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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

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SECURITY INFORMATION

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COUNTRY	USSR (Moscow Oblast)	REPORT	
SUBJECT	Production at Zavod 393 at Krasnogorsk	DATE DISTR.	24 September 1953
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THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.
THE APPRAISAL OF CONTENT IS TENTATIVE.
(FOR KEY SEE REVERSE)

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1.

2. Following are corrected spellings for some Russian names appearing in the report:

Page 3, Para 2e and f: Photo Transformator Maliy should read Foto Transformator Maliy
Page 3, Para 2e(3) and Page 4, Para 2g(3): Techesport should read Tekhnoeksport
Page 8, Para 2w(1): Pribor Dlia Krutiashtchich Momentov should read Pribor dlya Krutyashchikh Momentov.
Page 8, Para 3a: Zenith should read Zenit
Page 10, Para 3f: Semja should read Semya
Page 23, Para 7a(9): Kaliber should read Kalibr
Throughout the report, the term ZKB should probably read TsKB

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STATE	#x	ARMY	Ev #x	NAVY	#x	AIR	Ev #x	FBI		AEC		OSI Ev	x		

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(Note: Washington Distribution Indicated By "X"; Field Distribution By "#".)

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COUNTRY	USSR	DATE DISTR.	31 AUG 53
SUBJECT	Production at Zavod 393 at Krasnogorsk	NO. OF PAGES	25
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THIS IS UNEVALUATED INFORMATION

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GENERAL

1. Production of optical equipment was stopped in the plant during World War II when the facilities were evacuated to Novosibirsk. After the war, a small part of the equipment was returned and production again started. In 1946-1947 the plant was nearly completely furnished with equipment from the Zeiss plant in Jena. The German specialists were utilized in the reorganization and installation of the machines, and in training Soviet personnel in production methods. With the concentration of so many German design specialists, particularly in aerial cameras and photogrammetric instruments, [redacted] the plant may have functioned as a central research and development unit for the entire Soviet optical industry. This is borne out with the establishment of the Central Experimental and Development Department - ZKB, and the various research and design tasks that were accomplished there or under its supervision. However, we German specialists were so restricted in our movements throughout the plant area from March 1949 until our repatriation that a comprehensive listing of optical production cannot be made. The listing of optical products is as follows: (1) items in serial production; (2) items for which designs and one or two models for research and testing were made; and (3) items for which only the design was completed.

OPTICAL ITEMS IN SERIAL PRODUCTION

2. The following optical items were in serial production at Zavod 393:

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a. Camera "Zorky"

(1) Negative size 24 x 36 millimeters, with various lenses, generally one of five centimeters focal length. This camera formerly was designated "FED".

(2) The "Zorky" corresponds in general with the Leica IIc of the period 1940 to 1944. The Design Section of Workshop #36 was assigned various tasks of modernizations, and attachments for the camera. Included were designs of improved timing units for the shutter, detachable back for ground glass focusing, and adaptation to micro-photography. These modernizations and adaptations were not in serial production at the end of 1951.

(3) Production of the "Zorky" was approximately 400 cameras per month during 1951. Sale price of a standard model with an Industar lens 1:3.5/5 centimeters was approximately 1000 rubles.

b. Camera "Moscow II"

(1) Negative size 6 x 9 centimeters, with 10.5 centimeter focal length lens.

(2) This camera corresponds to the Zeiss Super-Ikonta of 1940-1944, with the addition of a coupled range finder. A modification of the "Moscow II" was made in 1951. The shape, negative size, lens and shutter remained the same; however, the camera was designed for film plate rather than roll film use. Designation of the modified camera was "Moscow III".

(3) Production of the "Moscow II" was approximately 200 cameras per month during 1951. The sale price was approximately 700 rubles.

c. Repaired captured German aerial cameras

(1) A number of German aerial cameras were brought to the plant for overhauling and repair for use by the Soviet Air Force. These cameras were the following types:

(a) Zeiss Rb 20/30 (Soviet designation AFA 33/20)
(b) Zeiss Rb 50/30 (Soviet designation AFA 33/50)
(c) Zeiss Rb 75/30 (Soviet designation AFA 33/75)

(2) No essential changes were made in the cameras. Cameras were adjusted for operation in low temperatures to -60° C. A cold-test chamber was used for this purpose. No German specialists were utilized for this testing; however, several of the German specialists were engaged in the overhauling and repair. The cameras were painted with silver-bronze (aluminum) paint before shipment from the plant.

(3) Approximately 20 to 30 cameras were repaired per month until 1950, when a Soviet designed aerial camera was placed in production. [redacted] types that were repaired [redacted] types Rb 20/30 and Rb 50/30 predominated. 50X1-HUM

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d. Aerial camera (Soviet type designation unknown to me.)

(1) The camera is probably a reconnaissance camera, either 18 x 18 centimeters or 18 x 24 centimeters negative size with lens focal length between 30 to 50 centimeters.

(2) There was no similar German aerial camera. The exterior format resembled either a Fairchild or Williamson type camera. Technical details are unknown to me since development of the camera was accomplished by the Soviets without German specialist participation. The camera was operated by an electric drive motor and with an intervalometer. Film flattening was accomplished by a glass pressure plate in the film magazine. The camera may have been installed in some type of stabilized mount.

(3) Production of the camera began during 1950 after the reorganization of Workshop #13. Approximately 20 cameras per month were produced during 1951. When production began, German specialists were no longer allowed in Workshop #13.

e. Photo rectifier - FTB (Photo Transformator Bolshoy)

(1) The photo rectifier - FTB was identical to the Zeiss rectifier model SEG-1 that was produced during 1940-1944.

(2) The only minor differences between the Zeiss-produced instruments and the Soviet product was in the substitution of aluminum alloys for some of the parts, the use of mercury vapor lamps for illumination, and redesignation of the lens name from DAGOR to LUCH (light ray).

(3) Production started in the middle of 1947 from parts that had been previously ordered and produced at Zeiss, Jena. The first production series was completed during the last half of 1947 and the first half of 1948 and consisted of 15-20 instruments. A second series was started by the Soviets with an unchanged design, but using parts made in the plant. Total production until the end of 1951 is estimated to be approximately 50 instruments. The Soviet Air Force appeared to be the principal user of these instruments. At the end of 1952, technical pamphlets describing this instrument were distributed by the Soviet export agency "Techexport". Copies of these pamphlets were seen in Jena.

f. Photo rectifier - FTM (Photo Transformator Maliy)

(1) The photo rectifier - FTM was identical to the Zeiss rectifier model SEG-IV that was produced during the period 1940-1944.

(2) Minor differences were the substitution of aluminum alloys for some of the parts, the use of mercury vapor lamps for illumination, and the redesignation of the lens name from DAGOR to LUCH (light ray).

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(3) Production started in the middle of 1947 with parts previously ordered and produced at Zeiss, Jena. A serial production of approximately 15 instruments was accomplished during the last half of 1947 and the first half of 1948. There is no information concerning further production. It is assumed that no additional instruments were produced since the photo rectifier - FTB was preferred.

g. Stereocomparator SK

(1) The Stereocomparator SK was identical with the Zeiss stereocomparator model E, 18 x 18 centimeter picture size.

(2) A variation in the optical system, for eight diameters magnification instead of the original design of four diameters, was calculated; however, the new optical system was not incorporated in any serial production.

(3) Production was started during the middle of 1947 with parts that had been previously ordered and produced at Zeiss, Jena. Approximately 15-20 instruments were completed during the last half of 1948 and in 1949. A second was completed after 1949. Total production by the end of 1951 is estimated at approximately 40 instruments. At the end of 1952, technical pamphlets describing the Stereocomparator SK were distributed by the Soviet Export Agency "Techexport". Copies of this pamphlet were seen in Jena.

h. Stereoplanigraph

(1) The stereoplanigraph was, except for the designation, identical to the Zeiss stereoplanigraph model C/5, with illuminated measuring marks, that which was produced during 1940-1945. No changes in mechanical or optical design were made. The only variation was the redesignation of the Topogon lens name to Orien.

(2) Production started near the end of 1947 with parts previously ordered and produced at Zeiss, Jena. Estimated production by the end of 1952 was eight-ten units.

i. Small Autograph

(1) The small autograph was identical with the Zeiss small autograph model C/3.

(2) Improvement was made on the central suspension bearing for the spacial ruler. This modification was designed by the German specialists in SKB-3 and was based on experimental model tests conducted in Jena during 1945-1946. These tests had shown that the central suspension bearing was not stable enough. It was also suggested that the optical system be modified primarily for a better distribution of light to both images and better illumination of the measuring marks. These suggested improvements were not incorporated in any production.

(3) Production was started near the end of 1947 with parts that had been previously ordered and produced at Zeiss, Jena. It is estimated that five-six instruments were completed by the end of 1951.

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j. Phototheodolite standard precision type

(1) This phototheodolite was identical to the Zeiss phototheodolite, model TAN, 13 x 18 centimeters negative size.

(2) No modification or changes were designed or made.

(3) Production started during 1948 and continued into 1949 with parts from Jena. Approximately 10-12 instruments were completed at the end of 1951.

k. Phototheodolite light weight

(1) This phototheodolite corresponds with the Zeiss light weight phototheodolite, model TAF, 13 x 18 centimeters negative size.

(2) The Zeiss model TAF was based on a design by Prof. FINSTERWALDER and incorporated a closed bag film magazine. No changes or modifications were made by the Soviets.

(3) Production of a small number of instruments was begun in 1949; however, the number and total production at the end of 1951 is unknown to me.

l. Phototheodolite, wide angle type

(1) This instrument corresponds with the Zeiss phototheodolite, model TAL, 6-1/2 x 9 centimeter negative size, and incorporating the Zeiss Topogon lens.

(2) Two or three incomplete instruments were brought from Jena and were completed in the plant. [redacted] 50X1-HUM

m. Rangefinders and gunsights for tanks

(1) A few of the German specialists who had formerly worked in the design of such items at Zeiss, Jena, were probably employed in the plant in similar design and experimentation in conjunction with ZKB and Workshop #14a. Particulars of their activities in research and design are not known [redacted] the plant had facilities for the production of rangefinders and gunsights for tanks [redacted] 50X1-HUM 50X1-HUM 50X1-HUM

n. Antiaircraft fire control devices 50X1-HUM

(1) Although [redacted] several captured German units in the Display and Demonstration Section of SKB-1 and SKB-2, [redacted] no [redacted] serial production was accomplished in this plant. 50X1-HUM 50X1-HUM 50X1-HUM

(2) Several models of Askania kinotheodolites were repaired in the plant; however [redacted] these instruments were used in recording instruments and not as antiaircraft fire control units. 50X1-HUM

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o. Photo cells

(1) Research and experimentation of various types of photo cells was accomplished. Technical details are unknown [redacted] but [redacted] considerable research had been done with special types for infra red. 50X1-HUM 50X1-HUM

(2) Production was accomplished in the Photo Cell Laboratory, ZKB after 1947, and in the Photo Cell Laboratory, Workshop #36 during and after 1950. Estimated total production from 1947 to the end of 1951 was 200-300 cells. The types of cells are unknown [redacted] 50X1-HUM

p. Optical anglemeter

(1) The Soviet optical anglemeter was similar to the Zeiss model. 50X1-HUM

(2) Production started in 1947 by a group of German specialists (FUNFACH and others) and stopped near the end of 1948. [redacted] [redacted] 400-600 units were produced. 50X1-HUM

q. Motion picture camera, 16 millimeter

(1) The external appearance of this camera was a kidney-shaped case with turret and three lenses, a holding handle fastened to the bottom of the case, spring wound motor operation, and with viewfinder located on the side. The external appearance was similar to the Bell and Howell, model DA-70 from 1941-1945.

(2) This camera had been designed for film reporting, i.e., news and documentary photography.

(3) Production of the camera was in progress in a section of Workshop #13 upon the arrival of the German specialists in 1947. Approximately 10 cameras per month were produced.

r. Recording camera, 16 millimeter (Soviet designation unknown to me.)

(1) This camera was a copy of a Siemens recording camera which had been used in Germany in connection with kinotheodolite equipment for antiaircraft fire control unit testing.

(2) Drawings were made in the Design Section, Workshop #36, during 1950-51 from a camera that was made available as a model. No changes were made from the camera. This camera was electrically operated and could be installed for automatic operation.

(3) Two series of production of 20-25 cameras were produced in Workshop #36, during 1950-1951. [redacted] 50X1-HUM

s. Askania kinotheodolites

(1) A number of captured Askania kinotheodolites, models Gtk-3, Gtk-40, and Kth-41, were brought into the plant for repair and overhauling with attempts of modification to meet specific requirements. Mechanical parts and tolerances

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were checked for operation in cold temperature to -40° C. Optical elements were recemented with a softer Canadian balsam. Electrical heating units were installed inside the kilotheodolite units.

(2) An additional Soviet requirement was to increase the photo cycle from four to ten frames per second. This requirement was partially achieved by alteration of the shutter system and switching relays in the camera mechanism. Cycling rates up to seven frames per second were obtained, but the results were not constant and the original four frames per second were retained.

(3) All models were preferred with long focal length lenses (60 centimeters), and without the electrical selsyn system. One instrument was equipped with a mirror type objective lens of 100 centimeter focal length. This was presumed to be Soviet designed and produced. The preference and use of long focal length lenses and the lack of electrical connecting systems led to the belief that these kinotheodolites were to be used in conjunction with rocket firing or other high flying experimental objects.

(4) No new production was undertaken on these Askania kinotheodolites. Only repair and checking of the units was accomplished. Accessories, such as time recording units, switching units and comparators were repaired. [redacted] 50X1-HUM Approximately 30 kinotheodolites (Askania Kth-41) were repaired in Workshop #36 by the end of 1951.

t. Electric motors, MUKS

(1) Production of a small electrical motor, designated MUKS, was started in the Electrical Laboratory and Mechanical Section, Workshop #36, in accordance with Soviet specifications. Two types of motors were built; one motor was for operation with 24 volts direct current. Technical details of the motor are unknown to me.

(2) The electric motors were built on order from Workshop #13 and it is possible the motors may have been used in the camera production. Such production may indicate difficulties in the supply of electrical parts from other plants.

(3) Motor production was continued until the beginning of 1951. Estimated total output was approximately 200-250 motors. After the departure of the German specialists in January 1952, Workshop #36 was reorganized to serve as an assembly shop for the electric motors.

u. Photographic enlargers U-1, U-2

(1) These two units were Soviet designed and developed as accessories for the "Zorky" and "Moscow II" cameras. These were simple instruments without automatic or special features.

(2) [redacted] approximately 50 units were produced per month. 50X1-HUM

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v. Film reader for microfilm documentation

(1) The film reader was similar to an older German model. It was developed and produced without German specialist help. It contained a matte glass reading plane in desk stand form with two metal doors to cover the reading plate when not in use. Ideas incorporated were not new, only the form of the reader had been changed slightly from the German model. [redacted] 50X1-HUM

(2) Production of the film reader was accomplished during 1947-1949 with approximately 20 per month completed. In 1949, the production was reduced or even stopped [redacted] 50X1-HUM

w. Device for measuring torsion moment 50X1-HUM

(1) This device was probably a Soviet design. [redacted] The Soviet designation for the device was PKM (Pribor Dlia Krutiashtchich Momentov). The instrument was used for measuring the force necessary for the operation of revolving parts in aerial cameras, primarily for testing and inspection operations.

(2) The format of the instrument was essentially a box approximately 25 x 25 x 40 centimeters which was fully enclosed. Keys for attaching instrument to camera parts were provided. Several ranges of measuring scales were utilized. The unit was electrically operated with an electric motor driving gear train. It contained a built-in heating unit that allowed for operation under field conditions or in cold test chambers. [redacted] 50X1-HUM

(3) Several small series of this instrument were produced in Workshop #36 during 1949-1950. Approximately 50 units were produced and delivered to the Soviet Air Force.

PRODUCTION OF DRAWINGS AND MODELS FOR RESEARCH AND TESTING

3. In the production of drawings and models for research and testing the German specialists were utilized to complete, or revise existing drawings and current projects that had been undertaken. In some, one or two models for further testing were constructed. [redacted] 50X1-HUM [redacted] adequate facilities existed in the plant for their production.

a. Camera "Zenith"

(1) Negative size 24 x 36 millimeters.

(2) The design of the "Zenith" was similar in appearance to the Contax S. It incorporated some parts that were originally designed for the "Zorky". It is a mirror reflex type camera incorporating a split image viewfinder and focusing of the eyepiece for various eyes. The camera case was fitted with a detachable back. Several variations in the shape of the box were made; however, the mechanical and optical parts remained almost unchanged.

(3) Design and model production of the "Zenith" was started in 1948 and carried on through 1949. Three sample models were produced in the Mechanical Section, Workshop #36. It was believed that one of the cameras was intended as a gift for Stalin's 70th birthday.

b. Accessories for the camera "Zorky"

(1) The Design Office, Workshop #36, designed accessories for the "Zorky" camera basing the designs on accessory equipment for Leica and Contax cameras. The purpose of this design effort appeared to be the adaptation of the "Zorky" for scientific purposes. Included in the design were attachments for microphotography, extension tubes for close-up photographs, and a printing device for making positive slides. No new ideas were incorporated in the design.

(2) One or two models were made in the workshops of Workshop #36.

c. Stereo equipment for camera "Zorky"

(1) Two stereo attachments incorporating prisms were computed by Dr. TIEDEKEN. One stereo attachment with a base of approximately 65 millimeters was designed for the standard lens Industar 1:3.5/50 millimeter. The other stereo attachment with a base of approximately 80 millimeters was designed for the lens Sonnar 1:2.8/50 millimeters. The attachments resembled the stereo attachment for the Leica camera and utilized that same principle of converging optical axis and total reflection from the prism surfaces. Images were reproduced approximately 17 x 23 millimeters (single frame) on the 24 x 36 millimeter negative size.

(2) A stereo viewer was designed for viewing of the photographs taken with the two stereo attachments. The negative produced, containing the two images, was enlarged to approximately 9 x 12 centimeters. The viewer consisted essentially of a lens type stereoscope that could be either hand held or placed on a table. Special printing was not required; reversing of the images for stereo viewing was accomplished in the viewing device.

d. Testing and measuring instruments for use in camera production

(1) For use on the "Zorky" camera

(a) Instruments for measuring the distance from the lens mounting ring to the film (negative) plane.

(b) Instrument for measuring the distance between the lens mounting shoulder and the focal point of the lens. The principle of the instrument is unknown to me.

(c) Device to aid in the assembly of the focal plane shutter.

(2) For use on the "Moskva II" camera

(a) Instrument for testing of the range finder.

[redacted]

(b) Instrument for testing speeds of between-the-lens shutter. The instrument used a light source with measuring accomplished by a photo electric cell with a tolerance indicator.

(3) For use on the "Zenith" camera

(a) Instrument for the adjustment of the reflex mirror to assure the proper distance from the film (negative) plane and the focusing plane.

(4) Small quantities of these instruments were produced for use within the plant for testing and aid in assembly of the cameras in production. It is doubted that any additional production was undertaken for export to other plants.

e. Automatic camera

(1) Negative size 24 x 24 millimeters.

(2) This camera is similar in form and elements to the "Robot", but is not a copy of it.

f. Camera "Semja"

(1) The negative size is [redacted] either 6 x 6 centimeters, or 6 x 9 centimeters.

(2) The Design Office, Workshop #36, was ordered to develop a cheap, small picture size camera for the Soviet market. The price range of the camera was not to exceed 300 rubles. [redacted]

g. Panorama camera "Tokarev"

(1) The negative was reproduced on 35 millimeter width film. This camera utilized a five centimeter focal length lens mounted in a rotating mechanism to cover approximately 150°.

(2) The box was approximately 50 x 80 x 100 millimeters in size. The lens was mounted in a rotating cone with a slit type diaphragm for the focal plane. The lens mechanism was spring operated and could be set for two speeds. The film plane was curved to accommodate the curved field of presentation of the swinging lens. The box also incorporated a built-in small, circular bubble level.

(3) An experimental model had been previously built by TOKAREV, a Soviet inventor, but the model did not prove successful because of various technical difficulties, particularly in the mechanical operation. The Design Section, Workshop #36, was given the task of redesigning the camera and eliminating all the weak points. The Germans working on the redesigning were somewhat surprised that such a task should be undertaken since the design was basically very old and had been superseded by many newer and improved paromaric cameras.

h. Color photograph printer "Multiplicator"

(1) This was a direct copy of the color correction printer that had been produced by the AGFA camera plant during 1942-1945. A slight modification of the optical system was made with the aid of Dr. TIEDEKEN.

(2) One model was constructed in the Soviet workshops without the aid of the German specialists.

i. Enlarger

(1) Designed for negative size 13 x 18 centimeters with fixed enlarging ratio of approximately 2-1/2 diameters.

(2) The enlarger was used in a horizontal position (horizontal axis). The lamp housing and negative carrier were cooled by a blower system.

(3) The enlarger was developed by the Soviets with the aid of Dr. TIEDEKEN in the illumination problems. The purpose of the enlarger is unknown [redacted] but with the 13 x 18 centimeter negative size and a fixed enlarging ratio of 2-1/2 diameters it is presumed that the enlarger would be utilized with a camera or photo-theodolite of that negative size.

j. Projector "Aero-Multiplex"

(1) The development of the "Aero-Multiplex" was originally assigned to Zeiss, Jena, in 1946 by the Soviet Plant Administration. The design of the projector was nearly completed at the time of our deportation and of the dismantling of the plant. Production of parts for five or six experimental units had been started and were taken to Krasnogorsk.

(2) The projector unit was designed for use with the Soviet camera utilizing the Russar 70 millimeter focal length lens. This unit was designed in order that three projectors could be used as a unit, or two units of three projectors each could be coupled and used. Units were designed for fitting into packing cases that could be readily transported either by air or by truck.

(3) The projector unit was very similar in design to the Zeiss Multiplex. Modifications made include:

(a) Projection lens - Russar 1:10/20 millimeters (approximately)

(b) Angle of field of lens - 122°

(c) Illumination is provided by a 50-watt bulb through a condenser unit. The condenser unit consists of two aspherical lenses with a heat absorbing filter.

(d) Stereoscopic viewing is accomplished by use of anaglyphic filters (red and green).

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(e) Diapositive size is approximately 60 x 60 millimeters.

(f) A small tracing (plotting) table that can be tilted for easier orientation in the rear part of the instrument.

(g) A pantograph was attached to the tracing table and could be used for enlarged or reduced drawing. The area of coverage of the pantograph was half of the stereo area of the projections.

(4) A diapositive printer was also developed. This printer had an adjustable reduction ratio up to approximately three diameters. The printer could be used for reproduction of prints when negatives were not available. Negative size of the printer was 18 x 18 centimeters.

(5) Little effort was expended on the production of the experimental models during 1947 and 1948; however, the effort was suddenly accelerated during 1949. Considerable difficulties were encountered in the lens mounting and adjustment of the Russar lens. Therefore, only three experimental models were completed in 1950. In the fall of 1949, an employee of the State Optical Institute, Leningrad, was given a Stalin Prize for the development of a Soviet multiplex projector. It appeared to the German specialists that further experimental work was carried out in the State Optical Institute based on the drawings and results that were started in Jena and, therefore, were further advanced than the developments carried out at Krasnogorsk.

(6) Since the projector was so fully developed at Leningrad, it appeared doubtful that production of the instrument would be carried out at Krasnogorsk.

k. Blink or flicker comparator for astronomical usage

(1) The development and construction of one experimental model was accomplished upon the assignment from the Academy of Science, Moscow. Development was performed in the Design Section, Workshop #36, and the construction was done in the Photogrammetric Section, Workshop #13.

(2) The instrument was a combined interpretation and measuring device. Diapositives on glass plates up to 25 x 25 centimeters could be accommodated in the instrument. Diapositives were held in the horizontal position. Readings of the plate coordinates scales to an interval of 0.02 millimeters. Micrometer readings of parallax in the two coordinate directions to 0.002 millimeters. Eye oculars of six diameters and 10 diameters magnification were provided. An eye ocular micrometer for two direction measurement and rotation for angular measurement was provided. The smallest reading on the micrometer was 0.001 millimeters.

(3) The blink or flicker device consisted of a scissors-type shutter for each eye ocular that could be operated by either hand or foot and allowed the operator to view the diapositives independently or together.

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(4) Since this instrument was apparently ordered for a specialized use, it is believed that no further production was undertaken.

l. Glossy drum print dryer

(1) The design of the print dryer was based on a similar dryer manufactured by Gerster, Sehmachtenhagen, near Berlin. The design was completed in 1947 and one model was completed in 1949-1950. Parts were completed in Workshop #36 and Workshop #14.

(2) The dryer had a cast iron frame approximately two meters high with an electrically heated drum approximately 80 centimeters in diameter. The drum was driven by a small electric motor. The drum was glossy surfaced. Photographs up to 50 centimeters in width could be dried. The capacity of the dryer was approximately 300 prints, 50 x 50 centimeter size, per hour.

m. SOD Instrument - photogrammetric measuring instrument (Deville) (See the first sketch /Enclosure (A)7 SOD Instrument)

(1) The scheme for this instrument was based on the Deville principle and modified by Dr. DROBISHEV. The design work was accomplished [redacted] in 1948 and the production of one experimental model was completed in Workshop #14. The instrument was designed for point by point measuring from oblique photographs. 50X1-HUM

(2) The base dimensions of the instrument were approximately 50 x 60 centimeters; the instrument could be placed on an ordinary table. The description and operation of the instrument is as follows: (numbers in parenthesis indicate complete unit, other numbers a show parts of the units). The binocular observation system (1) is arranged in a box form housing containing the essential elements consisting of two mirrors, 1, which could be rotated on a vertical axis; the focusing devices, 2; measuring marks, 3; and the eye pieces, 4. The picture carrying system (2) consisted of the picture holder, 1, picture size 18 x 18 centimeters, with rotation and adjustment for various focal length lenses (range 20 to 30 centimeters) in the taking cameras; mirrors, 2, with vertical axis for rotation in and out of the viewing plane. This mirror can be a half-coated mirror and thus non-rotated; however, it was virtually impossible to so thinly coat a mirror. Therefore, a normal reflecting mirror was used. The pictures are illuminated by reflectors, 3.

The observation system (1) and the picture carrying system (2) and (3) are mounted on bearing columns (6) and (7) and thus are orientated on a horizontal axis. Through this arrangement, the picture carrying systems can be rotated separately or together for orientation through the tilt angle Omega (W). Stereoscopic setting of the points on the pictures is accomplished through rotation of the tilt angle Beta (B) of the observation system and rotation through the angle Alpha (d) of the mirrors (1) 1. Focusing

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is done by hand on the focusing unit (1) 2. Each picture carrier can be adjusted individually to accommodate tilt and swing and minor changes in image size. This adjustment is accomplished through the movement F. The apparent picture plane and angle of viewing is shown by the broken line and the angle Fe (f).

The cross-slide system for the X and Y coordinates was arranged on a base plate and plotting plane (9) which could be rotated on the axis (8). Adjustment of the base plate and the picture carrying units enabled absolute orientation of the pictures. A vertical line on a small screen constituted a measuring rod for the point determination (5). This unit was attached to the X coordinate slide. Combined with the measuring rod was the plotting marker. Movement of the X and Y coordinates was done with the handle (10). Movement in the Y direction was by direct sliding of the unit. Movement in the X direction was accomplished by turning of the handle which in turn rotated an endless belt which moved the measuring rod.

Measurements on the instrument resulted in only the planimetric coordinates X and Y of point determination. Individual points to be determined on the pictures were set stereoscopically by adjustment of the observation system, picture carrying system and the plotting plane. When the correct orientation was completed, the mirrors (2) 2, are rotated allowing a free view of the measuring rod (5). The measuring rod is brought into stereoscopic coincidence with the images of the measuring marks in the observation system through adjustment of the X and Y coordinate system. When adjusted, the planimetric position is registered by a plotting marker attached to the measuring rod. This operation is repeated for each point that is to be determined.

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[redacted] the instrument did not present a very successful solution to the problem of measuring from oblique photographs. The measuring process is cumbersome and inconvenient and the system of picture carriers and observation stereoscope were so arranged in such a narrow and limited space that adjustment appeared to be difficult and may not have been stable. The base distance between the mirrors in the observation system could not be changed, thus the point determination was done in an unknown scale which had to be computed later.

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n. Test collimator for aerial cameras

(1) Two test collimators were developed, one with 1-1/2 meter focal length and the other with a three meter focal length. One model of the three meter focal length was built in Workshop #36. No new ideas were incorporated in the design of the instruments.

(2) The unit that was constructed consisted of a cast iron frame that was mounted on concrete columns with vibration (shock) absorbing mounts. The collimator unit was mounted on the

 [redacted] 50X1

cast iron frame. The collimator consisted of a lamp housing with rotating filter turret and interchangeable test plates and grids, and collimator lens system. The camera mount was adjustable for rotation of the camera around its axis and for horizontal movement and centering of the camera. The adjustable mount would accommodate various types of cameras.

o. Infrared guidance system

(1) During World War II, Zeiss, Jena, had developed an infrared guidance system named "JUNO". The Soviet Plant Administration ordered further research and development of this project prior to the dismantling of the plant in 1946, particularly in the completion of blueprints and models. The project was not completed at the time of deportation so the task was assigned to the Military Instruments Group in SKB-3. YUNGE was in charge of this group.

(2) One experimental model may have been built in the Electro Laboratory, Workshop #36, under the supervision of BLUME. Details of the experimentation or development are unknown to me. 50X1-HUM

p. "Black Body" radiator for long wave temperature radiation

(1) [redacted] the unit was a standard long wave (heat) temperature radiation unit to be used for laboratory work.

(2) Two types were constructed; one for laboratory use and one for use in the field. Several units of each type were constructed in Workshop #36 during 1950.

q. Laboratory instruments

(1) Various test instruments, such as collimators, optical benches, monocromators and accessories for standard laboratory equipment were ordered and built for the laboratories of ZKB. Most of these instruments were worked on by the Design Group headed by ROEGER in ZKB and later by the Design Office, Workshop #36. One or two units, as needed, were built in the sections of Workshop #14A and Workshop #36.

(2) Six units of a collimator of 1950 centimeter focal length, complete with lamp housing and accessories, were built and delivered probably to the University of Moscow. This collimator was of standard design. This was the only item constructed and delivered out of the plant area.

r. Kinotheodolite equipment

(1) It appeared to the German specialists that the plant had attempted to redesign the Askania kinotheodolite model Gtk 10/20 and to prepare for serial production of the redesigned model. During the first part of 1951, the redesign task was given to the Design Section, Workshop #36. An incomplete, partially disassembled unit

 [redacted] 50X1

was given to the Design Section to serve as a basis for blueprint drawing and study for redesign for specific requirements. The requirements were for long focal lenses up to 100 centimeters and operation in low temperature to minus 40° C.

(2) The Askania kinotheodolite model Gtk 10/20 was designed for a cycling time of 10 and 20 frames per second. During World War II, work in the further development and production of the Model Gtk 10/20 was stopped in preference to the development and production of Askania kinotheodolite model Kth 41. The Soviets apparently preferred the model Gtk 10/20 because of the faster cycling rate for taking photographs. They apparently had a large number of the model Kth 41 that had been captured during the war.

(3) Difficulties arose during the design and construction of an experimental model primarily due to the lack of suitable electrical components. Parts for the model were made in Workshop #14 and a few gear units were made in the Mechanical Section, Workshop #36. A model had not been finished at the end of 1951. There were apparently no changes in design from the original kinotheodolite although requirements had been specified. Minor changes in tolerances in the gear units were made to achieve the cold temperature operation. It is believed that serial production of the kinotheodolite is possible, but difficulties would be encountered in the supply of electrical components.

s. Time recording device forkinotheodolite equipment

(1) A time recording device called the "timetyper" had been used with the kinotheodolite equipment. This unit had been built by the Telephonebau and Normalzeit, GmbH Frankfurt/Main. The last German type was specifically designed for use with the kinotheodolite Askania model Kth 41 for antiaircraft fire control.

(2) The construction of three experimental models was completed in Workshop #36 by the end of 1951. The basic unit was simplified by the deletion of automatic switching units with time delay mechanism that was used in conjunction with antiaircraft firing. Time was recorded on a moving strip of paper and the Soviets required a higher rate of movement of the paper strip, from 10 and 50 millimeters per second to 50 and 100 millimeters per second. Difficulties were encountered primarily due to poor quality mechanical parts and electrical units. Testing of the kinotheodolite and the time recorder was not accomplished in the presence of German specialists [redacted] the units were suitable. 50X1-HUM

t. Comparator for kinotheodolite films

(1) The comparator was a direct copy of the instrument manufactured by Askania for interpretation and measuring of the kinotheodolite films. A greater degree of magnification was incorporated with finer lines and intervals on the scales resulting in a reading interval of one minute instead

 [redacted] 50X1

of the 10 minute interval of the Askania model. Scale plates for various focal length lenses were interchangeable.

(2) Drawings were made in the Design Section, Workshop #36. Models were probably started in Workshop #13 or Workshop #14; [redacted] 50X1-HUM

u. Interpolator for analyzing the time recording tapes

(1) This instrument was a copy of a corresponding instrument that had been manufactured in Germany. Modification for the increased speed of the recording tape were incorporated in the redesign of the instrument.

(2) Production of a model may have possibly started [redacted] 50X1-HUM

v. Electronic microscope

(1) During the summer of 1951, the German specialists observed the transport of parts and units from Workshop #14 to the main plant building. It was the opinion of several of the Germans that the parts were for an electronic microscope. However, none of the Germans were specialists in that particular field.

(2) [redacted] 50X1-HUM no design work was done by any of the design groups.

w. Device for adjusting the principal point in aerial cameras (See second sketch /Enclosure (B)/)

(1) This device was developed in the Design Section, Workshop #36, and one model was produced in the Mechanical Section, Workshop #36, for use in Workshop #13. Production of the one model was accomplished during 1950.

(2) The instrument utilized the auto-collimation principle. The aerial camera to be tested (1) was placed in the test stand (2) in the same manner as it is mounted in a normal camera mount. Under the camera lens was placed a plane mirror (5) which could be orientated in a horizontal plane by means of leveling screws and 10 second levels in two directions. A plane glass test plate (3) was placed on the film plane of the camera. On the glass plate were marks corresponding to the collimating marks of the camera and the principal point (intersection of lines connecting the collimating marks). Levels mounted on the glass plate were utilized in the horizontal adjustment of the camera to correspond to the mirror (5) in order that the glass plate (3) and the plane mirror (5) were parallel. An auto-collimating microscope (4) with built-in illumination is placed on the test plate in order to observe the principal point mark on the test plate and its reflected image from the plane mirror. For correct adjustment, the principal point and its reflected image must coincide. Adjustment of the film frame must be made until the correct position is found. Adjustment may also be made in the lens mounting or cone.

[redacted]

EQUIPMENT FOR WHICH ONLY DESIGN WORK WAS ACCOMPLISHED

4. Indicated below is the equipment for which only design work was accomplished. [redacted]

a. Aerial camera

(1) Negative size 30 x 30 centimeters, with lens of 50 centimeters focal length.

(2) The development task was given to the German specialists near the end of 1946. The requirement was to design a reconnaissance camera with characteristics similar to the Zeiss Rb 50/30. Later, the requirements were to include an automatic diaphragm control utilizing a photoelectric cell and an amplifier. This automatic unit was to be included within the lens cone. Exposure time and film cycling speed were to be set by means of a rheostat. The camera, including the film magazine, was to be electrically heated by internally placed heating units.

(3) A detachable film magazine incorporating vacuum film flattening similar to the last German model was to be utilized. This magazine was to be daylight loaded by use of special cassettes to be inserted in the magazine.

(4) Development and design work was completed in 1949. [redacted]

b. Aerial camera

(1) Negative size 50 x 50 centimeters, with focal length lens either 100 centimeters or 150 centimeters.

(2) The development task was given to the German designers during the end of 1946. The requirement was for a reconnaissance camera for high altitude and high speed aircraft. In conjunction with the design was a requirement for an image motion compensation device. The camera was designed for vertical mounting in an aircraft and later was changed for horizontal mounting with a mirror set at a 45° angle in front of the lens for vertical picture taking. The camera had a detachable magazine back with vacuum film flattening.

(3) The image motion compensation consisted of a pair of rotating glass wedges mounted in front of the camera lens. The unit operated continuously and in conjunction with the shutter and intervalometer. The rotating wedges must be in the exact position at the moment of exposure. Details of the switching system, mechanism, glass wedges and other components are not known to me.

(4) Development work was completed in 1949. [redacted] on the production of an experimental model or serial production [redacted] difficulties would be encountered in the mechanical units of the shutter and image motion compensation device and the synchronization of the electrical system.

50X1

c. Aerial mapping camera

(1) Negative size 18 x 18 centimeters, with 70 millimeter focal length lens.

(2) Development was accomplished in 1949 and utilized the Soviet Russar lens with 70 millimeter focal length with angle of field of 122°. A Soviet between-the-lens shutter, type Vertiporoch was used. [See Enclosure (C), Vertiporoch shutter.] One primary requirement in the design was to construct a camera of very light weight, approximately 40 kilograms. The design was based on the Zeiss RMK-S 18 x 18 centimeter negative size. The camera was designed for use in small, fast aircraft. Cycling rate of the camera was three seconds.

d. Stabilized camera mount

(1) The stabilized camera mount was designed primarily for the aerial mapping camera. The mount consisted of two concentric Cardan (gimbel) rings with electric motors and gear units and connected with an electrical conductive level so that the motors make corrections in accordance with the level bubble.

(2) The control segment of the unit consisted of an electrical circle level in a metal case through which electrical contact could be made in several directions, probably four. A unit that may have originated in the United States or Germany, although unknown to the German designers, was made available to the designers in SKB-1. The electrical system is unknown to me. The accuracy of the mount may have been within two or three degrees.

e. Contact printer

(1) Developed in conjunction with the aerial camera with negative size of 50 x 50 centimeters.

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(2) Designed in 1946-1947 and was based on a similar German model manufactured by Voelk, Berlin.

f. Film perforator

(1) Developed in conjunction with the aerial camera with negative size of 50 x 50 centimeters.

(2) The perforator was designed for 50 centimeter width film; it could be operated either by hand or motor driven. Several perforations could be simultaneously punched. In 1950, a perforator with the same principles, although designed for a lesser width film, was built in Workshop #36. The experimental model was tested and results were satisfactory.

g. Development unit

(1) The developing unit was in conjunction with the aerial camera with negative size 50 x 50 centimeters.

(2) This unit was similar in design to a developing unit manufactured by Voelk, Berlin. It consisted of rotating upright spools driven by an electric motor. Some modifications were made from the Voelk unit [redacted] 50X1-HUM

h. Device for testing the flatness of the film plane in 30 x 30 centimeter vacuum back film magazine. (See the drawing of the testing device for film flatness in film magazines /Enclosure (D)/.)

(1) The unit consists of two wide angle projection systems mounted with convertent axes which produce a double image on the film plane of the magazine. The image consists of two series of parallel lines at right angles photographed on film in the magazine. If the film in the magazine to be tested is not held in a flat plane, then the lines are reproduced as double lines with the distance between the two lines a determination of the amount of unflatness.

(2) The instrument is a closed case, approximately 50 x 60 x 100 centimeters, on which can be fastened the film magazine in the same manner as it is attached to the camera body. The unit was designed for magazines of 30 x 30 centimeter negative size. The magazine is operated in the normal manner by connecting to a motor driven driving key and a vacuum pump. The plate, 1, contains the perspective grid of parallel lines (white lines on a black background) which is illuminated through a matte glass, 2, from an illumination system, 3. The illumination consisted of several standard projection lamps. The plate, 1, is imaged through the plane mirror, 4, by the lens, 5, onto the film plane, 6, in such a manner that the perspective grid of plate, 1, becomes a grid of parallel lines of equal distance. The plates in the right and left part of the instrument are projected simultaneously and coincide in the film plane, 6. The shutters connected with the lenses, 5, are used to expose the film in conjunction with the operation of the film magazine. This produces the same effect of operation of the film magazine in taking of photographs. The testing of the film magazines could be conducted in a cold test chamber and in pressure variant chambers.

(3) In order to produce the perspective grid on the plate, 1, a reverse photographic process was used. A plate with the parallel grid is placed in position of the film plane, 6, and photographed on glass plates, 1, on fine grain emulsion. Any distortions in the projection system would be taken care of in this manner as long as the left plate was in the left position and the right plate in its position. Projection back through the projection system would reproduce the single parallel grid system in the film plane, 6.

(4) One experimental model was built, but the results of the testing are unknown to me.

i. Photo-cartograph (See the drawing of the photo-cartograph, DROBISHEV /Enclosure (E)/.)

(1) Bases for this instrument were principles and ideas of Prof.

50X1

DROBISHEV who also was present at various times supervising the design development. Design work was accomplished in the Design Section, Workshop #36. The photo-cartograph was a double projector unit for a negative size 18 x 18 centimeters and could be used for topographic mapping and print rectification.

(2) The base frame, 1, was similar in design to the Zeiss Small Autograph and stood on four metal pipe legs. In the front of the instrument was an upright column, 2, which was the Z coordinate. Mounted on the top of the upright column, 2, was the viewing head, 4. A projection screen, 3, could be moved in a vertical direction along the upright column, 2, (Z coordinate) by means of a pedal disc operated with the foot of the user. The projection screen, 3, was a fine grained matte glass with engraved measuring points. In the lower part of the moveable projection screen, 3, and the ocular viewing system of the viewing head, 4, was a parallel course of light rays (beams). The projectors, 5, were mounted on a base rail, 6. The lens system of the projectors could be adjusted whereby the calibrated focal length (approximately 200 millimeters) could be set exactly. The size of the diapositive for projection was 18 x 18 centimeters. The projectors could be adjusted to accommodate for swing, tip and tilt of the taking camera. The diapositive plate carrier could be adjusted in two coordinate directions in conjunction with rectification. The projectors were provided with a lens turret with three lenses of various focal lengths. These projection lenses were all the same type and were used to project image points at different magnification sizes. Turning of the turret to change lenses did not change the interior orientation of the projector; the image point would not have to be reorientated with each change of lens. The base components for measuring, X and Y coordinates, could be set on the projectors. The base rail, including the projectors, could be moved by hand wheel operation and the cross-slide system, 7, according to the planimetric coordinates X and Y. The spindle turns were transmitted over the connection keys, 11, to a small tracing table. For illumination of the diapositives during measuring for mapping, condenser units, 8, mounted on parallelogram supports, 9, were provided. The base points, 12, of the supports were always in the same plane as the image on the projection screen, 3. This movement was achieved through a corresponding slide system of the vertical column, 2, at the front of the instrument.

For using the instrument as a rectifier, the supports, 9, and the illumination condensers, 8, are moved aside and a reflector illumination unit, 10, is brought into place. This reflector is an ellipsoidal reflector similar to the one used on the Zeiss Stereoplanigraph C/5. A light tight connection between the lamp and the projector was available.

(3) Two variants of the binocular viewing system were designed on request of Prof. DROBISHEV. One variant was for a stereo reversing system whereby the left image could be transmitted to either the left or right eye and the same for the right image. The second variant was an episcopic

[redacted] 50X1

observation system for the corresponding parts of the projection images on the screen and replacement of the measuring points by round measuring marks similar to those on the multiplex tracing table. [redacted] 50X1-HUM

(4) [redacted] the value of the instrument would be quite small.

j. Waterproof case for underwater use of motion picture camera

(1) Development was accomplished during 1949 in Workshop #36. The case was to house the type of motion picture camera that was in production within the plant.

(2) The case was of cast metal, probably iron, with a large front window, and projecting control knobs for winding, shutter release and aperture setting. Water tight seals on the projecting rods was by means of a stuffing box. Case and stuffing boxes were designed for use in depths of approximately 30 meters.

k. Test stand for photo cells

(1) The test stand was designed in 1950 presumably for the photo cell laboratory of ZKB.

(2) The test stand was a cabinet with a front desk and work place. [redacted] 50X1-HUM

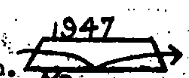
l. Microfilm unit

(1) This was one of the last assignments of the Design Section, Workshop #36 in 1951-1952. The design work was not finished in January 1952.

(2) The unit is a desk type with holder for the work to be microfilmed, and with a glass plate and pressure plate for copying books. An upright column held a special 35 millimeter camera. The unit was similar to the Zeiss Dokumator.

TRADE MARKS

5. The trade mark of the plant was an AMICI Prism: Sometimes the date and serial number would be as shown. On small items not requiring a serial number, only the prism would be shown.



TESTING INSTRUMENTS USED IN PRODUCTION

6. The instrument equipment of the plant, including the production sections, laboratories and experimental workshops of the ZKB, the Central Testing Laboratory (CIL), consisted almost entirely of the equipment which had been brought to Krasnogorsk from the Zeiss works in Jena.

 [redacted] 50X1

7. [redacted] types of measuring and testing instruments: 50X1-HUM

a. Precision

(1) Zeiss - Universal measuring microscope with attachments and accessories
(2) Zeiss - Workshop measuring microscope
(3) Zeiss - ABBE comparator
(4) Zeiss - Linear measuring machine (Laengenmess Maschine)
(5) Zeiss - Precision theodolite, Th C
(6) Zeiss - Precision caliper, as Orthotest, etc.
(7) Optical angle meters (Winkelmesser)
(8) Optical dividing head (Optischer Teilkopf)
(9) The micrometers and micrometer slide gauges, etc., used in production workshops, were partly of Zeiss origin and partly Soviet produced instruments from the "KALIBER" plant in Moscow.

b. Optical

(1) Goniometer
(2) Focometer
(3) Double collimator apparat
(4) Spectrometer
(5) Monochremator (Prismatic and lamp or light)
(6) Interferometer
(7) Densimeter, Densograph (Zeiss Ikon model)
(8) Solex instrument (for optical production)
(9) For testing of lenses, especailly for the determination of the resolving power, a Soviet system of line gratings (Strichmiren) was used as a testing device.

c. Electric and Photo-Electric Measuring Instruments

(1) Various types of current and voltage measuring instruments, from firms Hartman and Braun, Gossen-Erlangen, etc. 50X1-HUM
(2) Reflecting and/or mirror galvanometers
(3) Oscillographs, as electro cathod-ray oscillograph [redacted]
(4) Measuring bridges
(5) Tunning-fork-controlled oscillator
(6) Lux-meter
(7) A number of products of Soviet origin were also used in this field during 1950-51, as: current and voltage meters, similar to German types; measuring bridges; multi-loop bifilar oscillographs (portable type), for registering 35 millimeter films. The latter came from a Leningrad plant.

[redacted] the latest published advertising pamphlets of the Ministry for Electro-industry describing various electro measuring instruments for assembly and laboratory use at the plant in the beginning of 1951. Similar instruments could be also seen on display at the Polytechnic Museum in Moscow. 50X1-HUM

d. Two different systems were known to be in use in the Soviet Union for the determination of sensitivity of photographic materials:

[redacted] 50X1

(1) General photography - modified Harter, and Driffield systems (different numerical evaluation). (Not the American.)

(2) Scientific photography - Sd 0,85 - system, apparently a modification of the German DIN system, the density 0,85 (over a veil or screen) used as criterion. One such instrument (DIN system) was on hand at the plant.

MATERIEL SUPPLY

8. Materiel for production of parts were generally inadequate in supply. All raw materials used in the plant were produced in the USSR, so the shortages may have been caused by inadequate production to supply all the demands, or the result of poor planning in the distribution of the materials. The individual plants were connected through the higher ministries where all the production planning was done. The individual plant administrators were unable to take the necessary action to assure an adequate supply of raw materials. Another factor that perhaps influenced the shortage was the poor transportation system. [redacted] a combination of shortages in production and the poor transportation system resulted in a slow down of work in various sections of the plant on numerous occasions. 50X1-HUM

9. In the development of new designs and in making modifications, it was always necessary to list a substitute material along with the recommended material for construction. For example, the Soviet optical glass catalogs listed as many types of optical glass as the SCHOTT and GENNOSEN catalogs; however, the supplies that were available were very limited. The optical calculators had a difficult time in adjusting their calculations to conform to the available glass supplies. Normally, the optical calculator will follow the listing as given in the catalog, but it was found that a different type of glass, or a glass of slightly different refractive index, would be supplied which made necessary a change in the design. Shortages of materials for use in experimental work were particularly noticeable. Where advance planning had been accomplished, a year or over in advance of the production, supplies of materials seemed to be more readily available. Apparently no advance planning had been done for experimental work performed in the plant.

10. Supplies of metal, particularly in pre-formed shapes, were fairly adequate; however, designs had to be modified to fit the supplies on hand. Catalogs would show a variety of dimensioned stock; however, it was not always possible to obtain the desired shape when ordering, and consequently changes in design were necessary when the item was placed in serial production.

11. Electrical supplies were always inadequate. This included wire of various diameters (gauge), lamps, switches, various fittings, relays, rheostats, transformers, and motors. It was believed that motors were such a critical item that several series of production of the motor "MUKS" were undertaken in the plant to offset the normal supply. During 1946-1947, there were adequate supplies of electrical materials consisting of items brought from the dismantled plant at Jena.

12. A shortage of wood necessary for making patterns for castings was encountered.

 [redacted] 50X1

13. Supplies of non-ferrous metals, particularly brass and aluminum alloys, were generally critical. Designers were cautioned in too extensive use of brass for parts, and workmen were constantly urged to conserve the metal when producing parts. 50X1-HUM

14. [redacted] It is possible that the Russar lenses were produced in the plant at Leningrad.

15. Film for testing the kinotheodolites was difficult to obtain. Some 35 millimeter width film was provided, but it was always inadequate in amount. The film that was supplied was of Soviet manufacture and was marked from Factory #8. Film was normal black and white of approximately 20/10 DIN rating. The personnel who brought in the kinotheodolites for repair and later came to receive the units told the Germans that they had more film than they could use and would bring some to the plant. Later, they brought in a number of rolls of approximately 200 meters in length. This seemed to indicate that film was available for some purposes, but not available to the plant for testing purposes.

16. Nuts, bolts and screws of all sizes were in short supply. The German technicians always complained about the poor quality of these items that were furnished. A limited number of sizes were furnished. 50X1-HUM

[redacted]

ENCLOSURE (A) SOD Instrument - Photogrammetric Measuring Device

ENCLOSURE (B) Device for Adjusting Principal Point in Aerial Cameras

ENCLOSURE (C) Vertiporoch Shutter

ENCLOSURE (D) Testing Device for Film Flatness in Film Magazines

ENCLOSURE (E) Photo-Cartograph - DROBISHEV

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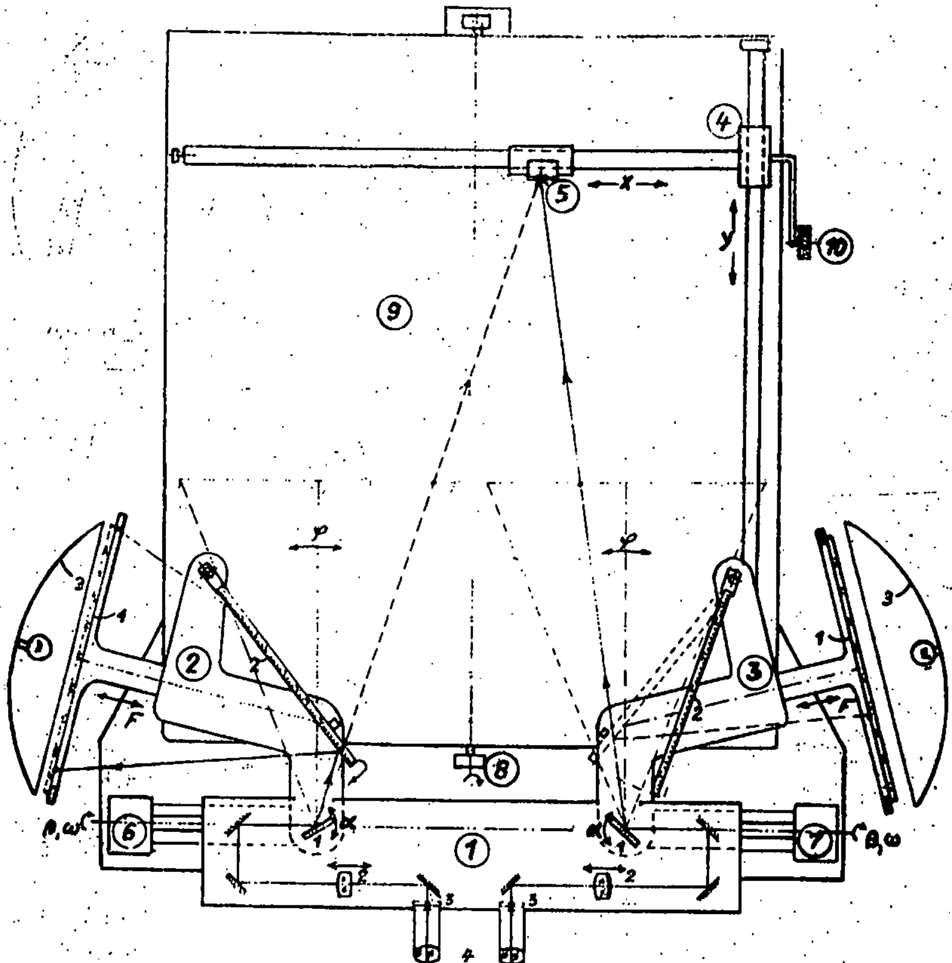

BCD INSTRUMENT - PHOTOGRAMMETRIC MEASURING DEVICE

(1). Binocular Observation System
1.. Swing mirror for Alpha (α) angle control
2. Focusing unit
3. Measuring mark
4.. Eyepiece
(2) and (3) Picture Carrying System
1.. Picture holder - 18 x 18 cm
2.. Folding mirror
3.. Illumination reflectors
(4) Cross-slide System for X and Y Coordinates
(5) Measuring Line with Plotting Marker
(6) and (7) Bearing Columns for Beta (β) Axis for the Binocular System and the Omega (ω) Axis of the Picture Carrying System
(8) Axis for Tracing Table Adjustment
(9) Base Plate and Plotting Plane
(10) Adjusting Handle for X and Y Adjustment

Enclosure (A)

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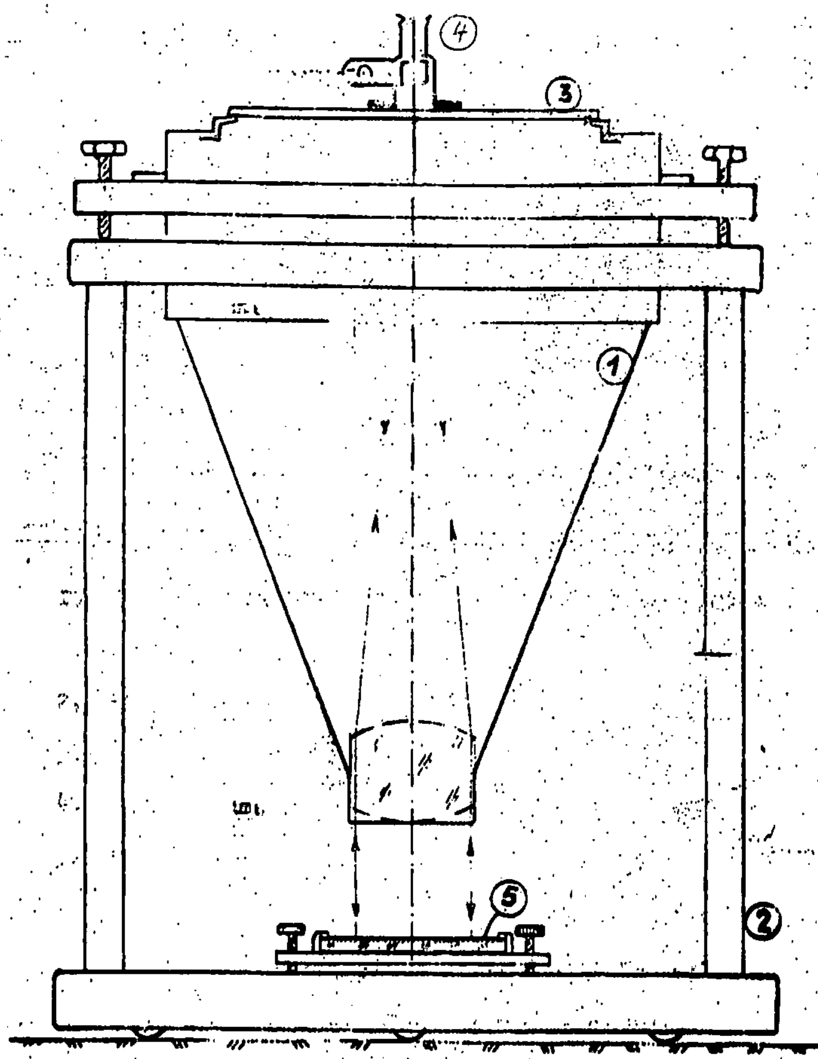

DEVICE FOR ADJUSTING PRINCIPLE POINT IN AERIAL CAMERAS

1. Aerial camera to be tested
2. Base of unit
3. Test plate with principal point and collimating marks
4. Auto-collimating microscope
5. Plane mirror

Enclosure (B)

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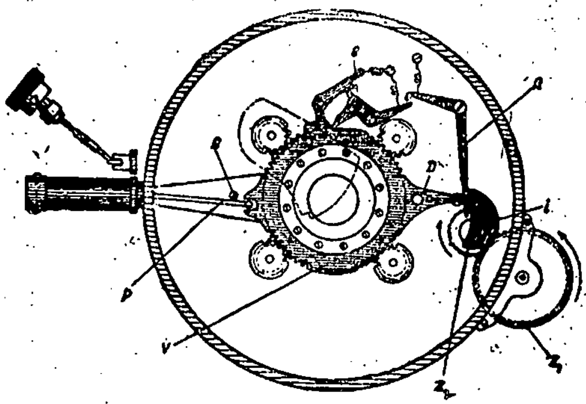

The VERTIPOROCH Shutter

TRANSLATION: (from Soviet Manual on Photogrammetry, by Prof. DROBISHEV; Moscow Edition, Geodesisdat, 1945. Figure 60, Page 82)

SHUTTER. The MAFA-13 contains a reversing action shutter of the VERTIPOROCH system. The movement of the shutter parts is accomplished through the vibration (movement) of a powerful spindle spring. The driving gear Z-1 rotates the gear Z-2 by means of the spiral 1 which periodically turns the guiding ring behind the projection D. As a result, the spring 0 turns from neutral to the extreme position on a certain angle $+\beta$; but the lamels (disks) turn at the same time from closed and cover more effectively the lens opening. When the spiral 1 jumps off the projection D, it produces a fast vibrating motion of the spring in a double angle -2β and reverses it to angle $+\beta$ in neutral position. During this time the guiding ring turns the gears with the disks back and forward, i.e., open and close the lens aperature. The levers R and S serve for the elimination of unnecessary motion of the spring and the guiding ring lock. After this, the cycle of the shutter operation begins again.

The exposure shift is in limits from 1/45 to 1/150 of a second by means of transposing the nut (screw) which serves to shorten the length of the workable spring part. The shutter's efficiency reaches 90 % which surpasses the action of foreign models. Testing experiments confirm the reliability of the design even after 20,000 exposures were made. This can be attributed to the perfect action of the disk movements resulting from the spring action.

Enclosure (C)

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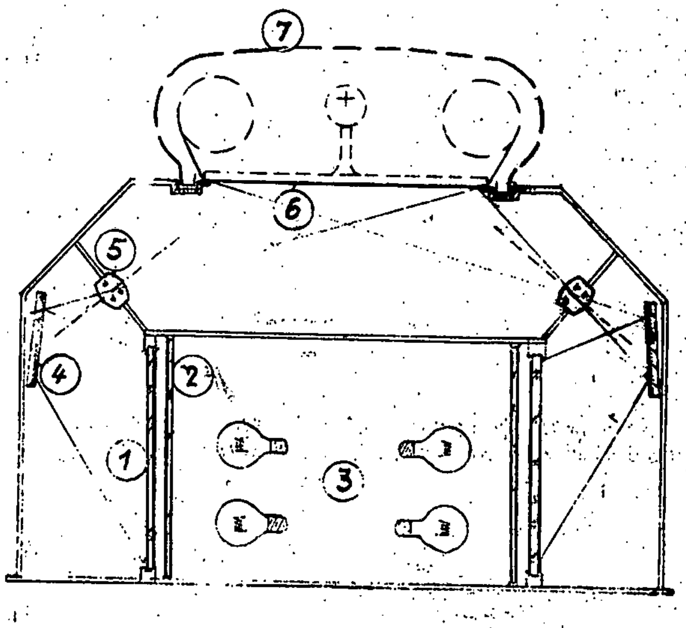

TESTING DEVICE FOR FILM FLATNESS IN FILM MAGAZINES

1. Plate with perspective lines
2. Matte plate for light diffusion
3. Illumination
4. Plane mirror
5. Wide angle lens (TOPOGON) for projection ratio approximately 1:1. Lens complete with shutter.
6. Film plane
7. Film magazine to be tested

Enclosure (D)

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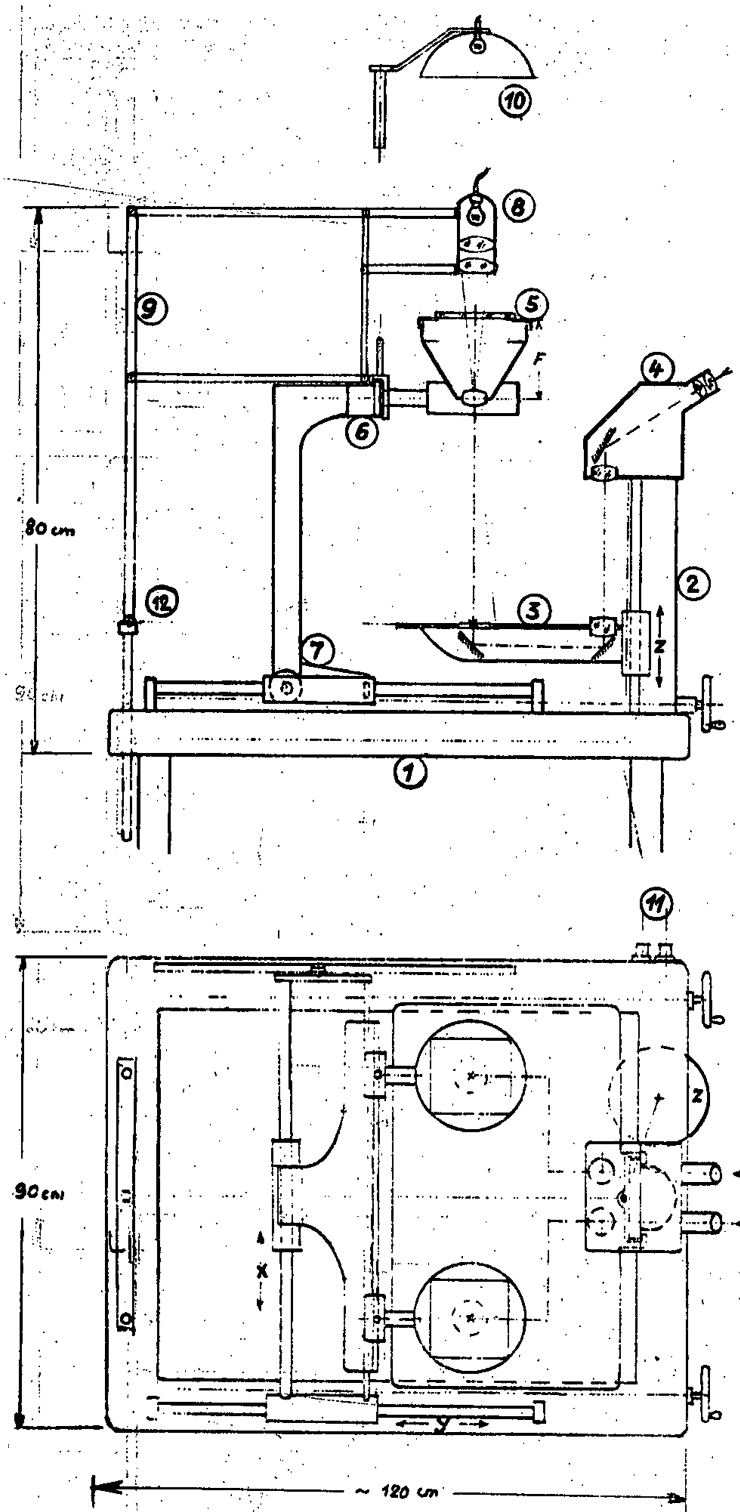

PHOTOCARTOGRAPH - DROBISHEV

1. Baseframe
2. Z coordinate column
3. Projection screen
4. Ocular viewing head
5. Projectors
6. Projector base rail
7. X and Y coordinate movement system
8. Condenser illumination unit
9. Support system for condenser illumination
10. Reflection illumination unit for rectifying
11. Connection to tracing table
12. Base point

Enclosure (E)

50X1