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MILITARY SUPPLY OF THE RUSSIAN ARMY IN THE WORLD WAR

By

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PART I.

PRIOR TO THE WORLD WAR.

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SELECTION OF NEW MODELS OF GUNS AND MATERIEL FOR ARTILLERY UNITS. METHOD OF INTRODUCTION OF NEW SYSTEM IN EQUIPPING OF TROOPS.

The Chief Artillery Department was required to look after all improvements in ordnance equipment, and after a preliminary test, to recommend the introduction of new models of equipment and materiel to the War Ministry and War Council, and then to have same approved by the Czar.

The immediate examination of new makes of ordnance materiel, the deciding on questions of theory, technique and tactics of artillery and small firearms, supervision over research and experimentation of all of the above - was the responsibility of the Artillery Committee of the Chief Artillery Department. As was also charged to it the remodeling of weapons, ammunition and ordnance materiel, small firearms and equipment.

The artillery Committee was composed of members of the Artillery Department who had received higher artillery training and instruction or who had gained renown as experts in some phase of

ordnance. The majority of the members of the committee were ordnance experts - professors and instructors of the artillery academy, or engineers working on production in technical artillery establishments. The only infantry representative, and who only acted as a consulting member of the committee, was the commandant of the former Rifle School, who participated in matters relating to small firearms.

There could be invited to the committee private individuals whose opinions might be useful in considering special questions, but this was done only in rare cases, and there were usually invited engineers or experts who were in some way connected with ordnance matters.

The officer in charge of the Chief Artillery Department, as chairman of the Artillery Committee of the Chief Artillery Department, was responsible for the activities of the latter.

Special tests, necessary in determining questions of improvement and introduction of new models, were usually conducted on the main proving-ground, or at the officers Rifle School; in either case under the supervision of the Artillery Committee of the Chief Artillery Department. In some cases tests were turned over to technical artillery establishments or to district artillery schools and proving-grounds.

The officers Rifle School worked in close cooperation with the infantry. The district proving-grounds were in the vicinity of artillery units; therefore, in conducting tests, turned over to them

by the Artillery Committee of the Chief Artillery Department, it took into consideration the requirements of the troops.

As far as the main proving-ground was concerned, its principal object was to conduct tests for the purpose of determining artillery instructional questions and to test the ballistic qualities of powder, guns, ammunition, etc. The main proving-ground came under the direction of the chairman of the A.G.C.A.D. (Artillery Committee, Chief Artillery Department) and conducted tests in accordance with instructions from him. The main proving-ground formed an integral part of the A.C.C.A.D. and was, so to speak, its scientific and technical laboratory. It was as far removed from the troops as was the A.C.C.A.D. The commanding officer of the main proving-ground and the officers detailed for carrying out tests were assigned, primarily, from officers who had received special higher artillery training, and who had served not less than two years in the line. Such a brief term of service did not afford them an opportunity of establishing proper ties with the troops of the line, and they soon forgot their needs.

Not having among it representatives from the troops of the line, the A.C.C.A.D. carried on its work individually. Having for its mission the supplying of the troops with the best types of equipment and armament, so as to meet all modern technical requirements, it had failed to properly consider their military requirements.

General Kusmin-Karavayew, in charge of the Chief Artillery Department, who had served for a long time with troops, realized that in the case of the greater part of equipment "tests of a proving-ground nature do not afford sufficient knowledge of the weakest points of the equipment undergoing the test." In his opinion, before deciding the question of supplying troops with new articles of equipment it is insufficient to make a study of the system involved, but that it is necessary to test it in actual service, as far as possible under unfavorable conditions, and that it is extremely important to know the opinion of the troops themselves on the new equipment introduced.

According to General Kusmin-Karavayew's explanation, submitted to the Supreme Investigation Commission, "The Chief Artillery Department endeavored to try out the principal equipment introduced into the service by actual use, but that not always was it possible to employ this more dependable way of testing the equipment." To support his contention he cited examples - that our 3-inch field gun had been basically tested by the troops, and that therefore the system worked well, "and did not require special measures for improvement," while howitzers of the 1904 model, hastily acquired during the Japanese war, without previously being tested, very soon became obsolete and were discarded; howitzers of the 1909 model "had also not been extensively tested in the army, and therefore, after two years' use already required remodeling."

Tests of new weapons by troops failed to produce proper results not only because they were carried on in great haste, but primarily because they pursued the one-sided object of a supplementary test of the conveyance or carriage and durability; the other, more important military qualities, determined by actual tests by the troops were not given much attention.

Actually, the model of our 3-inch gun, which had been thoroughly tested by the troops prior to acceptance for military use, served well, and "did not require special measures for improvement." Moreover, in regard to ballistic qualities, it is perhaps the best of our field guns.

At the same time, it possesses some very important negative qualities for combat use - almost complete ineffectiveness in frontal fire of shrapnel against a concealed enemy, limited use for fire overhead of its own infantry; besides, it is also difficult of manoeuvering.

This was not considered by the highly qualified specialists of artillery technique, who gave us an excellent gun, which satisfied almost all important ballistic and technical requirements, and which has given very useful service to the army for more than a quarter of a century. For this they cannot be blamed, for it is a matter which should have been considered by experts of military matters in general, by tactical experts. The General

Staff should have considered this, presenting this problem to artillery experts and explaining what basic combat requirements the light field piece had to meet. The General Staff should have emphasized the importance of the "desert nature" of future fields of battle (of which there was much said and written after the Japanese war), and to explain that maneuvering battles would be developed not on level open fields of the type of proving-grounds then in use, but rather on obstructed areas, and that the enemy would use every means of concealment, employing for this purpose trenches, fortifications, camouflage, etc.

The most important questions of army equipment were being worked out and decided exclusively by the Artillery Committee of the Chief Artillery Department, not only without any guidance whatever, but almost without any participation on the part of the General Staff. The participation in these matters of the War Minister, his assistants, the Military Council and the office of the War Minister were negligible. In the matter of infantry equipment there was yet some collaboration with the Rifle School, but as regards the selection of types of ordnance material, the A.C. C.A.D. carried out this work independently, without receiving from any one general suggestions as to the nature of requirements, to say nothing of detailed outlines as to the same.

Only in October of 1909, on the initiative of the inspector general of artillery, were representatives of the General Staff induced to participate in the work of selecting types of weapons for siege and fortress artillery (and that with much opposition, after four years had elapsed from the beginning of this work).

As we shall see below, participation by the General Staff in this work proved far from unuseful and not infrequently came to sharp disagreement on major questions at issue with the A.C.C.A.D. Finally, in 1910, one member of the General Staff was assigned to the A.C.C.A.D. as a consulting member, who did not carry sufficient weight as an effective representative of the "interests of the army and national defense." (The first such representative was Lieutenant-Colonel Romanovsky of the General Staff, detailed in December of 1909).

The separate work of the Chief Artillery Department without the proper collaboration of the troops and the General Staff, resulted in the improper solution of some important problems of army equipment, such as - improper evaluation of the importance of field howitzers and heavy field artillery in a maneuvering war, the preconceived views of the A.C.C.A.D. in respect to the mountain artillery of 1909, prejudice against long range artillery firing (because of this the Russian artillery, having as its equipment the light and mountain guns with maximum range of 8 kilometers (5 miles) entered the World War with 22-sec. barrels, enabling it to fire only about 4 - 5 kilometers); the failure to properly evaluate the importance of fougade shells, etc.

The introduction into the army of new types of armament is doubtless a very complicated and difficult task, requiring exceptional study and considerable time. It must be admitted that this was carried out in Czarist Russia very slowly, on the one hand, because of improper organization and handling of matters, and the great amount of work that piled up on the A.C.C.A.D. and, on the other hand, because of the attempts of the A.C.C.A.D. to supply the army with the most technically perfect types of armament. Under the circumstances, unfortunately, sight was lost of the fact that it was quite a difficult problem to keep pace with the rapid modern technical progress that was being made.

Examples of the tardiness in adopting new models of equipment in the army are many.

The plan of introduction and experimentation with the 34-sec. long range barrels by the A.C.C.A.D. progressed so slowly and bulk production, which is technically quite difficult, took so long, that after ten years the matter had not yet been finished, and the World War found us with the 22-sec. barrels. At the same time, back in 1909, i.e., five years prior to the outbreak of the World War, the French offered us a 37-sec. barrel, permitting the firing of shrapnel from our 3-inch mountain guns of the 1909 model up to seven kilometers. This offer was rejected, because the A.C.C.A.D. had proposed to adapt the 34-sec. barrel upon which it had been working.

The detonator for the 3-inch fougade shells was worked on by the A.G.C.A.D. about 5 - 6 years; the plan of its use and tests began in 1906 - 1907, and by May, 1912, the artillery was not yet supplied with fougade shells, which at that time brought forth one of the usual complaints against the Chief Artillery Department from the Imperial Duma. General Kuzmin-Karavayev, in charge of the Chief Artillery Department, recognized the complaint as being "entirely justified," and explained the delay in supplying the army with fougade shells by saying that the first two models of the detonator proved to be "unsuitable for use," that on the completion of the last accepted model there were found some "construction difficulties" and that some of the employes of the factory and of the Chief Artillery Department were resorting to base practices in selecting steel for the manufacture of detonators, endeavoring, in his opinion, "for ulterior purposes, to make detonators exclusively of steel supplied by the Firt Mills, and castings of the Hirsh pattern."

Byzantine shrapnel for the 3-inch cannon were experimented with for several years. By the end of 1912 there was finally completed the tests by the A.G.C.A.D. of the model of the 3-inch byzantine shrapnel, but our army failed to get it during the World War. The history of this shrapnel is quite interesting.

Artillery, situated in concealed positions, having guns protected with shields, is but little affected by fire from ordinary shrapnel. Therefore, ever since the replacement of field pieces by

rapid-fire guns, every effort has been made to obtain a means by which the enemy battery situated in concealed position and protected by its armor may be gotten at. Efforts to make shrapnel shells which would penetrate the armor were not successful, for such shells, because of their lightness, soon lose their velocity. Besides, for the purpose of greater penetration of the armor it had been made somewhat thicker. In a word, the practical weapon against concealed artillery remained only the fougade shell, but it was of little use in firing against an open target. Then, the best European artillery factories - Krupp, Schneider and the Rhine metal works - offered a newly developed shell, the so-called bysantine shrapnel, which was supposed to combine the qualities of a grenade and shrapnel, and it became the universally adopted shell. This shell may burst upon striking an object or in the air, sending forth fragments and solid cap which detonates on impact.

The bysantine shrapnel of the Rhine factory in 1912 was being tested not only on the main proving-ground, but on actual firing ranges of the artillery school for officers; types of bysantine shrapnel from the Krupp and Schneider factories which had been obtained in small quantities, had only been tested on the main proving-ground.

The experience on the range showed that the bysantine shrapnel of the Rhine factory could be used by the troops for long range firing of the 3-inch gun in place of its usual shrapnel.

By parallel tests in firing of artillery with shields it was determined that upon firing ordinary shrapnel the bullets do not penetrate the shield, and on striking the shield it bursts at such distance from the gun that it does no damage to the crew operating the gun. While at the same time the byzantine shrapnel, on striking the shield explodes while striking, causing much damage to the materiel and crew behind the shield. In long range fire, the cap of the byzantine shrapnel, on striking the shield, causes considerable damage to it and to the men behind it.

In view of the advantages recognized by the committee conducting the tests of the byzantine shrapnel over our ordinary shrapnel, and also considering the impossibility of any increase in 1913 of our military supply of shrapnel because of the already crowded factories with orders for reconditioning of defective 22-caliber barrels, the Chief Artillery Department decided to place an order abroad for a limited quantity of the newly adopted byzantine shrapnel, with the right of undertaking its manufacture in Russian government factories.

For the purpose of making a study of the production of this shrapnel there were ordered two officers-technicians to the Krgard factory in Dusseldorff. In May of 1910, with authority from the War Council, there was concluded a contract with the German factory for the delivery of projectiles. The first consignment received was

rejected and returned because of some construction defects. From the report of Colonel Gronow, who had returned from abroad, it was evident that in the future the factory could be relied upon to properly execute all orders given it. In 1914 officers were sent to Dusseldorff for the purpose of accepting the bulk of the orders, but war followed, and the receiving officers became prisoners of war, without succeeding in sending out a single consignment of the byzantine shrapnel.

The automatic rifle of the Fedorow system was tested for many years; as a result - at the beginning of the war it was decided to place an order for several thousand of such rifles for experimental purposes.

Even such a simple article as the metal lance for the Russian cavalry, a model of which had been tested for several years, was not ready when the war broke out, and the Russian cavalry had to go without it during the World War.

In 1910 there was developed a model of the steel lance; but the steel scabbard of this had to undergo such strict technical requirements that the Russian factories were unable to manufacture them, and orders for same were placed abroad - in Sweden and England. Among other things, the Chief Artillery Department, in March of 1911, requested the Ministry of Trade and Industry to designate Russian manufacturers who could produce scabbards of the required quality, but there was no reply forthcoming from the Ministry until 1915.

Bulk orders for lances were placed before any tests of the new model had been made by the troops; the first hundred lances received were tried out by one of the cossack regiments. The result of this this was to require technical changes in the make of the scabbard as well as that of the lance. Later, more extensive tests of the new model by the troops caused the small arms branch of the A.C.C.A.D. to decide "to limit the supply of steel lances to units of the regular cavalry only." In January of 1914 the small arms branch of the A.C.C.A.D. requested that the re-equipping of the cossacks with the steel lance be discontinued, because "the wooden lance has certain advantages over the new model not only from the economical standpoint, but also from the combat standpoint, in view of the fact that the cossack lance (wooden) for combat purposes, is two vershocks (3½ inches) longer than the 1910 (steel) model."

It was decided to hold a conference in the autumn of 1914 with representatives of the cossack units for the purpose of deciding the question of the new model lance.

The war started, and the question remained undecided.

A brief historical outline is given hereinbelow of the introduction of new models of weapons for use of the Russian field heavy and siege artillery, which is a good example of the slow manner of and the great difficulties encountered in accomplishing this - which was of such vital importance to the army.

At the beginning of 1905, i.e., before the end of the war with Japan, upon the initiative of the then inspector general of artillery (Grand Duke Sergei Mikhailovich Romanow) there was organized as a part of the Chief Artillery Department, a commission which was charged with the responsibility of examining the armament of our siege regiments for the purpose of determining its condition in reference to the requirements of modern warfare. The commission was not given a wider scope because at that time we were not yet faced with the question of any type of special "heavy field artillery," i.e., respecting large calibers capable of moving behind troops on the field of battle. Of such we had at the time only the 6-inch field mortars and field howitzers which were just being introduced; all of the "heavy" armament was part only of the siege regiments.

As chairman of this commission there was detailed the inspector of the fortress and siege artillery, General Reintahl, and as members - the commandant of the main artillery proving-ground, the commander of the 1st Siege Artillery Regiment, and the commandant of the fortress division of the officers' artillery school.

This commission, in its final report on May 25, 1905, stated that not one of our weapons at the disposal of our siege regiments meets the requirements of modern warfare; that the armament of our siege artillery is very much different, in a poorer sense, not only from those tested, but already adopted by other governments of siege artillery as regards power, rate of fire, mobility and ease of handling.

The commission therefore determined, in deciding the new equipment of our siege regiments, to disregard the obsolete guns, and to decide this question independently, designating for this purpose new guns, characterised by ballistic and construction data in accordance with modern warfare requirements.

In this connection, the commission stressed the principal features of new models of siege artillery, as well as the proper organization of "heavy" artillery. The commission proposed the introduction into the "corps" artillery batteries of only 48-lin. howitzers; the "army" artillery which could replace the artillery then in use by divisions, the commission proposed to supply with 6-inch howitzers. The equipment and organisation of the "army" artillery, in the opinion of the commission, should be independent of the regiments of siege artillery.

Thus the commission expressed its opinion regarding the definite distinction between the field "heavy" artillery and siege artillery.

The work of this commission, which outlined only in a very general way the basis on which the new field, heavy and siege artillery was to be constructed, had been turned over on the third of August of the same year for the detailed consideration of a special commission composed of members of the artillery committee as follows: Generals Muratow, Zabudsky, Durlyakher, and Yakimowich,

and was attended by the commandant of the main-proving-ground, General Mienchinsky, and the commander of the fortress division of the Chief Artillery Department, General Petrowsky.

This commission was charged with the following: On the basis of the work of the commission preceding it, to decide on very definite requirements which were to meet the demands of siege artillery of modern design. This work the commission finished in January, 1906.

The results of these two commissions were turned over to the A.C.C.A.D. for consideration, which, in turn, submitted its final conclusions on the subject in its report on the 13/25 May, 1906. This report contained the types of siege artillery of modern design and the requirements they should meet, as well as the organisation of siege artillery regiments.

This report of the A.C.C.A.D. was sent out to many commanders of troops of the line, primarily to outstanding commanders who had just participated in the war with Japan, with the request that they submit their views on the questions at issue. At the same time, the Chief Artillery Department, in accordance with the conclusions of the A.C.C.A.D. and both commissions recognized it as necessary to announce a competition for the development of a system of new siege guns, whereby among the participants in this competition there were to be the following factories, capable of making the complete construction of the weapons:

RUSSIAN: Obukhovsk, Putilovsk, Perm, Bryansk, St.Petersburg Metal Works.

FOREIGN: Armstrong, Vickers, Krupp, Scott, S.-Chamond, Schneider, Befors, Ehrhardt.

Aside from this, in order to be independent of these manufacturers, the A.C.C.A.D. was directed to develop a new pattern of siege artillery independently of the circular sent out.

Regarding all this the Chief Artillery Department submitted a report to the War Minister (on December 5, 1907 - No. 51123), who approved the proposed measures and directed that a report of this be submitted to the War Council, which was complied with on January 24, 1908 - No. 3713.

The War Council approved the report of the Chief Artillery Department. There also followed the concurrence of the Ministers of Trade and Industry and Finance for the application to the foreign market to obtain the above; the Finance Minister requesting the War Minister that, in placing the orders for artillery, because of loans secured from abroad, preference be given the French manufacturers over the German.

Of course, the results of all these measures could not be forthcoming very rapidly. Meanwhile, in the middle of 1906, there became apparent the insistent need of additional weapons in our siege regiments, where there was felt a great shortage in the basic calibers.

The siege regiments had up to this time the 6-inch cannon, weighing 120 puds (4,333 lbs.) and the 8-inch mortar. To await the results from the competing manufacturers it was recognized to be inadvisable; to order the old make - was inexpedient. It was therefore decided to immediately apply to foreign manufacturers where there had been ready siege artillery, which, although it fell short of the requirements specified in the circulars which had been sent out, was nevertheless sufficiently modern and much superior to our obsolete equipment.

At the same time it was intended that the artillery thus procured would serve as siege artillery until the time when the artillery meeting the requirements set forth in the circulars would start to come in, when the other artillery would gradually be turned over to the fortresses.

This decision was approved by the War Minister, and the Chief Artillery Department, without awaiting the results of the circulars sent out for bids of the manufacturers, applied to foreign manufacturers with the request that they submit detailed information and data of the 15-cm. howitzers and 22 and 24-cm. mortars of the newest types they had on hand. To this request responded the following manufacturers: Schneider, Krupp, Ehrhardt, Scott, Vickers and Bofors, which submitted detailed charts and ballistic data of the weapons they offered for sale. After considering these offers at the A.G. C.A.D. the Chief Artillery Department ordered abroad an entire special

commission at the beginning of 1907 for the purpose of testing on the proving ground of the factories by firing the guns offered and to make final selection of the best and most suitable models. The commission decided in favor of those of the Krupp and Schneider works, and the Chief Artillery Department was ready to make the purchases when it became known that the Rhine works (Ehrhardt) was finishing a type of 15-cm. howitzer which almost met all of the requirements laid down in our circulars. In order to familiarize itself with this new howitzer the commission made a second trip abroad, at the end of 1907, this time to the Ehrhardt works.

On the 15/28 February of 1908 there was published the official report by the A.C.C.A.D. of the work of this commission. It was realised that the tests made justified the award of orders to this factory without any further tests for the 6-inch howitzers of its make (muzzle velocity 1250 f.s. and weight of shell 100 funts (90 lbs.)), and that it was necessary to decline to award the proposed orders to the Krupp and Schneider factories. But at this very time there was received information that these two factories had achieved the same results as the Ehrhardt factory. Therefore it was decided to include them also in the placing of orders, and together with them also the Vickers factory, which was offering a new model howitzer.

Thus it became apparent that if things were not rushed it would become possible to satisfy the requirements of our siege regi-

ments and to at once receive weapons which would meet the requirements of the original circular of proposals.

On the basis of this, the Chief Artillery Department sent out to each of the Russian and foreign manufacturers on the 28th of March (April 10), 1908, a copy of the "specifications of the new models of siege artillery" with conditions of the circular of proposals, and requested reply not later than 1/14 May, 1908, as to whether or not they could submit by the 1/14 January of 1909 charts of the projected equipment. In the conditions of the Chief Artillery Department was stated that orders for bulk of types selected for use by our artillery would have to be executed in Russia, by Russian workers and of Russian materials.

Then, later in 1908, there was made another trip abroad by our commission to foreign factories and another proposal sent out to the manufacturers, aside from the previous circular of proposals, to the Krupp, Scott, Schneider, Vickers and Befors armament factories to deliver by 1/14 September of 1908, at the main artillery proving-ground for tests 6-inch howitzers using 100 funt (90 lbs.) shells, muzzle velocity 1250 f.s. with a view to supplying 52 of such howitzers.

At the close of 1908 and the early part of 1909 there were tested by firing on the main proving-ground and by transporting to the officers artillery school, makes of the following five factories: Krupp, Ehrhardt, Schneider, Scott and Befors. The howitzers of the Scott and Befors factories were considered to be unsatisfactory for

large orders, the others - satisfactory, and the A.C.C.A.D. gave preference to the howitzer of the Schneider make.

Weight of shell ..... 100 funt (90 lbs.)
Muzzle velocity ..... 1,300 f.s.
Angle of sight ..... (0--40° vertical; - 3° ⊥ 3° horiz.
Wheel base .....4.5"
Weight ..... 177.5 puds and 196 puds.*

At the same time the A.C.C.A.D. found it necessary to advise the Schneider factory that in executing the bulk of the order the weight of the gun and shield should not exceed 169 and 185 puds, respectively, and that one of such guns was to be delivered at the main proving-ground before the bulk of the order was delivered.

After this, in April, 1909, the A.C.C.A.D. continued to examine the conclusions of the commission on the selection of types of guns for the siege artillery in respect to that presented by the Vickers, Bofors and Ehrhardt factories (in response to the first circular of proposals) and the new patterns: 11-inch mortars, 8-inch howitzers and 42-lin. cannon. Here it was noted that our home factories had failed to respond to the proposals of the Chief Artillery Department: The Putilovsk, Perm and Bryansk factories had failed to submit any projects. The Obukhovsk factory had also failed to respond, but promised to submit by August of 1909 a ready gun-carriage for a 6-inch howitzer, and by autumn of the same year to submit its project for a 9-inch mortar and 6-inch siege gun.

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* - A pud equals 36.11 lbs.

Later, during 1909, there were tested on the main proving-ground the models presented: Krupp's 42-lin. and 6-inch siege guns, and Schneider's 42-lin. gun, 6-inch howitzer, and 6-inch siege gun. As a result of these tests, completed in 1910, preference was given the Schneider factory.

Thus, while these tests were conducted (on foreign proving-grounds as well as on our own) the matter of the decision to immediately order equipment for the purpose of supplying the shortage in our siege regiments, even though it may not be as up to date as that ordered in pursuance of our circulars of proposals, but which would nevertheless supply modern weapons of siege type - 6-inch howitzers and 8-inch mortars, was overlooked. This individual question naturally resolved itself in the general question of the selection of new types of weapons, in view of the fact that foreign manufacturers receiving our circulars competed with each other and endeavored to submit at the earliest possible time their best models; therefore, to place orders for less up to date models of weapons did not seem advisable, since the gain in time was not very important.

For example, the well known German Krupp works, interested only in money making, and not being concerned with the fact that Germany was preparing for war with Russia, offered us for test the 28-cm. howitzer which the factory had perfected, which according to their claims "had proved very successful and was making a good impression by reason of its mobility and great power."

In a letter from the representative of the Krupp works dated December 8, 1910, there were emphasized the following interesting points, which are reproduced here in condensed form:

"The requirements of the heavy guns for overhead fire laid down in the Russian circular of proposals, with maximum range of six or seven kilometers, in accordance with modern views on heavy artillery, can no longer be considered sufficient. In artillery circles of other great powers such guns are expected to be effective at a range of about eight or ten kilometers; which is considered quite important in view of the tactical conditions involved in the occupation of positions, the effect of fire and the bringing up of ammunition for such batteries. Particularly, the overhead heavy gun should be capable of directing its destructive fire against the most powerful fortress structures - concrete and armor, while itself being, as far as possible, protected against fire from the fortress.

"It will hardly be possible to bring up to the very line of any fortress equipped with long range guns, heavy overhead batteries, and to insure their supply with ammunition if the attacking batteries, of short range, are to be required to occupy positions about six or seven kilometers from the main defensive line.

"This is why there has been such insistent demand for large long range overhead heavy artillery which could be operated from positions beyond the range of direct shrapnel fire from fortress guns.

"This requirement is entirely satisfied by our 28-cm. howitzer using a projectile of 340 kls. (830-½ funts*) with muzzle velocity of 1,115 f.s. and range of over 10,000 m.(about 10 kilometers). Such superiority of ballistic qualities in comparison with results of the mortars specified, having a range of not more than six or seven kilometers, appears to be very important. We have developed a pattern which in every respect meets the requirements that are faced under conditions of attack in a way that is superior to the conditions of defense, and affording quick emplacement.

"Our howitzer has a wheel carriage and can rapidly be placed in action from the march or vice versa. It can be transported on poor roads with the aid of its limber and tractor. Our tests in this respect produced very satisfactory results."

This 28-cm. (11-inch) howitzer was tested at the Krupp factory in the presence of Generals Durlyakher and Zabudsky, who were sent to Germany for the purpose. The results of the tests were examined by the commission of the A.C.C.A.D. only on the 13/26 of March, 1912. The principal features of the Krupp howitzer were considerably above our specifications for the 11-inch mortars, with the exception of its weight under combat conditions:

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* - 1 funt equals .9 of a pound.

	28-cm. - Krupp howitzer	Our specifications for 11-in.mortar
Muzzle velocity (f.s.)	1,115	850
Weight of projectile (funt)	830	340
Traverse	5°	3°
Maximum elevation	65°	60°
Maximum range	about 10 kilometers	about 6 kilometers
Weight, under combat conditions (puds)	847	600 puds
Weight, under march conditions "		
Gun-carriage	497	about 300 "
Gun	544	" 300 "
Rate of fire - about two rounds per minute.		

The Krupp works were asked to deliver, at their own expense, one such model to the main artillery proving ground in Russia for tests there. The representatives of the Krupp works asked that their howitzer be procured on the same terms as were procured the 11-inch mortars from the Schneider factory and the Rhine works. This howitzer was not acquired.

The 11-inch mortar of the Rhine factory came more closely to meet our requirements, but the 11-inch Krupp mortar was much superior to it in many respects. The principal features of the 11-inch mortar of the Rhine factory were as follows:

Muzzle velocity	840 f.s.
Weight of shell	840 funts.
Maximum elevation	44½°
Maximum range	2,320 sashens[x]
Weight of gun with entire equipment	700 puds
Weight of gun under march conditions -	
Gun	308 puds
Carriage	393 puds
Rate of fire - about one round per minute.	

x - 1 sashen equals 7 feet.

The fire effect of this gun was found to be lacking; aim was considered satisfactory. The A.C.C.A.D. decided to test this model on the main artillery proving-ground, finding it to be of original design and deserving consideration.

This is the state of affairs affecting the question of the introduction of new types of heavy siege artillery: Having commenced in 1905, it was being considered and tested on proving-grounds and finally concluded and ready for issuing bulk orders in 1910.

This most important question so vitally affecting the army was being worked out exclusively by the A.C.C.A.D. and all the work of the selection of models of weapons for heavy field, siege and fortress artillery was carried on independently by the Chief Artillery Department.

But when all of the important technical work had been completed, and the phase of the question had reached a point where final decision could not well be made without consulting the General Staff, the Chief Artillery Department, in its report of October 19, 1909, inquired of the War Minister if he did not consider it advisable to appoint to the commission for the selection of types of weapons for the siege and fortress artillery a representative of the General Staff. This was agreed upon, and by the end of 1909 Lieut.Colonel Romanowsky was detailed as a member of this commission, who was succeeded in 1911 by Yakimowich, who in turn was succeeded by Baskow; besides, there also participated in the work of the commission Generals Elchaninow, Svechin, Koslowsky, and others.

Thus constituted, i.e., having representatives of the General Staff, the commission continued its work, and as a final result there were accepted for use of our heavy and siege artillery, the following types of guns:

1. Mortar artillery - 48-lin. howitzer, model 1909.
2. Heavy field artillery - 42-lin. accelerated fire, model 1910, and 6-inch light field howitzer, model 1910.
3. Siege artillery - 6-inch heavy fortress howitzer, model 1909, 6-inch siege gun, model 1910, 8-inch siege howitzer, model 1911, 11-inch siege mortar, model 1912.

In all seven types of heavy guns.

The first three of these guns had been fully supplied to the troops at the outbreak of the World War as required by our 1910 tables of mobilisation. The 6-inch siege guns, which were very complicated and difficult to manufacture had been ordered from the Schneider factory and at the outbreak of the war there were only four such guns in the hands of the troops. Of our own factories only the Putilowsk armament factory undertook the manufacture of these guns and was to have ready 36 pieces not earlier than 1916.

Of the 11-inch siege mortars 16 pieces were ordered from the Schneider works in 1913. The first of these were to be delivered in February of 1915. The war delayed delivery of these mortars; besides, the French government required the Schneider factory to make similar mortars for use of the French army, and therefore there was established a priority in the delivery of these guns - four pieces of these at a time were to be delivered to us for every four pieces delivered to the French.

It should here be stated that the tests carried out in 1912 with the 11-inch mortars (on Beresan Island) led our commission to the conclusion that notwithstanding the unquestionable power of this weapon, it would be insufficient to produce decisive results in dealing with modern fortifications and that this object might be reached only by the introduction of the 16-inch mortar. The work on this mortar was then (early part of 1913) turned over to the Schneider factory, which accepted the specifications for same as laid down by the A.C.C.A.D. (Agreement with representatives of the factory dated April 30, 1913). However, when the manufacture of this mortar was started the Schneider factory encountered great difficulty and recommended that the specifications as to muzzle velocity and weight of shell be lowered. The A.C.C.A.D. agreed on this. Of course, this mortar, the work on which had only commenced in the middle of 1913, could not be finished by the beginning of the World War, but it had reached such a stage in the work that it was hastily completed, placed on an improvised carriage (similar to the railway carriage of the German 16.5-inch howitzer) and in this condition forwarded to the active army (report of our receiver, dated November, 1914).[x]

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x - According to the office of the Inspector General of the Field Artillery at headquarters of the commander-in-chief, there were no 16-inch mortars on the Russian front - apparently, it had never reached Russia.

Representatives of the General Staff very frequently presented their views, in which the commission concurred, or which was at least duly considered by it in the selection of types of heavy artillery.

For example, in 1911, Elchaninow and Baskow expressed themselves in favor of the low carriage for the 6-inch howitzer because of its advantages in respect to mobility, fire and in concealment from enemy fire; the majority of the commission agreed on this.

In April, 1912, the Chief of the General Staff, General Shilinsky, in concurring on the report of the representatives of the General Staff, stated to the commander of the Chief Artillery Department his views of the necessity for going over the question relative the extent to which the 8-inch and 9-inch calibers meet the requirements of armament of siege parks.

In the opinion of the Chief of the General Staff, the 9-inch caliber so far appeared quite powerful and might yet be included in the siege artillery. However, "there are already types of 11-inch howitzers available which can be transported over ordinary roads and used as siege weapons.

"Permanent fortifications now resort to such concrete and coast defense protection that can be destroyed only by fire from guns not less than 11-inch caliber and against which the 8-inch and 9-inch calibers must be recognized as ineffective.

"For the purpose of destroying cover made of ordinary material in field fortifications the 6-inch howitzer is sufficient, and fire of the 8-inch and 9-inch calibers against such cover and batteries, even of siege artillery, would be uneconomical and undesirable in view of the difficulty in bringing up its cumbersome equipment.

"Against our western frontiers there are no such lines of antiquated fortified barriers which would justify maintaining the 8-inch howitzers.

"The gun-carriage with which General Durlyakher is experimenting for the 8-inch howitzer could be ready and tested not sooner than 1914, and will therefore be too late for the placing of orders.

"Should not the money designated for the 6-inch howitzer be applied for other uses."

The A.C.C.A.D. stated that the proposed gun-carriage for the 8-inch howitzer and 9-inch mortar with which General Durlyakher was experimenting met standard requirements and should be submitted for tests. But inasmuch as the views on weapons for siege and fortress artillery had undergone some change, it was necessary to again reconsider the question of the caliber and type of such weapons in a special conference of the representatives of the A.C.C.A.D., participated in by representatives of the General Staff and the Department of Military Engineers.

The conference was held up until the conclusion of the tests made on the Berezan Island, and was held in the summer of 1913.

In May of 1912 General Elchaninow, in his dissenting opinion of the official report on the gun-carriage for the 11-inch mortar stated that "the time of the 11-inch mortar has passed." Even the 11-inch howitzer he considered impotent for use by coast artillery and recognized the necessity for the development of a 12-inch, or better, 14-inch howitzer and to "cancel the orders for the bulk of 11-inch howitzers for use of coast fortifications, which was under way, no matter how perfect they may be."

Examining this question, the A.C.C.A.D. decreed:

1. Not to delay the tests of the developed 11-inch howitzer and to place orders for bulk production after it had been completely tested, because to develop a howitzer of larger caliber and greater muzzle velocity would require much more time than that required for the completion of the tests of the 11-inch howitzer which had already been developed.

2. Howitzers of 12-inch caliber will vary but little in effectiveness from the 11-inch howitzer, and therefore, there is no necessity for its development. It is now necessary to commence work on the development of a howitzer of the largest possible caliber, say 16-inch.

In November of 1912, in his dissenting opinion on the question of the type of shell for the 11-inch mortar of the Schneider make, General Ilchaninow wrote that "tests of ammunition will be useful provided they do not hold up the order for 11-inch mortars from the Schneider factory. In the future it will be necessary to have one with far greater muzzle velocity, but not at the price, however, of lowering the weight of the shell. A lowering of it to 640 funts will bring it down to that of the 10-inch, i.e., reduce its effectiveness. Lessened mobility may also be avoided - an example of which is to be found in the howitzer of the Krupp works."

Regarding the official report of the A.C.C.A.D. of December 30, 1912, in respect to the preliminary tests of the 11-inch mortars of the Rhine factory, the same General Ilchaninow stated his dissenting opinion: "I believe that at all events, it is necessary to endeavor to increase the range for mortars of larger caliber.

"Accelerated fire is of less importance in view of the greater time required for the flight of the shell, and therefore, the comparative delay in observation of individual shots.

"Greater muzzle velocity, however, should not adversely affect the weight of the shell or its effectiveness."

In February of 1913, General Ilchaninow expressed himself against the adoption of a shore gun-carriage for the 11-inch mortar for the purpose of placing it upon a wooden base in accordance with General Durlyakher's idea, believing that the money appropriated for

artillery could be used to greater advantage in providing weapons of new make instead of the adaption of old materiel. In his dissenting opinion he wrote, among other things: "The 11-inch mortar is now being recognized to be ineffective, and in Germany there is being developed a 35-cm. mortar, and in Austria a 42-cm.; more than twenty 30-cm. mortars have already been completed.

"Therefore, it would be better to consider the development of these siege mortars of large caliber, the money for which has already been entered in the special estimates for 1912 and 1913. It would be of greater advantage also to hasten the procurement of the 11-inch mortar of the Schneider make, than to expend time and money on experiments with the old 11-inch mortar."

In reply to this dissenting statement, Generals Shklyarevich and Durlyakher, members of the A.C.C.A.D. submitted a memorandum in which they pointed out that the proposed remodeling of the gun-carriage, only one such carriage, for the time being, had for its purpose the preparation of something suitable for future use prior to the introduction into the service of the 11-inch mortar of the Schneider make. That this remodeling will cost less than 2,000 rubles, will be ready in a few months, and will not affect either the order for the 11-inch mortars of the Schneider make or the development of mortars of larger caliber, which the committee had already begun.

It will not be necessary to order any ammunition, inasmuch as there are sufficient quantities of these of the 11-inch mortars and 11-inch cannon of the years 1877 and 1886, which may be used in firing the Schneider 11-inch mortar.

As a result, in March of 1913 the Petersburg Arsenal was required to remodel one 11-inch gun-carriage in accordance with the specifications laid down by General Durlyakher; later this was of considerable use in the siege of Peremyshl.

In general, it is to be admitted that the Artillery Committee of the Chief Artillery Department and our General Staff, at least in their separate individual representations, prior to the outbreak of the World War clearly represented the significance of large caliber guns and undertook appropriate measures, although these were not very intensive, for the purpose of developing more perfect and more powerful types of weapons of siege type.

Of course, the artillery committee had to a considerable degree to depend on foreign manufacturers, and was without knowledge of much that was being done in this line by our probable enemies - the Germans. This lack of knowledge on the part of the artillery committee of the progress that was being made abroad in this line was the basis of serious criticism by the Supreme Investigating Commission appointed on the 25th of July (7th August), 1915. At the same time, the circumstances in this respect were as follows:

The entire intelligence service relating to foreign armies came under the authority of the Chief of the General Staff, who had at his disposal special agencies for the purpose, members of the military intelligence service.

Literature served as the principal source of information regarding foreign armies for the Chief Artillery Department. There were also received occasional accounts from artillery officers detailed abroad, and reports of military agents relating to artillery questions.

The military publications source in the period immediately preceding the World War was very meagre in regard to newly developed artillery problems and construction, particularly so in respect to that pertaining to Germany. Information obtained through artillery officers serving abroad was of a sporadic and casual nature.

Information pertaining to foreign heavy artillery at the disposal of the A.C.C.A.D. in 1906 was entirely based on the various data and articles published in standard foreign military publications. It was known, for example, that at that time there existed in Germany heavy artillery with combat organisation and equipment of the 10-cm. gun of the 1904 model, the 15-cm. heavy field howitzer of the 1902 model, and the 21-cm. mortars. The siege artillery comprised, in addition to the above, various old types, like the 15-cm. long gun, which were later replaced with the 13-cm. guns of the 1910 model.

Data pertaining to the German, French and Austro-Hungarian heavy artillery that were available at the A.C.C.A.D. in 1913 are given in Tables 1, 2 and 3, below.

The Chief Artillery Department had in all 10,000 rubles available to cover the cost of officers detailed abroad, of which one-third was allotted to the Artillery Academy for the purpose of detailing officers of the Academy for instructional purposes, and the remainder was expended in ordering abroad officials of the technical services of the main artillery proving-ground and members of the A.C.C.A.D. The main purpose of this was to familiarize these with the corresponding services abroad, with foreign factories, with the development of new types of artillery there, and in part, for the purpose of acquiring a practical knowledge of foreign languages.

General Kuzmin-Karavayev, in charge of the Chief Artillery Department, pointing out the necessity of basic preliminary tests of newly adopted artillery equipment, admitted that the tests were being conducted entirely too slowly and that the reason why it took so long was not only because of shortcomings in the organization of the A.C.C.A.D. but also because of the fact that the latter was not sufficiently acquainted with the progress that was being made abroad in artillery development. General Kuzmin-Karavayev considered, for example, that the extremely slow development of the 12-inch gun at Kronstadt had been occasioned not only by the lack of proper equipment at the Metal Works, where orders for certain parts of the gun

had been placed, but also due to insufficient familiarity with modern construction and arrangement of guns of large caliber on the part of officers of the A.C.C.A.D. who "had first learned of the construction of the gun while work upon it was being carried on at the Metal Works, and who did not possess sufficient knowledge to competently supervise the work upon the weapon."

This situation was explained by General Kuzmin-Karavayev as being due to a lack of funds which would permit the proper observation of the progress that was being made in this direction by factories which are known throughout the world for their technical achievements," such as, for example, the Krupp, Schneider, Vickers, etc.

Reports of military agents, in view of the intricate make of present-day artillery and their unfamiliarity with it, often supplied material which was of no value or which fell short of describing the artillery involved, and from which it was impossible to draw any conclusion as to the matter reported upon.

In view of the insufficiency of such a state of affairs in procuring information, the Inspector General of Artillery made a report to the War Minister on July 19 (August 1), 1909 - No. 114, requesting that two officers, artillery technicians, be detailed to assist our military agents. This measure was approved by the War

TABLE 1.

GERMANY

Gun and caliber mm.	Muzzle velocity m/s	Weight of Shell kg.	Range m	Weight of gun kg	Weight of gun with carriage - kg.
10-cm. accelerated fire gun (105-mm.)	560	18	10,750	1345	?
15-cm. long gun (149.7-mm.)	495	42.3	10,000	3365	?
15-cm. heavy howitzer model 1902 (149.7-mm.)	350	39.3	7,450	1076	?
21-cm. steel morter (211-mm.)	308	119	8,200	3000	4,820
12-cm. heavy gun (120.3-mm.)	460	20.2	7,250	1300	?
21-cm. bronze mortar (209.3-mm.)	214	119	7,000	3079	?
8-cm. gun on armored carriage	457	1.67	3,000	142	?
18-cm. gun, accelerated fire	695	40.1	14,400	?	?

REMARKS:- According to latest intelligence reports there was also a 28-cm. coast mortar: Caliber 283-mm. (11.1-inch) with maximum range of 10,435 meters (4,900 sashens*). There were being developed mortars of calibers 32-cm., 34.5-cm., and 42-cm.

* = 1 sashen equals 7 feet.

Minister and was in turn submitted for the consideration of the War Council which recognized it as deserving of favorable consideration.

Because of financial considerations this measure, however, failed to be carried out at an early date. The Inspector General of Artillery again applied to the War Minister on February 28, 1912 regarding this matter (No. 138) calling his attention to the small amount of money that was involved (10,760 gold rubles) and stressing the importance of the matter.

But the concurrence of the Minister of Finance was withheld up to the outbreak of the World War.

TABLE 2.

AUSTRIA

Gun and caliber mm.	Muzzle velocity m/s	Weight of shell kg		Range m	Weight of gun kg	Weight of gun with carriage - kg
12-cm. gun, model 1880 (120-mm.)	516	17.5		8,000	1,700	3,650
15-cm. siege gun, model 1880 (149-mm.)	484	33		8,500	3,200	5,520
18-cm. siege gun, model 1880 (180-mm.)	258	58	shell	5,100	2,030	4,360
		64	shrapnel	4,500		
15-cm. battery, howitzer, mod. '99 (149-mm.)	293	38	shell	6,200		
		37	shrapnel	5,600	1,190	2,770
15-cm. mortar, model 1880 (149-mm.)	204	33	shell	3,500		
		37	shrapnel		625	1,190
24-cm. mortar, model 1898. (240-mm.)	258	133		5,800	2,162	7,440
9-cm. field gun (87-mm.)	448	6.4		?	487	1,327
30.5-cm. mortar	340	382		7,500	?	?

REMARKS: - The 30.5-cm. mortars were intended as equipment for the advance echelons of siege parks, for the purpose of following immediately behind the field army, in order to support it in attack against strongly fortified positions.

It is clear that under these conditions, it was impossible to expect up-to-date information on the progress that was being made abroad. Nevertheless, the more important military developments were known to the A.C.C.A.D., although of course, this was always subjected to considerable delay in reaching it. So, regarding the experiments in Austria with the 12-inch mortar the A.C.C.A.D. only found out in the beginning of 1912, and of the experiments in Germany with the 16-inch mortar it learned in the early part of 1913. It is of interest to note that of the tests of the latter we had found out only

TABLE 3.

FRANCE.

Gun and caliber mm.	Muzzle velocity m/s	Weight of shell kg	Range m	Weight of gun kg	Weight of gun with carriage - kg
120-mm. short cannon, model. 1878	290	20.35	7,500	550	1,475
155-mm. short cannon	280	40.5	6,400	102.5	3,139
155-mm. howitzer	?	43	6,500	-	3,200
155-mm. gun,mod.'77.	469	40.5	9,000	2,530	5,785
220-mm. gun	443	103	10,000	6,030	11,680
220-mm. mortar	230	118	5,400	2,000	4,400
270-mm. mortar	290	150	7,000	4,450	7,250

REMARKS: - According to available information, France intended to adopt the 6-inch guns and howitzers and the 11-inch Schneider mortars which were tested and accepted for our use.

after the A.C.C.A.D. itself had, on the basis of tests at the Beresan Island, recognized the necessity of the introduction into the service of the 16-inch mortar as a siege artillery weapon. And if the Chief Artillery Department had at its disposal a great gun factory (instead of the remodeling shop it had in Petersburg on the corner of Liteinoye and Sergievsk streets) and if in general our military industry had been maintained in accordance with the same high standards of our western neighbors, then of course, we would have had a different way of developing and perfecting so highly important a matter, which so vitally affects modern warfare. And inasmuch as this was lacking, it was inevitable that we drag at the tail of European armies and always fall behind in making improvements, the ideas of which not infrequently had originated by us, but because of the lack of technical means, became the property of foreign manufacturers.

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CONCLUSIONS

When in 1908 the Imperial Duma had undertaken for the first time a detailed consideration of the estimates of the War Minister, having already been burdened with the grievous results of the Japanese war, it was even more troubled by the sad state of affairs that was disclosed in our army and its unsuitability for coping with modern warfare conditions.

A thorough realization of the danger which was threatening the country pointed to the urgent necessity for the complete reorganization of the army at the earliest possible time.

Notwithstanding the complete agreement between the Duma and the former War Minister, General Rediger, from the outset on the question of the importance of this matter, there had soon arisen considerable disagreement as to the means of accomplishing it.

When the War Department was reproached by the Duma for being too timid in seeking funds for the needs of the army, General Rediger pointed out that the rulings of the Council of Ministers precluded more extensive expenditures. The War Minister submitted to the limitations imposed, as a result of which the "minimum time limit" for the proper reorganization of the army and bringing it up to date was to be extended over a period of from ten to twelve years.

The Duma was not satisfied with this state of affairs. However, on its own initiative, it would not increase credits for meeting the military requirements, acting on the strength "of the principle of the good manager and benevolent financier" who managed to get into the Duma primarily by reason of the efforts of the budget committee - "never to put before the government more expenditures than it asked for itself." The Duma, during the first years of its existence, was reproached, not without justification, that it was endeavoring to act, so to speak, "by inside, devious, quiet methods," without resorting to open declarations on public gatherings. "If we are to resort to this," asserted Guchkow in May of 1912, "then you can be sure that the cup will be overflowing and there will be nothing but cries of disgust and voices of protest." Of course, neither "devious, quiet methods," nor "cries of disgust and protests" could serve to help matters much.

At the same time the War Department had failed to manifest either the necessary energy or to endeavor to take advantage of the favorable situation that had developed in the Duma. Moreover, from year to year there were left over large sums of money which the War Department had not expended, and urgent military needs were left without being taken care of. Such a state of affairs continued until 1915 when, during the World War, in an unfortunate way, there were discovered many-sided defects in the army and great failure to provide

for material, which were repeatedly pointed out by the Duma.

The failure to make ready use of the money appropriated by the Duma is somewhat explained by the poor state of the development of Russian industry in general, the manner of opening credits and the tardiness of the supply of material, brought about by the legislative system and the existing beaurocracy. It was not quite clear to the Duma why the War Department, as it seemed, did not desire to "increase its demands and by so doing reduce the time necessary for placing the army on an efficient footing." At the same time the War Department could not "increase its demands" because the Finance Minister "cut off" its credits and the interdepartmental conferences were similarly disposed when examining proposed estimates. The Duma had heard of this, but in its opinion, "this was hardly a justifiable excuse for the War Department. A feeling of duty and a thorough realization of it, could have easily overcome such obstacles, for the War Department could have always relied on the full support of the Duma in this matter."

In the opinion of the Duma, to a considerable degree justified, an explanation for this state of affairs was to be looked for in another direction. Beginning in 1910 the relations of the War Department with the Duma's committee on national defense was undergoing a change - the War Department commenced to divorce itself from the Duma. The desire of the Duma to have full representation in the work of the department and to exert an influence upon

it encountered much opposition, in which respect the War Department fell back on its interpretation of article 96 of the ~~general imperial~~ organic laws. By the autumn of 1912 the presence of the various heads of the department at the committee conferences of the Duma became very rare; explanation of some of the questions arising before the committee, in view of the secrecy maintained, were not forthcoming.

The increasingly alarming fear of the Duma concerning the condition of the army was inspired partly by the general political situation, partly by the lack of confidence in the work of the various representatives of the War Department and particularly that of the War Minister, General Sukhomlinow. Within the walls of Tavrichesk Court the War Minister appeared very seldom. "We have the pleasure of seeing our War Minister here in the Duma practically for the first time - he does not customarily visit us, and we have as yet never heard his voice from our platform" - said A. I. Shingarew, a member of the Duma at the session of July 10, 1914. And this was after General Sukhomlinow had been War Minister for a period of five years. "I have learned with great disappointment that even our War Minister at the conference called by the chairman of the Duma, showed a complete lack of knowledge of the figures involved in the project which he came to advocate," said Shingarew at that same session.

At that same session, on examining the bill "regarding a large military program," Deputy Efremow of the Duma declared that the War Ministry as constituted at that time represented "a danger to the defense of the fatherland."

The Duma had no confidence in the work of the national defense carried on by our General Staff, the organization of which it believed to be unsatisfactory. Some of the activities of the General Staff brought forth the criticism of the Duma, but it did not have a full understanding of the activities involved; military secrets were jealously guarded from it and its committee.

We have stated above that beginning with the year 1910 there was noticable an effort by the War Department, in the way of interpreting article 96 of the ~~general imperial~~ organic laws, to restrict the sphere of action and criticism of the Duma by drawing a line between civil and military legislation. In the promulgation of the law of July 5, 1912, against espionage, there was given a resume of questions which were beyond the pale of criticism by the press. This resume was so broad in sphere that it, in reality, barred all public criticism and consideration of military questions and the implied inhibitions were of such a nature as to render one liable to serious charges and even more serious punishment.

The activities of the War Department, the life of the army and its needs were almost closed to public control and to public attention.

PART II

SUPPLY OF RIFLES AND MACHINE-GUNS.

RIFLES

RATE OF SUPPLY AND RESERVE OF RIFLES AT BEGINNING OF WAR.

The matter of computing the general requirements of rifles for the army was carried on by the Chief Artillery Department, based on the following data: Mobilization tables, setting forth the strength and organization of the army when brought up to war strength; lists and tables of equipment for military units; reserve rate of supply of rifles.

These data, with the exception of the tables of equipment, were prepared by the General Staff, which submitted it for necessary approval. The Chief Artillery Department, as was stated above, in no way participated in the preparation of the tables of mobilization and therefore had no knowledge of the number of men available (reserve and militia) or any information pertaining to the mobilization units. It was informed only, for the purpose of supplying equipment:

1. Of the preparation of lists of component parts of military units or establishments and the number of such;
2. Of the definite rate of supply of certain equipment, referred to in general as "mobilization reserves."

The reserve supply was divided into six categories: Ten percent; five percent; fortress; second phase reserve battalions; war time organizations; state militia.

Based on the above, approved by the War Minister and War Council in 1910 - 1912, there was formed within the Chief Artillery Department a supply branch for the purpose of meeting all of the army rifle requirements. Below are given summaries of the totals of this supply branch, showing the number of rifles called for and the number actually on hand at the outbreak of the World War, i.e., July 20 (August 2), 1914.

3-lin. rifles	Called for	Available on July 20, 1914
Infantry	3,270,320	3,306,505
Dragoon	464,405	530,898
Cossack	189,598	200,622
Total	3,924,323	4,038,025

In addition to the above there were the following 3-lin. rifles which needed remodeling:

Infantry	120,572
Dragoon	9,374
Cossack	3,772
Total -	133,718

	Called for	On hand July 20, 1914 - 118,657; the shortage of 167,602 carbines affected mainly the artillery.
3-lin. carbines	286,259	
In all, 3-lin. rifles and carbines ...	4,210,582	4,290,400
Pistols	436,210	424,434

From the above figures it is clear that to the question as to whether or not the Chief Artillery Department had carried out the requirements of the supply of the army with rifles at the outbreak of the World War - the answer is: Yes.

But here naturally arises another question: Were the requirements sufficient? The answer to this is seen from the following:

1. The number of our regular army troops - according to the figures of th e War Minister given in his report on the activities of the War Ministry in 1914 - at the outbreak of the war amounted to 1,232,738.

2. According to the tables of mobilization prepared by the General Staff in 1910 (which were adopted September 1, 1910, and in accordance with which the first orders were issued for bringing the army up to war strength by calling in the reserves on July 16 and 18 of 1914) there were designated from the reserves:

Soldiers 2,291,780

Previous service men (ratniks) of the first phase of the militia 242,067

Total - - 2,533,847

3. In accordance with the order of March 11, 1911 for the reorganization of the state militia, which placed the militia on separate priority lists, approved January 29, 1912, there were to be called into active service for the purpose of forming militia units:

Previous service men (ratniks) of the first phase of the militia 707,664

Aggregate - - 4,474,249

If we are to add to this the cossacks, then we will find that upon completion of mobilization in August of 1914, the strength of our army was not less than 4,900,000 men.

Then, in the order of the successive conscriptions for supplementing the army and navy, there were drafted:

RECRUITS

In October, 1914 715,389
In November, 1914 673,335
In March, 1915 632,000
In July, 1915 932,022

Total - 2,952,746

Enrolment of previous service men (ratniks) of the first phase militia:

MILITIA PREVIOUS SERVICE MEN (Ratniks)

From September, 1914 to April, 1915	1,580,000
In August, 1915	300,000
In September, 1915	600,000
Total - -	2,480,000

In all there were called into the service after the completion of mobilization, 5,432,746 men.

Here are two figures which we have to bear in mind:

About five million men - comprising the army on completion of mobilization (August, 1914);

About five million men - inducted into the service in the course of the first year of war.

Now there naturally arises the question: Was this foreseen in the slightest degree by the agency (i.e., the General Staff) whose business it was to provide for this?

The answer is clear: It was not. And this in a most striking manner. Actually:

1. In 1910, at a meeting of a special commission convened at the headquarters of the General Staff for the purpose of considering "the distribution of ordnance reserves," presided over by the first deputy chief of staff, General Obruchew, in considering among other things, the fact that there were on hand 810,000 old-make rifles (4.2-lin.) and 275,000,000 rounds of serviceable ammunition, it arrived at the conclusion that on supplying the militia units with these rifles there would still be left over 400,000 of these; that the current work at

our armament factories is increasing the output of 3-lin. rifles, and that in case of war it would be possible to manufacture 2,000 rifles per day; that the 400,000 rifles in question were uselessly encumbering the already overcrowded storage facilities, and therefore (in article 5 of its official report) the commission recommended that: The remaining old-make rifles, which are surplus, be taken out of storage and converted into hunting guns, that they be used in arming Russian citizens in frontier territory and Russian rifle societies, and that what would then be left should be scrapped. This official report was submitted to the War Minister, General Sukhomlinow, through his assistant, General Polivanow, together with a letter from the chief of staff inquiring if he would kindly concur in the recommendations of the commission relative the disposition of the 400,000 rifles which appear to be surplus after all militia units are supplied with these. The War Minister, in a letter dated November 19, 1910, concurred in the recommendations of the commission.

2. In the same year, 1910, by direction of the War Minister, the General Staff ordered to cut down the mobilisation supply of 3-lin. rifles by 338,897 pieces, to replace these with 245,524 old-make rifles (4.2-lin.) received in their stead from the state militia; in general, to lower the supply of reserve rifles by 93,373 pieces.

3. In 1912, there were approved special tables calling for the induction into the service of 707,000 "ratniks" for the purpose

of forming militia units. This change should have brought about a reconsideration of the figures of 1910 in regard to the rifles, but this was not the case.

4. In 1912 there were released:

To the Bulgarian government	50,000	3-lin.rifles;
	25,000	4.2-lin.rifles (old-make).
In 1913 - To Mongolian government	10,000	3-lin. rifles.
In 1914 - To Serbian government	120,000	3-lin. rifles.
Total -	180,000	3-lin. rifles.
	25,000	4.2-lin. rifles.
Aggregate - -	205,000	rifles.

In place of these 205,000 rifles there was no order given for additional rifles to the factories; i.e., these rifles were disposed of as if they were surplus.

5. The fact was overlooked that each year the number of soldiers on reserve was increasing, and that these would be on hand upon mobilisation - which actually happened to be the case in 1914.

6. Finally, the very obvious reports reaching the General Staff of the increasing military activity and preparations of our probable enemy was completely ignored. This should inevitably have brought forth an increase in our military forces and consequently, an increase in suitable equipment.

This is the kind of "foresight" of the agency of the War Minister to which in 1910 was transferred entire administrative power

over all questions of military supply. And the results of such "foresight" were not long to come to the surface in the very beginning of mobilization - because the four and a half million rifles on hand could in no wise suffice to supply the army of five million men.

And what is to happen later? Later all dependence was placed in the supply of the 2,000 rifles per day which our factories were supposed to turn out beginning with the announcement of mobilization. But here also - was it proper to suppose that these 2,000 rifles would be coming in with the first day of the war? Were our factories prepared for this? The necessity for the development of their productivity for such a rate of daily output was recognized back in 1910, but the law authorizing expenditures for this purpose was not passed until June 24, 1913, and the expansion of the factories was expected to be accomplished between 1913 and 1916.

But even this not too strenuous effort affecting the rifle factories was largely only imaginary, since with the passage of the law (also not with any too great haste) for their expansion - these same factories, by a sharp curtailment in orders for rifles, particularly in the period immediately preceding the World War, were neglected to such an extent that to increase their production up to the prescribed rate became an unusually difficult matter requiring a lapse of considerable time before it could be brought about.

Consequently, the production of 2,000 rifles per day from the first day of mobilization was out of the question. Very soon, however, it became apparent that even this, i.e., the 2,000 rifles per

day, was entirely inadequate, and that for the purpose of supplying the current needs of the army it was necessary to have at the front not less than 200,000 rifles per month, i.e., about 8,000 per day. And at the same time there were needed more than five million rifles for the first year of the war.

Such were the requirements which the war at once imposed upon us in respect to rifles. These requirements had to be met by all possible increases in production at home and by purchases and orders from abroad.

RIFLE REQUIREMENTS DETERMINED DURING THE WAR.

Beginning with the month of September of 1914, there commenced to come in reports from the Moscow and Kazan military districts of the shortage of rifles for the newly arrived recruits, previous service men of the militia, and for detachments sent to fill in depleted units in the field.

In its report to the War Minister dated October 14 (27), 1914, the Chief Artillery Department stated that there had been disclosed a shortage in rifles amounting to about 870,000 pieces, including 585,000 for recruits of the 1914 draft, 170,000 to fill requisitions from the various fronts, 93,000 for reserve battalions, and 22,000 for newly formed squadrons for the field and cossack replacements.

On October 26 (November 8) of the same year, the Chief of the General Staff reported to the War Minister that there were being received urgent rquests from the fronts for troops to fill depleted army units - which should be sent out fully equipped, but that it was necessary to sent out companies and troops with 50% and some with only 25% of the necessary rifles; that as a last resort, it would become necessary to send out infantry replacement companies entirely without rifles. On receiving this report the War Minister remarked: "Well, we will do the best we can."

The shortage in rifles increased with each succeeding month of the war throughout the active army, and on June 4 (17), 1915, a telegram was sent from the Headquarters of the Supreme Commander-in-Chief to the head of the Chief Artillery Department stating that "the situation regarding rifles is becoming critical; it is entirely impossible to fill depleted units because of the entire lack of rifles in army reserve and the arrival of new troops unequipped."

The chairman of the Special Commission appointed in 1915 for handling ordnance matters stated on August 29 (September 11), 1915, before the Supreme Investigating Commission that the monthly loss of rifles in the entire army amounted to 200,000 and that therefore to fill the shortage there were needed 2,000,000 rifles.

At that same time, in a representation of the War Minister - No. 4801, to the Duma, it was explained that "to satisfy the actual

shortage of rifles in the active army and for the purpose of supplying these in home territory to units lacking rifles, it would be necessary to receive from the factories not less than 200,000 rifles per month."

Thus, the World War actually called for the following rifle requirements:

For equipping the army on completion of mobilization, - about 5,000,000;
For successive conscriptions, - - - - - - about 5,500,000;

For meeting shortages, at the rate of about 200,000 per month, in the course of three years of war, - - - - - - - - - - - - - about 7,200,000.

In all there were required , - - - - - - - -about 17,700,000 rifles.

According to the mobilization tables of 1910, it was considered sufficient to have: 4,500,000 plus 700,000 x 3 = 6,600,000 rifles. That is, the error in the mobilization table estimates of requirements amounted to about 11,000,000.

It is of interest, along with the summary of the requirements in rifles given here to also show the figures arrived at by the Chief Artillery Department in accordance with immediate instructions from Headquarters of the Supreme-Commander-in-Chief at the time of the arrival of the Interallied Commission in Petrograd, i.e., in January of 1917, the successive requirements contemplated were to begin January 1 (14),1917

Originally it was proposed, in accordance with instructions from the above headquarters, to prepare and submit to the Interallied Commission the numerical requirements of our troops for three separate periods, each period commencing January 1 (14), 1917, as follows:

1. For six months - from January 1st, 1917 to July 1, 1917;

2. For twelve months - from Jan. 1st, 1917 to Jan., 1917; and

3. For eighteen months - from Jan., 1917 to July 1st, 1918.

Such a method of figuring requirements was already in use. So, a year before this, i.e., in January of 1916, there had been organized within the Chief Artillery Department a "branch charged with the supply of ordnance equipment to the army," computed on the basis of three periods: (1) For 3 months - from January, 1916 to April, 1916; (2) For 9 months - from January 1, 1916 to October 1, 1916; (3) For 18 months - from January 1, 1916 to July 1, 1917.

Here the periods were designated in accordance with the wishes of the Headquarters of the Supreme Commander-in-Chief. Along with this there were given the requirements as of each month (for meeting the current army needs), as were also shown special requirements (for the purpose of forming a reserve for emergency use, as well as for accumulating an annual reserve).

However, this method was considered to be unsatisfactory by the Interallied Commission and it decided that Russia should submit a summary of her requirements for the entire year of 1917. This was done, i.e., the requirements were stated for one, "the second, period." (See below).

Therefore, strictly speaking, it would be sufficient to show only one computation of our requirements, namely, for the annual period (for entire year of 1917), as the sole official representation considered by the commission. However, it is believed to be advisable

to show also the two other calculations; on the one hand - for the purpose of fixing the requirements which had been worked out for the semi-annual periods, and on the other hand - for the purpose of comparing the annual requirements as passed upon by the commission, with the remaining two requirements, i.e., with that for the semi-annual and the eighteen-months period, as prepared without any changes by the commission. The fact of the matter is that the requirements of the Headquarters of the Supreme Commander-in-Chief were always known to contain exaggerations, but against these the chief supply departments were powerless to do anything, and they were compelled to accept and execute these without criticism or argument.

With the Interallied Commission things were different: The allied representatives, being competent judges themselves of the requirements set forth by us, analyzed these in great detail, taking into account their fundamental importance, the nature of the conditions to meet these, considering the delivery of these to us, as well as all conditions at our front - and made some very drastic changes. It is this circumstance that is extremely interesting in evaluating the demands with which the Headquarters of the Supreme Commander-in-Chief repeatedly confronted the supply departments for military materiel.

Below, in the summaries of the supply of rifles there will be shown the number of rifles on hand at the outbreak of the war and in January, 1917, because prior to the arrival of the Interallied Commission there had been made a very careful check of all military equipment at the front and in reserve.

And so, the rifle requirements arrived at by the Headquarters of the Supreme Commander-in-Chief for the periods stated were presented as follows:

For first period (from January 1, 1917 to July 1, 1917) all requirements were based on that needed for each month (for the purpose of making up losses in rifles on the fields of battle and for replacing those which became unserviceable), and for special requirements (to supply shortages in rifles of reserve units, to replace rifles of foreign models used by the army and to equip troops of reserve units). The monthly requirements were considered to be 300,000 rifles per month, and the special requirements = 4,800,000 rifles. In all it called for: 300,000 x 6 = 1,800,000 plus 4,800,000 = 6,600,000.

Aside from this it also considered necessary to obtain an additional special supply of 100,000 Japanese rifles.

In all, for the first period = 6,700,000 rifles.

For second period (from January 1, 1917 to January 1, 1918) the requirements were as follows:

Monthly supply	200,000 x 12 =	2,400,000
Special requirements		650,000
Special requirements, Japanese ..		150,000
Total =		3,200,000 rifles.

For third period (from January 1, 1917 to July 1, 1918) the requirements were as follows:

Monthly supply	300,000 x 18 =	5,400,000 rifles.
Special requirements		2,700,000
Special requirements, Japanese ...		225,000
Total = =		8,325,000 rifles.

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MACHINE-GUNS

PLAN OF SUPPLY AND RESERVE OF MACHINE-GUNS AT OUTBREAK OF WAR

The amount of machine-guns for use of troops and as an emergency reserve was determined in the same manner as that for rifles. It was supplied in accordance with the figures prepared by the General Staff on the basis of the tables of organization and emergency reserve, after these had been duly approved. And in this work, as in the work pertaining to rifles, the Chief Artillery Department took no part whatever; it only served as an administrative agency department for the supply of the army with machine-guns on the basis of the requirements submitted to it by the General Staff.

These requirements prior to the World War were as follows:

In accordance with the plan for the supply of our army with machine-guns submitted to the Chief Artillery Department by the General Staff on September 24, 1910 - No. 4208 (secret) and in accordance with supplementary instructions from time to time issued by the General Staff, the matter of supplying our army with machine-guns was to be completed by the 1st (14th) of January of 1915. By that time there were to be had:

a. By the infantry: 352 machine-gun sections of first line troops, each having 8 machine guns 2,816
152 machine-gun sections of second line troops, each having 8 machine-guns 1,216

b. By the cavalry: 32 machine-gun sections of 8 machine-guns each 256

Total - - 4,288

Aside from the above, according to requests made at various times by the General Staff and which had been received prior to the declaration of war, there were to be had:

c. By the 4th Finland Rifle Brigade, to be organized in April, 1915, 4 sections having 8 machine-guns each 32
d. By the Amur Military District frontier guard, 6 sections having 4 machine-guns each 24
e. By the 3rd and 9th Siberian Rifle Divisions assigned to the Vladivostok Fortress garrison, 2 machine-guns per company .. 192

Total - 248

Aggregate 4,536

f. 10% as war reserve 454

In all - - - - - - - 4,990

These constituted all of the machine-gun requirements.

And here is how these requirements were met. By the time of the announcement of mobilization in July, 1914, there were the following machine guns in use by the army:

a.	By all of the 352 machine-gun sections of the first line troops	2,816
b.	By 120 sections of second line troops	960
c.	In the Finland Military District	32
d.	In the Amur Military District	24
e.	In view of the fact that the 3rd and 9th Siberian Divisions had been designated for service at the front, the machine-guns called for were not supplied them	- -
f.	By the 32 machine-gun sections of the cavalry	256
g.	In reserve there remained	69
	Total -	4,157

Thus, in July of 1914, there were not sufficient machine-guns to meet requirements - there being a shortage of 833 machine-guns of the number called for to be supplied by January 1 (14), 1915. In view of this, the Chief Artillery Department required the machine-gun branch of the armament factories to increase as much as possible the production of machine-guns. As a result of this the machine-gun manufacturers turned out in the remaining five months of 1914 828 machine-guns, and by the designated period, i.e., by January 1 (14), 1915, the Chief Artillery Department had in all available for troops and for emergencies a total of 4,985 machine-guns, i.e., only 5 machine-guns less than that called for.

Of course, we must admit that 5,000 machine-guns for an army of almost 5,000,000 men (i.e., one machine-gun for each 1,000 men) is a very small number, particularly in view of the fact that our enemies,

hastily preparing for the approaching conflict, augmenting within the last years the technical equipment of their armies, had a decidedly greater number of these. Therefore it is surprising that the rate of machine-guns to be supplied to the army worked out back in 1910, unquestionably small even at that time, had not been examined and increased in the course of the following four years, i.e., up to the World War. But even more surprising is the fact that even after the war had started, when in the course of the first months there had been disclosed within the army an insistent demand for machine-guns to replace those that had been lost and those that had become unserviceable, it was a long time before the Chief Artillery Department was called upon to meet the general (special) requirements in machine-guns, or the rate of current monthly needs of the army - aside from those which it had been called upon to supply in accordance with the general mobilization requirements. This latter consisted in the requirement on the part of the Chief Artillery Department to maintain the requisite "reserve rate," and in case of war to be prepared to supply this on an annual basis. And inasmuch as the reserve rate for emergency purposes was 10% of the total of the machine-guns called for (4,536), i.e., 454 machine-guns, it was this number that it had to procure in the course of the whole year's conflict.

MACHINE-GUN REQUIREMENTS IN THE WORLD WAR

Until May, 1915, demands for machine-guns were casual and sporadic, while during the winter (December - February) they were curtailed to a great extent and demands commenced to increase only with the revival of military activity. Inasmuch as the constantly increasing rate of production of machine-guns had made it possible to cover all of the special requirements, the Chief Artillery Department had no direct cause for foreseeing the huge demands for machine-guns which later poured in upon it. But already having some conception of the extent of the scale of warfare affecting other ordnance supplies (particularly rifles and munitions for field guns), and at the same time, not placing too much dependence on the government factories and the Russian military industry, the Chief Artillery Department, on its own initiative, recognized the necessity for bringing up the number of machine-guns to 16 ~~pieces~~ for each of the 508 infantry regiments and to accumulate a considerable reserve. Accordingly, the Chief Artillery Department in May of 1915, determined the current monthly requirement of machine-guns to be 800.

This calculation immediately met the favorable consideration of the Chief of the General Staff.

It is worthy of note that it was the Chief Artillery Department which first gave serious consideration to the question

of the necessity for the increased supply of our army with machine-guns. The agencies upon which the responsibility squarely rested for looking after such matters (the General Staff, the Headquarters of the Supreme Commander-in-Chief, the National Defense Committee) remained silent on this score.

Then followed changes in the determined rate of the requirements - the 800 machine-guns per month. This came in the very same year of 1915.

The first was received by the Chief Artillery Department in the form of a letter from the Assistant War Minister, General Lukomsky (dated August 22/September 4, No. 6790) relative to the necessity for the organization in addition to the machine-gun sections already in the service, special machine-gun sections of 8 machine guns each for the following: 616 infantry regiments, 79 cavalry regiments, and 177 cossack regiments - in all 872 sections, for which there were required 6,976 machine-guns. In addition to the above it was necessary to supply machine-guns to 180 reserve battalions - 4 machine guns per battalion; to 10 cavalry reserve regiments - 2 machine-guns each; to 60 reserve troops (hundreds) - 2 machine-guns for every 6 troops (hundreds); and to 19 military schools and 24 non-commissioned officers' schools - 4 machine-guns each.

And in addition, 50% to be maintained as a reserve.

Finally, on September 12 (25) there followed an order from the War Minister requiring the rate of machine-guns necessary for the supply of the army to be computed as two per each company or troop.

On the basis of these requirements, the time limit for the supply of these being set as January 14 (27), 1917, (i.e., 15 months), there was prepared the final schedule which is given below for the monthly requirements of machine-guns.

For the purpose of the supply of the 616 infantry regiments with two machine-guns for each company and 256 cavalry and cossack regiments with eight machine-guns per regiment, deducting the 2,196 machine-guns on hand, there were required 19,564 machine-guns; for the purpose of supplying 180 reserve battalions there were needed 720 machine-guns; in all - 20,284 machine-guns.

50% for reserve - 10,886 machine-guns. Aggregate - 31,170 machine-guns.

This required per month: 31,170:15 = 2,078 machine-guns.

The question of meeting these requirements was left up to the Chief Artillery Department.

Along with the above it is of interest to show the figures prepared by the Headquarters of the Supreme Commander-in-Chief of machine-gun requirements on the arrival in Petrograd of the Interallied Commission, i.e., on January 1 (14), 1917.

For three periods, each commencing January 1, 1917, and ending respectively, July, 1917; January 1, 1918; and July, 1918, there were set forth the following machine-gun requirements:

For first period (six months):

Monthly requirements ..... 600 x 6 = 3,600

Special requirements	For purpose of bringing the supply of machine-guns up to 24 per regiment	13,000
	Colt machine-guns (for the organization of machine-gun sections of 8 machine-guns each: For infantry - 7,200, For cavalry - 1,350, For reserve - 1,450).....	10,000
	Rapid-fire rifles (including Lewis and Shosh (?) guns) - at rate of 128 per infantry and 36 per cavalry regiment, and 10% reserve .	110,000

Total for six months,- machine guns . . . 26,600

" " " " - rapid fire guns . 110,000

If the above requirements could have been distributed equally over the period of six months then we would have had for each month 4,430 machine-guns and about 20,000 rapid-fire guns.

For second period (12 months):

Monthly requirements ..... 600 x 12 = 7,200

Special requirements	Machine-guns	13,000
	Colt machine-guns	10,000
	Rapid-fire guns	110,000

Total for 12 months - - - 30,200 machine-guns.
Total for 12 months - - 110,000 rapid-fire guns.

For third period (18 months):

Monthly requirements	600 x 18 =	10,800
Special requirements (Machine-guns		13,000
Special requirements)Colt machine-guns		10,000
Special requirements (Rapid-fire guns		110,000

Total for 18 months - 33,800 machine-guns.

" " " " - 110,000 rapid-fire guns.

Thus, on meeting the requirements for 1917, there would remain for the first six months of 1918 a monthly requirement of 600 machine-guns.

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PART XIX

SUPPLY OF ARTILLERY.

RATE OF SUPPLY AND GUN REQUIREMENTS.

NUMBER OF GUNS IN ARTILLERY UNITS AND IN RESERVE AT BEGINNING OF WAR

The World War found the Russian field artillery with a so-called "new organization," which had changed the make-up of the field artillery, the number of its batteries and the number of guns.

This "new organization" had been worked out by the General Staff practically without any participation of representatives from the Chief Artillery Department and was approved on May 16 (29),1910. It served as the basis on which the General Staff, without any participation whatever by the Chief Artillery Department, had worked out the "mobilization tables of 1910," which were in force at the outbreak of the World War.

The Russian field artillery was divided into light, mountain, mortar and heavy artillery.

As is clearly apparent from the report of the head of the Chief Artillery Department to the War Minister dated May 12 (25), 1910- No. 700, relative the "shortage of artillery materiel for equipping the field artillery," there had been included in the mobilization tables of 1910, aside from horse and cossack batteries:

684 field light batteries (442 active, 210 inactive (second-line), to be organized on mobilization, and 32 reserve);

45½ mountain batteries (42 active, 1 inactive, and 3½ reserve);

85-1/3 mortar batteries (74 active, 9 inactive, and 2-1/3 reserve);

60 field heavy batteries (in peace time, 24 field heavy batteries).

As organized prior to 1910, the field artillery was equipped with guns and materiel as follows:

683 field light batteries;

39 mountain batteries, including 13 batteries with mountain guns which had become obsolete, of the 1883 model, and 29 mortar batteries 5 of which were equipped with 6-inch mortars of old model and the remaining 24 batteries equipped with howitzers of the tested models of the factories of Krupp (8 batteries), Obukhovsk (8 batteries), and Putilovsk (8 batteries), which, particularly that of the last named factories, were recognized to be entirely unsuitable for the purpose for which they were intended.

There was no heavy field artillery of any sort of modern design and meeting modern requirements.

To meet the requirements of the 1910 tables of mobilization there were needed the following additional artillery: 1 field light battery; 6½ mountain batteries; 56-1/3 mortar batteries; and 60 field heavy batteries.

For the purpose of equipping the batteries set forth in the tables of organization of 1910, it was necessary to have the following number of guns: For 684 field light batteries - 5,472 3-inch accelerated fire guns; for 45-1/2 mountain batteries - 362 mountain accelerated fire guns, models 1904 and 1909; for 85-1/3 mortar batteries - 512 guns,- 476 48-lin. howitzers, model 1909, and 36-cm. howitzers of the Krupp make; for 60 batteries of heavy field artillery - 240 guns, including: For 41 batteries - 164- 6-inch field howitzers and for 19 batteries - 76 42-lin. accelerated fire guns.

In all, for equipping 874 plus 1/4 plus 1/3 batteries there were required 6,586 guns.

For the purpose of determining the general requirements of the number of batteries and the number of pieces in our army it is necessary also to take into consideration those batteries which were not affected by the 1910 reorganization.

72 horse batteries of 6 guns each; 7 mountain horse batteries of 6 guns each; and 5 batteries of the Amur military district of frontier guard of 4 guns each; in all - 84 batteries and 494 guns.

1 battery of the Officers' School, having 8 guns.

Consequently, our army, at the outbreak of the World War should have had available 875 light, mountain, mortar, and heavy batteries with 6,594 guns and 84 horse and mountain horse batteries with 494 guns, a total of - 959 batteries and 7,088 guns.

In addition to the guns available for equipping units of field artillery, there was maintained a reserve of artillery materiel for supplying deficiencies within the batteries. For the purpose of determining the rate of this reserve, termed the war-time reserve, there had been organized at the General Staff, simultaneously with the army reorganization of 1910, a commission headed by the Assistant War Minister, General Polivanow. Representatives of the Chief Artillery Department participated in the sessions of this commissions.

As is seen from the official report of one of the sessions of this commissions convened in 1910 for determining the distribution of artillery reserves based on the newly established ratios, the amount of war-time reserve had been determined as follows:

15% reserve of accelerated fire guns, light and horse	842 guns.
15% reserve of 48-lin. howitzers	74 howitzers.
15% reserve 3-in. mountain guns	57 guns.
10% 6-in. howitzers	16 howitzers.
10% 42-lin. guns	8 guns.
Total	997 pieces.

In the report of May 12 (25) 1910 (No. 700) referred to above, the head of the Chief Artillery Department, going into the detail of each statement contained in the 1910 mobilization tables pertaining to the artillery, expressed his grave doubts as to the possibility of equipping the field artillery in due time in accordance

with this mobilization scheme. The Chief Artillery Department not only had not been called upon to collaborate in the preparation of the new tables of mobilization, but had not even been consulted in respect to the matter of progress that was being made along the line of special artillery work in which it was engaged at the time. The chief of the General Staff considered it sufficient to consult General Obruchew, representative of the Chief Artillery Department, only when considering questions pertaining to war time reserve. In deciding general questions relative the reorganization of the field artillery, its composition, strength and equipment, the general staff acted without any participation of the CHief Artillery Department and entirely independently.

As a result of this, in the preparation of the mobilization tables of 1910, one of the most important things was overlooked; namely, the time element, which was necessary for the supply of the requisite artillery materiel involved. Aside from this, the entire work of the preparation of the tables of mobilization assumed a purely academic nature, since the authors of this were concerned with only one thing: The setting forth of needs, without considering how and in what factories these needs can and must be satisfied. As if it had never occurred to them that for the timely supply of these, and particularly - for the ultimate solution of these problems, which become inevitable with the progress made in the development of military technique by our neighbors - that first of all, it was imperative that we develop our own factories

and prepare our technical experts; and that it was by no means enough to merely figure out the amount of money involved in arriving at the contemplated artillery requirements.

Be that as it may, the question was decided, and without any participation by the Chief Artillery Department, to which the requirements were submitted, and which it was manifestly incapable of fulfilling. In its report of May 12 (25), 1910 - No. 700, the Chief Artillery Department pointed out that the new mobilization tables which it had received (1910), on the one hand had failed to consider certain requirements which, were partly lost sight of and partly taken into consideration only after the completion of these (without waiting for the final preparation of the lists of artillery units) and on the other hand - made such new requirements for which there had as yet been no funds whatever allotted. And, inasmuch as in considering the whole matter the time element had entirely been ignored, "the fighting readiness of our army in accordance with the 1910 mobilization tables, as far as the artillery is concerned, can not be assured, because until the shortage of artillery materiel has been taken care of with funds available for the purpose, as well as funds that will yet have to be made available, there will be a shortage in guns and other artillery equipment which will not permit the forming of all units of the field artillery included in the mobilization tables of 1910."

The Chief Artillery Department particularly had foreseen difficulty in the matter of the supply of the army with heavy guns in the number set forth in the tables of mobilization, believing that "after the types of these will be determined - it will take about three years before they will be ready for army use, and that therefore the heavy artillery contemplated for our use will not be available before 1915 or 1916."

Which clearly shows the whole practical value of the tables of organization based on equipment the models of which had yet to be selected and approved.

From the above data it is apparent that for the purpose of putting in effect the mobilization scheme of 1910 it was necessary to acquire a considerable number of guns and other artillery materiel which were lacking for the purpose of forming the new units as well as for re-equipping existing artillery units equippedwith obsolete guns and also for establishing a war-time reserve.

Part of the shortage in guns was to be supplied from orders for guns placed by the Chief Artillery Department in 1909. As a whole, for the purpose of meeting the requirements, the Chief Artillery Department having received authorization from the War Council in 1910, for the procurement of guns for meeting the shortages as well as other materiel, had placed orders for same at government as well as public factories.

These orders, though in some isolated cases were somewhat late in coming in, were filled by the beginning of the World War, with the exception of 22 mountain guns and 28 48-lin. howitzers, which were finished by the middle of October, 1914, i.e., the third month of the war.

TABLE 10.

TYPES OF GUNS		Required		Available July 20 1914	+ (surplus) - (shortage)
		Guns	Batteries		
3" field guns:	In use	5,480	685	5,480	
	In reserve	781	-	785	
	Total - - - - -	6,261	685	6,265	+ 4 (0.6%)
3" horse art.guns:	In use	432	72	390	
	In reserve	61	-	17	
	Total - - - - -	493	72	407	- 86 (18%)
3" mountain art.guns:	In use	424	57½	408	
	In reserve	57	-	32	
	Total - - - - -	481	57½	440	- 41 (9%)
48-lin. howitzers:	In use	512	85-1/3	512	
	In reserve	74	-	22	
	Total - - - - -	586	85-1/3	534	- 52 (9%)
6" field howitzers:	In use	164	41	164	
	In reserve	16	-	9	
	Total - - - - -	180	41	173	- 7 (4%)
42-lin. guns:	In use	76	19	76	
	In reserve	8	-	8	
	Total - - - - -	84	19	84	0
	Aggregate 8,085		959	7,903	- 182 (2¼%)
In addition, 3.4" guns, mod. 1895 for state militia ...		224	28	125	- 99 (45%)
	In all - - -	8,309	987	8,028	- 281 (3.38%)

Table 10 shows the number of guns required to be available according to the mobilization tables of 1910 by the beginning of the war and that actually on hand July 20 (August 2d), 1914.

From this table it is seen that at the outbreak of the World War the artillery units of the active army, with the exception of some horse and mountain batteries, were duly equipped with the guns called for; in all there were lacking 132 guns, or 2½% of the number required, primarily in the emergency reserve. The greater shortage was in that of the horse artillery guns - 86 (or 18% of all horse artillery guns), next were the mountain guns - 41 (or 9%), and 48-lin. howitzers - 52 (or 9%).

It is obvious that a shortage of 2½% was of but slight importance, particularly in view of the fact that by the third month of the war the shortage of the mountain guns and the 48-lin. howitzers had been supplied, if it were not for the general low state of all of our artillery as compared with that of our opponents.

It is necessary to make this comparison in order to clarify the situation in which the belligerent powers found themselves in respect to artillery - this very potent factor in modern warfare.

COMPARISON OF RUSSIAN ARTILLERY WITH THAT OF THE GERMAN AND AUSTRIAN.

According to General Staff intelligence, on January 1, 1912, the organization and strength of German artillery was as follows:

The German artillery was divided into field and foot artillery.

The field artillery was organized into brigades; in each brigade there were two artillery regiments; each regiment was divided into two separate groups each of three batteries; each battery having six guns.

Aside from this, there were 22 horse batteries.

The foot artillery was organized into brigades, each brigade having two regiments; the regiments were subdivided into battalions of four batteries each. This artillery was designated for war-time use as follows: Heavy artillery for field armies; siege artillery; fortress artillery; coast artillery.

All battalions of the heavy field artillery were equipped with 15-cm. howitzers and 21-cm. mortars.

These weapons were also used as siege artillery.

Each howitzer battalion of heavy artillery comprised four batteries of four guns each, and mortar battalions comprised two batteries of four guns each.

In war-time there was attached to each corps one heavy howitzer battalion; the remaining heavy howitzer battalions, as well

as the mortar battalions of the heavy field artillery were intended for use by army commanders for the accomplishment of special missions. The siege artillery was also available for similar purposes.

In 1911 the Reichstag passed a law providing for the strength of the German army by March 31, 1916.

According to the data contained therein, the German artillery, both field and "foot," in the course of the five years covered by this law, was to be greatly increased. Particularly was there to be a great increase in the amount of artillery in event of war.

According to approximate figures obtained by the General Staff, on January 1, 1914, the strength of German artillery, counting regular army artillery, reserves, landwehr, and landsturm, including horse batteries, was as follows: 1,149 light field batteries, 150 batteries of light howitzers and 33 horse batteries, a total of 1,332 batteries of 7,992 light guns.

The heavy artillery comprised 381 heavy batteries with 1,396 guns, 100 batteries of these were of exceptionally heavy field type and comprised 400 heavy guns; the remainder of the 281 batteries comprised 996 guns of siege types, etc.

In all, according to available data, there were on January 1, 1914, counting the field artillery and the heavy guns, exclusive of the siege guns - 1,432 batteries, comprising 8,392 guns and 281 heavy batteries with 996 heavy guns, or a total of 1,713 batteries and 9,388 guns.

Prior to and during the World War there was carried on intensive development along heavy field artillery lines, for which provision had been made in peace-time by the law of 1911, and by developments brought about in the course of the World War.

According to information of the General Staff, the Germans made use of their siege artillery for organizing heavy field artillery units, the guns of which were of the same type as that which had been used by the heavy artillery.

The Austro-Hungarian artillery consisted of artillery units of the Imperial army, of Austrian landwehr and Hungarian artillery units, subdivided into field, mountain, horse, and heavy artillery, and organized into regiments.

Within each regiment there were 6 gun and 2 light howitzer batteries of 6 guns per battery. Heavy howitzer divisions comprised 2 batteries each of 4 guns. Mountain artillery regiments had 5 batteries per regiment.

According to data of the General Staff submitted to the Supreme Investigating Commission as of January 1, 1914, in accordance with 1913 mobilization tables, the amount of Austro-Hungarian artillery, including horse batteries, were as follows: Gun batteries, 298, comprising 1,788 light guns; light howitzer batteries 132, comprising 792 guns; 33 horse batteries, comprising 132 guns; 42 heavy batteries, comprising 168 heavy guns; mountain batteries - 60 gun and 38 howitzer batteries, comprising 240 mountain guns and 152 howitzers. Aside from

this, there were in Austria-Hungary 85 reserve batteries having 478 guns and 97 siege batteries having 338 guns.

In all, according to the data of 1914, there were 785 batteries having 4,088 guns.

During the World War in the Austro-Hungarian army as well as in the German army, there were great increases in artillery units.

According to General Staff intelligence reports there were estimated to be the following newly created artillery batteries in May, 1915: Field gun batteries (Imperial and landwehr), 68 batteries comprising 408 guns; mountain batteries 32, with 192 guns; 9 horse batteries with 54 guns; howitzer batteries 30, with 180 guns, and heavy batteries 26, with 108 guns; and also 8 batteries of 30.5-cm. howitzers with 32 guns.

In all, there were newly organized 173 batteries with 970 guns.

In comparing the strength of our artillery in the World War with that of the German artillery, it is apparent that the latter greatly exceeded our number of batteries and guns. During the war we had 959 batteries and 7,088 guns, and Germany had available 1,432 batteries and 8,392 guns, i.e., exceeding that of our army by 473 batteries and 1,304 guns. If we are to take into consideration the fact that at the outbreak of the war our batteries comprised 7,030 guns(having a shortage of 58), and that the Germans, counting their

siege artillery, which participated even in the maneuvering period of the World War, had a total of 1,713 batteries with 9,388 guns, then the comparative weakness of our artillery compared to that of the German army becomes even more apparent.

As far as Austria-Hungary is concerned, if we are to add to the 785 batteries of the 1913 mobilization tables the 173 batteries which were formed by May of 1915, comprising 970 guns, the organization of which apparently had been contemplated in the 1914 mobilization tables - then we shall have the strength of Austro-Hungarian artillery as follows: 958 batteries and 5,058 guns, i.e., 1 battery less and 2,030 guns less than that of our own field artillery.

The strength of our artillery and that of our enemies can be seen at a glance by comparing the number of batteries and guns assigned, in accordance with 1914 data, to an infantry division forming part of a corps of two divisions.

At the outbreak of the World War there was designated within our army for each infantry division one artillery brigade of 6 light batteries of 8 guns each and one mortar battery equipped with 6 light howitzers; in all 7 batteries having 54 guns.[x]

In Germany the infantry division had assigned to it an artillery brigade of 12 light field batteries (including 1-½ light howitzer batteries) of 6 guns per battery and 2 heavy field howitzer batteries of 4 pieces each; in all - 14 batteries having 80 guns.

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x - Our organization called for one mortar division per corps. The division comprised 2 batteries of 6 howitzers each.

In Austria-Hungary there was designated for each infantry division 6 gun batteries each of 6 guns, 2 howitzer batteries of 6 light howitzers per battery, 1 battery of 4 heavy howitzers and 1/2 mountain battery of two guns; in all - 9-½ batteries having 54 guns.

Thus, in Germany for each infantry division there were twice as many batteries as there were in our divisions and the number of guns exceeded ours by 26, and in Austria-Hungary for each infantry division there were 2-½ batteries more than in our division, with the same 54 guns per division but with the advantage of having heavy howitzers included in the number of the 54 guns.

The above organization and strength of the German field artillery were approximately the same in 1909 when the reorganization of the German artillery was completed.

Our former military representative (agent) in Berlin, General Michelson, as far back as February, 1908, reported to the Chief of the General Staff, General Palytsin, of the rapid growth in the German military forces, and later, in 1909, submitted to General Sukhomlinow, who had succeeded General Palytsin, tables of mobilization and schedules for the development of the first line German troops on mobilization, which General Michelson believed should be used as a basis in making estimates of the enemy military preparations. In 1910 General Michelson presented to the General Staff new German mobilization tables with supplementary information relative to the strength of Germany's military forces. It was stated above that in 1911 the Reichstag had

passed a law for the increase of Germany's armed forces.

As far as the question of increasing our artillery is concerned, as is apparent from the representations made in the Duma by the General Staff relative the matter of appropriations for additional national defense purposes on February 20, 1914, No. 447, the General Staff only in 1914 completed its work on the preparation of a large program for increasing the strength of our army, in which much space was devoted to the increase in all types of artillery, the obsolete nature of which, as explained by the General Staff itself, required fundamental changes throughout the army.

The proposed increase in artillery was to be made in the way of the organization of new artillery units as well as in the increase of the number of batteries and guns within the artillery brigade. This matter had formerly been considered, first by two commissions - one in 1900, organized by the head of the Chief Artillery Department from representatives of the artillery and the General Staff, and the other in 1906 presided over by the former Inspector-General of Artillery and later, in 1909, by the Mobilization Committee, formed by the General Staff for the purpose of preparing a scheme for the reorganization of the army, which was to be based on the findings of the 1906 commission.

According to the scheme of the organization (which was not carried out), in each infantry division there was to be an artillery brigade comprising the following: 9 batteries of light field artillery

of 6 guns each (54 guns), 2 mortar batteries, each battery having 6 guns (12 light howitzers), and 1-½ batteries of heavy field artillery of 6 guns; in all 12-½ batteries and 72 guns, i.e., still 1-½ batteries and 8 guns less than that of the German division.

These measures were to be carried out by April 1, 1917, but the outbreak of the World War halted the progress of our large program for the increase in the strength of our artillery.

X X X X X

TYPES OF ARTILLERY EQUIPMENT OF RUSSIAN LAND FORCES AT THE CONCLUSION OF THE WORLD WAR

The effort to maintain uniformity in caliber of guns and uniformity in shells continued in considerable measure in the Czarist army up to the World War, in spite of the experiences of the last preceding wars - the Russo-Turkish war of 1877 - 1878 and the Russo-Japanese war of 1904 - 1905, experiences which taught the need of great caution in this respect.

This effort was backed by our General Staff for well known reasons - "uniformity of caliber" and "uniformity of shells" facilitate manufacture and supply, simplify the matter of instruction and employment in combat.

As a result, the Russian artillery of the field armies, not to mention fortress artillery, embarked on the World War having in all four basic calibers of guns, two per gun - 3-in. (76-mm.) and 42-lin. (107-mm.) and for howitzers - 48-lin. (122-mm.) and 6-in. (152-mm.) and six different patterns: 3-in. field gun, model 1902; mountain 3-in. gun, model 1909; heavy field 42-lin. gun, model 1910; field 48-lin. howitzer, 1909 and 1910 models; heavy field 6-in. howitzer, model 1910.

The war compelled us to give up the above seeming simplicity and facility in our scheme of the artillery supply and to accept for the purpose of equipping the artillery of our field armies the most heterogeneous calibers and types of guns.

Below is a brief description of the guns which comprised the equipment of our land forces at the close of the World War. For the purpose of showing at a glance the characteristic qualities of these they have been grouped into four separate groups according to the nature of their mobility.

GROUP I - Light field guns. - These guns accompany troops everywhere - on the march and in combat. They are animal-drawn. Motorisation not essential.

GROUP II - Heavy field guns. - Guns of this group are easily transportable over improved roads. However, on poor roads and where roads are sandy they are difficult to handle. They are animal-drawn, therefore the heavier types of this group are incapable of moving in the general column of troops and have to be kept in the rear of the columns of the main body on the best available roads. They are, therefore, not available in the first stages of an engagement, and in the pursuit of the enemy they cannot keep up with the infantry to which they are assigned. Motorization of these is essential.

In field combat and in defensive operations the guns of this group are attached to corps or divisions, in which case their employment is similar to that of the guns of GROUP I. In the attack on fortified positions and fortresses they are employed in accordance with the general plan of the attack in conjunction with the weapons of the two groups following.

GROUP III - Heavy guns. The guns of this group are transportable on wheels and some of these are capable of firing from wheel carriage. However, in view of their great weight, these guns are transportable only on first class roads; on gravel roads only when these are in very good condition and dry, and bridges must be dependable. In case of poor roads (highways in poor condition, in rainy season) the transportation of these guns is a very complicated matter and at times becomes entirely impossible. Employment in battle from the march is very slow. It is partly animal-drawn and partly tractor-drawn. Guns of this group are incapable of moving in march columns and proceed under separate cover, often at the head of the supply train of the second section. Upon executing their mission at one place the guns of this group may be transferred to the next.

GROUP IV - Position guns. Guns of this group comprise fortress guns unsuitable to be transferred from place to place. Their transfer is accomplished only under the most exceptional circumstances and is

unusually difficult. The organization of their maintenance for use on positions which had not been prepared beforehand is most difficult. Their transfer is possible only on railways; delivery from railway stations to positions - in disassembled state, by improvised railway of wide or (for short distance hauls) narrow gauge railroads. Special preparations are necessary for loading, unloading and emplacement (cranes, jacks, blocks, etc.)

Therefore, guns of this group cannot follow the troops which they serve; these are brought up to positions only after the latter are well in hand and properly secured.

The only exception in the case of this group is that of the 12" howitzer of the Vickers type, which may be taken apart in 6 parts and with the aid of tractors transported on highways by means of special carriages.

In tables 18-a, 18-b, 18-c, 18-d, 19, 20, and 21 are shown the guns enumerated in these four groups: In describing these only the following data are given:

The weight of the equipment of the gun on the march and in combat; the time required for going into action from the march, the maximum range of fire of shell and shrapnel; weight of explosive charge.

The main purpose of the guns of the first subdivision (Table 18-a) - is the firing on live targets either in the open, or behind trenches without overhead protection; against open machine-gun positions

TABLE 18-a.

GROUP I - Light Field Guns.

First subdivision.

GUNS	Weight of Equipment on march: pud 1	Weight of Equipment in combat: pud 2	Readiness: min. 3	Maximum range: eh. ver. 4	Maximum range: shr. ver. 5	Explosive Shell: funt 6
1. 3-in. (76-mm. accelerated fire gun, mod.1900-1902	123	65	0	8	5.2	2
2. Light gun (3.42-in.) mod. 1877 - 1895	105	60	0	6	3	3.3
3. Battery gun (4.2-in) model 1877	120	75	0	5	3	4
4. 75-mm. gun, mod.1898 (2.95") Japanese (Arisaka) make	100	56	0	7.3	7.3	2
5. 90-mm. (3.5") French make	130	65	0	9.7	5.6	4.1
6. 77-mm.(3.03") N.A.96 German gun.captured by us	114	60	0	7.7	6.6	0.4
7. 76.5-mm.(3") M.5, Austrian gun, captured by us	111	60	0	6.5	5.7	0.5
8. 3-in. mountain gun, model 1909	75	38	0-10	6.6	6.6	2
9. 3-in. mountain gun, model 1904	26	20	0-10	4	4	2
10. 3", model 1913 (on mountain carriage, 1909 model)	75	38	0	6.6	6.6	2
11. 75-mm. mountain gun, Arisaka make	22	20	0-10	4	3.4	2

and trench guns; against artificial obstacles (barbed wire barriers) against which they serve more economically than guns of larger caliber.

Of course, this is true to the fullest extent as far as the 3-inch accelerated fire gun is concerned, and to a lesser extent in regard to the other types.

TABLE 18-h.

Second subdivision: Mortar or howitzer artillery.

GUNS	Weight of Equipment: on march: pud 1	Weight of Equipment: in combat: pud 2	Readiness: min. 3	Maximum range: sh. ver. 4	Maximum range: shr. ver. 5	Explosive shell: funt 6
1. 48-lin. light howitzer model 1909-1910	145	90	0	7.2	7.2	11.8
2. 45-lin. light English howitzer (received from the English)	130	83	0	6	6.1	6.5
3. 12-cm. (47.2-lin) Japanese howitzer (Krupp make)	134	69	0	5	5	3.3
4. 10-cm. (M. 99) Austrian light howitzer	113	60	0	5.7	5.2	3
5. 6-in. field mortar (our old gun of 1880)	110	80	0	3.6	3.5	15.8

The guns of the second subdivision (Table 18-h), using powerful fougade shells, are suitable for the following missions: For fire on communications lines, trenches and camouflage works (not reinforced with concrete or thick layers of earth), in which cases they only serve to destroy or to obstruct the exits of these; overhead shrapnel fire - against enemy situated in shallow trenches without overhead protection; intensive fire against troops operating in open field (bombs and shrapnel).

The artillery of the third subdivision (Table 18-g) are given special combat missions in accordance with the missions for which they are best suited, namely: The weapons of lines 3 and 7 are used especially as antiaircraft guns; that in line 2 are used as special guns

TABLE 18-g.

Third subdivision: Special light guns.

GUNS	Weight of Equipment: on march: pud[X]	Weight of Equipment: in combat: pud[X]	Readiness: min.	Maximum range: sh.: verst	Maximum range: shr.: verst	Explosive shell: funt[X]
	1	2	3	4	5	6
1. 3-in. accelerated fire gun, model 1910	60	33	0	2.4	2.4	2
2. 3-in. gun for armored cars	-	-	0	2.4	2.4	2
3. 3-in. antiaircraft gun, model 1914	78[#]	78	about 5	8	7.8	2
4. 57-mm. (2-¼-in.) rapid fire gun of Nordenfeld make	45 weight includes platform	105	about 10	5.6	2.2	0.25
5. 57-mm. (2-¼") Caponiere gun, Nordenfeld make	28 incl. platform	57	0	-	0.8	-
6. 47-mm. (.85") gun, Hotchkiss make	70	59	0	1	-	14 zolotniks[X]
7. 40-mm. (1½") rapid-fire gun, Vickers	39 including auto.	39	0	5	3	-
8. 40-mm. rapid-fire gun, Deper, on carriage	96	52	0	5	3	-
9. 37-mm. trench gun, model 1915, Rozenberg	6.5	11	0	3	0.2	4 zolotniks
10. 37-mm. (1.46") automatic gun, Maklen	-	16	0	3	-	4 zolotniks

for armored cars. The remaining seven types are used for defense and flanking purposes of approaches to our own barriers; for repulsing attacks, as support fire; for the purpose of neutralising enemy trench and machine guns; for accompanying reconnaissance forces and for use by shock troops.

X - 1 pud = 36.11 pounds.
1 verst = 0.66 mile.
1 funt = 0.90 pound.
1 zolotnik = 0.40 drams.

- Includes weight of automobile.

TABLE 18-d.

Fourth Subdivision: Trench weapons for close range combat.

GUNS	Weight of Equipment on march: pud	Weight of Equipment in combat: pud	Readiness: min.	Maximum range: b. paces	Maximum range: shr. paces	Explosive shell: funt
	1	2	3	4	5	6
Bomb-throwers						
1. 9-cm (3.5") C.R. Type	1.5	4.2	5	500	-	1.8
2. 8-in.	2	1	0	350	-	0.6
3. 3.5-in. Aazen	1.5	1.5	0	400	-	0.6
4. 6-in. Kogorn small mortar	2.5	2.5	0	600	-	0.3
Mine-throwers						
5. 58-mm. Dumezil	5	12	10	500	-	20-25
6. 58-mm. No. 1	5	12	10	600	-	26
7. 58-mm. No. 2	7	20.5	10	1,000	-	40
8. 6-in. Putil mortar	-	18.5	10	1,300		11
9. 47-mm. Likhonin type	3	6	10	550	-	23
10. 20-mm. Likhonin "	1	1.5	5	500	-	43
11. 9.45-in. English Batinnel make	-	100	20	1,500	-	60
12. 89-mm. Izhorsk make	-	70-80	20	1,500	-	80
13. 240-mm. French make	-	120	20	2,800	-	140

The usual missions in combat of the fourth subdivision weapons (Table 18-d) in close range fighting are considered as follows:

Bomb-throwers: To serve as a supplementary weapon for infantry in all of those cases where it is impossible to employ more effective weapons: In trenches, on reconnaissance, in attack, in repulsing surprise enemy attacks, in firing at close range on enemy positions and trenches. These weapons are ineffective for use against artificial barriers of any sort; their moral effect on troops is negligible.

Mine-throwers: Because of their great explosive effect, these are well suited for the purpose of destroying barriers and obstructions and covered positions of any sort; therefore, if the situation permits of approach to an object at a distance of about 400 paces, these can be employed with considerable success. Their effect on the morale of troops is considerable.

Of the heavy field guns shown in Table 19, GROUP II, we are referring primarily to the 42-lin. gun and the 6-in. howitzer, model 1910, (shown in lines 5, 6 and 10 of the table) as heavy field artillery; the remainder of the weapons shown in the table are guns of "siege type," of limited mobility because of their great weight, and are incapable of keeping up with troops on the march; however, many of these were employed by us during the World War, particularly in the course of position warfare, as heavy field artillery weapons.

The weapons in GROUP II are characterised by powerful action at considerable distance, surpassing in this respect all other field guns above enumerated. This is particularly true in the case of the most effective of these - the 6" Schneider gun.

The weapons of this group are employed in action against distant enemy artillery, for inflicting damage at a distance in rear of the enemy lines, and to fire at enemy positions at distances too great to be reached by light field guns; aside from this, the 6-in. gun is employed against concealed enemy fortified positions, such as concrete

structures covered with thick layers of earth, blockhouses, etc., and the 6-inch Schneider gun is particularly suitable for use against strong vertical targets.

The howitzers of Group II (Table 19) are employed to greater advantage in action against structures and trenches in fortified areas as well as that of field type.

The appropriate missions for the powerful weapons of these types are the following: Destruction of fortified positions and trenches against which ordinary field guns are ineffective; fire against distant points of vital importance (against enemy artillery of large size and great range causing much damage). For use against enemy artillery in general and field artillery in particular - the smaller calibers (42-lin., 120-mm. and 10.5-cm.) of these guns are, primarily, to be selected as the most effective and longer range weapons, which because of these advantages, are most suitable for important use, of which field guns are incapable, against enemy rear lines: Against enemy reserve installations, reserve forces and columns, transport, supplies, lines of communications, airships, etc., as well as for use against vertical targets.

To assign to these weapons the mission of the destruction of various sorts of obstructions (barbed wire and others) is inexpedient and is permissible only under exceptional circumstances which justify such employment by developments in the situation.

TABLE 19.

GROUP II - Heavy Field Guns.

WEAPONS	Weight of Equipment on march pud	Weight of Equipment in combat pud	Readiness min.	Maximum range b. ver.	Maximum range shr. ver.	Explosive shell funt
	1	2	3	4	5	6
Guns						
1. 6-in. siege accelerated fire, mod.1912, Schneider	250	350	20	11.6	10.5	14
2. 6-in. gun, 120 pud model 1877	228	190	30	8.2	8.2	22
3. 5-in. (60 funt) English make	-	285	10	9	8	7
4. 120-mm. French make	214	235	30	9.4	-	11
5. 42-lin. accelerated fire gun, model 1910	154	130	10	11	10	5
6. 42-lin. gun, model 1877	188	150	30	9	8.4	5
7. 10.5-cm. (4.2-in.) Japanese make	196	160	10	9.3	8.4	5
Howitzers						
8. 6-in. siege, English pattern, Vickers	-	224	10	8.6	-	14
9. 6-in. fortress, accelerated fire, model 1909	187	170	10	8.2	8.2	22
10. 6-in. field accelerated fire, model 1910	154	130	10	7.2	7.2	22
11. 15-cm. siege (Krupp make) Japanese	149	125	20	5.5	5.5	6.3

TABLE 20.

GROUP III - Heavy Guns.

WEAPONS	Weight of Equipment on march pud	Weight of Equipment in combat pud	Readiness min.	Maximum range b. ver.	Maximum range shr. ver.	Explosive shell funt
	1	2	3	4	5	6
Guns.						
1. 155-mm., French, model 1877	380	350	10 min.	10.6	-	17.3
2. 6-in. gun, 200 pud, model 1904	362	325	3 hrs.	11.4	10.6	22
3. 6-in., 190 pud, model 1877	328	290	24 hrs.	8.2	6.2	13
4. 120-mm., Obukh make	382	680	1 hr.	13.5	13.5	5
5. 120-mm. Vickers	379	-	1 hr.	11.4	10.6	5
Howitzers						
6. 11-in. Schneider	310	930	1 hr.	10.2	-	143
7. 9.2-in. English	250	-	10 hrs.	8.4	-	38
8. 8-in. Vickers, Mod. 1	250	377	10 min.	7	7	39
9. 8" Vickers, Mod. 2	250	512	10 min.	9	-	22
10. 20-cm. Japanese, model 1912	200	1,364	12 hrs.	9.5	-	58

The weapons of GROUP III (Table 20), particularly the more powerful types of this group - the howitzers, are ordinarily employed only under conditions of open warfare, in preparations for attacks against forts, fortified points of strategical importance, strongholds, fortified trenches and strong enemy positions of great strategical importance. The importance of these guns is therefore very great

when position warfare sets in and when for the purpose of making an advance it becomes necessary to prepare a "break through" strongly held enemy positions, and also in sectors where the nature of the missions are such that they cannot be accomplished by the weapons of the preceding groups. The long and effective range of the guns of this group (6", 200 pud and the 120-mm.) can successfully be used in firing against distant targets (which are beyond the reach of the other groups) of vital importance, as well as against enemy artillery of large caliber.

Needless to say, for the purpose of the destruction of various kinds of artificial barriers, fire against trenches and live targets with these weapons is to be resorted to only under the most exceptional circumstances.

The weapons of this group are designed primarily for use in preparation for active operations in the field or in case of siege on fortresses. In sectors designated for passive defense, these weapons may produce only casual results which would seldom justify the efforts entailed in bringing them up or the expensive "shots" fired by these; besides, it would tie them up here and render difficult their bringing up to other positions where their employment might be of vital importance.

Particularly the guns of this group may be especially useful as follows: The 10" gun - with its long range and great power, as well as the 6" gun, of course, to a correspondingly lesser

TABLE 21.

GROUP IV - Position Guns.

WEAPONS	Weight of Equipment on march: pud	Weight of Equipment in combat: pud	Readiness: hours	Maximum range: b. ver.	Maximum range: shr. ver.	Explosive shell: funt
	1	2	3	4	5	6
GUNS						
1. 10-in. Coast Defense gun, 45 caliber	1,770	3,000	7 days	19.2	-	46
2. 9-in. Coast Defense gun, mod. 1867	925	2,000	5 days	9.6	-	20
3. 6-in. Coast Defense gun	350	1,200	2 days	12.4	-	6.6
Howitzers						
4. 12-in. mod. 1915, Obukh make	1,200	3,900	1.5 days	12.6	-	198
5. 12-in. English Vickers make	837	3,600	1 day	9.7	-	134
Mortars						
6. 11-in. shore, model 1877	640	1,600	10 hrs	8.2	-	145
7. 9-in. shore, model 1877	336	930	8 hrs	7.2	-	43
8. 9-in. siege	336	-	8 hrs.	6.2	-	99

degree, for firing on distant targets of exceptional importance; important supply centers, railway terminals, dense traffic centers, large camps and in general at large bodies of troops, - at large

headquarters, at strong artillery, like the 42-cm. howitzers, etc.

The 12-inch howitzers and the 11-inch mortars - against strongholds defended by strong horizontal defensive means, and exceptionally strongly defended sectors of enemy positions, separate forts - barriers and strongholds of fortress type, reinforced by all means of the permanent fortifications.

The 9-inch gun and the 9-inch mortar - for use against objects of lesser resistance and lesser importance.

It must be recognized as entirely inexpedient and inadvisable to make use of the weapons of this group solely for the moral effect they may have on the enemy.

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ARSENALS

REMODELING OF GUNS.

The Chief Artillery Department had at its disposal government arsenals for the manufacture of artillery equipment - gun-carriages, limbers, ammunition chests, wheels, etc.

The production of these government arsenals was insufficient for meeting requirements - therefore gun-carriages and other artillery equipment were produced upon orders from the Chief Artillery Department at other government and public factories. These orders were a sort of side-line for these factories and did not constitute their basic and primary concern.

The important Russian arsenals, each of which was overcrowded with orders beyond production capacity during the World War, were as follows:

The "N" Arsenal - charged with the production of gun-carriages for 3" rapid-fire field guns, model 1902; gun-carriages for 48-lin. howitzer, model 1909; gun-carriages for 48-lin. howitzer of the Schneider type; limbers for the 3" mountain guns, model 1909; limbers and ammunition chests for the following weapons: 3" field guns; 3" mountain guns; 42-lin. rapid-fire guns; 6" field howitzers;

6" fortress howitzers; 6" Schneider guns. Carts, two-wheel, telephone, model, 1908; carts, two-wheel, Sokolow machine-gun; combat wagons, double harness, model 1884; machine-gun carriage of Kolesnikow make; saddle equipment.

The "L" Arsenal - charged with the production of gun-carriages for 3" mountain guns, model 1909; gun-carriage for the 48-lin. howitzers model 1909; gun-carriages for 48-lin. howitzer of Schneider type; gun-carriages for 42-lin. rapid-fire guns; limbers for: 3" field guns, model 1900; 3" mountain guns, model, 1909; 48-lin. howitzer, 1909 and 1910 models; ammunition chests: For 3" field guns; 3" mountain guns, model 1909; 48-lin. howitzers, model 1911; machine-gun carriages of the Kolesnikow make; saddle equipment.

The "M" Arsenal - Gun-carriages for 3" guns, model, 1902; limbers and ammunition chests: Models 1903 and 1909, Tarnowsk make; carts, two-wheel; combat wagons; machine-gun carriages of Kolesnikow make; saddle equipment.

Soon after the beginning of the World War all three of these arsenals were called upon to produce a considerable amount of various types of reserve parts of artillery equipment, particularly wheels and carts.

Aside from this, in view of urgent needs, our arsenals were required to do some extensive remodeling of guns to which these arsenals were not accustomed, and this greatly complicated the work of the arsenals and considerably affected the work on gun-carriages and other artillery equipment.

Then, because of their geographic location, two of these arsenals served throughout the war as the principal remodeling bases for the South-Western and Western fronts.

Orders coming in directly from the fronts greatly hindered the work of these arsenals in complying with the instructions received from the Chief Artillery Department. The "L" Arsenal was the one most seriously affected in this respect.

During the war (1914 - 1917) the work of the "N" and "M" Arsenals included production and remodeling of the equipment set forth in tables 25 and 26.*

The "L" Arsenal in its production came very closely to the "M" Arsenal. The "L" Arsenal executed during the war as many orders as the "M" Arsenal, and in addition had the very difficult job of making gun-carriages for the 48-lin. howitzers, the 42-lin. guns and the 3-in. mountain guns of the 1909 model.

Particularly great difficulty was encountered in the make of the mountain carriage of 1909 model by the "L" Arsenal. The first order for 62 gun-carriages of this model was worked upon by this arsenal from November, 1910 to September, 1914. In this work the arsenal was for the first time to become acquainted with the use of nickel steel; it was necessary for it to determine the thermal finishing of this metal, to familiarize the technical personnel with the new

* - Tables 25 and 26 by no means show all articles made and repaired by these arsenals; the tables merely serve to give a general idea of the variety of the work carried on by them and do not indicate the extent of the production of the arsenals in question - which was far in excess of that shown in these tables. E.Z.B.

TABLE 25

"N" ARSENAL.

Article of equipment	1914	1915	1916	1917	total
Production					
Gun-carriage, 3", Mod. 1902	98	114	107	39	358
Ammunition chests	1756	1609	2684	1194	7243
Combat wagons and carts	338	209	576	308	1431
Machine-gun carriages	-	-	1240	884	2124
Wheels, various kinds	9076	12809	12518	8035	42438
Spare parts of equipment	1372097	3356808	6710283	3286954	about 15000000
Saddles	2378	2539	298	820	6035
Harness	65	1167	1626	1807	4665
Repair					
Gun-carriages, various types	258	449	1530	278	2515
Ammunition chests and limbers	375	1286	282	224	2167
Combat wagons and carts	36	28	56	76	196
Wheels	1206	419	598	328	2551
Spare parts	12257	41031	36971	19851	110110

TABLE 26

"M" ARSENAL.

Production					
Gun-carriages, 3" Mod.1902	-	-	60	120	180
Ammunition chests, limbers	274	636	864	970	2744
Combat wagons and carts	638	1691	1389	763	4481
Machine-gun carriage(Kolesnikow)	-	-	341	510	851
Wheels, various kinds	3735	1267	28638	13448	47088
Spare parts	61398	11995	580662	1088676	1742731
Harness	-	-	555	300	855
Repair					
Gun-carriages, various kinds	5	-	108	8	121
Ammunition chests and limbers	20	40	1692	62	1814
Combat wagons and carts	-	-	89	3	92
Wheels, various kinds	92	-	3414	227	3733
Spare parts	-	-	62	14333	14395
Saddle equipment	-	-	500	300	300

working methods, to instruct personnel relative the peculiar methods of handling this newly introduced metal, which resulted in defective makes and rejections. Four factories were invited to make the "cheek" for this gun-carriage of nickel steel, each of which submitted a very different bid for 64 of these, as follows: Naval gun factory - 20,320 roubles; public gun factory - 10,560 roubles; public machine works - 5,440 roubles; and the mountain gun factory - 2,900 roubles.

The order was given to the mountain gun factory, requiring it to deliver these by March, 1912; actually, this factory delivered all of these by October of 1913, the delay amounting to one year and seven months. This delay was explained by the mountain gun factory as being due to the great difficulties encountered in working with the special steel, requiring entirely different methods of handling and resulting in unforeseen difficulties and rejections in the finished product.

Beginning with the latter part of 1912 the Chief Artillery Department commenced to receive from the army reports of frequent breakage in the mountain gun-carriages of the 1909 model, which had been manufactured by the "N" public gun factory, which, among other equipment had also submitted this model.

The "L" Arsenal was given an order for the make of the new construction type of certain parts of the gun-carriage which was expected to be stronger than the one in use, and it was required to submit these for test and to note the changes in construction on the charts of these gun-carriages so that these may be available in the manufacture of new equipment. This retarded considerably the work of the arsenal.

The work of actual basic reconstruction of guns was carried out by three of our arsenals and two large public machine works. All of these were asked in the latter part of 1915 to so arrange their work that the arsenals would be in a position to remodel 15 or 20 guns per month each, and each of the machine works twice the number of that remodeled by each of the arsenals, i.e., that all of these combined be prepared to remodel about 100 3" guns per month.

TABLE 27 shows the number of guns that was actually remodeled during the World War by our arsenals, showing separately those requiring new barrels and those requiring ordinary remodeling.

TABLE 27.

Remodeling of guns by Government Arsenals during the World War, from 1915 to 1917.

Type of gun	Arsenal	Time of Remodeling	1915 Change of barrel	1915 Ordinary	1915 In all	1916 Ch'g of bar'l	1916 Ordinary	1916 In all	1917 Ch'g of Bar'l	1917 Ordinary	1917 In all	Aggregate
3" field model 1902	"N"	1916 & 1917	-	-	-	165	-	165	12	-	12	177
	"L"	1916 & 1917	-	71	71	141	-	141	150	-	150	362
	"M"	1916 & 1917	-	40	40	141	-	141	68	-	68	249
	In all				111	447		447			230	788

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CONDITION OF ARTILLERY EQUIPMENT IN RUSSIA AS COMPARED WITH THAT OF THE GERMAN AND AUSTRIAN ARMIES.

As we have seen above (Table 10), at the beginning of the World War, i.e., by July 20, 1914, the number of guns for equipping the light and heavy field batteries were sufficient; there was a shortage of 58 guns required for the horse and mountain batteries. This amounted to only about 0.83% of the total number of guns designated for the batteries.

In the emergency reserve, not counting the shortage of 99 guns of the 1895 model for batteries of state militia, there was a shortage of 124 guns, or about 12% of the total number of guns designated as emergency reserve.

In all there was a shortage of 182 guns or 2-½% of the number called for.

Thus, we may consider that on the fronts, all artillery units of the active army were fully equipped, and that only in the war time reserve was there a shortage of about 220 guns (including that required for the militia). The shortage in mountain guns and the 48-lin. howitzers was supplied in the third month of the war, so that in reality there were only lacking 86 guns for the horse artillery and nine 6-inch howitzers. Such a shortage, considering as a whole the number of

guns involved, must be recognised as insignificant.

Nevertheless, our army at the outbreak of the World War was not sufficiently equipped with field artillery, as compared with the artillery equipment of our neighboring armies, which it had to meet on the fields of battle.

This situation is clearly apparent from a comparison of the number of batteries and guns of the Russian field artillery with the field artillery of our former principal enemy - Germany.

The German field artillery exceeded our own, in general, by 484 batteries and 2,310 guns.

The superiority of German artillery over our own is even more apparent when we compare the number of guns per infantry division (of a corps of two divisions) of that of our own with that of the German and Austrian.

Our infantry division had 7 batteries with 54 guns, while the German infantry division had 14 batteries with 80 guns of field artillery, i.e., twice as many batteries, and 26 guns more than we had per infantry division; the Austrian division had 9-½ batteries and 54 guns, i.e., the same number of guns we had, but exceeded our own in the number of batteries. This comprised a more convenient organization, affording greater facility in combat for the Austrian artillery when properly handled.

Besides, while in our division and even in our corps there was no heavy field artillery at all, each German division had 8 heavy howitzers and each Austrian division had 4 heavy howitzers.

True, it is to be remembered that the greater part of the German forces were on their western frontier, against France, during the war, and the Austrians directed part of their forces against Serbia. But the Czarist Russian government should have properly taken into consideration on the one hand, not only its own strength, but also the strength of its ally, France, and on the other hand - the strength of Germany and her ally, Austria.

Comparing the general number of batteries and guns which were available in round figures in 1914 for equipping first-line troops of the Russian and French armies, on the one hand, and that of the German and Austrian armies on the other - we see that at the outbreak of the World War the first two allies combined had 2,034 batteries with 11,388 guns and the second, had - 2,498 batteries with 13,476 guns, i.e., the latter were more far-sighted in their preparations for the war, and as far as artillery was concerned, were much stronger than the former.

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PART IV

AMMUNITION SUPPLY.

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AMMUNITION REQUIREMENTS DURING THE WORLD WAR.

It is worthy of note that at the General Staff, as well as at the Headquarters of the Supreme Commander-in-Chief, until the early part of 1915, there was complete satisfaction with the situation regarding rifle ammunition. As was the case prior to the outbreak of the World War, apparently, no one was in any way concerned with the doubtless shortage of ammunition, in spite of the ceaseless alarmed reports of the Chief Artillery Department; the "higher-ups" after the beginning of the World War acted as if they had never realized that the time was on hand to sound alarm on this score. On the contrary, everybody seemed to point out that the ammunition question was well taken care of, and was in no way worrying the high command. Actually, aside from that released in the year preceding the World War to: Bulgaria - 30,000,000 rounds, Montenegro - 21,000,000 rounds, and Mongolia - 9,000,000 rounds, there was at the outbreak of the World War released to the Navy Department - 10,500,000 rounds, and to Siberia, in July and December of 1914 - 200,000,000 rounds. In all - 270 500,000 rounds.

Besides, soon after the beginning of the World War, in accordance with the wishes of the officers in charge of ordnance

supply at the fronts, rifle ammunition was sent from munition factories directly to the supply bases at the fronts. And very soon, as a result of crowding the stores of these supply bases with rifle ammunition, the needs of which was small at the time, the same officers in charge of ordnance supplies endeavored to curtail the supply of ammunition. The supply was curtailed, and this resulted in the piling up of these at one ordnance depot away from the front where in December of 1914 there accumulated a reserve supply of 60,000,000 rounds (this circumstance was responsible for the releasing of additional 80,000,000 rounds to Serbia in December, 1914).

And after this "satisfactory" situation, beginning in January of 1915, the Chief Artillery Department was being flooded with requests for rifle ammunition to such an extent that to fill these became more difficult every day and finally there came the crisis, the prospects of overcoming which became remote.

Thus almost a half-year of invaluable time had been lost, time when foreign markets were not yet crowded with orders from all of the warring nations. Therefore, our factories had to increase their actual output to the utmost, carrying it to a dangerous point while at the same time they were busy with expansion and the make of new equipment.

According to the mobilization estimates of the requirements by the General Staff, the annual production of our three munition factories was considered sufficient to take care of all needs when these operated on a 24-hours basis, turning out in all 550,000,000 rounds; i.e., the General Staff figured that in addition to that manufactured in peace-time for the mobilization reserve in supplementing the 3-lin. ammunition there would be needed in time of war about 50,000,000 rounds per month.

At the same time, as far back as the early part of 1915, there commenced to come in to the Chief Artillery Department requests from the active army greatly (3 - 4 times) exceeding the estimates of the General Staff, and on June 3 (16), 1915, the chairman of the special artillery commission (who was also inspector general of artillery) informed our representative in America, General Sapeshnikov, relative the offer by an American to supply 450,000,000 3-lin. rounds of ammunition, that the requirements of the Russian army in rifle ammunition was "unlimited," and that, therefore, it was necessary to arrive at an agreement on the matter of the supply of large quantities and to conclude contracts without any fear of exceeding requirements.

From 1915 onward the requests for rifle and machine-gun ammunition from the Headquarters of the Supreme Commander-in-Chief increased by leaps and bounds for supplementing monthly requirements as well as, particularly, for these special requirements which arose

simultaneously with the forming of new units which was on a scale which had never been foreseen in the last period before the war in the preparation of the tables of mobilization. These special needs during the war amounted to 3,000,000,000 rounds.

The Headquarters of the Supreme Commander-in-Chief determined the monthly requirements to amount to 200,000,000 rounds in the early part of 1916; in the middle of the same year this was raised to 225,000,000 rounds - 25,000,000 for Austrian rifles and 25,000,000 for use in the interior of Russia (for range practice of reserve regiments). Finally, at the conference of allied representatives, in January of 1917, there was set forth as the monthly requirement of ammunition, 350,000,000 rounds. Special requirements of ammunition were stated to be 2,500,000,000 rounds. The ammunition requirements for rifles of foreign make were stated to be as follows: Japanese - 45,000,000 per month; Gra and Gra-Kropachek - 15,000,000 per month; Westerly - 5,000,000 per month; Lebel - 7,000,000, and for the English 0.303 (machine-gun) - the number of rounds was not determined; there were ordered in all 900,000,000 rounds. The total monthly requirements were stated to be 430,000,000 rounds, and the special requirements, 2,500,000,000 rounds.

Below are shown figures for rifle and machine-gun rounds prepared in accordance with instructions from the Headquarters of the Supreme-Commander-in-Chief at the time of the arrival of the Inter-allied Commission.

For first period (six months) until July 1, 1917.

Per month -	3-lin.	300,000,000	x 6 =	1,800,000,000
	Austrian	25,000,000	x 6 =	150,000,000
	Japanese	45,000,000	x 6 =	270,000,000
	Gra-Kropachek	15,000,000	x 6 =	90,000,000
	Lebel	7,000,000	x 6 =	42,000,000
	Veterly	5,000,000	x 5 =	25,000,000
	English 0.303	400,000,000	for 4 months	400,000,000
			Total -	2,777,000,000
Special requirements	3-lin.			2,500,000,000
	English 0.303			400,000,000
			Total -	2,900,000,000
			Aggregate -	5,677,000,000

Or, altogether, about 1,000,000,000 per month.

For second period (12 months) - till January 1, 1918.

Per month -	3-lin.	325,000,000	x 12 =	3,900,000,000
	Austrian	25,000,000	x 12 =	300,000,000
	Japanese	45,000,000	x 12 =	540,000,000
	Gra-Kropachek	15,000,000	x 12 =	180,000,000
	Lebel	7,000,000	x 12 =	84,000,000
	Veterly	5,000,000	x 12 =	60,000,000
	English 0.303			400,000,000
			Total -	5,464,000,000
Special requirements	3-lin.			600,000,000
	English 0.303			400,000,000
			Total -	1,000,000,000
			Aggregate -	6,464,000,000

Or, altogether, about 500,000,000 per month.

For third period (18 months) - till July 1, 1918.

Per month -	3-lin.	300,000,000 x 18 =	5,400,000,000
	Austrian	25,000,000 x 18 =	450,000,000
	Japanese	45,000,000 x 18 =	810,000,000
	Gra-Krnpachek ..	15,000,000 x 18 =	270,000,000
	Lebel	7,000,000 x 18 =	126,000,000
	Veterly	5,000,000 x 18 =	90,000,000
	English 0.303...		400,000,000
	Total -		7,546,000,000
Special requirements	3-lin.		2,500,000,000
	English 0.303		400,000,000
	Total -		2,900,000,000
	Aggregate -		10,446,000,000

Or, altogether, about 600,000,000 per month.

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SUMMARY OF THE SUPPLY OF RIFLE AND MACHINE-GUN AMMUNITION.

The final summary of the supply of the army with rifle and machine-gun ammunition is as follows:

1. In accordance with the last pre-war mobilization requirements of 1907 - 1908, there were required to be available for use by the troops and in reserve at the beginning of mobilization 2,746,000,000 rounds. This amount, known to be inadequate, had been accepted only because of the fact that the Department of Finance would not authorize the necessary funds for the supply of the amount recognized at the time to be necessary, (i.e., based on the number of rifles and machine-guns then available), 3,346,000,000.rounds. For the supply of the reduced amount (2,746,000,000 rounds) the necessary funds were not forthcoming until 1913, and the ammunition and powder factories were unable to work at their full capacity, having been enabled to do so only b y 1913.

2. Because of such limitations imposed by reason of the lack of funds, at the outbreak of the World War, i.e., on July 20 (August 3), 1914, there were actually available 2,446,000,000 rounds of 3-lin. rounds, i.e., 300,000,000 rounds (11%) less than the minimum recognized as inadequate to fully meet requirements.

3. Relative the further supply of ammunition to our army in the course of war, the General Staff considered, in accordance with the mobilization plans, that the annual output of our three munition factories would be sufficient (provided these worked on a 24-hour basis), turning out a total of 550,000,000 rounds per year.

This estimate proved to be entirely out of all proportion to the scale on which warfare was carried on, and our factories, having developed their output three times their normal production were still unable to supply the current needs at the fronts and for use in the training of troops at home, which called for the supply of from 200,000,000 to 300,000,000 rounds per month. As a result of this it was necessary to commence to build a new large munition factory and to resort to the purchase of munitions abroad.

4. Orders from abroad covered primarily the special requirements which had not been foreseen by the mobilization plans in regard to ammunition needs, and which were created with the organization of the great number of new units for use at the front and for reserve. These requirements amounted to about three billion rounds. From abroad there was mainly to be procured a supply of about one billion rounds per year for those foreign rifle models which happened to be in use by the Russian army.

The orders placed abroad for munitions were delayed. This delay of almost six months, was occasioned by the full supply of ammunition at the front during the first period of the war, when there was

an ample supply of artillery ammunition and therefore there were smaller requirements in rifle ammunition. When, however, the artillery reserve of ammunition became exhausted, there inevitably commenced to be greater expenditures of rifle ammunition. As a result the entire reserve that had been accumulated of rifle ammunition was soon exhausted and there soon started an ammunition famine which could be appeased only by 1917.

5. In Table 44 are shown all of the ammunition supplies of rifles and machine-guns procured during the war of 1914-1917.

In all there were available at the outbreak of the World War and supplied during the war up to 1917, 6,483,000,000 rounds of rifle and machine-gun ammunition; actually there was within the army on January 1, 1 9 1 7 - 1,136,000,000 rounds, i.e., there had been used up between 1914 and 1916 more than 5,000,000,000 rounds.

TABLE 44.

	Aug. 1914	1915	1916	1917	Total
	In million rounds				
At outbreak of war, in hands of troops and in reserve	2,655	-	-	-	2,655
Received from Russian factories	341	1,022	1,482	1,210	4,055
Received from allies and from America	-	150	833	-	983
Captured from enemy	Data not available				
Aggregate -	2,996	1,172	2,315	1,210	7,693