burning (explosive conversion) of powder deep into the powder granule.

SKOROST' ZVUKA [Speed of Sound] -- velocity of the distribution of sound waves in resilient media (gases, liquids, and solids). The velocity of sound distribution varies in different environments. The speed of sound in air will depend on air temperature and density and will be approximately 1,200 kilometers per hours (330 meters per second). Sound oscillations are characterized of the frequency of the oscillations and the length of the sound wave. Oscillations with frequencies below 20 oscillations per second are called subsonic and those exceeding 20,000 oscillations per second are called supersonic.

SKOROST' NAKATA [Counterrecoil Velocity] (u -- Variable) -- motion speed of the center of gravity of recoil mechanisms during counterrecoil relative to the guides along which recoil mechanisms will move.

SKOROST' ORBITAL'NAYa [Orbital Velocity] -- motion speed of a satellite along an orbit; motion speed of a missile of any other body [sic] which must be attained in order to encircle the Earth along a given orbit with engine shut down.

SKOROST' PARABOLIChESKAYa [Parabolic Velocity] -- see parabolicheskaya skorost' [parabolic velocity].

SKOROST' PERVAYa KOSMIChESKAYa (KRUGOVAYa) [Satellite (Circular) Velocity] -- velocity relative to the Earth equalling 7.9 kilometers per second (for a circular orbit near the earth's surface) whereby a body is converted into an artificial satellite. Its magnitude will depend on the body's flight altitude above the Earth. At satellite velocity, the force of the Earth's gravity equals centrifugal force.

SKOROST' RAKETY MAKSIMAL'NAYa [Maximum Missile Velocity] -- velocity at the end of the powered portion of the trajectory.

SKOROST' SVOBODNOGO OTKATA [Velocity of Free Recoil] (w -- Variable) -- the motion speed of the center of gravity of the recoil mechanisms during svobodnyy otkat [free recoil] (see).

SKOROST' SNARYaDA [Projectile Velocity] (v) -- velocity of a projectile's progressive motion at the examined point in a trajectory.

SKOROST' TORMOZhENNOGO OTKATA [Velocity of Retarded Recoil] (v -- Variable) /267 -- motion speed of the center of gravity of recoil mechanisms during retarded recoil relative to the guides along which the recoil mechanisms will move.

SKOROST' TRET'Ya KOSMIChESKAYa [Solar Velocity] -- velocity relative to the Earth equalling 16.7 kilometers per second whereby a missile overcomes the gravity of the Earth and Sun and departs the Solar system. Solar velocity sometimes is called parabolic velocity or solar escape velocity.

SLAZhENNOST' RASChETA [Crew Teamwork] -- ability of crew members to operate in accord when carrying out their functional responsibilities at a missile, launcher, piece, assembly, and so on. Crew teamwork is achieved through excellent knowledge of the applicable equipment and systematic drills. It insures successful accomplishment of combat missions.

SLED RADIOAKTIVNOGO OBLAKA [Radioactive Cloud Pattern] -- zone of terrain in which radioactive contamination occurs as a result of fallout of radioactive substances

(dust) from the cloud of a nuclear burst. A radioactive cloud pattern with identical radiation levels within its boundaries most of the time forms an ellipse elongated in the wind's direction.

SLEDYaShchIY ELEMENT (DATChIK RASSOGLASOVANIYa) [Servo Element (Error Sensor)] -- device automatically comparing a missile's actual position with the programmed position and, in the event of their disagreement, supplying a signal to an amplifier. It is used in artillery remote-control and missile guidance systems.

SLOY POGRANIChNYY [Boundary Layer] -- air stream directly contiguous to the rounded surface of a missile in flight. Forces of friction arise in the boundary layer on the missile's surface as a result of air's viscosity, creating drag.

SLUZhBA RAKETNO-ARTILLERIYSKOGO VOORUZhENIYA [Missile and Artillery Supply Service] -- service engaged in supply of missile and artillery armament, and small-arms, missiles and their warheads, projectiles (mortar shells), small-arms ammunition, and other types of missile and artillery equipment.

SLUChAYNOYe SOBYTIYe [Random Event] (Theory of Probabilities) -- each /268 phenomenon studied in the theory of probabilities is called an event. A random event is one which, under given conditions, can or cannot be. An example is deviation of a projectile from the target. A certain event is one that must occur, such as the drop of a projectile after firing.

SMAZKA ARTILLERIYSKAYa [Artillery Lubricant] -- liquids used to decrease friction between moving parts of mechanisms insuring normal weapon operation and preventing damage due to wear and corrosion (rust). This category includes gun, non-freezing, and liner lubricant, vaseline (MVP) and spindle oil, grease, and so forth.

SMESEVYYe RAKETNYYe TOPLIVA [Composite Propellants] -- special rocket powders in the form of a mechanical mixture of high-molecule fuels (sulfur, asphalt, rubber, bitumen, resins, and others), crystallized oxidizers (ammonium sulphate, ammonium nitrate, sodium nitrate), and binders (sulfur, rubber, and others). Propellant charges manufactured using the poured method are made of composite propellants.

SMESEOBRAZOVANIYa [Mixing] -- process of formation, in the requisite proportion,

of a homogeneous mixture of fuel and oxidizer pairs in liquid-propellant rocket engines.

SMEShchENIYe [Displacement] (C) -- distance along the horizon (shortest) from the piece to the observer-target plane expressed in linear units.

SMEShANNOYe RAKETNOYe TOPLIVO -- see gibridnoye raketnoye toplivo [hybrid propellant].

SNARYaD ARTILLERIYSKIY [Artillery Projectile] -- type of ammunition designed to be fired from an artillery piece. They are categorized by purpose as basic, special, and auxiliary. Basic artillery projectiles include armor-piercing, cement-piercing, high-explosive, fragmentation, high-explosive-fragmentation, shaped-charge, and incendiary. Special-purpose projectiles include illuminating, smoke, and others. Auxiliary artillery projectiles include armor-proving, carriage-proving, training, and practice projectiles. They are categorized by caliber as small (20--70mm), medium (70--155mm), and large (more than 155mm). The longest artillery projectile today does not exceed 5.6 calibers.

SNARYaD DAL'NOBOYNYY [Long-Range Projectile] -- artillery projectile with /269 a well-rounded form and high ballistic properties. A long-range projectile has a long nose, short cylindrical portion, and a relatively-long base with a cylindrical/conical form.

SNARYaD NADKALIBERNYY [Spigot-Mounted Projectile] -- artillery projectile whose caliber is greater than that of the piece. Such projectiles only have the base inserted in the barrel.

SNARYaDNAYa STROPKA [Projectile Sling] -- sling (line) used to place projectiles from racks onto carts or a transporter for delivery to the loading section in large-caliber shipboard artillery.

SNARYaD PODKALIBERNYY [Subcaliber Projectile] -- see podkalibernyy broneboynyy snaryad [subcaliber armor-piercing projectile].

SNARYaD KhIMIChESKIY [Chemical Projectile] (Foreign) -- artillery projectile

to exterminate personnel and animals by means of toxic chemical agents and to contaminate terrain. It is a conventional high-explosive projectile and will comprise a casing, burster tube with explosive charge, fuse, and toxic chemical agents (OV).

SNARYaD TsEL'NOMETALLIChESKIY (SPLOShNOY) [All-Metal Projectile (Shot)] -- artillery projectile without an inner cavity (without an explosive charge). This category includes armor-piercing shot and practice steely pig-iron balls.

SOGREVATEL'NYYe ZARYaDY [Heating Charges] -- artillery charge for heating up the piece's bore prior to initiation of combat firing at temperatures below 0°.

SOLIDOL [Grease] -- thick dark gray ointment used to lubricate wheel bearings.

SOPLO [Nozzle] -- hollow conical pipe in the form of a funnel for directing the expulsion of the gas stream from a high-pressure space into a space of lower pressure.

SOPLOVAYa ZAGLUShKA (KRYShKA) [Nozzle Cover (Cap)] -- solid-propellant rocket engine (RDTT) accessory covering the nozzle. It will serve to protect the inner part of the engine against the effect of the environment during storage (to hermetically seal the charge during storage).

SOPROVOZhDENIYe TsELI [Target Tracking] -- term understood to mean constant /270 determination of target coordinates. Three coordinates primarily are used to determine a target's position in space and they are obtained by different methods.

SOPROTIVLENIYe DONNOYe [Base Drag] -- aerodynamic drag arising as a result of intense rarefaction (a vacuum is formed) behind the base of a projectile (missile) exceeding frontal drag. Base drag is linked with separation of the boundary layer and with vortex generation behind the flat base of a projectile (missile) during flight. Base drag will depend on the form of the missile's rear area, fuselage length, empennage, condition of the boundary layer, and other causes. A missile with engine operating does not have rarefied space opposite the nozzle opening. It arises at all rotating masses having a bottom in the rear portion.

SOPROTIVLENIYe TRENIYa V UPLOTNYaYuShchIKh USTROYSTVAKh PRI NAKATE (OTKATE) [Friction Resistance in Seals During Counterrecoil (Recoil)] (F -- Variable) --

resultant of the forces of friction during counterrecoil (retarded recoil) arising in buffer and recuperator seals (in collars and stuffing boxes).

SOPROTIVLENIYe TRENIYa NAPRAVLYaYuShchIKh PRI NAKATE (OTKATE) [Friction Resistance of Guides During Counterrecoil (Recoil)] (T -- Variable) -- resultant of the forces of friction during counterrecoil (retarded recoil) arising on the guides along which the recoil mechanisms will move.

SOPRYaZhENNOYe NABLYuDENIYe [Combined Observation] -- simultaneous observation from at least two NP. Combined observation in artillery is used for intersection and determination of the coordinates of targets, check points, reference points, measurements of burst deviations from a target during registration based on measured deviations, and so forth.

SOPRYaZhENNYYe TRAYeKTORII [Complementary Trajectories] -- trajectories responding to different quadrant angles of departure, one of which is greater and the other smaller than 45°, and in which identical ranges are obtained.

SORTIROVKA BOYePRIPASOV [Ammunition Classification] -- distribution of projectiles and charges by lots, i. e., into groups in which all elements of the rounds will be identical in purpose, weight, marking, weight signs, fuse type, and so forth. /271

SOSREDOTOChENNYY ARTILLERIYSKIY OGON' [Concentrated Artillery Fire] -- fire delivered simultaneously by several batteries or battalions on one target or on a group of targets reduced to a sector. Concentrated artillery fire is employed for destruction or suppression of enemy personnel, his fire weapons, and other targets.

SOSTAVNAYa RAKETA [Multistage Rocket] -- multistage rocket.

SOShNIK [Spade] -- component of the carriage of a field artillery piece in the form of a welded bar attached to the trail. Carriage trails, with the aid of the spade, transfer forces to the ground during a shot, thus imparting a stable position to the piece.

SPOYLERY [Spoilers] -- device on a solid-propellant rocket engine making it possible to change the engine's reverse thrust (direction of the jet stream). It

is possible with spoilers to divide the jet stream expulsed from the nozzle into two parts with its rotation 90° to the engine's longitudinal axis. It is possible with spoilers to insure a smooth decrease in engine thrust and bring it to zero. They are activated by a command from the remote control system.

SPOSOB OBSTRELA (STREL'BY) [Shelling (Firing) Method] — optimal distribution of aiming points and projectiles to achieve the requisite degree of target destruction. The shelling method includes determination of the number of pieces (batteries, battalions) allocated to fire for effect, determination of the number of range (deflection) settings and magnitudes of range (direction) bounds, determination of projectile consumption and their distribution among pieces (batteries, battalions) and range (deflection) settings, as well as selection of the order of fire when firing for effect.

SPUSKOVOY MEKhANIZM [Trigger Group] — special mechanism in the breechblocks of artillery mounts for cocking and releasing the striker with firing pin. Manual, mechanical, and electrical trigger groups are used.

SREDINNAYa OShIBKA ILI SREDINNOYe OTKLONENIYe [Probable Error] (E) — error (deviation) from a specific series of errors (deviations), whose absolute magnitude is greater than any error (deviation) in one-half of the series and less than /272 any error (deviation) in the other half of the series. The following designations are used: $B_{.}$ — probable error; $B_{\partial.}$ — range probable error; v_{∂} — gun-target line probable error; B_{δ} or v_{z} — direction probable error; $B_{\theta.}$ — vertical probable error; $B_{N.}$ — direction probable error on the normal to the trajectory; $B_{N.}$ — direction probable error on the normal to the gun-target line (in the vertical plane); $B_{p\partial}$ or v_{h} — range probable error; $B_{p\theta}$ or v_{y} — height-of-burst probable error; $v_{t.}$ — probable error in fuse burning time. It is most practical to take possible error for each direction as equalling four probable errors from the center of dispersion. The overall dimensions of the dispersion ellipsoid (ellipse) in range, width, and altitude equal eight probable errors. Possible deviations are taken as equalling five probable errors in more precise calculations.

SREDNIY VETER [Mean Wind] — wind averaged in velocity and direction for all layers of air within the limits of the height of rise of a nuclear burst's cloud. Mean winds are accepted as the average of all wind directions and velocities acting

upon particles of radioactive dust as they fall on the terrain along the movement pattern of a burst's radioactive cloud.

SREDNYaYa ARIFMETIChESKAYa OShIBKA [Mean Arithmetic Error] (E_1 or α) -- magnitude equal to the mathematical expectation of the absolute value of an error.

SREDNYaYa KVADRATIChESKAYa OShIBKA [Mean Square Error] (E_2 or δ) -- magnitude equal to the square root of the mathematical expectation of the square of the error.

SREDNYaYa TOChKA RAZRYVOV [Mean Point of Bursts] (C_a) -- computed position of the center of the burst dispersion ellipsoid taken, instead of the true center, from results of measurements made.

SREDNYaYa TOChKA PADENIYa (POPADANIYa) [Center of Impact] (C_y) -- computed position of the center of the projectile dispersion ellipsoid during percussion firing taken, in place of the true center, from results of measurements made.

SREDNYaYa TRAYeKTORIYa [Mean Trajectory] -- imaginary trajectory passing through the center of the dispersion area (ellipse), i. e., through the center of impact.

SREDSTVA VOSPLAMENENIYa [Primer] -- element of an artillery round igniting the powder charge during firing. Primers include flash, percussion, and /273 electric tubes and primer cups.

SREDSTVA DOSTAVKI YaDERNOGO ORUZhIYa [Nuclear Weapon Delivery Vehicles] -- combat equipment for delivery of nuclear charges to targets (objectives). Ballistic missiles, cruise missiles, aircraft, artillery pieces, naval torpedoes, missile-equipped submarines, aircraft carriers, and so on are nuclear weapon delivery vehicles.

STABILIZATOR RASKRYVAYuShchIYSYa [Hinged Fin] -- see next entry.

STABILIZATOR SKLADYVAYuShchIYSYa [Folding Fin] -- folding empennage of a rocket which unfolds due to spring action when the rocket leaves the guide tube. Rockets with folding empennage, as a rule, are employed from tube launchers. The empennage

is folded up when the rocket is in the guide tube, which greatly facilitates installation of the rockets, for example on an aircraft.

STABILIZATORY VZRYVChATYKh VEShchESTV [Explosive Stabilizers] -- admixtures retarding decomposition of explosives and increasing their chemical and physical stability. Carbonates of sodium, calcium, and magnesium and various organic compounds -- aniline, urethane, and others, are used as high explosive stabilizers. For example, up to 1.5% diphenolamine is added to smokeless pyroxylin powder, while up to 3% centralite is added to nitroglycerine smokeless powder.

STABILIZATsIYa VZRYVChATYKh VEShchESTV [High Explosive Stability] -- increased high explosive durability through addition of stabilizers, which increase their chemical and physical stability.

STABILIZATsIYa RAKETY [Rocket Stability] -- maintenance of the given direction of a rocket's axes in space during flight. Unguided rockets can be stabilized with the aid of empennage or rotating motion of a rocket around its longitudinal axis. The control system accomplishes this for guided missiles.

STABILIZIROVANNAYa KORABEL'NAYa ARTILLERIYSKAYa USTANOVKA [Stabilized Shipboard Artillery Mount] -- artillery mount in which the axes of the piece's trunnions as a ship rolls are maintained in the horizontal plane by stabilizing devices and mechanisms, i. e., the piece is laid as if with a fixed horizontal plane. /274 Shipboard artillery mounts are categorized by laying method as stabilized and unstabilized.

STANINY [Trails; Bases] -- 1. A field artillery lower mounting has two, three, or four trails to impart stability to the piece when firing. Trails, in conjunction with spades, transmit forces to the ground during firing. 2. Foundations supporting individual nodes and parts of an artillery mount. The right and left parts of piece mounting's turntable on a deck artillery mount. Bases have subtrunnion beds upon which a piece's rocking portion is supported by its trunnions.

STANTsIYa NAVEDENIYa RAKET [Missile Guidance Station] -- radiotechnical facility used to guide a missile or to keep it directed toward the target throughout a particular section of its trajectory.

STANTsIYa ORUDIYNOY NAVODKI (SON) [Fire Control Radar] -- radar station intended to detect aerial targets and to determine precisely their changing coordinates (to track such targets). Changing coordinates are fed into a computer (PUAZO), which generates data for antiaircraft piece fire control.

START (RAKETY) [Launch] -- take-off, launch of a missile (rocket projectile).

STARTOVAYa BATAREYa [Launch Battery] -- missile and surface-to-air missile troop firing subunit intended to launch missiles.

STARTOVAYa POZITsIYa [Launch Position] -- sector of terrain occupied, or prepared for occupation, by missile launchers. Launch positions are categorized as main and alternate.

STARTOVYY VES RAKETY [Rocket Launch Weight] ($G_{нач}$) -- initial weight of a rocket ready for launch with a payload. The rocket payload may include a container with instruments, cabin with passengers, artificial Earth satellite, or high-explosive charge. Rocket launch weight is rather large. For example, the single-stage Redstone rocket weights 28 tons, while the two-stage Titan weighs 100 tons. Launch weight is sometimes called rocket initial weight ($G_{нач}$):

$$G_{нач} = G_{полезн} + G_{констр} + G_{топл},$$

where $G_{полезн}$ -- weight of the payload for which the rocket is designed;
$G_{констр}$ -- weight of the rocket design, which includes the weight of the engine, tanks (without propellant), and auxiliary equipment;
$G_{топл}$ -- weight of the rocket propellant;
$G_{конечн}$ -- rocket weight after engines are shut down.

The following ratios exist among these weights:

$$G_{конечн} = G_{нач} - G_{топл},$$
$$G_{конечн} = G_{полезн} + G_{констр}.$$

STARTOVYY KOMPLEKS [Launch Complex] -- one or several launchers with missiles and associated support equipment.

STARTOVYY RAKETNYY DVIGATEL' [Booster Rocket] -- rocket engine used in an airborne platform to facilitate lift-off or impart initial velocity required for cut-in of the rocket's main engines. As a rule, powder rocket engines (PRD) are used as boosters, with liquid-propellant rocket engines (ZhRD) used as a exception. Booster rockets are used in various rocket projectiles equipped with PVRD, and as boosters for list-off of missiles and aerodynamic projectiles, as well as in aviation for rocket-assisted take-off.

STARTOVYY STOL (PUSKOVOY STOL) [Launch Pad (Launch Table)] -- special horizontal platform providing support for a rocket (with various support equipment) to insure vertical lift-off of space rockets, ballistic missiles (medium- and long-range), and certain antiaircraft projectiles.

STATsIONARNAYa ARTILLERIYa [Fixed Artillery] -- artillery mounts installed in fixed positions on a concrete foundation in coastal artillery and permanent concrete border defenses (fortresses). Fixed artillery is categorized as turret or exposed. Fixed batteries usually are equipped with long-range naval pieces. Well-protected and camouflaged batteries, especially those in turrets, are very survivable.

STVOL (ORUDIYNYY) [Barrel (Piece)] -- part of a piece directly intended for propelling a projectile in a specific direction and with a specific initial /276 velocity.

STVOL'NAYa ARTILLERIYa [Tube Artillery] -- all types of artillery pieces in which the projectile acquires initial velocity as a result of the action of powder gases in the barrel. Guns, howitzers, rifled mortars, and smooth-bore mortars are the basic types of tube artillery.

STVOL'NAYa NAREZNAYa ARTILLERIYa [Rifled Tube Artillery] -- all types of artillery pieces in which there is rifling in the barrel.

STEOL M [Steol M] -- anticorrosion frost-resistant liquid for filling counterrecoil devices. It is a mixture of 46.3% glycerine, 20% ethyl alcohol, 32 % (by weight) water, 1.6% chromate of potassium, and 0.1% sodium hydroxide. Its specific weight is 1.09—1.11, solidification point below -57° C, and boiling point 89—92° C.

STEREOSKOP [Stereoscope] -- optical instrument used for examination of photographs and for selection and training of range finder-stereoscope operators. An observer using this instrument, with the aid of two photographs of the same object (or sector of terrain) taken from two different points of view (one from the position of the right eye, the other from the position of the left eye), examining with both eyes both photos combined into one with the aid of stereoscope's optical wedges, gets the sensation of depth. In artillery, the stereoscope is used for range-finder-stereroscope operator selection and training.

STEREOSKOPIST [Stereoscope Operator] -- range-finder specialist operating a stereoscopic range-finder. In combat, he measures target range.

STEREOSKOPICHESKIY DAL'NOMER [Stereoscopic Range-Finder] -- complex optico-mechanical instrument comprising various lenses, reflecting prisms, mirrors, and other components. It is used to measure range to a target (check point) and burst.

STEREOSKOPICHNOST' ZRENIYa [Stereoscopy] -- ability of the eyes to sense the depth of space when viewing with both eyes and to distinguish the relative position of objects in depth in space (distance from each other). The maximum distance at which a human with the naked eye distinguishes the relative position of objects /277 in depth is called the radius of stereoscopic vision. On the average, this is 1,350 meters for a human.

STEREOTRUBA [Battery Commander's OP Telescope] -- binocular optical instrument with variable base (distance between oculars), which can reach 75 centimeters. They are categorized as small and large (BST). See bol'shaya stereotruba [large battery commander's OP telescope].

STEKHIOMETRIYa [Stoichiometry] -- study of the composition of a propellant mixture, of the numerical ratio between fuel and oxidizer, in which propellant components chemically interact and burn completely, without residue.

STEKHIOMETRICHESKIY KOEFFITsIENT [Stoichiometric Coefficient] -- characteristic of the stoichiometric ratio of rocket propellant components. It shows how many kilograms of oxidizer are required for complete oxidation of one kilogram of fuel.

STEKhIOMETRIChESKIY SOSTAV TOPLIVNOY SMESI [Propellant Mixture Stoichiometric Composition] — rocket engine propellant composition in which the excess-oxidant ratio (a) approaches 1 (a = 1), i. e., that quantitative ratio of propellant components in which substances chemically interact. Stoichiometric propellant mixtures, as a rule, are an explosion risk.

STEKhIOMETRIChESKOYe SOOTNOShENIYe KOMPONENTOV [Stoichiometric Component Ratio] — weight ratio among components in which the amount of oxidizer in the propellant is the minimum required for complete oxidation of the fuel.

STOYKOST' VZRYVChATYKh VEShchESTV [High Explosive Stability] — ability of a high explosive to retain its chemical and physical properties for a prolonged period under various storage conditions.

STOPIN [Quickmatch] — fire-conductive cord used to transmit flame. It is black or white. Black quickmatch is a cellulose unspun yarn thread impregnated with calcium nitrate solution and covered with a liquid mass containing black powder and glue. White quickmatch will comprise a cellulose thread covered with novolac resin and potassium nitrate. It burns at the rate of 60—70 millimeters per second. Quickmatch is used in artillery to transmit flame from a time fuse to the bursting charge of projectiles (illuminating, incendiary, and so on).

STRATEGIChESKAYa RAKETA [Strategic Missile] — long-range military guided /278 missile with a range exceeding 1,000 kilometers (including intercontinental missiles as well). It is capable in a space of several minutes to deliver a charge of enormous destructive force 1,000 kilometers and more from the place of launch.

STRATEGIChESKIY RAKETNO-YaDERNYY UDAR [Strategic Nuclear Missile Strike] — surprise massed powerful nuclear missile strike by strategic missiles (intercontinental, global, and long-range missiles, and by strategic aviation) against the most important enemy strategic targets and objectives: missiles, air force and naval bases, military-industrial and administrative-political centers, strategic aviation bases, nuclear weapon and nuclear ammunition warehouses, troop groupings, and other objectives whose destruction influences enemy military-industrial potential. A strategic nuclear missile strike will make it possible quickly to inflict a decisive defeat on the enemy.

STRATOSFERA [Stratosphere] -- layer of the atmosphere above the troposphere reaching a height of 80 kilometers. The height of the troposphere extends in moderate latitudes to 10--12 kilometers and to 8--10 kilometers in polar latitudes. The stratosphere lies above the troposphere. The upper layer of the atmosphere lies above the stratosphere. This is the ionosphere, between 80 and 1,000 kilometers, having increased ionization. The temperature of the ionosphere increases with an increase in altitud . Air density continually decreases with altitude. It is 0.32 at an altitude of 10 kilometer, while 0.003 is the normal air density at an altitude of 40 kilometers.

STRATOSFERNAYa RAKETA (GEOFIZIChESKAYa) [Stratospheric (Geophysical) Rocket] -- rocket intended for flight at high altitudes for the purpose of studying the upper layers of the atmosphere. They are equipped with appropriate instruments for measurement of the atmosphere's parameters and their transmission to the Earth. Many stratospheric rockets parachute containers filled with observational data to Earth. Such rockets are used to determine the composition of the atmosphere, changes in air pressure, density, and temperature, the degree of ionization of the air, intensity of cosmic rays and solar radiation, and other atmospheric parameters.

STREL'BA ARTILLERII [Gunnery] -- basic type of artillery combat operations. Artillery employs gunnery to accomplish fire missions. Artillery fire is /279 delivered to destroy or suppress enemy personnel, fire weapons, and combat equipment, as well as for destruction of defensive structures. Gunnery is categorized as preliminary preparation, registration, and fire for effect. Preliminary preparation will comprise target reconnaissance, preparation of pieces, ammunition, and instruments, determination of fire position coordinates, determination of ballistic and meteorological firing conditions, determination and refinement of initial settings for firing, and other gunnery elements. Preparation of initial settings can be complete, abbreviated, or visual. It will depend on the situation, firing conditions, time, and the availability of instruments. Complete preparation provides the opportunity to open fire for effect without registration. The latter is used to refine (look for) sighting device settings with the precision sufficient for switching to fire for effect.

STREL'BA ZENITNAYa [Antiaircraft Gunnery] -- firing at aerial targets (aircraft, aerodynamic projectiles, parachute landing forces, and so forth). Firing at aerial

targets has its own special features. It is delivered at targets with high speeds (150 meters per second and more) and flight altitudes (10 kilometers and more). The speed of aerial targets greatly will exceed that of all other mobile targets and is only less by a factor of 5--6 than the initial velocity of antiaircraft pieces (800--900 meters per second). Aerial targets have relatively small overall dimensions and high maneuverability. During antiaircraft gunnery, coordinates of a moving target continually are being determined during the time of preparation for the shot and the projectile flight time, taking ballistic and meteorological firing conditions into account. Firing at aerial targets is firing for effect right from the outset. Present position data for a moving aerial target (β_0, ε_0, H_0) and velocity vector V are determined at observed position A_0. During firing, pieces are directed to future position A_y located away from observed position A_0 in the direction of target course to the magnitude of the predicted vector. The magnitude of the predicted vector will depend on target velocity V and travel time of target from position at observation to future position τ_y, which will comprise time for piece and ammunition preparation for firing and dead time τ_p expended on the preparation /280 of initial data, their transmission to the piece, and piece laying. At the moment the target is located at point A (present position), a battery volley will be delivered (firing of the pieces) to future position A_y, when dead time τ_p ends. The basic (accompanying) method of firing and barrage fire are used when it is impossible to employ more accurate fire in medium- and high-caliber antiaircraft artillery. The entire firing process is automated in medium- and high-caliber antiaircraft artillery. Special computers, antiaircraft fire directors (PUAZO), are used in medium- and high-caliber antiaircraft artillery to solve the target engagement problem. Target present position data are determined by radars or optical instruments and transmitted to the PUAZO input device. Computers use these data to generate piece arcs of fire and fuse settings considering ballistic and meteorological firing conditions and transmit them via synchronous transmission lines to pieces, where the pieces are laid to the proper point by means of power drives. Automatic small-caliber antiaircraft artillery has automatic sights which generate angular predictions of target movement during the projectile's flight time to the predicted point for delivering direct fire at aerial targets. Direct fire is delivered at diving and low-flying aircraft. Barrage fire (placing a curtain of fire in the target's path) is employed at night and under poor visibility conditons or when it is impossible or inadvisible to employ barrage fire. Antiaircraft gunnery employs a fragmentation

shell with time fuse (powder, mechanical, radiotechnical, acoustic, or other type). Small-caliber antiaircraft artillery delivers fire with a fragmentation-tracer projectile with impact fuse.

STREL'BA KORABEL'NOY ARTILLERII [Shipboard Artillery Gunnery] -- artillery fire by shipboard artillery against maritime and coastal targets has its own special features. Firing is delivered from mobile and rocking platforms against high- /281 speed targets. The special features of shipboard artillery gunnery stem from the conditions under which fire is delivered at targets: maritime surface targets with and without armor, maritime submerged, aerial, coastal, and high-speed targets. Gunnery occurs during brief contacts with the enemy and at a distance, beginning with very long ranges -- up to 220 cable lengths (40 kilometers) and ending with very small -- up to 5 cable lengths (1 kilometer). Shipboard artillery gunnery begins with preparation of initial data, distinguished by two degrees of preparation. Full (instrumented) preparation occurs with the aid of PUS [fire control directors], while abbreviated preparation uses Firing Tables. Two types of piece laying are employed, visual and central. The former is when each piece is laid on the target with the aid of sights, while the latter is when all pieces simultaneously are laid on the target with the aid of special central laying devices. The gun-layers do not see the target when this method is used. Firing is categorized as registration and for effect. Three types of registration are used: from observation of impacts, from measured deviations, and from measured range. In registration from observation of impacts, the fire director controls fire based on Artillery Firing Rules (PAS) from the combination of blips near the target. This method is used in exceptional circumstances or by small ships lacking central laying PUS. Special computers -- fire directors (PUAO), are used to solve the target engagement problem. Computers automatically compute initial firing data and control piece mechanisms. Target detection and movement data reach the computer from radars. Data on the course and speed of one's own vessel and the enemy vessel, wind direction, and so on simultaneously are supplied. Computers use these data to generate complete gun elevation and deflection data, which are transmitted automatically to the piece fire control instruments. Gunnery methods at sea now have changed. The requirement for visual observation for fire adjustment has disappeared. A radar furnishes /282 data necessasry for each round and makes it possible to determine on special screens projectile range and lateral declination and to introduce the requisite corrections.

STREL'BA NA PORAZhENIYe [Fire for Effect] -- fire intended for accomplishment of the fire mission.

STREL'BA PRYaMOY NAVODKI [Direct Fire] -- delivery of fire from an artillery piece from an exposed fire position when the piece is laid directly on the target. The following missions may be tasked on an artillery piece allocated for direct fire: destruction (repulsing) enemy armor and infantry; destruction of permanent and field defensive structures; destruction of fire weapons and personnel sheltered in various structures; destruction of antitank and anti-infantry obstacles; destruction of surface targets; and others. Missions are accomplished in a short period of time and with the greatest fire effectiveness when direct fire is employed.

STRUYNAYa FORSUNKA [Spray Nozzle] -- device for spraying liquid propellant components being supplied to a jet engine's combustion chamber. A spray nozzle is a cylindrical aperture small in diameter through which a long narrow stream of opellent is impelled at high velocity, thereby breaking it into tiny droplets due to the liquid's friction with the gas located in the jet engine's combustion chamber.

STUPEN' RAKETY [Rocket Stage] -- conventional rocket in the form of a rocket engine with propellant reserve and control actuators for assembly of multistage rockets in order to obtain high velocities and ranges (ballistic, intercontinental, space, and others). For example, a multistage rocket will comprise several interconnected stages (rockets). The first stage's engine accelerates the payload, and the subsequent stages as well, to a certain velocity. The stage automatically separates when the propellant is expended, the next stage's engine ignites, and so on.

STUPITsA [Hub] -- component of a piece's wheeled drive with an opening /283 for mounting on the carriage's service axle. The hub, with the aid of spokes or a disc, are connected with the wheel's rim, thus delineating a solid and spoked wheel.

SUDA-MIShENI (KORABLI-MIShENI) [Vessel Targets (Ship Targets)] -- self-propelled (radio-controlled) ship used in practice artillery and torpedo gunnery by naval ships and coastal batteries under conditions approximating combat. Obsolete combat ships (battleships, cruisers, destroyers) are used for this purpose. They are unloaded,

survivability enhanced, and equipped with control systems. Ship targets are controlled by radio from the shore, ship, or aircraft. Personnel operating the target ship are taken off when gunnery is in progress.

SUMMATOR [Adder] -- special device for algebraic addition of information coming from two or more sources. They can be electronic, mechanical, pneumatic, and hydraulic. An adder is either an electric circuit including a potentiometer, inductive impedances, and capacitors, or a device consisting of several tube cascades. They are used in inertial navigation systems, electronic computers, and other equipment. See ETsVM [electronic computer].

SUPERAERODINAMIKA [Superaerodynamics] -- aerodynamics studying the motion of airborne platforms in a highly-rarefied medium.

SUPERBAZUKA [Super Bazooka] -- US Army antitank weapon firing an unguided shaped-charge rocket projectile 90 centimeters long weighing 3.8 kilograms. The shaped bursting charge will weigh 1 kilogram and can penetrate 20--25 centimeters of armor. One soldier does the firing. Maximum range is 900 meters. Besides the shaped-charge projectile, the unit of fire includes fragmentation-high-explosive projectiles for destruction of personnel and combat equipment.

SUKhOY VES RAKETY [Rocket Dry Weight] -- weight of a liquid-propellant rocket design without propellant.

SFERIChESKAYa SISTEMA KOORDINAT (ZENITNOY TsELI) [Spherical Coordinates (Of an Antiaircraft Target)] -- coordinate system in which the position of an aerial target in space is determined by slant range, angle of site, and azimuth.

SFERIChESKIY SNARYaD [Spherical Projectile] -- rounded artillery projectile employed in smooth-bore artillery. The spherical projectile appeared in the /284 15th century and existed unchanged until the mid-19th century, until introduction of rifled pieces. The first spherical projectile was the pig-iron ball, its action being the force of its impact. In the second half of the 16th century, the spherical bursting charge was created. A spherical bursting charge is a thin-walled pig-iron ball charged with black powder, with a touchhole for a fuse, which activated the charge.

SKhEMA OGNYa [Fire Chart] -- sketch drawn to scale and with conventional symbols depicting fire missions of a unit (subunit, group). It is customary to mark the following on the chart: forward edge of friendly defenses, enemy disposition, and artillery fire missions in the form of specific arcs of fire. Each target (arc of fire) is assigned its own number (designation).

SKhEMA ORIENTIROV [Reference Point Diagram] -- free-hand drawing depicting local features selected as reference points. The latter are numbered from right to left from friendly to enemy lines. Reference point numbers assigned by the senior chief are not changed. Plotting reference points on such a diagram and timely determination of their ranges facilitates target designation, delivery of fire on targets, amd memorizing the reference points. Only reference points designated by the senior chief are used in reports to the senior chief and for coordination with supporting and adjacent subunits.

SChISLENIYe PUTI [Dead Reckoning] -- integration over time of rocket velocity components relative to the assigned (computed) direction to a target.

TABLITsA OGNYa ARTILLERIYa [Artillery Capabilities Chart] -- document containing data on the procedure for delivering artillery fire. It is prepared in a form convenient for use by the staffs of artillery units and subunits as artillery combat operations are planned.

TABLITsY STREL'BY [Firing Tables] -- collection of magnitudes characterizing the ballistic properties of a given piece (rocket). They will contain three groups of ballistic data: basic data; range and bearing changes corresponding to various deviations in firing conditions from tabular data; characteristics of the dispersion of projectile (rocket) impact points (bursts).

TABLIChNAYa TRAYeKTORIYa [Standard Trajectory] -- projectile (rocket) trajectory computed from basic tabular data: initial velocity, projectile weight, and projectile form (outline), for normal atmospheric conditions and, with the requisite precision, in accord with the experimental trajectory following reduction of the latter to the identical tablular data and atmospheric conditions.

TABLIChNIYYe USLOVIYa STREL'BY [Standard Gunnery Conditions] -- the following are standard gunnery conditions: topographic condition -- the target is located on the horizontal at the muzzle; ballistic condition -- the projectile's initial velocity is standard, charge temperature is +15° C, projectile weight is standard, the form of the projectile with fuse corresponds to the standard outline; meteorological conditions: stationary atmosphere, barometric pressure at piece location and at the piece horizontal at the muzzle equals 750mm, air temperature at the piece and at the horizontal to the muzzle is +15° C, air temperature distribution in height is standard. /285

TAKTIKO-TEKhNIChESKIYe SVOYSTVA ORUZhIYa [Weapon Specifications] -- basic indicators characterizing the specifications of a weapon (small-arms, mortar, artillery pieces, combat vehicles, atomic and missile weapons, and so forth). They include: caliber, number of riflings, rifling depth and width, initial velocity, firing range, rate of fire, piece maximum bore pressure, projectile and charge weight, projectile (bullet) destructive and penetrating ability, laying speed, maximum traverse and elevation, barrel life, unit of fire, system weight

in combat and travel configurations, rate of conversion from travel to combat configuration and vice versa, mobility, rate of movement on the march and in combat, armor protection (shipboard and self-propelled artillery), number of people servicing the piece (system), and so on. Specifications for self-propelled artillery mounts (tanks) include armament, unit of fire, armor protection, engine output, fuel reserve, crew composition, and so forth.

TANKOOPASNOYe NAPRAVLENIYe [Probable Avenue of Tank Approach] -- strip of terrain in which the enemy, due to accessibility (passability) and tactical importance, may employ tanks. This usually includes roads and ravines without natural obstacles, which allow massed employment of tanks.

TARAN [Ram] -- ancient siege weapon used to knock down fortress walls by means of a powerful blow. A ram was a heavy timber with a metal tip reinforced with chains or ropes on the transom (trestle) of a special wooden mounting. Up to 100 men served the ram weapon. Men besieging a city, swinging the ram with their arms, struck the wall in the same place, making passages for troops.

TVERDOYe TOPLIVO (REAKTIVNYKh DVIGATELEY) [Solid Propellant (For Rocket Engines)] -- solid substance in the form of a chemical compound of fuel and oxidizer. Smokeless powder (ballistite, cordite, and others) in the form of tubes, packs, /287 rings, and so on mainly are used as solid propellent. Solid propellant, for example, powder in the form of a cast charge filling the rocket engine's combustion chamber, can be used. Other substances besides powders also can be used as solid propellants. Attempts are being made overseas to replace powder with a plastic propellant. An example is a propellant based on asphalt with an admixture of oil. As a solid propellant (powder) burns, gases with temperatures of 2,000--2,500° and pressures of 50--250 atmospheres are released, providing a gas exhaust rate from the nozzle of 1,600--2,000 meters per second. Solid propellants are used in the rocket engines of rocket projectiles, in rocket projectile boosters, and aircraft. It is considered feasible at the present time to use solid propellants for long-range projectiles travelling hundreds and thousands of kilometers.

TEKUShchAYa TOChKA [Observed Position] (A) -- point at which a moving target will be located at a given time.

TEKUShchIYe KOORDINATY [Present Position Data] -- magnitudes determining the position of a moving point (target) on a plane or in space at each given moment. The coordinates of a moving point are determined continuously. The determination of the coordinates of a moving point begins immediately prior to registration and will continue until firing ceases.

TEKUShchIY REMONT MATERIAL'NOY ChASTI [Equipment Current Maintenance] -- type of minor maintenance on artillery (mortar) equipment within a formal preventive maintenance plan. Artillery equipment repair is subdivided into minor repair, unit repair, and major overhaul. Equipment current maintenance includes that which can be accomplished with the aid of the piece or battery ZIP. As a rule, equipment current maintenance is done by the piece crew under the direction of the piece commander and platoon commander or by a piece master technician under the supervision of an artillery technician.

TELEUPRAVLENIYe [Remote Control] -- methods and technical means used to effect control of mechanisms and processes from a distance. It includes command transmitting and receiver selector devices. Signals to control objects are sent from a command post. The signal (command) transmission line can be wire, optical, or radio. A single communications line now is used, as a rule, for transmission of several commands to the controlled object. In order to transmit several /288 commands on a single communications line, each one is supplied with an identifier (strictly-defined width, amplitude, polarity, and so forth), i. e., is encoded, then emitted into space. The receiver aboard the controlled object decodes and transmits the received radio signal commands only to those circuits for which they are intended. Remote control systems are equipped with remote monitors (remote signalling, in particular) in order to monitor the controlled object (pilotless airborne platform) at a distance. Two remote control methods, command and beam, most often are used in missile and projectile control. Remote control is used widely in military affairs.

TEMPERATURA VSPYShKI VZRYVChATYKh VEShchESTV [Explosive Flash Point] -- minimum temperature at which an explosive under the influence of external actions begins to convert at the rate required to obtain an explosion.

TEMPERATURA GORENIYa POROKhA [Powder Combustion Temperature] (T_1) -- combustion (formation) temperature of powder computed from 0° K (absolute scale).

TEMPERATURA OBYChNOGO VZRYVA [Normal Burst Temperature] -- maximum temperature to which gaseous products are heated during the explosion of a conventional explosive.

TEMP OGNYa [Rate of Fire] (Γ, or τ_0) -- time interval between two successive rounds (volleys) fired at one command (surface-to-surface artillery).

TEMP STREL'BY [Cyclic Rate of Fire] (T_c or τ_c) -- time interval between two successive, separately-prepared, antiaircraft artillery rounds (volleys).

TEN [Tyen] -- powerful high explosive, a white crystallized substance used to charge detonators in special ammunition. [see TEN [pentrite].

TEORIYa ARTILLERIYSKOY STREL'BY [Artillery Gunnery Theory] -- portion of artillery science based on external ballistics, the theory of probabilities, and the theory of errors studying the basic tenets of the theory and practice of artillery gunnery and developing the most advisible rules of gunnery against ground-based, maritime, and aerial targets. The science facilitating most correct and effective accomplishment of gunnery fire missions.

TEPLOVAYa GOLOVKA SAMONAVEDENIYa [Heat Seeker] -- special device reacting to the infrared (thermal) radiation of a target used to guide missiles, torpedoes, and other weapons to a target. A heat seeker continuously automatically determines error angle (angle between the heat seeker axis and the assigned bearing), generates, and transmits commands to the appropriate actuating elements controlling missile trajectory. A heat seeker is installed in the nose of a guided missile and covered by a fairing transparent to infrared rays. It is employed in passive missile guidance systems in the final leg of the flight trajectory.

TEPLOPROIZVODITEL'NOST TOPLIVA [Propellant Thermal Output] -- calorific value, amount of heat released during complete combustion of 1 kilogram of propellant. Propellant thermal output is determining experimentally by burning propellant in a calorimeter.

TEPLOTA VZRYVChATOGO PREVRAShchENIYa [Heat of Formation] (Q_w) -- amount of heat released by 1 kilogram of powder during its combustion in full volume and as gases are cooled to a temperature of 18° C (water--steam).

TEPLOTVORNOST' RAKETNOGO TOPLIVA [Rocket Propellant Calorific Value] -- rocket propellant efficiency, i. e., amount of heat released during complete combustion of a unit of propellant weight. It is measured in kilocalories per kilogram. Rocket propellant calorific value is determined experimentally using a calorimeter.

TERMISTOR [Thermistor] -- bolometer with a semiconductor sensing element possessing the property to change electrical conductivity as temperature changes.

TERMIT [Thermite] -- mixture of powdered metallic aluminum with the oxides of various metals. An example is a mixture of 24% powdered aluminum and 76% ferric oxide. Aluminum (Al) is a fuel and ferric oxide (Fe_2O_3) is an oxidizer. Igniting, thermite creates a temperature of approximately 2,400--3,000°. Thermite essentially does not give off flame when burning. Barium nitrate and other fuels are added to thermite to increase the flame. Thermite cannot be extinguished /290 with water. It separates water into oxygen and hydrogen, forming a highly-incendiary mixture -- firedamp.

TERMOGRAF [Thermograph] -- instrument continuously registering air temperature comprising two basic parts, a receiver and a recorder. The receiver is a curved bimetal plate which bends when the temperature changes (direction of bend determined by either an increase or decrease in temperature), driving a kinematic link with pen. The recorder will comprise a cylindrical drum with a clock inside and a paper tape on the outside for temperature registration. Thermographs are set up for daily, 2-day, and weekly operation. They are used for recording temperatures in powder magazines and ammunition dumps, as well as in meteorology.

TERMOKOMPENSATORY [Heat Compensators] -- portions of piping and tunnel pipes with corrugated walls. They eliminate formation of temperature stresses in case of uneven heating and cooling of propellent feed system piping and do not transmit rocket engine vibrations to propellant tanks.

TERMOPARA [Thermocouple] -- heat-sensing element in the form of two conductors made of different metals or alloys which are connected by one end and which are intended for use in thermoelectric receivers of luminous energy in tracking heads (seekers) that employ the thermoelectric effect.

TERMOYaDERNOYe (VODORODNOYe) GRUZhIYe [Nuclear (Thermonuclear) Weapon] -- weapon based on use of the energy formed during the nuclear fusion reaction of light elements (isotopes of hydrogen, lithium). The high temperature, on the order of tens of millions of degrees, required to elicit the nuclear fusion reaction of light elements is achieved by placement, inside the thermonuclear ammunition, of a charge of other ammunition of uranium-235 or plutonium-239.

A thermonuclear weapon is one of the most powerful destructive modern types of mass destruction weapon. It can be employed in the form of thermonuclear (hydrogen) bombs and long-range guided missiles with thermonuclear charges, /291 which possess infinite destructive force. The TNT equivalent of a thermonuclear weapon is computed in thousands and millions of tons of TNT.

TETRAZEN [Tetrazine] -- explosive initiator used in manufacture of percussion compositions for detonator caps. It is a solid fine crystallized powder with a yellowish tinge. Its density is 1.64 grams per square centimeter and its flash point is 140°. It begins noticeably to decompose after prolonged heating above 50°. Its initiating ability is less by a factor of 2 than that of fulminate. It is used in isolated form as an initiating explosive.

TETRIL [Tetryl] ($C_7H_5N_4$) -- powerful high explosive exceeding the force of TNT. A pale-white solid fine crystallized substance. The density of pressed tetryl is 1.58--1.68 grams per cubic centimeter, its flash point about 200°, and detonation rate for pressed tetryl with a density of 1.63 grams per cubic centimeter is 7,2000 meters per second. Its heat of explosion is 1,100 kilocalories per kilogram and the burst products are poisonous. Tetril noticeably begins to decompose when heated to 100--110°. It is insoluble in water, but highly soluble in benzene, aniline, and acetone. It is more sensitive than TNT to shock and friction. Tetryl is the product of processing dimethylaniline with nitrosulphuric acid. It began to be used in military affairs in the early 20th century. It is used in manufacture of fuse detonators, detonator caps, and detonating cords.

TEKhNIChESKAYa ATMOSFERA [Technical Atmosphere] -- unit of pressure measurement equal to 1 kilogram per square centimeter. The technical atmosphere (at) is accepted in technology as a unit of pressure. One at = 1 kg/cm^2 = 10 m water column = 735.6 mm of mercury. Two pressures are recognized: absolute (measured

from zero) and gauge (superatmospheric, manometric). A normal, or physical, atmosphere equals the pressure of a column of mercury 760mm high at t = 0° C, mercury density 13.5951 grams per square centimeter, and normal acceleration of gravity 980.665 centimeters per square second. It is designated atm and 1 atm = 1.033 kg/cm^2 x 1 at = 0.968 atm. The initial pressure of artillery system hydropneumatic recuperators, compressed air (gas) pressure in cylinders, and others are measured in atmospheres.

TEKhNIChESKAYa PODGOTOVKA STREL'BY [Technical Firing Preparation] -- preparation of pieces (mortars, combat vehicles), ammunition, and instruments for gunnery, /292 alignment and adjustment of sighting devices, determination and calculation of individual piece (mortar, combat vehicle) corrections, alignment, adjustment, and determination of individual corrections for observation instruments and fire control instruments.

TEKhNIChESKAYa POZITsIYa [Missile Service Area] -- sector of terrain in which a missile technical unit (subunit) deploys to carry out technical preparation of missiles for launch.

TEKhNIChESKAYa SKOROSTREL'NOST' [Technical Rate of Fire] -- maximum number of rounds in 1 minute fired by a given weapon, given the most advantageous piece loading and firing conditions.

TEKhNIChESKIY REZhIM OGNYa [Sustained Rate of Fire] -- maximum number of rounds established for a given piece for a specific time interval so as to preserve equipment life.

TOLUOL [Toluene] ($C_6H_5CH_3$) -- organic compound of aromatic hydrocarbons, foundation for the high explosive TNT. Colorless, transparent liquid with a distinctive odor derived from coking of coal or from petroleum products. It has a fusion temperature of 95° C, boiling point of 110.6° C, and a specific weight of 0.87 at t = 20°. Insoluble in water, it is used to obtain trotyl.

TOPLIVO GETEROGENNOYe RAKETNOYe [Heterogeneous Propellant] -- rocket propellant in the form of a mechanical mixture of separated fuel and oxidizer.

TOPLIVO GOMOGENNOYe (KOLLOIDAL'NOYe) TVERDOYe [Homogeneous Propellant] -- solid rocket propellant whose molecule simultaneously will comprise fuel and oxidizer. Single-base and multibase homogeneous propellants exist.

TOPLIVOZAPRAVSHchIK [Fuel Truck] -- see zapravshchik toplivom [fuel truck].

TOPLIVO KORROZIONNOAKTIVNOYe RAKETNOYe [Corrosive Propellant] -- rocket propellant with the ability to cause corrosion. Virtually all rocket propellant oxidizers are corrosive. Admixtures found in these propellants (inorganic water-soluble acids, organic acids, alkalis, free sulphur) are the active corrosive /293 ingredients.

TOPLIVO METALLIChESKOYe (RAKETNOYe) [Metallic Propellants] -- conditionally taken to mean propellant made up of a fuel of inorganic origin, including boron and silicon.

TOPLIVO NESAMOVOSPLAMENYaYuShchEYeSYa [Nonhypergolic Propellant] -- liquid rocket propellant requiring a special device for initial combustion of combustible mixture in order to ignite the propellent components.

TOPLIVO RAZDEL'NOY PODAChI RAKETNOYe [Bipropellant] -- liquid bipropellant comprising two main parts, fuel and oxidizer, stored aboard the rocket in separate tanks and supplied separately to the combustion chamber via appropriate piping and mixed only in the chamber itself. The system has two sets of pipes for supplying the bipropellant (one for fuel, the other for oxidizer). There are tripropellants as well, thus requiring three sets of piping. Water is the third component and is supplied to the combustion chamber to reduce the extraordinarily high combustion temperature. Bipropellants are used predominantly at the present time in liquid-propellant rocket engines.

TOPLIVO RAKETNOYe (DLYa RAKETNYKh DVIGATELEY) [Propellent (For Rocket Engines)] -- see raketnyye topliva [rocket propellants].

TOPLIVO SAMOVOSPLAMENYaYuShchEYeSYa [Hypergolic Propellant] -- liquid propellant whose components (oxidizer and fuel) upon contact (mixing) chemically react and ignite without any external source of ignition.

TOPLIVO TVERDOYe RAKETNOYe [Solid Propellant] -- rocket propellant in the form of a mixture of fuel and oxidizer in a solid aggregate state. Modern solid propellants are subdivided into two groups, ballistic (powder) and composite. The main substance in ballistic solid propellants are nitrocellulose and solvent (nitroglycerine, dinitrodiethylene glycol, and others). Along with basic substances (nitrocellulose and solvent), ballistic propellants include admixtures: retarders, stabilizers, flexibilizers, and the like. Ballistic powders are referred to /294 as nitroglycerine or diglycol, depending on solvent. Composite solid propellants are a thin mechanical fuel-oxidizer mixture. Rubber, organic resins, polyethylene, and other substances are used as fuels, while inorganic substances rich in hydrogen (chlorates, nitrates, perchlorides, and others) are used as oxidizers for these propellants.

TOPLIVO TOKSIChNOY RAKETNOYe [Toxic Propellant] -- rocket propellent comprising poisonous components capable of poisoning an organism. The majority of rocket propellants due to toxicity are more dangerous than conventional propellants.

TOPLIVO UGLEVODORODNOYe RAKETNOYe [Hydrocarbon Propellant] -- rocket propellant based on hydrocarbon fuel. Special devices are used to ignite these propellents.

TOPLIVO UNITARNOYe RAKETNOYe [Monopropellant] -- rocket propellant in which fuel and oxidizer are mixed beforehand or propellant comprising chemical substances with fuel and oxidizer simultaneously contained in its molecule. Monopropellants are subdivided into two classes, unitary monopropellant and unitary liquid propellant comprising two or more mutually-soluble liquid substances.

TOPLIVO KhIMIChESKIYe [Chemical Propellant] -- rocket propellant in which a chemical combustion reaction, with subsequent transformation of the propellant's chemical energy into mechanical energy, is used to obtain energy, i. e., the kinetic energy of a gas stream. The foundation of chemical energy is the electrical link between an atom's electron shell and nucleus.

TOPOGEODEZIChESKAYa PODGOTOVKA [Topogeodetic Preparation] -- creation of a topogeodetic control network in a single system of coordinates and topogeodetic site survey of launch and fire positions, obervation posts, and artillery reconnaissance subunit posts. A topogeodetic site survey includes determination of

the coordinates and elevations and orientation of launchers (pieces, instruments). It can be conducted based on geodesy or from a map (aerial photographs). /295

TOPOGEODEZICHESKOYe OBESPECHENIYe [Topogeodetic Support] -- type of troop unit support by providing topographic and special maps, initial geodetic and gravimetric data, and other topographic documents.

TOPOGRAFICHESKIYe INSTRUMENTY [Topographical Instruments] -- measuring instruments used to accomplish topographic operations (theodolite, telescopic alidade, topographic drawing board, surveyor's level, measuring tape, and others). In some cases, aiming circles and battery commander's OP telescopes are used.

TOPOGRAFICHESKOYe OBESPECHENIYe [Topographic Support] -- system of measures to support troop combat operations by providing requisite data and materials for study, evaluation, and use of terrain in the interests of combat mission accomplishment. Main tasks include: creation of topographic and special maps and their uninterrupted supply to troop units; terrain topographic reconnaissance; development of geodetic control surveys and preparation of initial geodetic data for delivering artillery fire and launching missiles; production of photo maps and other photographic documents.

TORMOZHENNYY OTKAT [Retarded Recoil] -- motion of piece recoil mechanisms considering (where possible) all forces acting upon recoil mechanisms during firing.

TORPEDA [Torpedo] -- self-propelled and self-guided underwater cigar-shaped projectile for destruction of the submerged portion of an enemy vessel from submerged and surface vessels, from torpedo-equipped aircraft, helicopter, and coastal mounts. Guided aerial torpedoes for employment against submerged submarines are in the inventory of foreign armies. A torpedo can carry conventional or thermonuclear explosives. Russian inventor I. F. Aleksandrovskiy designed the world's first torpedo.

TORSION [Torsion Bar] -- long circular rod operating on torsion used in artillery system torsion springs. A torsion bar, twisting when the articulated semiaxle displaces upwards or downwards, plays the role of a spring in a /296

torsion spring. A torsion bar has thickened ends with slots, one end rigidly attached to the lower carriage and the articulated semiaxle with wheel attached to the other.

TOChKA VSTREChI [Point of Impact] -- point in which a projectile (destructive element) engages a target (obstacle) or transfers from one medium to another.

TOChKA VYLETA SNARYaDA [Projectile Point of Origin] (O) -- 1. Center of a piece's muzzle face. 2. Position of a projectile's center of gravity at the instant of departure.

TOChKA VYSTRELA [Present Position] -- point at which a moving target will be located at the moment a shot is fired.

TOChKA NAVODKI [Aiming Point] -- point (local object) selected for sighting (laying) a piece. It must clearly be visible to the gun layer (gun-layers).

TOChKA PADENIYa SNARYaDA [Projectile Impact Point] -- trajectory's point of intersection with the horizontal at the muzzle.

TOChNOST' STREL'BY [Firing Accuracy] -- probable evaluation of possible positions of projectile (mortar shell) impact points (bursts) relative to the aiming point. It is characterized by range, vertical, and deflection probable errors.

TRAYeKTORIYa (ARTILLERIYSKOGO SNARYaDA) [Trajectory (Of an Artillery Projectile)] -- curved line in space from the point of origin to the impact point (of a burst) described during flight by the center of gravity of a projectile under the influence of air resistance and gravity. The form of a trajectory will depend on the projectile's quadrant angle of departure. The trajectory of a projectile in a vacuum will have the form of a parabola (a symmetrical curve). A projectile in a vacuum is subjected only to gravity, with air resistance absent. Apex is the term applied to the highest point of a trajectory above the horizon and will divide it into two legs, ascending and descending. The ascending branch is greater and flatter, while the descending branch is smaller and more curved.

TRAYeKTORIYa BALLISTIChESKOY RAKETY [Ballistic Rocket Trajectory] -- curve depicting the geometric location of the points of a rocket's center of mass during its flight from moment of launch until target engagement. Here, the motion of the rocket's center of mass is looked upon as the motion of a mass point with a mass equal to the rocket's mass to which all the forces acting upon the rocket are applied. It can be divided into the following legs: launch, insertion, /297 inactive, and stabilization. However, following established tradition, a ballistic rocket's trajectory usually will be divided into two legs. The active leg is the portion of active flight in which rocket acceleration will occur with the aid of the engine, i. e., the leg from the launch to the point at which the engine shuts down (approximately 5--10% of the trajectory's total length). The inactive leg is that section of the trajectory from the point at which the engine shuts down until impact. The active leg of the trajectory in turn will be divided into smaller legs, vertical climb and inclined climb. Most ballistic rockets are launched vertically, so, initially, the active leg is a vertical line. Rocket design and role determine their trajectory.

TRAYeKTORIYa POLETA PROGRAMMNAYa (ZADANNAYa) [Programmed (Assigned) Flight Trajectory] -- a guided missile will move along a predetermined trajectory. It is impossible to change the trajectory during flight. This method of missile guidance is called programmed guidance, while the corresponding flight trajectory is called a programmed trajectory.

TRAKT OKhLAZhDAYuShchIY [Cooling Passage] -- interhousing space in a liquid-propellant rocket engine between the exterior and interior shells of the combustion chamber and the nozzle.

TRASSER [Tracer] -- device which leaves a visible trace in the form of a colored strip as a projectile flies through the air on a trajectory. The trace is a flame at night or smoke during the day. Trajectory visibility considerably facilitates registration and target designation. A tracer is a part of fuse's bottom. A tracer is housed in the base of a projectile with a nose fuse. At present, beam-action tracer compound is being used widely, i. e., they ignite from the flame of a powder artillery charge at the moment of firing.

TRASSIRUYuShchIYe SNARYaDY [Tracer Projectiles] -- artillery projectiles

employed to facilitate registration and target designation of moving aerial and ground-based targets. Tracer projectiles are equipped with a base fuse with tracer compound or a special tracer device housed in the base of the projectile. Tracer projectiles are employed mainly in antiaircraft and antitank artillery. /298 During flight, a tracer projectile leaves a visible fire or smoke trace.

TRASSIRUYuShchIYe SOSTAVY [Tracer Compositions] -- mechanical mixtures of fuel substances (aluminum or magnesium), dyes, and oxidizer (barium nitrate or strontium nitrate). Tracer composition components are as follows: white tracer -- magnesium (fuel) 36%, barium nitrate (oxidizer) 49%, resin (binder) 15%; red tracer -- magnesium (fuel) 30%, strontium nitrate (oxidizer) 60%, and resin (binder) 10%. Tracer compositions are used to charge tracers in tracer, tracer-fragmentation, and armor-piercing-tracer artillery projectiles, as well as in manufacture of tracer, armor-piercing-tracer, ranging-adjustment, and other cartridges. Tracer composition flame and smoke are of various colors, such as white, red, yellow, blue, green, and so forth. Tracer compositions, burning, leave a flame or smoke trail behind them, providing the possibility to adjust fire.

TRIANGULYaTsIYa [Triangulation] -- basic method of constructing a network of site survey planning points on the surface of the earth to create (surveying) topographic maps of all scales, establishment of a single system of geodetic coordinates, determination of the difference in elevation between two control points, and other geodetic measurements on the terrain.

TRIMMERY [Trim Tabs] -- additional surfaces on missile control surfaces with less surface than the control surfaces and taking upon themselves a portion of the lift.

TRINITROREZORTsINAT (STIFNAT SVINTsA, TNRS) [Trinitroresorcinol (Lead Styphnate, Teneres)] -- explosive initiator, lead salt of styphanic acid (trinitroresorcinal). Solid yellow fine crystal substance with a specific weight of 3.08 and flash point of about 270°, i. e., higher than fulminate and lower than lead azide. Its detonation rate is 5,000 meters per second and it is less sensitive to shock than is lead azide. Trinitroresorcinal is barely hygroscopic, insoluble in water, and decomposes under the action of sunlight and acids. It does not react with metals and is used in place of fulminate in percussion compositions.

TROPOPAUZA [Tropopause] -- transition layer in the atmosphere between the troposphere and stratosphere. Its thickness fluctuates from several hundred meters to several kilometers. The tropopause is located at an altitude of /299 16--18 kilometers over the Equator and in the subtropics and at an altitude of 9--12 kilometers in moderate and polar latitudes.

TROPOSFERA [Troposphere] -- lower layer of the atmosphere extending in moderate and polar latitudes to an altitude of 8--12 kilometers. The stratosphere (up to an altitude of 40 kilometers), mesosphere (from 40 to 80 kilometers), ionosphere (above 80 kilometers), and exosphere are located above the troposphere. The latter is separated from the stratosphere by a transient layer, the tropopause. The thickness of the troposphere layer will depend on the longitude and time of year. The troposphere comprises 3/4 of the entire mass of atmospheric air. All weather phenomena will depend on processes occurring in the troposphere. See stratosfera [stratosphere] and ionosfera [ionosphere].

TROTIL [TRINITROTOLUOL] [Trotyl (Trinitrotolulene)] $(C_7H_5(NO_2)_3$ -- aromatic series nitrogen compound, powerful high explosive derived from nitration of toluol ($C_6H_5CH_3$) with a mixture of nitric and sulfuric acid. A solid light-yellow sour crystal with a density of 1.663 grams per cubic centimeter. The density of cast TNT is 1.56--1.60 grams per cubic centimeter and is up to 1.61 for pressed TNT. Its fusing temperature is 81°, hardening temperature about 80°, and flash point 300°. It will burn with a smoking flame in open air and converts to detonation in a closed casing. Pure TNT is a chemically-stable compound which does not react with metals and is relatively less dangerous to handle than other explosives. The detonation rate of TNT at a density of 1.6 reaches 6,700 meters per second. Its explosion temperature is 970 kilocalories per kilogram. TNT is a basic explosive for charging projectiles and mortar shells, service rockets and rocket projectiles, naval mines, torpedoes, and aviation bombs, as well as for manufacture of ammotols, demolition charges, in alloys with other explosives, for combination with the fissionable material during explosion of atomic and thermonuclear bombs, rockets, and atomic artillery projectiles.

TROTILOVYY EKVIVALENT YaDERNOGO BOYePRIPASA [TNT Equivalent of Nuclear Munitions] -- amount of TNT whose explosive energy is equal to the energy which

would be released in the detonation of a given nuclear charge. The TNT equivalent may expressed in tons, thousands of tons (kilotons), or in millions of tons (megatons).

TRUBKA (VZRYVATEL') DVOYNOGO DEYSTVIYa [Combination Fuse] -- time or time-impact fuse. A combination fuse is equipped with a timer and striker. The latter will /300 activate the charge by hitting the barrier in the event the timer fails to operate or if the fuse setting turns out to be incorrect.

TUMBA [Pedestal] -- fixed foundation of a collapsible artillery mounting. It is a complete cone cut off at the top with a flange at the bottom. A pedestal has a pintle inside replacing the turntable.

TUREL' [Ring Mount] -- type of rotatable mounting or turret for mounting machine guns and small-caliber guns on military aircraft, small vessels, patrol boats, tanks, self-propelled antiaircraft mounts, and armored personnel carriers allowing them to rotate in the horizontal and vertical planes.

TRUBONASOSNYY AGREGAT (TNA) [Turbopump Assembly] -- assembly comprising a turbine and two centrifugal pumps (one to supply fuel, the other to supply oxidizer). A TNA will feed propellant components to a rocket engine combustion chamber and is used in long-range liquid-propellant rocket engines.

TURBOREAKTIVNAYa RAKETA [Turbojet Rocket] -- rocket whose stabilization in the trajectory is achieved by rotation around its longitudinal axis. Rotation is created by a nozzle unit whose axes are directed towards the rocket's axis. The greater the deflection angle of the nozzle axis, the greater the angular velocity that can be imparted to the rocket. Given sufficient rotational velocity, a rocket will become stable, similar to an artillery projectile. Such rockets do not have empennage for stabilization.

TURBOREAKTIVNYY DVIGATEL' (TRD) [Turbojet Engine] -- gas-turbine air-breathing engine widely used for subsonic and supersonic flight velocities. Basic TRD parts include a compressor, combustion chamber, gas turbine, and jet nozzle. A fuel like kerosene is used as propellant in a TRD. The air stream will pass through a diffusor to the compressor and is compressed by a factor of several

times, then is supplied to the combustion chamber, into which liquid fuel is squirted. The gas turbine converts part of the energy formed in the combustion chamber into mechanical energy of rotation of a common turbine-compressor shaft. Passing through the turbine, high-velocity gases flow into the atmosphere via /301 a jet nozzle, creating engine thrust. Turbine rotational velocity reaches 15,000--20,000 rpm and more. TRD of varied design with thrust ranging from 2--6 tons and more are in use at the present time.

TURBOREAKTIVNYY SNARYaD [Turbojet Projectile] -- rocket projectile whose stabilization in flight is accomplished by rotation around its own axis. The projectile does not have a stabilizer.

TURBULIZATOR [Vortex Generator] -- swirler, special device in a ram-jet engine (PVRD) serving to provide better propellant and air mixing.

TEN [Pentrite] -- high explosive of increased power (more powerful by a factor of about 1.5 than TNT). It is a crystal substance insoluble in water. Pentrite will flow when heated and is flammable. It is used to manufacture detonators, detonator cords, and to charge detonator caps. Pentrite is the most sensitive of all types of high explosives to mechanical effects.

TYSYaChNAYa [Mil] -- unit of measurement of angles in artillery equal to 1/6,000th of a circle. Angles expressed in mils are written and pronounced as follows:

Angle in Mils	Pronounced	Written
1	zero-zero-one	0-01
10	zero-ten	0-10
35	zero-thirty five	0-35
100	one-zero	1-00
1125	eleven-twenty five	11-25

Scales with mil graduations are affixed to all artillery measuring and laying instruments. The system of measuring angles in mils is convenient since it facilitates easy and rapid conversion from angular units to linear units, and vice

versa, because the length of the arc corresponding to the angle in one mil equals 1/1,000th of the range, distance.

TYaGOVOORUZhENNOST' LETATEL'NOGO APPARATA [Airborne Platform Thrust-to-Weight Ratio] -- ratio of an engine's thrust to the airborne platform's weight. This ratio indicates how many kilograms of thrust are required per kilogram of weight and is the rocket engine's thrust characteristic.

TYaZhELAYa ARTILLERIYa [Heavy Artillery] -- shipboard artillery with a caliber of 203mm or more and surface-to-surface artillery with a caliber of 150mm or more. Heavy artillery is subdivided by combat role and location as field and coastal. Heavy field artillery is intended to combat enemy artillery and to destroy substantial defensive structures. Heavy coastal artillery is employed to protect naval bases and important coastal installations and sectors against enemy attack from the sea.

TYaZhELAYa VODA [Heavy Water] -- variety of water in which conventional hydrogen is replaced by deuterium or tritium.

TYaZhELYY VODOROD H^2 (DEYTERIY) [Heavy Hydrogen H^2 (Deuterium)] -- heavy isotope of hydrogen (deuterium). An atom of hydrogen (H) will comprise a nucleus and one electron. Isotopes of hydrogen atoms possess an identical electrical charge of the nucleus, but different mass number. Heavy hydrogen has a mass number of 2. There is one proton in the atomic nucleus of light hydrogen, one proton and one neutron in heavy hydrogen (deuterium), and one proton and two neutrons in superheavy hydrogen (tritium). Hydrogen isotopes have different nuclear properties. There will be an insignificant amount of heavy hydrogen (deuterium) in naturally occurring water. Heavy hydrogen (deuterium) is used in military affairs as a thermonuclear fuel in thermonuclear (hydrogen) bombs, a neutron retarder in atomic reactors, as well as for other scientific and research purposes.

UBOYNOST' OSKOLKA [Fragment Lethality] -- ability of a fragment to penetrate an obstacle of specific thickness. Lethal fragments are those weighing at least 5 grams with a kinetic energy at the moment of impact of at least 10 kilograms. A fragment's penetrating ability will depend on its form, weight, and mainly velocity.

UVELIChENIYe OPTIChESKOGO PRIBORA (KRATNOST') [Optical Instrument Magnification (Enlargement)] -- ratio of the overall dimensions of the image of an object observed through an optical instrument to the overall dimensions of that same object examined with the naked eye, or the ratio of the diameters of the entrance and exit pupils of an optical instrument, since it equals the ratio of the focal lengths of the lens and ocular of this instrument, which, in turn, equals the instrument's magnification.

UGLOMER [Azimuth Scale] -- instrument for measurement of horizontal angles used for firing from machine guns, mortars, and pieces.

UGOL ATAKI [Angle of Attack] (α) -- angle between the longitudinal axis of a rocket and the bearing of the rocket's velocity vector. An angle of attack may be positive and negative.

UGOL BROSANIYa [Quadrant Ang. ; of Departure] (θ_0) -- angle formed by the initial velocity vector (line of departure) with the piece (launcher) horizontal at the muzzle.

UGOL VERTIKAL'NOGO OBSTRELA [Firing Elevation] -- angle formed by the extreme positions of a piece's (launcher's) tipping parts on the carriage or by another mount (combat vehicle).

UGOL VETRA [Wind-Fire Angle] -- 1. Difference between directional angles /304 (aiming circles) of a target and ballistic wind (a_w). 2. Difference between target course azimuth and ballistic wind azimuth ψ_2 (for antiaircraft artillery). 3. Difference between the ballistic wind azimuth and target azimuth ψ_2 (for antiaircraft artillery).

UGOL VOZVYShENIYa [Quadrant Elevation] (φ) -- angle composed by the axis of the bore of a laid piece (line of elevation) with the piece horizontal at the muzzle measured from 0° to 90°.

UGOL VSTREChI [Angle of Impact] -- angle between the line of impact and the plane of the tangent to the surface of the target at the same point. It is measured from 0° to 90°.

UGOL VYLETA [Angle of Jump] (γ) -- angle between the bearings of the bore axis prior to and following the shot (angle being the difference between the elevation and quadrant angle of departure $\gamma = \theta_0 - \varphi$).

UGOL GORIZONTAL'NOGO NAVEDENIYa ORUDIYa [Angle of Deflection] -- angle in the horizontal plane formed by the average and the extreme (right or left) barrel positions on the carriage or on another mount when the piece is positioned on a horizontal supporting foundation.

UGOL GORIZONTAL'NOGO OBSTRELA [Maximum Traverse] -- arithmetic sum of piece positive and negative angles of deflection formed in a given piece at one spot in its location.

UGOL GORIZONTAL'NOY NAVODKI [Firing Angle] (ψ) -- angle between the target plane and the piece aiming point plane.

UGOL DERIVATsII [Drift] (Z) -- angle between the piece-target line and the plane of fire.

UGOL ZASEChKI [Target Angle] (γ) -- angle between the observer-target planes of two observation posts. It is measured from 0° to 90°.

UGOL KRENA [Angle of Bank] (ψ) -- angle characterizing the rotation of a rocket around its longitudinal axis, i. e., the angle formed between the vertical plane and the plane of stabilization.

UGOL MESTA RAZRYVA [Site of Burst] -- angle between the piece horizontal at the muzzle and the piece-target line.

UGOL MESTA (TOChKI) [Angle of Site] -- angle between the piece or instrument horizontal at the muzzle and the line connecting the piece or instrument with an observed point.

UGOL MESTA TsELI [Angle of Site] (ε) -- angle between the piece horizontal at the muzzle and the gun-target line ($\varepsilon = \varphi - \alpha$). /305

UGOL NABLYuDENIYa MESTA RAZRYVA [Burst Angle of Site from OP] -- angle between the observation instrument plane (OP) and a line connecting the intrument (OP) with the burst.

UGOL NABLYuDENIYa MESTA TsELI [Target Angle of Site from OP] -- angle between the observation instrument (OP) and the observer-target line.

UGOL NAKLONA KASATEL'NOY [Inclination of the Trajectory] -- angle composing the tanget to the trajectory at the point being examined and the piece horizontal at the muzzle.

UGOL NUTATsII [Angle of Yaw] (δ) -- angle composed by the axis of a projectile with the tangent to the trajectory at the point being examined.

UGOL OBSTRELA [Effective Field of Fire] -- horizontal angle within the limits of which a piece (turret) can deliver fire (without changing the position of the trail, carriage, vehicle, and so on).

UGOL ORIENTATsII [Attitude Angle] -- angle between the axis of a rocket (projectile) and launcher axis.

UGOL PADENIYa [Angle of Fall] (θ) -- angle between the line of fall and piece horizontal at the muzzle.

UGOL PIKIROVANIYa (KABRIROVANIYa) [Dive (Pitch-Up) Angle] -- angle between the horizon and target course in the vertical plane.

UGOL PRETsESSII [Angle of Orientation] (γ) -- angle composed by the plane of the angle of yaw with the vertical plane passing through the tangent to the trajectory at the point being examined.

UGOL PRI TsELI [Target Offset] (ω) -- angle between the target plane and observer-target plane.

UGOL PRITsELIVANIYa [Angle of Elevation] (υ) -- angle in the vertical plane between the gun-target line and the line of elevation (launch). Theoretically, elevation is measured from 0° to 180°, while, practically, in mountainous terrain it ranges from 0° to a magnitude exceeding 90°.

UGOL RAZLETA [Angle of Opening] (2ψ) -- angle between the tangent to the trajectory of two bullets or fragments (destructive elements) of a projectile separated to the extreme at the moment of its burst.

UGOL RASSOGLASOVANIYa [Error Angle] -- angle between seeker axis or an assigned bearing and the missile-target line.

UGOL SBLIZhENIYa MERIDIANOV [Grid Declination] (γ) -- angle (sharp) /306 between a geographical meridian and the positive bearing of the X-axis of a Gauss-Krueger grid.

UGOL SKOL'ZhENIYa [Slip Angle] -- angle formed by the bearing of the velocity vector of a rocket's center of mass and the vertical plane of symmetry.

UGOL SNIZhENIYa (SKLONENIYa) [Descent (Depression) Angle] -- negative elevation; angle formed by the line of elevation and piece horizontal at the muzzle in a case where the line of elevation passes below the piece horizontal at the muzzle.

UGOL TANGAZhA (ϑ), RYSKANIYa (ψ), I KRENA (γ) RAKETY (TANGAZh, RYSKANIYe I KREN RAKETY) [Rocket Angle of Pitch ϑ, Yaw ψ, and Bank γ (Rocket Pitch, Yaw, and Bank)] -- angles characterizing the change in rocket (rocket projectile) position in space under the influence of forces and torques during flight. Angle of pitch (pitch) is rotation of the missile around the horizontal transverse axis. Yaw angle (yaw) is rotation of a rocket around the vertical transverse axis. Bank angle (bank) is the rotation of a rocket around the longitudinal axis.

UGOL UKRYTIYa [Angle of Crest Clearance] (α) -- angle at a piece formed

by the piece horizontal at the muzzle and the bearing to the crest of the piece shelter.

UDARNAYa VOLNA [Shock Wave] -- region of strong compression of the medium (air, ground, water) propogated at extremely high velocity in all directions from the center of the burst.

UDARNAYa VOLNA YaDERNOGO VZRYVA [Nuclear Burst Shock Wave] -- one damaging factor from a nuclear burst. A nuclear burst shock wave causes personnel casualties and destruction of equipment and various structures. Its casualty-producing and destructive capability is determined by overpressure and propelling action.

UDARNAYa STREL'BA [Percussion Fire] -- fire with impact projectiles which detonate with a delay or instantaneously upon encountering an obstacle. Firing armor-piercing, cement-piercing, high-explosive, high-explosive-fragmentation, fragmentation, and other projectiles falls in this category.

UDARNIK [Firing Pin Assembly; Percussion Plunger] -- 1. Component of the breechblock striker mechanism of firearms. The firing pin strikes the cartridge's cap or primer cup to ignite the charge when firing. 2. Artillery fuse component operating as a result of the reaction of an obstacle or the force of inertia /307 and intended to ignite an igniter cap, causing the fuse to trip and the projectile to explode.

UDARNYYe SNARYaDY [Percussion Projectiles] -- projectiles that explode upon impact with an obstacle. This category includes armor-piercing, high-explosive, high-explosive-fragmentation, cement-piercing, and others.

UDEL'NAYa TYaGA [Specific Thrust] -- ratio of the thrust of an engine to the propellant flow rate. It is a qualitative indicator for a rocket engine characterizing both its economy of operation and the energy potential of a given propellant. The higher the specific thrust, the less propellant that is expended in a unit of time for creation of the requisite thrust. Specific thrust increases with altitude and reaches its maximum value in a vacuum. Specific thrust in a vacuum is 10--20% greater than on the ground and will depend on exhaust gas velocity, which, in turn, is determined by propellant quality and special engine design features.

UDEL'NYY VES DVIGATELYa [Engine Specific Weight] -- ratio of the weight of an engine structure to the thrust it creates and characterizes the degree of engine design sophistication. It ranges from 0.02--0.05 kilograms per kilogram.

UDEL'NYY IMPUL'S [Specific Impulse] -- ratio of the thrust of a solid-propellant rocket engine to propellent flow rate. See udel'naya tyaga [specific thrust].

UDEL'NYY OB"YeM POROKhOVYKh GASOV [Powder Gas Specific Volume] (ω_1) -- volume occupied by the gases from 1 kilogram of powder at 0° C and 760mm of mercury (water--steam).

UDEL'NYY RASKhOD TOPLIVA [Propellent Specific Consumption] -- amount by weight of propellant per unit of engine thrust per second or per hour. Propellant specific consumption is on a par with udel'naya tyaga [specific thrust] (see) as an important engine characteristic. The lower the propellant specific consumption, the longer the rocket's range.

UDLINENIYe RAKETY [Rocket Fineness] -- magnitude characterizing a rocket's form; ratio of a rocket's length (or a portion of it) to the diameter. Short-range rockets have the greatest fineness (8--15), while long-range rockets have the smallest fineness (4--8).

UZEL [Knot] -- unit of ship speed equal to one nautical mile per hour (1.852 kilometers per hour), or 0.514 meters per second.

UNIVERSAL'NAYa ARTILLERIYSKAYa USTANOVKA [Dual-Purpose Artillery Mount] /308 piece that can deliver fire against maritime, coastal, and aerial targets. Preference is being placed in all the world's fleets lately on dual-purpose automatic artillery.

UNITARNOYe TOPLIVO (REAKTIVNYKh DVIGATELEY) [Monopropellant (For Rocket Engines)] - homogeneous propellant comprising fuel and oxidizer simultaneously. It burns due to its own oxygen and does not require access to hydrogen from without. Rocket engine solid propellants fall in this category, with powder mainly used in this capacity at present.

UNITARNYY PATRON [Quick Firing Fixed Round] -- artillery round in which the projectile with fuse, powder charge with igniter, flame inhibitor, retarder, and a means for detonating the charge (primer cup or cap) are connected with the aid of a casing into a complete unit. They are employed in quick-fire fixed round pieces (fixed ammunition loading). The piece is loaded in one drill. This method is used for modern pieces.

UPLOTNITEL'NYYe USTROYSTVA [Sealing Devices] -- 1. Seals and gaskets in areas where pistons exit to keep liquids in the cylinders of retarded recoils and hydropneumatic recuperators. They comprise rings, seals, and packings held down by rings, springs, and nuts. 2. Device on a turbopump assembly shaft to prevent oxidizer leakage into the fuel pump (or fuel to oxidizer) comprising individual jackets and impellers (disc with radial apertures). Rotating along with the shaft, it creates an hydraulic lock in front of the sealing device.

UPRAVLENIYe OGNEM [Fire Control] -- aggregate of organizational measures and activities performed by commanders and staffs for effective employment of fire to destroy the enemy under the specific conditions of the situation. Fire control includes use of target reconnaissance data, transmission of target designations, assignment of fire missions, determination of initial settings for delivering fire, call for fire (or cease fire), adjustment of fire, maneuver with fire, and checking the results of firing.

UPRAVLENIYe POLETOM LETATEL'NOGO APPARATA [Airborne Platform Flight Control] -- change in the direction of motion of an object for the purpose of accomplishing an assigned mission. /309

UPRAVLENIYe RAKETOY [Missile Control] -- insuring the motion of a missile along a specific trajectory to increase accuracy in hitting the target. It will consist of missile guidance and stabilization. Guiding the missile to the target involves determination of the most advantageous trajectory for target destruction and generation of the requisite values of missile motion parameters which correspond to this trajectory. Stabilization involves insuring stable missile motion along the trajectory determined during the guidance process by acting upon stabilizing and control devices. A missile can be controlled during its entire flight trajectory or only on a specific leg of it. Various types of control systems are used depending

on missile role, target character, and launch range. These systems can be divided into four groups: autonomous, telecontrol (remote control), homing, and combined.

UPRAVLYaYeMYYe RAKETY [Guided Missiles] -- missiles having special control equipment making it possible to guide the missile to the target and to stabilize its flight along a given trajectory. Guided missiles include the following categories: ground-based, launched from the ground; maritime, launched from surface and submerged vessels; aviation, launched from aircraft and other airborne platforms; surface-to-air, launched by PVO troop subunits against aerial targets; antitank, launched against tanks and other armored targets. Guided missiles are categorized by design, aerodynamic characteristics, and control system operating principle. They are subdivided by control system operating principle as those with autonomous, remote, homing, and combined control.

UPRAVLYaYeMYYe REAKTIVNYYe SNARYaDY [Guided Rocket Projectiles] (Foreign) -- rocket projectiles with equipment for trajectory flight control. Guided rocket projectiles (URS) are subdivided by body design into ballistic projectiles, aerodynamic projectiles, and cruise missiles. They are categorized by role as naval, surface-to-surface (NURS), antiaircraft (ZURS), and aviation rocket projectiles /310 (AURS). URS are categorized by control and guidance principle as autonomous control, telecontrol, homing, and combined systems and by engine and propellant used as powder, liquid, and air-breathing projectiles. Tactical and strategic URS exist. URS are employed by the Ground Forces, Navy, and Air Force.

UPREDITEL'NOYe VREMYa [Projectile Flight Time] -- time interval between the initial moment and computed moment of projectile (destructive element) impact with the target.

UPREZhDENNAYa LINIYa TsELI [Line of Future Position] -- straight line connecting the piece with the future position.

UPREZhDENNAYa TOChKA [Future Position] -- point at which, according to calculations, a projectile (destructive element) must engage a moving target.

UPREZhDENNYY UGOL PRITsELIVANIYa [Future Angle of Elevation] -- angle in the vertical plane between the line of future position and the line of elevation.

UPRZAZENFORM [Directorate of the Director for Antiaircraft Battery Formation] -- created in 1918 from the "Steel Batallion" at the Putilov Plant for reestablishment and formation of antiaircraft batteries. In 1921, this directorate was reorganized as the Directorate of the Assistant Chief of RKKA Artillery for Antiaircraft Artillery. In subsequent years, several measures were taken both to reorganize the directorate and to organize antiaircraft artillery. By order of the Republic's Revvoyensovet [Revolutionary Military Council] dated 30 August 1923, the title "antiaircraft [zenitnaya] artillery" was promulgated to replace "antiaircraft [protivosamoletnaya] artillery".

UPRUGIY LAFET [Carriage with Recoil] -- carriage with barrel recoil that has counterrecoil mechanisms. The barrel of modern pieces is linked flexibly rather than rigidly to the carriage, i. e., with the aid of counterrecoil mechanisms, which take care of barrel retardation during recoil and counterrecoil to the initial position. Action of the shot is diminished sharply thanks to barrel counterrecoil. The carriage during a shot is subjected to the action only of /311 the force of the counterrecoil resistance, which is less by a factor of 30--40 than the recoil force. For example, the highest value of the recoil force of the 85mm divisional gun is 145 tons, while the force of the recoil resistance totals only about 5 tons.

URAVNOVESHIVAYuShchIY MEKhANIZM [Equilibrator] -- mechanism equallizing a piece's tipping parts. In modern pieces having relatively low height, long barrels, and high firing elevation, the equilibrator balances the tipping part relative to the cradle trunnion axis. Spring and pneumatic equilibrators exist.

USILENNAYa KRYShKA [Reinforced Closing Plug] -- device hermetically sealing a cartridge plug. It is removed prior to loading.

USILITEL' SISTEMY UPRAVLENIYa LETATEL'NOGO APPARATA [Airborne Platform Control System Amplifier] -- device increasing the power of a signal from a master to a slave using energy from an outside source. Electronic, magnetic, semiconductor, mechanical, and other amplifiers are used in airborne platform control systems.

USTANOVKA PRITsELA [Sight Setting] (h) -- setting a sight with sight graduations (scales) to impart angle of elevation to a piece.

USTANOVKI -- DERZhATELI -- KRONShTEYNY [Fittings -- Holders -- Brackets] -- for holding a rocket and its initial orientation prior to launch. They are used for launching unguided aviation rockets.

USTANOVKI DLYa PORAZhENIYa [Settings For Effect] -- settings for firing for effect arrived at from the results of registration or check firing or computed without registration.

USTANOVShchIK [Erector] -- special hoist (machine) for placing rockets on launch pads in launch position and their transportation within the unit's boundaries.

USTOYChIVOST' ARTILLERIYSKOGO ORUDIYa NA KhODU [Artillery Piece Stability in Transit] -- capability of an artillery piece moving over broken terrain and off roads to resist tipping forces. It is categorized as longitudinal, transverse, and lateral stablity and will depend on the system, location of the center of gravity, length and width of the undercarriage, turning radius, speed, and road conditions.

USTOYChIVOST' RAKETY V POLETE [Rocket Stability in Flight] -- capability /312 of a rocket to return to initial position following cessation of the action of any kind of force causing it to deviate. It is an important factor in precise accuracy in hitting a target. It is a combination of the stability of the center of gravity and angular stabilization.

USTROYSTVO REVERSIVNOYe [Reverser Assembly] -- device used to turn a jet stream to create reverse thrust of a solid-propellant rocket engine. They are of the most varied design.

UChEBNYY ARTILLERIYSKIY SNARYaD [Artillery Training Projectile] -- dummy projectile used to train a piece crew in ammunition loading, supply, and handling, as well as for study of ammunition.

UChEBNYY VYSTREL [Training Round] -- dummy elements of a service round, i. e., simulation of a service round. It is used to train piece crews to handle ammunition and to study it.

FAZOVAYa SISTEMA OPREDELENIYa TRAYeKTORII RAKETY [Phase System of Rocket Trajectory Determination] -- complex of radiotechnical instruments for determination of the location of a rocket in a trajectory using the method of comparing the phase of diverse signals received from a ground-based transmitter and from a transponder aboard the rocket. Comparison of the phase of signals received from the ground station and from the transponder aboard the rocket makes it possible to determine the range from the receiving radar station to the rocket since the phase shift of the signal is proportional to the path along which the rocket is moving. This system usually includes at least three ground transceiver stations which independently measure the range to the rocket. The position of the rocket in the trajectory at every given moment is determined by the intersection of the spheroids constructed from each station.

Cinetheodolites (at least three in each area installed a considerable distance from each other) are used most often to determine a rocket's flight trajectory in the launch area and in the impact area, with the phase system used in the impact area only during poor visibility.

A rocket's entire flight trajectory is determined from the data obtained from cinetheodolite photos and radar observations in the initial and final legs of the trajectory.

FAZOVYY DETEKTOR [Phase Detector] -- device whose voltage at output is proportional to the difference in two input electrical signals. They are used /314 mainly in rocket projectile and rocket passive seeker systems.

FAKEL ZAZhIGANIYa [Pilot Flame] -- ignition flame created by a special device in a liquid-propellant rocket engine for reliable ignition of the combustible mixture and maintenance of constant burning in the combustion chamber during the intial operating period.

FAKEL PUSKOVOY [Ignition Flame] -- see above entry.

FIKTIVNYY REPER [Fictitious Check Point] -- center of a group of bursts

whose coordinates are determined based on intersections from combination observation posts or by other means.

FLANGOVYY OGON' [Flank Fire] -- fire from pieces or small-arms weapons directed towards the target's flank, i. e., along the target's front. Flank fire is the most productive, especially against attacking enemy combat formations.

FITING [Fitting] -- rocket piping component connecting oil pipes where they turn and branch.

FLATTER [Flutter] -- self-excited bending and twisting oscillations of the empennage (wings) of rockets flying with a speed exceeding critical velocity.

FLEGMATIZATORY [Retarders] -- admixtures (camphors, vaseline, paraffin, castor oil, water, and others) reducing the sensitivity of explosives to external effects. They possess the property to envelop individual particles of explosive, as if creating a protective shell, which reduces their sensitivity to external effects. They are used in artillery to reduce the sensitivity of explosives to shock. Thus, for example, armor-piercing projectiles are charged with retarded TNT to prevent premature detonation upon impact with armor.

FORKAMERA [Precombustion Chamber] -- chamber for preliminary propellant component mixing and burning; a starting, igniting chamber. A precombustion chamber is located ahead of the combustion chamber. It is used in liquid-propellant rocket engines with a spherical combustion chamber and in several air-breathing engines.

FORMULYaR ARTILLERIYSKOGO ORUDIYa [Artillery Piece Book] -- special book, something like the piece's passport. It will contain the piece's tactical and technical specifications and all plant data concerning manufacture and testing /315 of the piece through proving ground firing. While the piece is in service in troop units, the number of rounds fired from it, with notation of projectiles and charges as well as damage and malfunctions detected during firing, will be entered in it. In field artillery, a record also is kept of the distance the piece has travelled.

FORSUNKA [Injector] -- device for spraying liquid propellant components reaching the combustion chamber of liquid-propellant rocket engines. The fuel and oxidizer sprayed in the combustion chamber form a homogeneous vaporous mixture for burning. There are two basic types of injectors categorized by spraying method, spray and swirl. Fuel and oxidizer injectors are installed in a set order. Their arrangement on the flat engine heads can be checkerboard, ringed, or honeycomb. The number can vary from several pair to several dozen pair. Swirl and spray injectors sometimes are used simultaneously in an engine.

FORSUNKA DVUKHKOMPONENTNAYa [Bipropellant Injector] -- injector which sprays two propellant components (fuel and oxidizer) or a monopropellant injector. They are divided into injectors with external and internal propellant component mixing.

FORSUNKA ODNOKOMPONENTNAYa [Monopropellant Injector] -- injector which sprays only one propellant component (fuel or oxidizer).

FORSUNKA S PREDVARITEL'NYM SMESHENIYeM KOMPONENTOV TOPLIVA [Premixed Propellant Component Injector] -- bipropellant injector with external or internal propellant component mixing.

FOTON [Photon] -- light quantum: particle of light, random-frequency luminous (electromagnetic) radiation. A photon possesses a specific amount of energy (quantum) and specific amount of motion. Types of electromagnetic radiation are: visible light, X-rays, infrared rays, and gamma rays. Photons also are called light quanta, X-ray quanta, and gamma quanta. Infrared and violet rays are combined under the common name "light." A photon always will move at the speed of light at approximately 300,000 kilometers per second. Infrared rays are used widely in control of rockets and other weapons. Infrared homing /316 systems, which in tactical and technical specifications rate with radar, are based on the principles of invisible infrared rays. Theoretically, electromagnetic radiations (photons) are looked upon as a means for interstellar flight.

FOTONNAYa RAKETA [Photon Rocket] -- rocket in which energy released in the process of reaction of a stream of particles of electromagnetic radiation (photons -- light quanta) are proposed for use. A photon rocket can be used for the launch

of space equipment with very high speeds (up to the speed of light). Theoretically, the photon rocket is looked upon as a means of interstellar flight.

FOTONNYY RAKETNYY DVIGATEL' [Photon Rocket Engine] -- engine in which the energy released in the process of annihilation (conversion) of particles and antiparticles with release of their mass in the form of energy is proposed for use. This is a power plant comprising a power system, radiation source, and screen. The exhaust velocity of the propulsive mass in a photon rocket engine may reach 300 million meters per second. Theoretically, the photon rocket engine is looked upon as a means of interstellar flight.

FOTOSOPROTIVLENIYe (FS) [Photoconductive Cell] -- photo element with an internal photo effect whose operating principle is based on the use of the phenomenon of photoelectroconductivity intended for use in luminous energy photoelectric receivers in tracking heads (infrared seekers). Luminous energy receivers with an internal photoeffect -- photoconductivity, are used in most infrared seekers.

FOTOELEKTRIChESKIY SEKSTANT [Photoelectric Sextant] -- aerial navigational system intended for automatic guidance of long-range cruise missiles. A photoelectric sextant provides cruise missile guidance to a target at great ranges and with great precision. The basic element of a photoelectric sextant is a light-sensing telescope, amplifier, and indicator unit.

FOTOELEKTRONYY INDIKATOR [Photoelectronic Indicator] -- infrared ray receiver which converts luminous energy into electrical energy. It is used in infrared seekers. /317

FRONT BATAREI [Battery Front] -- straight line connecting the piece on the right flank with the piece on the left flank. The distance between adjacent pieces is called interval and the distance in depth is referred to as echelon.

FRONTAL'NYY OGON' [Frontal Fire] -- fire of artillery or a small-arms weapon delivered perpendicular to the target's front. It is most effective against deep targets (columns, infantry and tank combat formations, and the like) since projectile dispersion, as a rule, is greater in range than lateral dispersion and less effective against broad but shallow targets (trenches, an attacking target, and so on).

FOTOELEMENT [Photoelectric Cell] -- instrument which converts the luminous energy of radiation into electrical energy. It will comprise a vacuum cylinder housing a photoactivated cathode and anode. The inner surface of the cylinder, which is coated with a light-sensitive substance, usually is the cathode.

FUGASNOYe DEYSTVIYe [Blast Effect] -- destruction of any medium (ground) caused by the force of the shock wave of an exploding charge of explosives or bursting charge of an artillery projectile. Blast effect will depend upon the weight and amount of the bursting charge, depth of penetration of the projectile into the obstacle at the time of burst, and the properties of the medium (ground). Three zones are delineated in a medium subjected to the action of the gases of a bursting charge of a projectile (mortar shell, bomb, fougasse): compression zone (characterized by compaction and dislodgement of the medium), destruction zone (characterized by destruction of the bonds among the medium's particles), and jarring zone (only oscillating motion of the medium will occur). The volume of the crater formed in the earth or in any medium in the area where an artillery projectile explodes is accepted as the measure of blast effect.

FUGASNYY SNARYaD [High-Explosive Projectile] -- general-purpose artillery projectile providing a high explosive effect upon detonation, i. e., greater destructive action by the force of gases than by fragments. A high-explosive projectile to some extent also possesses a shock force. The basic characteristics of a high-explosive projectile are: wall thickness of a gun projectile is 1/6--1/8, of a howitzer projectile 1/8--1/16, and of a mortar projectile 1/10--1/15 of the projectile's caliber; the ratio of the bursting charge to the projectile's weight is 10--15% for gun and up to 25% for howitzer and mortar projectiles. /318 TNT mainly is used as the bursting charge in high-explosive projectiles, which are equipped with a nose or base fuse with inertial or delayed action. High-explosive charges are employed mainly for firing from large-caliber pieces to destroy permanent non-cement field-type defensive structures.

FUTLYaR [Case] -- cylinder of galvanized sheet steel with a bottom and cover for hermetic packing of bag charges (hermetically -- completely covered and airtight). The cover's hermetic seal in old models is provided by projectile grease, while a rubber gasket is used in new cases. Heatproof cases are being used at the present time. This case contains insulation consisting of asbestos

board 2--4 millimeters thick placed between the case walls and styrofoam placed in the case. This protects the charge against radical temperature changes and exterior heat in the event of a fire.

FYuZELAZh [Fuselage] -- body of a rocket, a glider with a specific aerodynamic design. The body of a rocket is a load-bearing element and will house the warhead, onboard control and guidance system equipment, feed source, propellant source, and power plant. Fuselage (body) structure is categorized as light, rigid, and streamlined. The body of a rocket is divided into the nose, center, tail, and base portions.

KhARAKTERISTIKA RAKETY KONSTRUKTIVNAYa [Rocket Design Characteristic] -- ratio of a rocket's launch weight to the rocket's structure weight.

KhVOSTOVOYe OPERENIYe (UPRAVLYaYeMYKh RAKET, BALLISTIChESKIKh NAZEMNYKh I ZENITNYKh SNARYaDOV) [Empennage (Of Guided Missiles and of Ballistic Surface-to-Surface and Surface-to-Air Projectiles)] -- system of vertical and horizontal surfaces located in the tail section of rocket projectiles and intended to impart stability.

KhIMIChESKAYa SISTEMA ZAZhIGANIYa [Chemical Ignition System] -- rocket engine ignition system in which hypergolic liquid components are used to ignite liquid propellant. Chemical ignition occurs in a ZhRD using a nonhypergolic basic propellant by installing hypergolic component tanks in the engine. When the engine is started, the hypergolic propellant forms a pilot flame, which ignites the nonhypergolic propellant.

KhIMIChESKIY SNARYaD [Chemical Projectile] -- see snaryad khimicheskiy [chemical projectile].

KhODOVAYa ChAST' ARTILLERIYSKOGO ORUDIYa [Artillery Piece Undercarriage] -- axle-tree with wheels or tracks and suspension system. It is intended for movement of an artillery piece and to support it on the ground. Artillery piece undercarriage selection will depend on its design, weight, caliber, and required speed.

KhOLOSTOY VYSTREL [Blank Round] -- round with a blank charge without projectile delivered from a piece.

KhOLOSTOY ZARYaD [Blank Charge] -- artillery charge to produce the sound of a round during maneuvers and exercises and for delivery of salutes and signals.

TsAPFY [Trunnions] -- small cylindrical lugs screwed into the threaded apertures of a piece's carriage (tipping party of a mounting). Set screws keep the trunnions from coming unscrewed. They are supported by ball bearings or bronze inserts to reduce friction as the piece is laid. Trunnions in heavy artillery are supported on special sub-trunnion devices. Trunnions were called pintles in ancient times and the part of a piece where they were located was called the pintle section.

TsAPFENNYYe GNEZDA [Trunnion Bed] -- semicircular recesses in trails (in the piece mounting) in which trunnions and bearings are located. Trunnions with bearings, when placed on a mounting, are fastened from above by semicircular shackles called clamps or trunnion brackets.

TsAR-PUShKA ["The Tsar Gun"] -- the largest ancient Russian artillery piece intended to fire "canister" (grape shot). Its official name is "Russian Fowling-Piece." It was cast by the famous Russian cannon master Andrey Chokhov in 1586 and is now preserved in the Moscow Kremlin. The gun's caliber is 890mm (35 inches), barrel length 5.5 meters, and weight 40 tons (2,400 poods). In finishing and overall dimensions, Tsar-Pushka is an unsurpassed example of the casting science of the renowned Russian gun masters.

TsEVOChNOYe KOLESO [Lantern Pinion] -- special type of rod comprising a disc with cylindrical dogs (shanks) fastened around the outside and playing the role of teeth. It is used in shipboard turret piece training gear. /321

TsEVOChNYY OBOD [Lantern Ring] -- device comprising two rings connected by rollers replacing the toothed rim in piece training gear. It is used in a heavy shipboard turret mount.

TsEYKhMEYSTER [Master of the Ordnance] -- term applied to generals directing naval artillery units until transformation (in 1830) of naval artillery. General-Master of the Ordnance was the term used for the chief of naval artillery.

TsELEUKAZANIYe [Target Designation] -- method and means of rapid and accurate designation of target location to another individual on the battlefield. Various

methods of target designation are employed in artillery practice: both when the designator and receiver are located in the same OP and when the designator and receiver are located in different OP.

TsELIK [Wind Gauge] -- simplest sighting device in the form of a fixed or movable protuberance for alignment of the foresight located on the barrel or other parts of rifles, machine guns, pistols, revolvers, and panoramic telescopes.

TsENTRAL'NOYe ARTILLERIYSKIY POST (TsAP) [Artillery Control Center] -- special well-sheltered and -armored space aboard a combat vessel where main computers and artillery fire directors are concentrated. Target designation, piece laying, and shipboard artillery fire control emanate from here.

TsENTR DAVLENIYa [Center of Pressure] -- point of application of a resultant aerodynamic force to a specific point on a rocket. It usually does not coincide with the center of gravity and, when this is so, depending on their mutual positioning, a moment of aerodynamic force will arise. This force can be tilting or stabilizing. The center of pressure point will be located on the rocket's longitudinal axis.

TsENTR MASS [Center of Mass] -- point which can be considered the concentration of the entire mass of a body (rocket, projectile) when examining its motion as a whole.

TsENTROBEZhNAYA FORSUNKA [Swirl Injector] -- device for spraying propellant liquid components in rocket engines. A propellant component, passing through /322 the injector, acquires rotary motion, which is retained at the output. The expelled streams under the pressure of centrifugal forces distend into a film, which falls in minute droplets.

TsENTRUYuShchIYe UTOLShchENIYa SNARYaDA [Projectile Positioning Bands] -- small circular rings where a projectile's ogive becomes cylindrical and above the driving band to center the projectile in the piece bore. In other words, it is for coincidence of the projectile and bore axes. The projectile's diameter at the positioning bands is 0.1--0.2 millimeters less than piece caliber.

TSILINDRICHESKIYe SISTEMY KOORDINAT [Cylindrical Coordinate System] — those coordinate systems in which the position of an aerial target is determined by horizontal range, altitude, and azimuth.

ChASTICHNAYa DEZAKTIVATsIYa ARTILLERIYSKOGO ORUDIYa [Artillery Piece Partial Radioactive Decontamination] -- removal of radioactive contamination from piece (mortar, multiple rocket launcher) mechanisms on the spot by the piece crew following an atomic attack. Combat mission accomplishment is not interrupted. Contamination is removed initially from those areas with which the piece crew continually comes into contact when accomplishing the combat mission. Decontamination is accomplished by wiping off piece mechanisms with rags or cloths soaked in decontaminant or pure uncontaminated water. Gasoline, kerosene, diesel fuel, and other solutions also are used. Artillery piece parts initially decontaminated are the sight, breechblock, sight wheels, loading mechanisms, those used to convert from travel to combat configuration, and others which the crew uses during firing.

ChASTOST' [Frequency] (4) -- ratio of the number of manifestations of a given event to the number of tests (experiments) run.

ChAST' BOYeVAYa KASSETNAYa [Cluster Warhead] -- warhead carrying several small service projectiles that operate independently. The projectiles disperse in the air, covering a significant amount of space, when this type warhead detonates.

ChAST' OZhIVAL'NAYa [Ogive] -- forward ogival portion of a projectile (rocket) having the form of a cone with a curvilinear generatrix.

ChAST' KhVOSTOVAYa [Tail Section] -- conical ogival or cylindrical rear extremity of a rocket, the extension of the central cylindrical portion housing /324 the tail section. A rocket usually has stabilizers in the tail section.

ChERVYaChNAYa PEREDAChA [Worm Gearing] -- mechanism transmitting rotation between intersecting axes with the aid of worm toothing. The angle between axes usually is 90°. It is used to obtain high gear ratios (ratio of the number of wheel teeth to the number of worm threads) while retaining transmission compactness. Worm gearing used in rockets, launchers, and artillery pieces, as a rule, is irreversible, i. e., permitting transmission in only one direction, from the worm to the worm gear wheel, thus obviating the need for a brake, catch, or any other device hindering reversal of the worm gear wheel. The main drawback of

worm gearing are great losses to friction, resulting that this transmission has low efficiency (less than 0.5 for irreversible worm gearing and about 0.85 for reversible).

ChISLO MAKhA [Mach Number] -- see M-chislo [Mach number].

ChISLO TsIOLKOVSKOGO [Tsiolkovskiy Number] -- ratio of the total or launch mass of a rocket to the final mass, i. e., based on propellant consumption (ratio of a rocket's launch weight to its final weight):

$$Z = \frac{M_0}{M_к},$$

where Z -- Tsiolkovskiy number;
M_0 -- launch mass of the rocket;
$M_к$ -- final mass of the rocket.

The greater the Z number, the greater the relative propellant reserve aboard the rocket.

ChISTOYe PRESLEDOVANIYe [Pure Pursuit] -- method of guiding a missile to a target in which the velocity vector continuously will pass through the target.

ChUVSTVITEL'NOST' VZRYVChATYKh VEShchESTV [Explosive Sensitivity] -- ability of explosives for explosive transformation under influence of external forces. It is determined by the maximum temperature or minimum shock force sufficient to cause an explosion.

ChUGUNNYYe YaDRA [Cast-Iron Balls] -- solid artillery projectiles with fractional and reduced charges intended for practice firings.

ShAG NAREZA ARTILLERIYSKOGO STVOLA [Artillery Barrel Twist] -- length along the axis of a barrel along which rifling makes one revolution. It is measured by the caliber of the piece.

ShAG PRITsELA [Range Change to Stay On Line] ($Ш_n$) -- sight correction introduced during an aiming circle change to maintain bursts in the observer-target plane.

ShAG UGLOMERA [Deflection Shift to Stay On Line] ($Ш_y$) -- aiming circle correction introduced during a sight change to maintain bursts on the observer-target line.

ShAG UROVNYa [Site Change to Maintain Bursts in the Plane of Site from the OP] ($Ш_{yp}$) -- correction to the level introduced during a sight change to maintain air bursts in the vertical plane containing the angle of site.

ShARNIRNAYa TsEP' [Link Chain] -- chain whose links are articulated used in shipboard artillery system laying and supply mechanisms.

ShAROShKA [Rasp] -- breechblock accessory for bag-loading pieces used to clean the obturator spindle's bush firing hole and to remove an expended tube without sabot (i. e., flange) from the bush firing hole in the event the fuse sabot separates during extraction.

ShERADA [Sherada] -- large-caliber rifled mortar which fired rocks. The charge initially was inserted, followed by a wicker basket filled with rocks, laid like a bomb on top of the charge. The Sherada was employed as a fortress weapon.

ShIMOZATsIYa [Shimosation] -- cooling of a molten explosive by continuous stirring in order to obtain a homogeneous mass.

ShIFRATOR [Encoder] -- device for conversion of transmitted command signals in telemechanical, radar, and other communications into conditional signals /326

(stipulated by characteristic differentiations) on several channels. An encoder forms a signal from a collection of combinations of elementary pulses. Signals formed and coded by an encoder are transmitted via a communications line by transmitters to actuators. An encoder is used mainly in missile and rocket projectile remote guidance systems.

ShKALA RASSEIVANIYa [Dispersion Scale] -- numerical expression of the law of projectile dispersion: 2%, 7%, 16%, 25%, 25%, 16%, 7%, 2%.

ShNEK [Worm Conveyor] -- swirl injector threaded insert forming a screw-like channel between the insert and injector wall.

ShRAPNEL'NYY SNARYaD (ShRAPNEL') [Shrapnel Projectile (Shrapnel)] -- projectile with thin walls and threaded cap charged with spherical bullets. A time fuse activates it. When a shrapnel projectile is detonated in the air, bursting charge gases expel the spherical bullets from the projectile casing and they destroy the target. Famous Russian artilleryman V. Trofimov in detail tested and described the action of shrapnel projectiles. This projectile is a thing of the past and virtually was unused during the Great Patriotic War.

ShRAPNEL' STERZhNEVAYa [Rod Shrapnel] -- projectile charged with casualty-producing elements in the form of square rods used in firing against aircraft.

ShTAUFER [Compression Grease Cup] -- grease nipple, lubricator for greasing artillery system mechanisms where lubricant must be applied under pressure. The lubricator is a cylindrical vessel with a screw-on top. Having filled the lubricator with lubricant, the latter is supplied under pressure to the mechanism by pressing down on the cap.

ShTEKERY [Plugs] -- 1. Automatic devices, cable connecting a rocket via the main switchboard supplying current from ground-based sources. The rocket switches from external to internal power when the plugs are disconnected. 2. Accessories on the ends of antenna leads for connection to a receiver (transmitter).

EKRANIROVANNAYa BRONYa [Spaced Armor] -- armor system with air layers consisting of two or several sheets of armor separated by an air layer, i. e., one sheet of armor is separated slightly from another. The exterior sheet of spaced armor is called the shield.

EKSTRAKTsIYa [Extraction] -- removal of an expended casing from the chamber or the vent tube from the bush firing hole of the obturator spindle of an artillery piece's slotted screw breech mechanism.

ELEKTROVAKUUMNYYe PRIBORY [Vacuum Tubes] -- instrument whose action in based upon use of the various phenomena of the passage of electricity through a vacuum and rarified gases. Recently, vacuum tubes using various electrical phenomena in rarified gases have found wide use.

ELEKTRONIKA [Electronics] -- field of electrical engineering based upon use of phenomena of the passage of electricity through a vacuum and solids. The main instruments used in electronics are electronic tubes, ion instruments, and semiconductors. In its broadest sense, the term electronics is understood to mean the complex of equipment concerned with use of electron tubes and ion instruments: television, radar, night vision devices, automated and remote control equipment, missile (projectile) control and guidance systems, and others. /328 Electronics are used in modern military equipment and especially in projectile and missile control.

ELEKTRONNYY PRIBOR [Electronic Instrument] -- special radioelectronic instrument in which an electronic device accomplishes measurement. They are employed on guided missiles, torpedoes, and bombs to guide them to the target in the final leg of the trajectory.

ELEKTRORAKETA [Electric Rocket] -- rocket whose thrust is created by an electric rocket engine. Nuclear reactors or solar power plants are used as the source of electrical energy. An electric rocket engine develops a small amount of thrust, resulting in their not being able to be launched from the Earth.

An electric rocket can move independently only after it has been placed in space by other engines capable of developing great thrust (chemical or nuclear).

ELEKTRORAKETNYYe DVIGATELI [Electric Rocket Engines] -- engines with high exhaust velocity of the propulsive mass from the nozzle. They must comprise two basic parts, electric power source and propulsor using this power to accelerate and discharge the propulsive mass. Nuclear reactors or solar power plants are proposed for use as the electric power source in electric rocket engines. Three types are known at the present time: ionnyy dvigatel' [ion engine] (see), plazmennyy dvigatel' [plasma engine] (see) with plasma acceleration through thermodynamic expansion and those with acceleration of the plasma by means of a magnetic field. The rate of propulsive mass expulsion from the nozzle in an electric rocket engine reaches 3×10^4 -- 2×10^5 meters per second, but consumption of propulsive mass is slight. Therefore, there is little engine thrust. Electric rocket engines cannot be used to impart to an airborne platform the accleration required to overcome the force of the earth's gravity. It is evident that an electric rocket engine will be cut in when a space vehicle acquires escape or orbital velocity from engines capable of developing large thrust (nuclear or chemical propellant engines). As a result of the slight consumption of propulsive mass, electric rocket engines can operate for an extended period of time and, in spite of the slight acceleration, can impart very high terminal velocity to a space vehicle.

ELEKTROSTATIChESKIY NEKONTAKTNYY VZRYVATEL' [Electrostatic Proximity Fuse] /329 proximity fuse with a principle of operation based on the phenomenon of electrostatic induction under the influence of an electrical field created by the target itself. This fuse insures projectile (rocket) detonation near the target. A typical electrostatic proximity fuse will comprise a current source insulated from the fuse housing, gas discharger, and electric igniter. The main drawbacks to this fuse are very high sensitivity to natural interference and small radius of action.

ELEMENT SISTEMY UPRAVLENIYa (RAKETOY) [Control System (Rocket) Element] -- component part of a complex and complete mechanism (system), any part of a control system performing a specific function. An example is an actuator, servo, amplifier, and the like.

ELERONY [Ailerons] -- one of a cruise missile's motion control elements.

They are installed on the wings. Control of a missile's course in bank angle is accomplished by turning the ailerons in the appropriate direction. When there is a bank angle, the lift of the bearing surfaces separates into vertical and horizontal components. The vertical component balances the force of gravity, while the horizontal changes the direction of missile motion in the horizontal plane. Suspended ailerons (located beneath the wing), super-ailerons (located above the wing), pre-ailerons (in the forward part of the wing), and tip ailerons (at the ends of the wings) are used along with conventional ailerons.

ELLIPSOIDAL'NAYa OShIBKA [Error of Ellipsoid of Dispersion] (ϑ) -- conditional designation of a system of error-vectors in space subordinate (in any direction) to the Gauss law. It is represented by a individual ellipsoid.

ELLIPS RASSEIVANIYa SNARYaDOV [Projectile Ellipse of Dispersion] -- area in which the craters from the impact of projectiles fired from the same piece at the same settings in a short period of time and with maximum possible adherence to uniformity in firing conditions (identical projectiles and charges, uniform aiming, and so on) are located. This area, given a sufficient number of rounds, is close to an ellipse in form and is called the projectile ellipse of dispersion.

ELLIPTIChESKAYa OShIBKA [Elliptical Error] -- conditional designation for /330 a system of error-vectors in a plane subordinate (in any direction) to the Gauss law. It s represented by an individual ellipse.

EPITsENTR VZRYVA [Burst Epicenter] -- projection of the center of an air (underground, underwater) burst of a nuclear weapon on the surface of the earth or water. The point (place) of a nuclear ground burst is called the center of burst.

ESMINETs-RAKETONOSETs [Missile Destroyer] -- surface combatant possessing high maneuverability and speed with missiles and launchers on board. They are equipped with shipboard missiles, special antisubmarine missiles (rocket-assisted torpedoes), and surface-to-air guided missiles (ZUR). Destroyers can inflict nuclear missile strikes on maritime targets and accomplish antisubmarine and air defense missions.

EFFEKT DOPPLERA [Doppler Effect] -- phenomenon of the change in frequency of received electromagnetic, acoustic, and other oscillations (waves) compared with those emitted during mutual closure (separation) of receiver and transmitter (oscillation source or reflector). The frequency of the oscillations received by a receiver during mutual closure (separation) of receiver and transmitter changes in proportion to the rate of change of the distance between the source (reflector) of the oscillations and the receiver. The Doppler effect is used to determine the direction of motion of a missile, target, and so on.

EFFEKTIVNOST' STREL'BY [Gunnery Effectiveness] -- concept, on the one hand, characterizing physical damage inflicted on a target against which fire was delivered, measured either by the number of damaged targets located within a group target or by the damaged individual structrual or technical elements of an individual target. On the other hand, it is a concept characterizing the positive result from the point of view of influence upon accomplishment of a combat mission by friendly troops obtained as a result of physical damage inflicted on the enemy.

For example, the most effective gunnery is that conducted under identical firing conditions with the identical number of projectiles expended to kill a group of enemy infantry resulting in destruction of the greatest number of targets. If fire is delivered to achieve a specific result (damage, destruction) without a limitation on projectile consumption, then the most effective gunnery /331 is that in which the mission is accomplished with the fewest projectiles expended.

EFFEKT FOTOELEKTRICHESKIY [Photoelectric Effect] -- phenomenon of the excitation of electrons under the influence of luminous energy on an environment, subject, or material which leads to full or partial release of charged particles. There are three types: external (electronic emission), release of electrons from the surface of bodies under the influence of light; internal, a change in the electrical conductivity of a substance (semiconductors or dielectrics) under the influence of a falling stream of luminous energy; photogalvanic, excitation of EDS [electromotive force] on the boundary between a conductor and semiconductor or among heterogeneous conductors under the influence of a falling light stream. The action of the photoelectric effect is used in luminous energy receiver designs. Luminous energy receivers with an internal photoelectric effect (photoresistor) are used in most infrared seekers.

ETsVM [Electronic Computer] -- electronic digital computer possessing an enormous high-speed capability (dozens and hundreds of thousands of operations per second); they are acquiring ever-increasing importance in military affairs, especially in the field of command and control and primarily in the control of modern technology.

Use of computers in missile and artillery troop units, in control of their fire and maneuver, and in supplying them with timely reconnaissance data provides inestimable advantages. Computers make it possible to reduce to the minimum the time required to prepare initial setting data for missile launch and artillery fire, which reliably provides the opportunity for timely destruction (suppression) of the enemy and primarily enemy means of atomic attack.

A computer is a complicated complex of electronic and electromechanical automatic devices operating in accordance with a specified program. A computer must have the following devices, as a minimum: arithmetic unit (AU) for arithmetic and logic operations during the problem-solving process; storage unit /332
(ZU) (machine "memory") for receipt, storage, and output of digital material, which is initial data and intermediate and final results. The task execution program also will be stored in the ZU; control unit (UU) for automatic control of all computer devices when executing the program task; input unit for entry of initial data and task execution programs into the memory unit; output unit for output of computational results in the form of printouts or other media convenient to use; control station for operational control of the computer (start, stop, input of individual entries into the ZU, and so forth) and to monitor computational operations visually. All computer units are interconnected by a system of buses via which instructions, numbers, and control signals in the form of electrical pulses and potentials is accomplished.

YaDERNAYa BOYeGOLOVKA [Nuclear Warhead] -- missile warhead loaded with a nuclear charge.

YaDERNAYa RAKETA [Nuclear Missile] -- intercontinental supersonic low-altitude missile with a nuclear power plant for strategic strikes from intercontinental ranges. The missile is equipped with a nuclear ram-jet engine (YaPVRD). Uranium-235 or plutonium-239 will serve as the nuclear propellant.

YaDERNAYa ENERGIYa [Nuclear Energy] -- same as atomnaya energiya [atomic energy].

YaDERNOYe ORUZhIYe [Nuclear Weapon] -- general term for weapons whose action is based on the utilization of intranuclear energy released as a result of nuclear reactions -- fission, fusion, or both simultaneously.

YaDERNOYe BOYePRIPASY [Nuclear Munitions] -- warheads of missiles of various types and purposes, aerial bombs, projectiles, shipboard torpedoes, depth charges, and fougasses with nuclear charges.

YaDERNYY VZRYV [Nuclear Burst] -- see atomnyy vzryv [atomic burst].

YaDERNYY ZARYaD [Nuclear Charge] -- see atomnyy boyevoy zaryad [atomic propelling charge].

YaDERNYYe DVIGATELI [Nuclear Engines] -- rocket engines, heating of the propulsive mass in which will occur due to heat released during intranuclear transformations. Nuclear rocket engines (YaRD) have more potential capabilities to increase the specific thrust than chemical engines (ZhRD, PRD).

Nuclear engines are categorized as: heat-exchanger nuclear rocket engines /334 in which heating of the propulsive mass will occur due to the energy released during nuclear fission, thermonuclear engines, and combined nuclear-chemical engines. Chemical-propellant engines must assist in the launch of rockets with such engines.

YaDRO [Ball] -- round projectile employed in smooth-bore artillery. At the present time, the balls are of steely pig-iron, i. e., a solid artillery projectile with fractional and reduced charges used for practice firing.

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