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Scientific Order of Battle (a) Establishments

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IV. Annexures

- "A" Diagram of a Spectrograph GOMZ ISP 22.
- "B" High voltage arc unit D.C.2 GOMZ.
- Low voltage arc unit D.C.2 GOMZ.
- Low voltage single spark unit with high capacity condenser without self-inductance coil for analysis of Bronze CuZnPbSi.

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ELECTRONICS

1. Electron Tubes

The State Optical and Mechanical Works No. 349 (GOMZ), Leningrad, is concerned in the manufacture of measuring instruments. In particular, there is a department for the manufacture of spectrographs and this department includes a research section.

A certain amount of work has been done on the electrical circuits for multiplier tubes; it was carried out by a Russian, Podmoshensky.

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Multiplier tube design itself was directed by Goerlich in Moscow. Dr. Paul Goerlich, well-known as a physicist, is in Sorky (Moscow, Postfach 2)

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2. Reflecting Galvanometers

An existing Soviet model has been considerably improved by a German specialist, Kurt Hohmann. Difficulties were met in the acquisition of non-ferrous copper wire and even bronze strip. The galvanometer sensitivity was between $1 - 5 \times 10^{-9}$ amp. 1 meter scale interval; duration of oscillation < 1 second.

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NAVAL

1. Periscopes

The State Optical and Mechanical Works No. 349 (GOMZ), Leningrad, is concerned in the assembly of periscopes. About 200 periscopes of Zeiss manufacture, captured equipment in various stages of completion, lay about the GOMZ Factory. The Special Construction Bureau had asked for a new design incorporating improvements

[Redacted] The Zeiss designer working on periscopes was Alfred Kaschlik.

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2. Rangefinders

Specific details and quantities are not known, but in general 6-8 meter base rangefinders were made for supply to ships and 2-4 meter base rangefinders for antiaircraft equipment.

3.

[Redacted]

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ARMY

Rangefinders

The State Optical and Mechanical Works No. 349 (GOMZ), Leningrad, is concerned in the supply of rangefinders. Specific details and quantities are not known, but in general 6-8 meter base rangefinders were made for supply to ships and 2-4 meter base rangefinders for antiaircraft equipment.

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SCIENTIFIC ORDER OF BATTLE

A. Establishments

1A. State Optical Institute (GOI), Leningrad

[redacted] there is no close connection between GOI and Factory GOMZ. GOI is, in fact, a separate institute engaged in training of optical designers and users of optical equipment. It is located on the Litovskaya Ulitsa, about one mile from the GOMZ.

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[redacted]

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The captured Zeiss equipment which was in this Institute was not completely understood by the Russians and they often took advice on how to set up and adjust instruments.

2A. State Optical and Mechanical Works (GOMZ)

Between 2,000 and 3,000 workers were employed here, about 60 percent of them skilled, the remainder unskilled or administrative, supervisory, party, and trade union. The factory is situated on Chugunnaya Ulitsa, north-central area of Leningrad, about 2 km NNE of the divergence of the rivers Neva and Nevka.

Direction

Last Director-in-Chief	Unknown
Last-but-one Director-in-Chief	Semonov
Chief Engineer	Archipov
Commercial Director	Potapov
Personnel Director	Smirnov (MVD Colonel)

Heads of Departments

Astro	Dobitshin
Measurements	Titov and Shoshin
Fine Measurement	Delyanov
Cinema	Unknown
Photo	Unknown
Laboratories for Measurement and Fine Measurement Departments:	Shoshin Rudakov
Laboratories- Chemical, Metallographic, Technological, Photographic, Spectrographic, (Discharged about a year ago) Vaporizing, Photo cells, etc:	Muraweiski Deputy Saitzev

Technical Standard in GOMZ

The standards of accuracy in GOMZ were similar in most respects to international standards (that is, with regard to margins and material specifications). However, margins could on occasion be set to such narrow limits that they became ridiculous and were evidence of insufficient understanding of the task in hand.

Difficulties were experienced in the production of platinum step filters. The required accuracy could not be reached because of the ignorance of

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the operators and lack of appreciation of the mathematics of the subject. The filters were also measured with unsuitable apparatus. Sventizki of the State Optical Institute himself said that the Beckmann spectral-photometers made in GOMZ were not suitable for filter gauging, as the spectrographic measurements gave quite different values.

In sensitometer standards, too, the demands made could not be met, as the photographic plates were exceptionally bad.

Among many other examples of misunderstanding [REDACTED] is one of a demand made on the Zeiss designer, Weber, to consider a rangefinder weighing 200 kg; all details regarding accuracy, purpose, ancillary equipment were immaterial; only the weight was important.

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Acceptance of the finished products was made by the OTK (Technical Control Section). The inspectors were to check individual parts, not for quality, but for availability. The specialist knowledge of testing methods, testing equipment, and tolerances was not available. Also it appears that the recipients of scientific instruments are unable to decide whether defects are optical, mechanical, or electrical. Nevertheless, many complaints were received (about 10 percent of the output). Probably about half of these would not have occurred if the recipient had been able to recognize and correct small faults. The pressure of the monthly target unavoidably led to careless work.

Products of Factory GOMZ

Cine projectors (amateur box camera type) (sic)

Large scale astronomical equipment

Telescopes, transit instruments, reflex telescopes. In one case, the mirrors required had to be ordered [REDACTED]

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Maksutov, a Russian telescope designer, was often in the factory supervising work being done to his design. [REDACTED]

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Precision Measuring Instruments

Optimeters, ultra optimeters, interferometers, microscopes, universal measuring machines; almost all were designed by Zeiss men on the lines of Zeiss products. Dr. Kuhne was a leader in the production of optical equipment.

Precision Ball Bearings

Mueller-Nuernberg designed, and brought to the production stage by C. Buettner. The tolerance reached on all working surfaces is supposed to have been less than 1μ . Sensitometers for photographic emulsions - details unknown.

Reflecting Galvanometers

The existing Soviet model has been considerably improved by the German, Kurt Hohmann. Difficulties were found in obtaining non-ferrous copper wire and bronze strip. Sensitivity $1 - 5 \times 10^{-9}$ amps. Scale interval 1 meter; duration of oscillation < 1 second.

Spectralphotometer, Beckmann Type

Mechanically and electrically a bad copy of the original English apparatus UVI-Spek-Hilger and the American Unicam: The electrodes for the cells were particularly bad.

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Spectrographic EquipmentQuartz Spectrograph. Model ISP.22 (See Diagram 1 appended)

This has medium dispersion (similar to Zeiss Z.24), an aperture ratio of about 1:25, a collimator aluminum mirror $F = 600$ mm, a double lens camera objective $F = 800$ mm and a useful aperture of 32 mm, a slit adjustment of 0.001 mm and a mm scale Hilger model optical bench. The accessories were simple spark tripod, spherical condenser $F = 165$ mm, cylindrical condenser $F = 165$ mm, latterly Zeiss 3-condenser system with achromatic condensers $F = 75$ mm, $F = 150$ mm, $F = 275$ mm, and a 9-step platinum filter on quartz, permeability 10 - 100 percent. There were also in preparation 3-step platinum filters 100-50-10 percent permeability.

The 3-Prism Glass Spectrograph, Model ISP.51

This is a re-design of the Zeiss model developed by the German Leo, at present still in Leningrad. It has three easily interchangeable cameras $F = 12$ cm (Raman 1:2.7), $F = 27$ cm (1:5.5), $F = 84$ cm (1:20). The accessories were a simple spark tripod, sometimes a Raman lamp, a 9-step platinum filter on glass, various condensers.

1 Littrow Spectrograph, KB.55

A model similar to Hilger No. E.478. This was the original Zeiss design QG.55. It had interchangeable quartz and glass lenses, fully automatic adjustment by means of a hand-wheel with a special wave length drum for quartz and glass, a wave length scale, symmetrical precision slit (one dividing line = 0.001 mm). The objective $F = 160$ mm ratio of aperture about 1:40. Accessories similar to ISP.22.

Planned Spectrograph

1 Diffraction Spectrograph with plano grating.

Spectrum Projector - similar to the Zeiss model.

Double Spectrum Projector - original Zeiss design.

Microphotometer MF.2 - Later Zeiss design with Soviet reflecting galvanometer.

Measuring Microscope MIR.13 - a bad copy of Hilger.

Abbe Comparator ISA.2 - original Zeiss design.

Spark Generator IG.2 (See Diagram 2 appended)

Raysky principle, with control spark gap.

Arc Generator DG.2 (See Diagram 3 appended)

For AC arcs. This was an original model by Sventizki. It gave condensed sparks 220 v. and with a special circuit for particularly strong spark discharge of the order of 10 μ F 220 v.

Refractometer - Similar to Zeiss immersion refractometer.

War Equipment

Rangefinders for warships, artillery, antiaircraft guns. Periscopes for submarines. Warlike equipment was designed by German specialists only until September 1951.

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In Course of Construction

A machine for gratings for plano gratings 120 x 120 mm. The grating was to have [redacted] 1200 lines to the mm. A fairly large group of Zeiss designers under the control of a Soviet specialist (name unknown) was occupied with this design.

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3A. Spectrochemical Laboratory in the Factory GOMZSoviet Director
Soviet AdvisersE.I. Voronzov, Research Engineer
Professors Prokofiyev and Sventizki
from the State Optical Institute.

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The spectrographic laboratory consisted of a small routine section to which had been added, later, a research section.

The layout of both sections conformed to the generally accepted plan of such laboratories, except that in the Routine Section the design had permitted the camera ends of both Q.24 and ISP.22 to be placed in the dark room; this is an established procedure, which facilitates the rapid analysis of control samples. The floor spacing was adequate. There were three rooms made out of one large one:

Studio
Dark Room
Evaluation of Work Room

The Studio was fitted with the following:

- 1athe Kaerger (brought from Jena)
- 1 work bench - Soviet make
- 1 grinder - Soviet make
- 1 work bench with quartz spectrograph Q.24, assembled in the works from material brought out of Jena
- 1 work bench with quartz spectrograph Q.24 brought from Zeiss-Ikon, Dresden.
- 1 work bench with quartz spectrograph ISP.22 - GOMZ make
- 3 or 4 spark generators Zeiss, GOMZ, and laboratory make

The Dark Room contained the following:

- 2 work tables for Q.24 and ISP.22
- Double developer stand with water supply and foot valve mounted or on the floor
- Drying apparatus
- Small store cupboard

Evaluation of Work Room was equipped as follows:

- 3 desks brought from Jena
- 3 apparatus cupboards brought from Jena
- 5 apparatus tables brought from Jena
- 1 wardrobe
- 1 rapid photometer
- 1 rapid photometer made in GOMZ with a progress lens from Zeiss, Jena
- 1 Spectrochemical Evaluation apparatus - Kaiser type from Zeiss, Jena
- 1 Spectrochemical Evaluation Unit made in GOMZ
- 1 Spectrum Projector - GOMZ
- 1 Double Spectrum Projector, Zeiss
- 1 Quartz Spectrograph, ISP.22 - GOMZ
- 1 Stelescope, LOMZ make, probably a copy of a Hilger model
- Various spark and arc generators - GOMZ
- 1 Steelometer - LOMZ - never used.

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Ninety percent of the tools and individual parts were from Jena and Dresden.

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There was automatic drying equipment. The water supply apparatus and the plate agitating equipment was designed and made [REDACTED] on the lines of Jena and Dresden models.

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Equipment

The laboratory had three medium dispersion type quartz prism spectrographs. This type of spectrograph is suitable for the analysis of copper and aluminum base alloys with which the laboratory was mainly concerned. They are not well-suited for the analysis of highly alloyed steel but good use seems to have been made of them, however, for the comparatively few steels submitted for analysis.

One spectrograph was Zeiss Q.24. The others were GOMZ ISP.22. The ISP.22 had an aluminized collimating mirror instead of a lens. It was agreed that this made the spectrograph cumbersome. The mirror gives uniform focus for rays of all wavelengths; its use had also been determined by the shortage of high-quality quartz. External lenses and diaphragms were used for the purpose of isolating selected portions of the light source.

The accessory equipment consisted of standard types of good design and they were adequate for the amount and type of work being done in the laboratory. The microphotometer was original Zeiss design with a built-in galvanometer. The spectrum projector, made in GOMZ, is a poor copy of the Zeiss original. The double projector, designed in 1941 by Zeiss, proved satisfactory: any desired spectra from 2 spectrograms can be laid together without a dividing line; dispersion differences can be optically corrected or compensated up to about 6 percent. The steelscope is a copy of a fairly old Hilger design, with finder scales for steel and non-ferrous examination without comparison spectrum, and was a very useful apparatus for classification analyses. The spectrochemical evaluation apparatus, after Dr. Kaiser's model, was made in 1942 on the lines of the Owen calculator; it is provided with a scale for carrying out simple background correction.

The following Spark Generators were used:

- (a) Feusner Spark Generator with synchronous motor
- (b) GOMZ Spark Generator, Raysky system, with control spark gap
- (c) High tension DC Spark Generator - Polack design
- (d) Low tension Spark Generator 220 v DC - designed by Polack
- (e) Generator for DC single sparks and AC quarter arcs - Polack design
- (f) GOMZ Arc Generator for constant AC arcs, sometimes up to 20 amps.

This was a good apparatus developed by Sventizki, Abramson, and Taganov.

Other fittings were the following:

Cathode ray oscillograph [REDACTED] - a small laboratory model brought from Dresden.

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1 rotary mirror made in the laboratory, 3,000 rpm synchronous motor.

2 cameras for rotary mirror photographs of spark discharges.

1 camera with folding spark slide and built in the laboratory.

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Analysis

It is evident that the photographic plates available for spectrographic analysis were of a very poor quality. Both gamma and speed varied between plates in the same box. Also there was considerable variation in the quality of individual plates. This was found when the plates had been subject to complete fogging and differences in gamma obtained between spectrum lines only a few angstroms apart. Consequently, no generally accepted procedure of plate calibration had been adopted. Instead, there was used a 3-step platinum filter giving 50 percent, 100 percent, and 10 percent transmission; density differences between steps were used to ascertain the gamma of the plate. The poorness of the plates was generally recognized but it was not possible to influence the manufacturers to improve the quality. There was no close cooperation between plate manufacturers and users.

Counter electrodes of copper were used, chiefly because there was no supply of high purity carbon or graphite electrodes available. The graphite electrodes supplied were gritty and pitted very easily. Prokofiyev expressed an opinion that the breakdown of graphite electrode points invalidated their use.

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Very good work seems to have been done in the determination of elements present in high percentages in copper base alloys and the reproducibility quoted for tungsten in highly alloyed steel is exceptionally good; the use of the medium spectrograph in this respect is notable.

The aluminum base alloy samples were obtained by casting in heavy copper molds. The method of parting the pencil-shaped electrode was of interest since it enabled the most satisfactory portion of the electrode, the center, to be used.

The complete excitation conditions, line pairs, and reproducibility obtained are as follows:

1. Alloy - Silumin

<u>Component</u>	<u>Sand Casting</u>	<u>Pressure Casting</u>
Si	10-13%	8-10%
Fe	0.2-0.6%	0.4-1.5%
Mn	0-0.5%	0.2-0.6%
Mg	0-0.5%	0-0.5%
Cu	0-1%	0-2%
Al	Remainder	Remainder

Excitation:

Feussner and Raysky spark generators
C = 10,000 pF, peak voltage 15-17 kv
L = OH 100 sparks per second

Electrodes: Pair of hemispheres, radius 2.5 mm
Space: 3.5 mm
Slit: 0.035 mm, 3-step filter 100/50/10 percent
Preliminary spark: 2 minutes
Exposure: 30-45 seconds
Analysis lines:

		<u>Reproducibility</u>
Al 2567.99	Si _I 2514.3	approx. 1.8%
Al 3050.1	Fe _I 2756.3	approx. 3. %
Al 3050.1	Mg _{II} 2790.8	approx. 2.5%
Al 3050.1	Mn 2939.3	approx. 3. %
Al 3050.1	Cu _I 3247.5	approx. 4. %

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2. Alloy - Hydronalium

Component	Pressure Casting
Mg	7-12%
Fe	0-0.5%
Mn	0-0.4%
Cu	0-0.3%
Si	0-0.4%
Al	Remainder

Conditions of Test

Excitation: As with Silumin
 Electrodes: As with Silumin
 Space: 3 mm
 Slit: 0.035 mm 3-step filter 100/50/10 percent
 No preliminary spark.
 Exposure: 30 seconds
 Analysis lines:

		Reproducibility
Al 3050.1	Mg 2779.8	approx. 1.7%
Al 3050.1	Si 2881.6 with back-ground correction	approx. 3. %
Al 3050.1	Fe _I 2756.3	approx. 3. %
Al 3050.1	Mn 2939.3	approx. 3. %
Al 3050.1	Cu _I 3247.5	approx. 4. %

3. Steels

(a) Ordinary structural steels:

Cr up to 1.5%
 Ni up to 4. %
 Mn up to 1.5%
 Si up to 1.5%
 Mo up to 0.8%
 V up to 0.8%

Excitation: As with Silumin
 Electrodes: Steel with ground plane surface
 opposed electrode: copper cylinder 1.5 mm diameter
 Space: 2 mm
 Slit: 0.015 mm 3-step filter 100/50/10 percent
 Preliminary spark: 1 minute
 Exposure: 20-30 seconds
 Analysis lines:

		Reproducibility
Fe _I 2689.2	Cr _{II} 2677.2	approx. 2.8%
Fe _{II} 2828.6	Mo _{II} 2816 with back-ground correction	approx. 3. %
Fe _{II} 2926.6	Mn 2933.1	approx. 2.5%
Fe _{II} 3154.2	V _{II} 3110.7	approx. 3.5%
Fe _I 3399.3	Ni _I 3414.8	approx. 2.8%
Fe _I 2518.1	Si _I 2516.1 with back-ground correction	approx. 3. %
Fe _{II} 2876.8	Si _I 2881.6	approx. 3.5%

(b) High alloy steels:

W 1 - 22.1%
 Cr 3 5. %
 Mn 0.2 0.6%

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V	0.2	2.5%
Mo	0.5	2.5%
Ni	0	5. %
Co	0	5. %
Si	0.1	0.8%

Conditions: Exactly as (a)
Analysis lines:

		<u>Reproducibility</u>	
Fe _{II}	2396.7	W _{II} 2397.1	approx. 2.6%
Fe _{II}	2876.8	Cr _{II} 2862.6	approx. 2.8%
Fe _{II}	2944.4	Mn 2939.3	approx. 3. %
Fe _{II}	3154.7	V _{II} 3110.7	approx. 3.5%
Fe _{II}	2828.6	Mo _{II} 2816.0	approx. 3. %
Fe _{II}	2307.3	Ni _{II} 2316.0	approx. 3. %
Fe _{II}	2576.9	Co _{II} 2582.2	approx. 3. %

- (c) Chrome steels: Cr 6 - 15%
 Chrome nickel steels: Cr 16 - 20%
 Ni 7 - 10%
 Nickel steels: Ni 25 - 36%

Conditions: Exactly as (a)
Analysis lines:

		<u>Reproducibility</u>	
Fe _{II}	2876.8	Cr 2862.6	approx. 3. %
Fe _I	3009.6	Ni _I 3012.0	approx. 2.5%

- (d) Nickel steels containing Mo and Ti:

Cr	18%
Ni	8%
Mo	From 0.5 to 2.5%
Ti	Up to 0.8%

Conditions: Exactly as (a)
Analysis lines:

Ti	3088	Fe	3085
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4. Bronzes: Brass

Zn	2 - 40%	Impurities in the form of
Sn	0 - 12% (? - illegible)	As (2288)
Si	0 - 5%	Bi (3067)
Pb	0 - 5%	Sb (2597)
Cu	Remainder	Ni (3414.8)

Excitation:

Impulse: Condenser discharge or polarized AC arc
 1 light impulse 1000th of a second
 4 testing points

Electrode: Sample machined flat with stuck-on insulating
 disc, 1 mm thick, and 4 holes 1.2 mm diameter

Opposed electrodes: Graphite cone 60° or copper wire 2 mm diameter

Analysis lines:

		<u>Reproducibility</u>	
Cu _{II}	2544.8	Zn _{II} 2557.96	approx. 3. %

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		<u>Reproducibility</u>	
Cu _I	2824.4	Pb _I	2833.1 with background correction
			approx. 6. %
Cu _I	2824.4	Sn _I	2839.99 with background correction
			approx. 3. %
Cu _I	2824.4	Si _I	2881.6
			approx. 4. %

Research and Development

Low voltage single spark unit (See Diagram 4 appended)

This high energy impulse unit is of particular interest as it seems to overcome the effect of "third element." The examples quoted are with respect to the determination of zinc in silicon bronze, the effect of varying silicon content being reduced by the use of the single spark unit.

The technique is that of the "exploded wire," in which a bank of condensers is shorted across the wire sample, the latter being immediately vaporized and excited. This technique has not been generally used because of the difficulties associated with the preparation of the sample. It is admitted that the "exploded wire" technique formed the germ of this idea. In effect, the copper counter electrode is fashioned at its top in the form of a wire and the path of the discharge to the sample is restricted by a plastic disc. The disc has a hole drilled in its center, 1.2 mm in diameter. (The composition of the plastic could not be ascertained.) A separate disc is used for each exposure and the average result from four exposures was reported. The amount of metal vaporized by one discharge of the condensers (time: 0.001 seconds) is sufficient to give a dense spectrum. It is asserted that without the disc the discharge spreads along the surface of the sample and a poor spectrum is obtained. With the disc in position a deep uniform crater is caused by the discharge.

The publication of the results of this research rests with Voronov.

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Infra-Red

At the moment, no work on the infra-red end of the spectrum is being done at GOMZ. No questions on infra-red spectroscopy were ever raised by the Soviets.

Direct Reading

The consideration of a ruling machine for diffraction gratings was envisaged. The theoretical information was available but there was no indication that the project would be put on a practical basis for some time. An adaptor for the prism spectrograph was designed and this enabled the photo multiplier tube to be traversed behind the focal plane of the spectrograph.

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It seems, therefore, that direct reading equipment is not in use in the USSR since neither the grating spectrographs nor the integrating devices are available. The integrators could be made, however, once grating spectrometers are manufactured.

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Literature



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Soviet scientific journals are available. Doklady, Izvestia and Vistruk were mentioned, but the only one supplied regularly was Zavodskaya Lab. The magazine Priroda was seen at regular intervals. From time to time the Soviet equivalent to Technical Specifications for Test Procedure for various metals and alloys was made available.

[redacted] a Soviet correspondent of a technical publication had to be very careful of his facts; if they were subsequently proved wrong, he was liable to a fine.

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[redacted] Taganov, who published a technique for the analysis of low carbon content steel. This was found to be untrue and Taganov was punished accordingly.

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Conclusion

The standard of analysis at GOMZ spectrographic laboratory appears to be in keeping with that obtained generally in a unit engaged primarily in routine analysis. The staff of two well-trained girls (educated up to School Certificate standard) should have been, and were, capable of analyzing the 60-80 samples a day with which it is claimed the laboratory had to deal. Close supervision had to be exercised because of the mixed batch of alloy types.

4A. Photographic Laboratory

Russian Director	...	Mme. Smirnova
German Director	...	Dipl. Ing. W. Falta
Design and Equipment	...	Dipl. Ing. W. Falta

This laboratory consisted of three rooms, measuring altogether about 70 sq. meters. The internal fittings were poor. The developing tanks were of tinned iron and rusted badly. There was no particularly interesting apparatus in the laboratory with the exception of a sensitometer designed by Falta himself: this was for measurement of photographic emulsions. Falta had to cope with the many difficulties which arose from bad properties of photoemulsions which were supplied (i) from Dinamo Works, Leningrad, (ii) Works No. 2, Novo-Ryazanskaya, Moscow, and (iii) the NIKFY (NIIKF?) Institute, Moscow.

It is impossible to compare the technical level of this laboratory with that of any laboratory in Jena. The Jena photographic laboratory under the direction of Dr. Gundlack comprised many branch laboratories with first-class equipment; the Leningrad Laboratory was much smaller in scope and was more concerned with production than with checking.

Vaporizing and Photo Element Laboratory

Russian Director	...	Mme. Achremchik
German Director	...	Kurt Hohmann

Madame Achremchik had no technical knowledge whatever and relied entirely on the qualifications of her subordinates or the instructions received from higher authority. Hohmann did good work in the production of platinum step filters and Freiwald, of the State Optical Institute, played a leading part in the manufacture of photo elements. All special equipment was designed by Hohmann with the assistance of a willing and skillful

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Russian junior engineer. These two men were the mainstay of the laboratory, which was not used for research but solely for production. The filters in particular were enormously improved by Hohmann. Until 1948 they had been produced by the State Optical Institute but were of poor quality.

At the end of 1951, the standard reached by the laboratory was far below that of the corresponding Jena laboratory OB.3 in 1945, when the Russian engineer Roshdestvensky, of the State Optical Institute, went to Jena, investigated the platinum vaporizing methods there, and afterwards applied his experience in Leningrad.

6A. Optical Laboratory

Russian Director	...	Nahum Krup Succeeded in 1949 by Mme. Moskalova (?)
German Director	...	Kurt Voigtsberger

This laboratory belonged to the Central Designing Bureau (TsKB) and had at least eight rooms of about 30 cu. meters each. Twenty-two people were employed there and 21 of them were women. The main equipment, furniture, and apparatus were mostly from Jena.

The following instruments were installed:

- 1 Zeiss Littrow Spectrograph QG.55, Russian designation KS.55, which was used for adjusting the lenses of spectrographs of the same type in regular production.
- 1 Zeiss 3-Prism Glass Spectrograph, Russian designation IGP.51. It had 3 different cameras and Raman fittings.
- 1 Russian Quartz Spectrograph ISP.22
- 2 or 3 Russian microphotometers illegible . 2.
These were designed from Jena drawings of the Zeiss rapid photometer.
- 1 simple Spectrum Projector - GOMZ
- 1 Double Projector - GOMZ (after Zeiss original).

Many other pieces of apparatus such as refractometers and Abbe comparators and measuring microscopes.

The work carried out by the laboratory was mainly working out adjustment instructions for the fitting shops and the development of improvement of apparatus. Shoshin, Professor Prokofiyev, and Professor Mandelstamm, from the State Optical Institute in Moscow, had a great deal of influence over this laboratory according to Voigtsberger.

7A. Laboratory for Precision Instruments

Russian Directors	...	Rudakov
	...	Shoshin
	...	Schilling
German Director	...	Dr. Kuehne

This laboratory has two rooms, each about 100 sq. meters, in separate buildings, and was equipped with a great deal of apparatus all from Jena. About 30 people, most of them women, were employed. The main work done was the development and the checking of current production.

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Appendix G
Page 128A. Optical Laboratory

Russian Director ... Mme. Olga Sergejevna Orlovskaya
No German assistants.

Little is known of this laboratory. The work done in it is mainly testing and chacking of finished lenses which have been "platinum gauged."

The monochromator testing gear was badly arranged; Orlovskaya is quite a good engineer but in many technical matters uncertain of herself and lacking in experience. The staff of assistants, mostly women, is, according to Western ideas, also inexperienced.

9A. Other Laboratories - of which little is known.

There were also laboratories for cine-optics and for the production of aluminum mirrors. These, however, were under all-Russian direction and no details can be given. There was also an Astro Optics laboratory workshop under Russian Direction. The name of the Russian director is not known, but the real head was a Herr Pfaff from Jena, who knows well the production processes in astro optics.

10A. Progress Optical Instrument FactoryLocation

Progress Factory is situated on the right (north) bank of the Neva, 2 km due west of the divergence of the Neva and the Neyka. Nearest bridge: Liteniy Bridge.

The number of workers was about the same as GOMZ and the ratio of skilled and unskilled about the same.

Direction

The Commercial Director was called Abramov.

Technical Standards

No details were known. According to statements made by colleagues, conditions were about the same as in GOMZ.

Products

As far as is known, microscopes of simple and medium types are produced here.

The production figures were comparatively large and the quality relatively good but not up the Zeiss standard. [REDACTED]

[REDACTED] It was a bad copy, particularly on the electrical side, and was not satisfactory in mechanical and optical details.

Microscope Optics

There were only simple drying systems and an achromatic oil immersion. As far as is known, apochromatic apparatus was not produced or, if it was, only a few types of so-called plano achromatic apparatus. German staff who were connected with this work were Mehlis and Vogler.

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[Redacted]

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Appendix G
Page 13

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Conclusion

It seemed that Progress was very like GOMZ, although the staff in GOMZ had the impression that the Progress Factory was better organized and directed.

11A. Leningrad Optical Glass Factory

The fused quartz used in the optical instruments was made at the Leningrad Optical Glass Factory. This works [Redacted] is in the SE Sector of Leningrad on the left bank of the Neva near the Volodarsky Bridge. Next door is the Lomonosov porcelain factory. [Redacted]

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Annexures: A and B as listed on page 2.

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SECRET CONSTRUCTION: BASE CAST IRON
HOUSING SILUMIN.

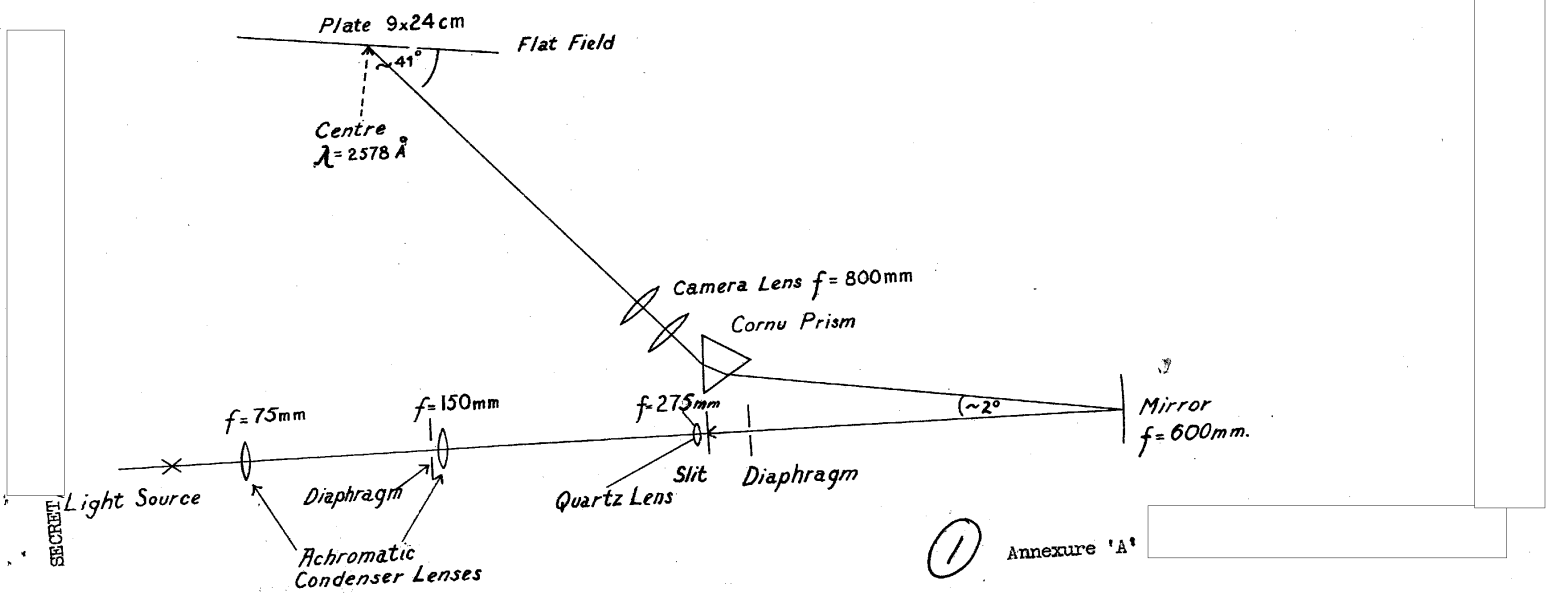
PRISM: QUARTZ CORNU PRISM - 44mm LENGTH OF FACE.
- 40 " HIGH.

LENSES: COLLIMATOR ALUMINIUM MIRROR $f = 600\text{mm}$.
CAMERA LENS $f = 800\text{mm}$.

SLIT: SYMMETRICAL WITH STAINLESS STEEL JAWS,
DRUM DIVISIONS 0.001mm. SPECTRUM FROM
2000 to 7000A - 180mm LONG MILLIMETRIC SCALE.

BAR FOR ACCESSORIES: BAR HILGER COPY, SECURED TO THE
SPECTROGRAPH BY TWO BOLTS.

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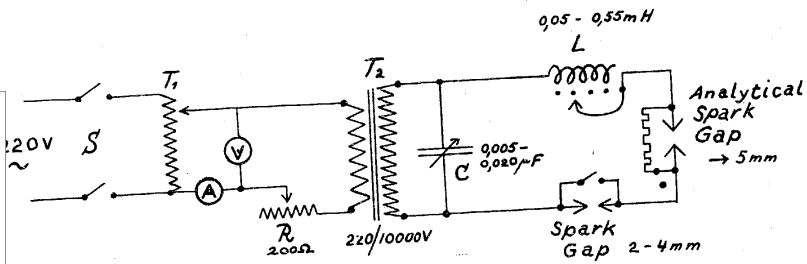
① Annexure 'A'

DIAGRAM OF A SPECTROGRAPH GOMS ISP 22.

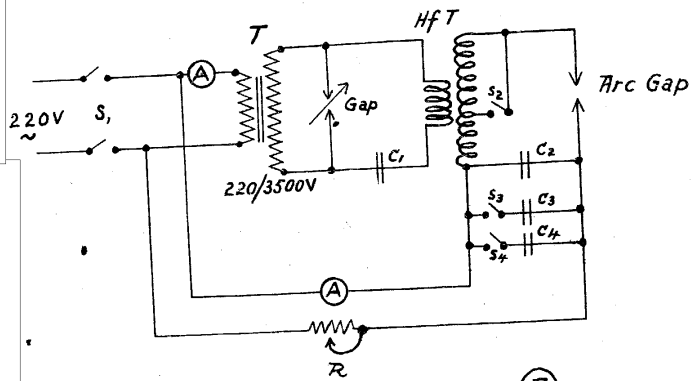
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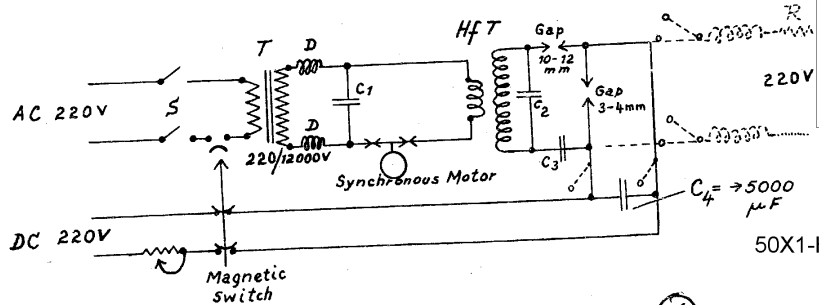


HIGH VOLTAGE SPARK UNIT IG2 GOMS



LOW VOLTAGE ARC UNIT DG2 GOMS

3



LOW VOLTAGE SINGLE SPARK UNIT WITH HIGH CAPACITY CONDENSER WITHOUT SELF-INDUCTANCE COIL FOR ANALYSIS OF BRONZE CuZnPbSi

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Annexure 'B'

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CONSTRUCTION: BASE CAST IRON HOUSING SILUMIN.

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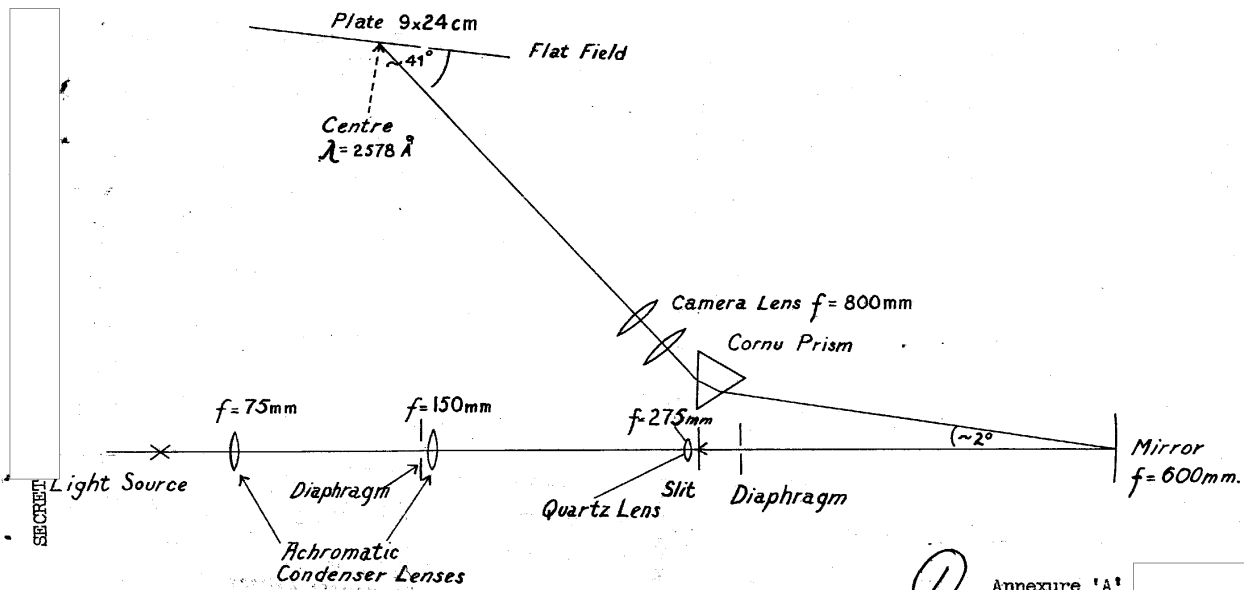
PRISM: QUARTZ CORNU PRISM - 44mm LENGTH OF FACE - 40" HIGH.

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LENSES: COLLIMATOR ALUMINIUM MIRROR $f = 600mm$. CAMERA LENS $f = 800mm$.

SLIT: SYMMETRICAL WITH STAINLESS STEEL JAWS, DRUM DIVISIONS 0.001mm. SPECTRUM FROM 2000 to 7000A - 180mm LONG MILLIMETRIC SCALE.

BAR FOR ACCESSORIES: BAR HILGER COPY, SECURED TO THE SPECTROGRAPH BY TWO BOLTS.



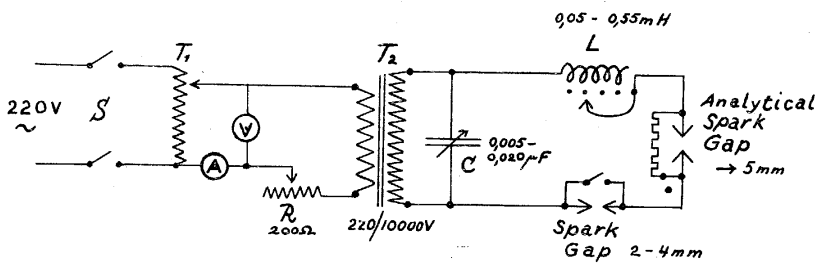
① Annexure 'A'

DIAGRAM OF A SPECTROGRAPH GOMS ISP 22.

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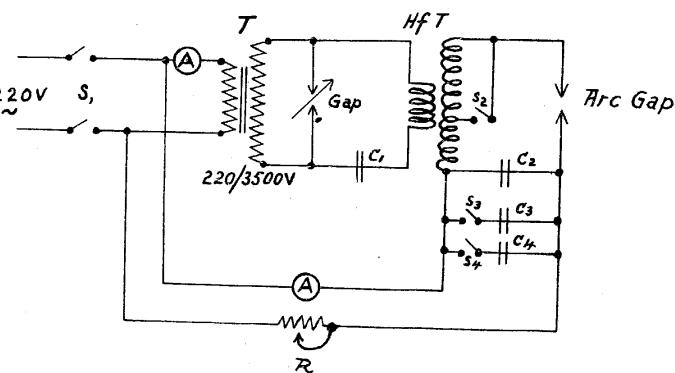
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HIGH VOLTAGE SPARK UNIT IC2 GOMS

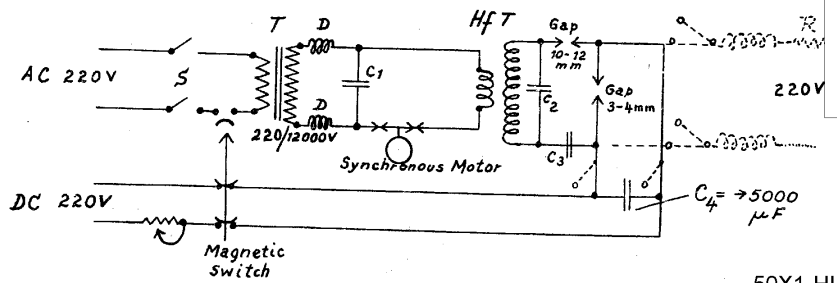
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LOW VOLTAGE ARC UNIT DC2 GOMS

3



LOW VOLTAGE SINGLE SPARK UNIT WITH HIGH CAPACITY CONDENSER WITHOUT SELF-INDUCTANCE COIL. FOR ANALYSIS OF BRONZE $CuZnPbSi$

4

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Annexure 'B'

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FORM NO. 81-44A
FEB 1952

CENTRAL INTELLIGENCE AGENCY

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CLASSIFICATION

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SECURITY INFORMATION

INFORMATION REPORT

REPORT

CD NO.

COUNTRY USSR (Leningrad Oblast)

DATE DISTR. 18 Sept. 1952

SUBJECT 1. State Optical Institute (GOI), Leningrad
2. Leningrad Institute for Precision Mechanics and Optics (LITMO)

NO. OF PAGES 2

DATE OF INFO.

NO. OF ENCLS. (LISTED BELOW)

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PLACE ACQUIRED

SUPPLEMENTARY REPORT

* Not graded

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Appendix G, Part B, paragraph 1 is included in order to help in avoiding any confusion that may arise.

Appendix G, Part B, paragraph 2 believe that Rozhdestvenskiy died in 1940.

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See next page for Appendix G, Parts A and B

CLASSIFICATION

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ARMY	<input checked="" type="checkbox"/>	AIR	<input checked="" type="checkbox"/>	FBI		ATTC	<input checked="" type="checkbox"/>							

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-2-

[Redacted]
Appendix G [Redacted]
[Redacted]

SCIENTIFIC ORDER OF BATTLE

A. Establishments

State Optical Institute (GOI), Leningrad

This is probably in the Petrograd section of Leningrad (that is, across the Neva in the NW part of the city). Students are trained in specialized fields, mainly spectroscopy. For personalities see Part B, paragraph 1, below.

Leningrad Institute for Precision Mechanics and Optics (LITMO)

Exact location cannot be given; it is believed to be in the neighborhood of Litovskaya Ulitsa, as a laboratory assistant once indicated. Here also, students are trained in specialized fields, including spectroscopy. It is impossible to say how far the work of the two institutes overlaps. It was said in Leningrad that spectography students preferred LITMO as it was easier to pass examinations there. For personalities see Part B, paragraph 2, below.

B. Personalities

1. Russians known to be at GOI:

- a. Professor Prokofiyev
- b. Sventitskiy
- c. Taganov
- d. Freiwerth (photo elements) 50X1-HUM
- e. Professor Stosharov (?) [Redacted]
- f. Rozhdestvenskiy [Redacted]
- g. Frau Gramm

2. Russians known to be at LITMO:

- a. Mrs. or Miss Plotkina, who formerly worked under Prokofiyev in [Redacted] 50X1-HUM

[Redacted]

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