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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

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THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.  
THE APPRAISAL OF CONTENT IS TENTATIVE.  
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2. The following corrections in transliteration should be made:

- Zeche = Tsekh, page 3 and elsewhere
- Novitsky = Novitskiy, page 4 and elsewhere.

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INFRARED RESEARCH AT ZEISS, JENA, JULY 1945 TO OCTOBER 1946

1. I heard that Generals DOBROVOLSKIY and NIKOLAYEV gave orders at Zeiss, Jena, during the summer of 1945 for the construction of samples of all types of equipment produced by Zeiss during the war with particular emphasis on military devices. I also heard [redacted] of Soviet orders requiring drawings to be prepared of these devices. Specific Soviet requirements for further developments were also given. I recall that one of these specific requirements mentioned the "Juno" device including a specific request for drawings. I understood at that time that this was an automatic homing device for rockets. I heard other names mentioned, such as Wasserfall, Kiel Geraet, Krebs, Waermepeil Geraet. This represents the only time in 1945/46 that I heard infrared techniques mentioned. I did not hear of "Lichtsprecher" requests although I was familiar with this device from a demonstration of a forerunner of the Lichtsprecher 80 at Zeiss in the late 1930's. I recall that after the war it was extremely difficult to build anything because there were no plans to work from. Chiefly supervisors were evacuated [redacted] prior to Soviet occupation of the plant, but the designers and other personnel usually remained.

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2. [redacted] after the war I did not see any wartime German infrared equipment, for example, IR viewers or Waermepeil Geraet, but recall seeing large searchlight reflectors 1.20 meters in diameter. I did not know what they were used for. They were moved later but I do not know where. I do not think GOERLICH had any direct influence in selling infrared to the Soviets since the Soviets apparently knew the value of infrared when they came to Jena. They gave orders to reproduce all drawings of wartime infrared equipment and to build sample equipment. After it became impossible to retain Dresden as a laboratory site, some of the more important people were brought to Jena so that they would not leave the Zeiss organization. The former scientific chief, Geheimrat HARTING, was very active in this respect. He tried to persuade personnel to return to Jena and concentrate on the re-establishment of Zeiss. When GOERLICH came to Zeiss, he started the photocell laboratory. 50X1-HUM
3. I did not hear anything about lead sulphide at that time but assumed that the photocell laboratory was concerned with the fabrication of standard type vacuum photocells used for sound movies. I had never entered the photocell laboratory and did not know whether or not it had been started at the request of the Soviets. The following personnel were associated at that time with Dr. GOERLICH: Dr. KROHS; Dr. GAENSWEIN; Laboratory Technician WOLF; Mr. HAUNSTEIN; and several other laboratory assistants. HAUNSTEIN, after the departure of GOERLICH and his associates, remained and was still with the cell laboratory in 1952 [redacted]. At the same time Dr. STRAUBEL took over the crystal laboratory, formerly operated by Dr. SMAKULA, [redacted]. The Soviets were of course interested in everything that was going on at Jena in 1945/46 and looked also into both the photocell laboratory and the crystal laboratory, but I did not notice any greater interest in these than the others. I did not hear anything about KRS-5 at that time, but knew merely that there existed a crystal laboratory and that Dr. STRAUBEL was in charge of it. I did not learn anything about filters or filter production. I do not believe many things were sent to the USSR in the beginning, since nothing remained there. 50X1-HUM
4. The Soviets collected books, drawings and parts in order to initiate production. A small series production may have been started for the Soviets, but production really began in the summer of 1946 when the move came. Some boxes of equipment may have been sent to the USSR in the first few weeks after July 1945, [redacted]. It is possible that work was going on with near infrared viewing devices or components, but I have no information on this. 50X1-HUM

TRANSFER TO USSR

5. The mechanics in the group were put to work in December 1946 in the existing Soviet division. At this time the designers also received their first tasks. The largest portion of the designers were at that time still outside in a former recreation camp situated at Planernaya and had also started to work there. There were few facilities, but at least they could get their first tasks and start thinking about them. The scientists, however, were kept waiting until their equipment arrived. Their laboratory was set up in the old territory with the material that had arrived from Jena.
6. [redacted] part of the design group, but in order to avoid having to move [redacted] requested permission from the Works Administration to stay and was then associated with the shop for Aerial Photography 50X1-HUM

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in Zeche 13. This was not the same group in which GOERLICH was. [redacted] was already working when GOERLICH was still waiting for equipment. GOERLICH was then in the old territory where his laboratory was later set up. The design group was also supposed to go into the old territory and when the material came from Jena in February and March, 1947, a laboratory was set up to include a design office. Sometime later, possible in summer, 1947, the main design office was transferred to Krasnogorsk. Thus, after May, 1947, both scientists and designers were together in the old territory while the production technical personnel, mechanics, etc., were set up in the new territory in the Soviet division where they fitted best. The scientific branch was jointly staffed with Soviet and German scientists with the Soviet director-collaborator of the German supervisor actually being in charge. There were no noticeable facilities for infrared work in the existing new territory.

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7. The new territory at the time of arrival of the German personnel already had a Soviet optical division of about 200-300 people, which was concerned with routine fabrication of lenses and prisms in connection with Soviet camera production. I am quite certain that there was no dark tunnel in the new territory. I cannot remember very much about the Optical Division in the new territory since I was there only occasionally. The equipment was quite adequate for the routine requirements of lens and prism fabrication, utilizing optical glass. Work was concerned primarily with the fabrication of objectives for the Soviet Leica. Prisms and mirrors for other optical devices and lamp reflectors for office illumination were made here. I never saw Osram lamps such as were used by the Germans in infrared searchlights. I also never saw the preparation of gratings. The Vacuum Division carried on some mirror coatings. There was also a small Electrical Division making electrical parts used in various devices. Beginning in April, 1947, a laboratory was built in the old portion of the camp with several divisions, including one for military design, one for aerial photography, a photocell laboratory, an optical laboratory, a crystal laboratory, a measurement laboratory, which was divided into a mechanical and optical branch, an electrical laboratory and a photographic laboratory. I believe that actually two electrical laboratories, one staffed entirely by Germans and the other only by the Soviets, existed. The two laboratories worked closely together.

RESEARCH AT ZECHE 36

8. In 1949 the Germans had to move into a special division set up for Germans in the new territory which was called Zeche 36. They had to start from scratch and build a new laboratory. This new laboratory had a crystal laboratory, a photocell laboratory, an electrical laboratory, a measurement laboratory, all of which had very limited facilities. They remained in operation until about the spring of 1952. As I recall, all of Division 36 was then reorganized and became a production division with Soviet personnel. I do not know further details. A small research and development group remained, but the division as such had lost its character. The electrical division, for instance, became a production division for electric motors. The Soviet laboratory did not increase ostensibly between 1949 and 1952, but I am certain that the staff had increased to approximately 100 people. [redacted]

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9. [redacted] several Soviets [redacted] apparently understood quite a bit about infrared and obviously had been interested in it for some time. During the summer of 1947 I had the feeling for the first time that infrared work was going on after the construction office had been moved from Planarnaya to Krasnogorsk into previously prepared facilities. Work on the construction of the "Juno" equipment was then continued. The electrical laboratory was involved in the electronic aspects. Apparently the "Juno" equipment had not been completed or even nearly completed prior to the move to the USSR. One experimental model, which was sufficiently well constructed to serve as a prototype for a zero series, was finally completed in 1949 by Zeche 36 after the move from the old territory. In this connection the photocell laboratory under Dr. GOERLICH furnished lead sulphide cells. Dr. STRAUBEL was engaged during 1947-1949 in production of KRS-5 crystals which is a vital window and lens material for the intermediate and far infrared region. I have described below the individual facilities pertaining to infrared.

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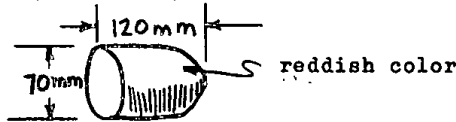
Photocell Laboratory

10. I do not recall any details regarding the layout of the photocell laboratory in the old territory but know that GOERLICH and NOVITSKY, the Soviet Civilian Supervisor, occupied one room in which laboratory equipment was located and that another room was associated with this room. I considered NOVITSKY an excellent man and [redacted] GOERLICH make favorable comments about him.

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Crystal Laboratory

11. I recall the layout of the crystal laboratory very well [see page 16]. The following personnel were located there: Dr. STRAUBEL; Mr. LOTZ, a laboratory technician; a Soviet engineer who was in charge but who had his own office somewhere else; a Soviet female laboratory technician and a Soviet mechanic. The Soviet engineer in charge was not as able as NOVITSKY, who headed the photocell laboratory but was more competent than most other Soviet supervisors. The crystals which I saw grown were of cylindrical shape, conical at the bottom, with an over-all length of approximately 120 mm. and a diameter of 70 mm.



KRS-5 Crystal

They were of a distinctly reddish color. I heard that special precautions had to be taken with the material as it was poisonous. Personnel working there were actually examined for poisoning. The longest crystal I ever saw was 20 cm. long with a diameter of about 40 mm. Three crystal growing ovens stood in the laboratory. I do not recall having seen polishing machines. I saw KRS-5 being worked on a lathe, but lens blanks may have been cut and polished somewhere else. I am certain that there were no facilities to test lenses, such as an optical bench, in STRAUBEL's laboratory. However, it is quite possible that the associated measurement laboratory, described below, carried on lens testing. I do not recall having seen any other crystals.

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12. I cannot estimate the number of crystals grown there, but KRS-5 crystals were grown in the summer of 1947 as soon as the ovens were installed. Not all ovens were running continuously. Even one oven could not have been kept operating at all times since there was a shortage of raw material. For a time German stocks which came with the laboratory equipment from Zeiss in 1947 were available. Later operations had to stop occasionally for lack of material. One German mechanic came from Leningrad in the summer or spring of 1948 to help with the KRS-5 production. This mechanic had already learned earlier how to make lenses and he trained the Soviets. He knew that all ovens were operating at full capacity whenever raw material was available until 1949, [redacted]

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13. At one time I saw about twelve biconvex lenses made from KRS-5 of about 50-60 mm. diameter. I do not know the origin of these lenses nor their actual use. I only knew generally that they were required for certain infrared devices. I had the feeling, but cannot specify why, that these lenses were made specifically for military equipment. I never saw a lens holder.

14. All Soviet laboratory technicians remained there as well as their chief, but LOTZ and STRAUBEL left with the other Germans. It is quite possible that more personnel joined the Soviets later and I assume that work on crystals continued after the Germans had moved out.

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[redacted] STRAUBEL did very little work afterwards with the ovens which were placed at his disposal in the new territory. I believe that STRAUBEL returned to the old laboratory several times and several times Soviets, either the chief or a laboratory technician, from the old laboratory came up. I observed these visits only during the first months after the move.

#### Measurement Laboratory

15. This laboratory covered a rather large space of two rooms and a dark room [see page 16] and was well equipped with material from the central test laboratory of Zeiss, Jena. I do not recall specific equipment but noted that about ten Soviet laboratory technicians worked in the laboratory with equipment including an Abbe comparator, several collimators, microscopes, and several optical benches. I recall that the equipment in the dark room included monochromators and a spectrograph. A Nernst glower was used as a radiation source. I do not recall any recording spectro meters. Unfortunately I cannot elaborate on additional equipment located there. Soviet personnel was headed by KRIVOVYAS, who seemed to have headed all optical activities. German personnel included Dipl. Ing. REINDL and laboratory technician HOFMANN.

16. In the second room belonging to the measurement laboratory, beyond a corridor, were about ten Soviet laboratory technicians making optical measurements. The room contained a universal microscope, comparators, and collimeters. In my opinion this is a likely place where KRS-5 lenses would have been checked. I never saw an image tube in the measurement laboratory or anywhere else. [redacted] shown a sketch of an image tube.

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Electrical Laboratory

17. I do not recall details of the electrical laboratory except that the chief of the laboratory was a man named BURDASHKIN, who had formerly been in Jena with the Soviet mission there. I never entered this electrical laboratory which the Soviets later obtained from the Germans.

Photocell Laboratory

18. The photocell laboratory was combined with the vacuum laboratory in one room. Dr. GOERLICH shared a room with other personnel, particularly with Mr. FUCHS, who conducted work independently, with an assistant, on interference filters, lens coatings, and prisms coatings. In this room were two vacuum systems of approximately 50 cm. diameter, which served only FUCHS and BRAUNE. GOERLICH had his own vacuum system located next to the dark room. The main room contained a large work bench and in the rear of the room was Dr. GOERLICH's desk, Dr. KROH's, Mr. HARTMANN's, Mr. WOLF's and a Miss HEYNE's (who later became Mrs. GOERLICH). A small darkroom approximately 1.5 m. wide and about 3 m. long was in one corner. I did not know what equipment was here, but I believe a black body may have been in this room. I saw an optical bench and other equipment there but cannot describe it further. I did not see a monochromator. There was no glass blowing facility in this room, but there was a small room down the corridor where the glass blowers worked. Liquid air was brought in bottles to GOERLICH, but I am not certain whether the liquid air was used for cooling the cells or for some other purposes. I knew that GOERLICH fabricated cells in this room, but I cannot describe details. I did not see a light chopper. I felt that most of the facilities in GOERLICH's laboratory were exceedingly primitive; and in fact, GOERLICH fabricated photocells only for a short period of time in the new laboratory and production then tapered off. [See page 17].

Crystal Laboratory

19. This laboratory had two ovens for growing crystals. However, very little work was carried on here on KRS-5 after the move; in fact one oven was later taken away from Dr. STRAUBEL. A work bench was in one corner and Dr. STRAUBEL's desk in another. In another corner of this laboratory was Dr. GUNDLACH, who worked in photochemistry and had nothing to do with STRAUBEL's work. After 1949 STRAUBEL worked on black bodies for lack of something else to do. I never saw KRS-5 crystals being cut on a lathe or lenses made from them in the new laboratory [see page 18].

Electrical Laboratory

20. In the Electrical Laboratory there were two work tables, a lathe, etc. There were several desks for the following personnel: Dr. BLUME, HOETZEL, ERHARDT, EDER. I saw the "Juno" device standing there on a table in 1949 after the move from the old territory. The equipment stood sideways pointing towards the ceiling at an angle. BLUME was in charge of a portion of this project and had delegated work on different electrical portions to mechanics and laboratory technicians. The Electrical Laboratory had to solve electrical problems which came up in connection with general design tools. At one time they built small motors for aerial cameras. The

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armatures were wound by hand on primitive machines. It was impossible to get such motors from the outside. There was definitely not a large output from the German Elektor-labor since they had only the most meager facilities. I saw in the electrical laboratory no infrared devices except the demonstration model of "Juno." [See page 19.]

#### Measurements

21. There was a small measurement laboratory which made examinations of construction equipment, and it may be that tests of black bodies were carried out. In this measurement laboratory was Mr. REINDL, who was formerly in the Mess-labor. GOERLICH had to borrow some instruments and set up a small Measurement Laboratory of his own. Optical and mechanical measurement were carried on there. GOERLICH also examined monochromators which were built for him. As far as I know no photo-cell tests were made there. Testing of the black body, in my opinion, involved only checks for proper connections and for operation of the heating and cooling system. These tests were made by STRAUBEL whose crystal growing operations had come to a standstill, and he was then given mechanical tasks on a month to month basis.

#### Black Bodies

22. I knew that a number of black bodies had been built initially for laboratory purposes in 1949. One of these was for GOERLICH. I have made a drawing of the black body built for the laboratory [see page 21]. This black body utilized a copper block, a heating coil and water cooling through external connection. I do not know the temperature range of the black body nor the constancy of temperature that could be obtained. In front of the main baffle of the black body was a disk of 20 cm. diameter with a number of circular apertures of different sizes eccentrically located. The black body did not have any rotating shutter directly associated with it, but one was mounted on an optical bench as a separate device. I do not recall special cell holders for the optical bench. The black body itself was built for mounting on an optical bench. I recall a thermocouple as well as a thermometer for temperature measurements. Black bodies were first made for laboratory experiments by the mechanical shop. Two or three different kinds were built. STRAUBEL carried out the internal construction and made some performance tests but was unable to make measurements of their properties as a black body, as he worked them in a small mechanical shop. Difficulties were encountered in keeping the fittings for the water cooling system tight. This caused much concern since the units were not ready on time, and for this reason the problem of the black bodies became generally known. I do not recall whether GOERLICH's black body was in his laboratory for repair or for actual use at this location.

23. [redacted] seeing a black body in GOERLICH's laboratory after [redacted] I recall that in the first half of 1950 a number of black bodies (approximately a dozen) were ordered for field use. These black bodies did not have water cooling, were smaller than the first ones, and were built in wooden boxes approximately 30 x 20 x 20. I had the impression that they were for military use since they were painted in the standard Soviet field color (gray olive green). One could open a cover on top. I do not know the operating temperature, and did not see a thermometer inside. I think that they were made in two sizes according to Soviet designs given to the Germans. I do not know where they were sent when completed.

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PHOTOCELLS

Description of Cells

- 24. The photocell was a doubled walled glass cylinder, hollow on the inside with three glass tips at one end, two of which served as the feed-through of electrodes [see page 20]. The sensitive surface was in the front of the structure. I do not recall a special bubble window over the sensitive surface. I recall the sensitive surface as being uniformly bluish-gray in color with a visible fine structure and with two metal strips leading from the sensitive surface to the rear. I am not certain whether their color was shiny or dark. I believe the sensitive surface was approximately one centimeter square.
- 25. A spring loaded plunger [see page 20] fitted in the hollow of the cell, and retained pressure on dry ice so that it would retain contact with the sensitive surface. Over the cell fitted a metal housing [see page 20] that was somewhat wider on one end than on the other and into which the cell could be fitted. The plunger was held back by this housing. This housing was of aluminum, and I knew that these cell housings were later painted black since I had also seen the identical pieces painted black. I recall seeing a mounting ring for these cells in which the cell housing was held by means of three springs. The final outside diameter of the cell with housing was approximately 5.5 cm. with the photocell itself approximately 4 cm. in diameter. The total length of the cell structure was about 12 cm.; with the housing the total was slightly longer.
- 26. I saw these cells for the first time in 1949 after the move to the new territory. I saw several of them in GOERLICH's laboratory but do not know exactly where they were located. I saw the unfinished glass bulbs frequently in the glass blowing room and believe I also saw completed photocells in the design office. In fact I believe that RITTER had either a photocell or the aluminum housing for it on his desk. I also believe that SCHRUMP had a cell at one time or another.
- 27. I recall that the quota for GOERLICH after 1949 was approximately 15 photocells per month. Several times about 15 photocells, packed into their housing, were delivered by GOERLICH to the Soviets, with GOERLICH pointing out that what he was carrying to the Soviets was more important than anything the other Germans were doing there. The finished product already had black housings. The last time I saw photocells in GOERLICH's laboratory was approximately in the middle of 1950. From then on GOERLICH did not do any further work but may have occasionally made individual cells. I recall quite clearly the term lead sulfide but do not recall hearing the terms lead selenide or lead telluride. I never heard any discussions as to what military or scientific use these cells might have. I had an impression that these cells could detect warm objects but cannot elaborate as to the reason for this belief. I have no details on the particular characteristics of these photocells. I recall specifically having seen and heard of dry ice as well as liquid air and low temperature experiments in GOERLICH's laboratory. I recall that the spring loaded plunger was part of a cooling system for cells. I never saw a button type photocell.

I never saw photocells with different color surfaces than those I have described, nor different type of areas, nor different construction.

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28. I cannot give a detailed description of test facilities for photocells. I believe that I saw photocells in the measuring laboratory, but I do not recall the exact circumstances. I did not see a test set up where a photocell was actually inside, but I believe that the measuring laboratory would have been the only place where complete tests on photocells could have been carried on.

Photocell Test Set

29. A Soviet requirement which originated about 1950 and on which the design office had been working involved a photocell test set in desk form where production type testing of lead sulphide photocells could be done. I have made a sketch showing panel instruments, switches and the cell holder position [see page 22]. This task was given to designer JUNGE. The test stand was actually designed but I do not know that it was ever built. I believe that the test set was undoubtedly for mass production, but I do not know whether or not original intentions were to build several of these test sets. I do not recall whether the radiation source was a light bulb or a built-in black body. The test set was designed for the identical photocells which GOERLICH had produced since JUNGE had a cell body to take the dimensions of.

Juno or Kiel Geraet

30. The Germans in Zeche 36 continued to work on the so-called Juno Geraet and I believe that this was the first German model the Soviets obtained [see page 23]. I am uncertain whether or not I had heard the name Kiel. I do not know whether or not the Soviets might have also built it somewhere else. I saw the device in the electrical shop in 1949. The so-called "Juno Geraet", which I saw, was built into a wooden frame for mounting and consisted of a main mounting ring in the center of which was a mirror 15-20 cm. in diameter, which was rotating in a tumbling type action. The equipment made a grinding noise when operating. In front of the mirror was a black cylinder containing a cooled Pbs photocell of the same type that I saw in GOERLICH's laboratory. I recall particularly a circular frame holding the photocell mounting cylinder by means of three black springs. I do not recall seeing a tilting mechanism and believe there was no hood over the mirror and photocell mounting, but rather that the photocell mounting may have been held to the main frame by three rods since I recall seeing the mirror even from the side. I recall positively that an oscilloscope was used in testing this device but do not recall the oscilloscope pattern. When I saw it, BLUME was in charge of this device and tested it apparently for its electrical operational functions (but not for its infrared sensitivity). A hinged cover with a hemispheric shape of approximately 50-60 cm. diameter which could be placed over the device was noticeable. It had a multitude of individual windows in a metal framework, [see page 23], and the windows were made of quartz or glass forming segments of the hemisphere. [redacted] whether aerodynamically such a cover would be satisfactory for a rocket (Juno being an infrared seeker head) and whether the transparent glass segments would be strong enough to withstand the air pressure.

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[redacted] there would of course be a question as to the suitability of this cover for use in the nose of a rocket as well as the size of the equipment. I never heard the name of Kiel IV mentioned synonymously with the Juno device.

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31. When I saw the device, it was pointed up but not in a specific direction and was half tilted. I did not notice people walking in front of it and making movements with their hands simultaneously observing the oscilloscope pattern. I do not know of any specific problems arising with electric motors in connection with this device. I recall that RITTER had a small amplifier on which he made several changes, but I do not recall whether this was a complete amplifier or just part of one. I do not recall having seen shock-mounts on the amplifier (for aircraft installation).
32. The "Juno" device built in Krasnogorsk was a Zero series model (preproduction) from which other units could have been duplicated. I thought that the equipment was well built and not just quickly put together. I can not state whether the equipment was built for aircraft installation. I did not see members of the Soviet Air Force observe the device, but I did see people of the Soviet electrical laboratory, who had walked up from the old territory, come to see it. I do not recall seeing Soviet production people looking at the device.
33. I knew that Dr. GOERLICH looked for low noise vacuum tubes and that he selected tubes with specially low noise. GOERLICH worked particularly on noise problems and he and Irmgard HEYNE actually published this information later in a  newspaper. I do not recall specific discussions about such tubes in connection with the Juno Geraet. Dr. GOERLICH did not appear to take a special interest in the device and did not appear to have collaborated particularly in the actual construction or design of this equipment. Apparently he rather concerned himself with producing photocells for it. I doubt that GOERLICH has sufficient understanding of the mechanical and electrical problems involved since he was primarily a photocell expert.
34. I never heard of any connection between "Juno" Geraet and radar techniques, or that radar people worked with the "Juno" device. Among the Zeiss people BLUME was the only one who really knew something about infrared equipment design from the physicist point of view. It is possible that the "Juno" instrument could also have been built somewhere else. I never saw mirrors similar to those mountings used in the "Juno" nor did I see the dome-shaped cover, or mount rings with the photocell built in, or other parts of the "Juno" device in any other laboratory room, with the exception of photocells or photocell holders which one could identify with additional existing units of the same equipment.
35. At first a Soviet was chief of the electrical laboratory, and later a German, a Mr. ERHARDT. BLUME worked only as project engineer, and RITTER, who was subordinate to ERHARDT or BLUME, was designer in the design office. I do not think that BLUME was completely in charge of the "Juno" device. I believe that when the requirement came to build the "Juno" device the work was divided between BLUME for the electrical work and RITTER for the mechanical work. The electrical laboratory turned the model over finally to the Soviets. Guidance and the final decision on the design of this equipment rested with the Soviets. The chief of the electrical laboratory was BURDASHKIN who at one time was in Jena and who was quite well informed on infrared. BURDASHKIN had a lot of discussions on the "Juno" device.

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36. I do not recall that any preproduction devices were ever sent to Novosibirsk for further production, but I had the impression that aerial camera series production might have been carried on in Novosibirsk. I believe that therefore it was possible that other production was also going on at Novosibirsk which might include the "Juno." I knew only of the single model delivered to the Soviets in 1949. I have neither seen nor heard of any further production of this device. I cannot recall why I received the impression that "Juno" was made for rockets. I never heard of BUSCHBECK or his group. I do not believe that much value was placed on "Juno" at first. I believe that if this equipment was built in Krasnogorsk, one would have placed more effort on it immediately. Suddenly this program was intensified toward the end of 1949 and the beginning of 1950. The Korean War was never mentioned [redacted] in connection with their requirements.

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Filters

37. I saw infrared filters which I believe were definitely from old German stock. I never saw production of such filters in the USSR. FUCHS made experiments with interference filters on his own initiative. I did not have the impression that he had specific requirements for filters. I do not know if GOERLICH had requested special filters, but thought that it was possible he did. FUCHS was interested in a method to absorb infrared to reduce heat radiation from lamps which might be damaging to a photographic negative. I heard also that FUCHS had mathematicians to help him on this problem.

Radio and Television

38. I never saw radar sets in the factory compound and do not know whether or not there was any work going on in this field. I only know that Prof. HABAN, who belonged to another working group in the Moscow region, was later transferred to this factory and given a special laboratory [redacted] in this neighborhood. There was no obvious connection between GOERLICH and HABAN and I do not know what HABAN worked on. I never heard millimeter waves mentioned in connection with HABAN, who worked primarily alone without German personnel but had Soviet female laboratory assistants.
39. I did not notice any controlled aircraft tests. An antiaircraft searchlight battery was stationed in the neighborhood nearby, but not in the factory compound. I have heard the name of Mannfried von ARDENNE, but do not know where he was located and am sure that GOERLICH had no connection with him.

Image Tubes

40. I have never seen high voltage devices producing voltages of 20,000 volts or so. I never saw a slide projector in connection with test instruments and did not see an image tube.

Monochromators

41. I saw monochromators but not in direct connection with cell work. Two or three monochromators were built by the mechanical shop and were tested by the measurement laboratory. I thought they were for infrared but do not know the type of prisms used. I do not recall

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having seen prisms from KRS-5, but remember seeing monochromators which were specifically made for the infrared spectrum, or at least heard discussions about infrared in connection with them between about 1950 or beginning of 1951, about the same time the photocell test set was built.

Proximity Fuses

42. I have never heard about work on proximity fuses, infrared or otherwise.

Phosphorus

43. I have no information on infrared sensitive phosphorus.

Reference Facilities

44. There was a rental library at the plant which had wartime literature primarily. Most of the recent material was in the Scientific and Technical Library in Moscow, where scientific journals from all over the world, [redacted] and many translation thereof, were available.

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SHORTAGES OF COMPONENTS

45. There was no satisfactory stock of components anywhere. A shortage existed for the Soviet laboratory as well as the German laboratory. Armament production activities would probably obtain better supplies. Work on experimental devices carried on here was primarily dependent on German stocks or parts fabricated by the personnel themselves. This shortage continued. It was impossible to even get such parts as capacitors, etc. I do not know if the situation was better beyond the Urals but had the impression that it was since the establishments there had been operating already for sometime, otherwise I cannot conceive how the Soviets could have built anything. I believe that the laboratory was not put on a firm production schedule like other plants and therefore had low priority in respect to components.

EVALUATION OF ROLE OF ZAVOD 393

46. I believe that as far as infrared was concerned no production of any significance was being carried on at Zavod 393 proper and that the designs produced there as well as the components, such as photocells and KRS-5 lenses, might have been shipped out to other distant organizations for utilization in their particular programs. Since there had been no particular rush about completion of the "Juno" device, it may have also been built somewhere else and the photocells may have been sent there. This conclusion [redacted] would be supported by the fact that the equipment development and fabrication program known to us would not require the number of photocells which apparently had been produced there.

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47. Several visitors came from the Leningrad State Optical Institute (Staatliches Optisches Institut). Some of them had been already in Jena as a part of the Soviet occupation forces. This optical institute also has a branch office in Moscow. These people always visited several divisions of Zorkiy, particularly the optical computing office. I do not know who was particularly interested in infrared.

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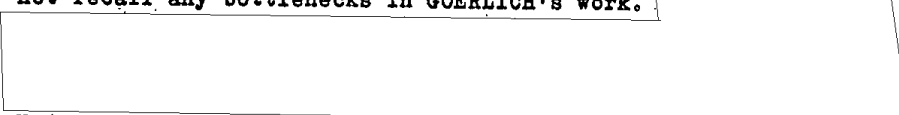
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EVALUATION OF WORK CONDUCTED BY DR. GOERLICH

49. I had the impression that Dr. GOERLICH was quite eager to please the Soviets and enjoyed some prominence there. He was well liked by the Soviets and treated well and respectfully by them. He felt very secure about his position in the plant. He was a little better supplied than other Germans; for instance he could obtain glass and chemicals when the others could not. I am not sure whether these items were from old Zeiss-Jena stocks or not. I did not recall any bottlenecks in GOERLICH's work.

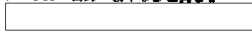


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He was respected by the Soviets as the most prominent scientist in the Krasnogorsk group. His German colleagues did not share this opinion however. GOERLICH was very conceited because he was on such good terms with the Soviets. The Soviets permitted GOERLICH to act a bit freer than the other scientists, for instance, he could go to Moscow without escort while other Germans could not. He also enjoyed some other special privileges granted by the Komendant and the staff of the administrative office. When GOERLICH took his monthly production of photocells to the Soviets he pointed out many times that his work was particularly important for the Soviets; however, he did not specifically state that he meant in a military sense.



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50. GOERLICH had more visitors, usually Soviets from the outside, than any other German. Two visitors per month came on an average. Sometimes NOVITSKY came with another visitor.  any military personnel visiting GOERLICH. The interest of the Soviets in the photocell production is reflected in the visit of the Minister of Armaments to STRAUBEL and GOERLICH at one time in 1947 after the laboratory had been set up. GOERLICH was not particularly interested in military technical problems but was assigned primarily to photocell work. I had the impression that the application of his work did not interest GOERLICH particularly. I do not know of any GOERLICH interest in television nor did I hear of any work going on with photomultipliers or supericonoscopes in GOERLICH's laboratory. GOERLICH had no facilities for building equipment using photocells or for testing such devices. I believe that if GOERLICH had constructed any significant devices and tested them, this would have become known.

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51. I believe that since GOERLICH had so many contacts with the Soviets, he should have a fairly good idea what use the Soviets were making of his photocells. However, I have no concrete information to support this. After the move in 1949, GOERLICH went only rarely to the laboratory, but NOVITSKY came quite frequently. I did not have the impression that GOERLICH made many fundamental studies in Moscow in view of the limited equipment in his laboratory. He

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therefore spent most of his time working on his book. As far as correspondence was concerned, most scientists were able to correspond with [redacted] East Germany, and GOERLICH was able to maintain correspondence with [redacted] covering both technical aspects as well as matters concerning his stamp collection.

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PRESENT STATUS OF GOERLICH AT ZEISS, JENA

52. When GOERLICH returned to Jena there was a general reception for all returnees and influential people of the anti-Fascist group ( a political organization of earlier returnees). A Mr. WANKE, who was a representative of the Labor Office (Gewerkschaftsvorsitzende), came specially to Jena for this meeting. Besides GOERLICH, BRAUNE, and MUELLER, there were several other members of the anti-Fascist group at this reception. A few days later the announcement of the appointment of GOERLICH as Scientific Director of Zeiss, Jena took place.

53. KROHS, who collaborated with GOERLICH in the USSR, was put in charge of the cell laboratory. I knew that the cell laboratory took on the task of fabricating photocell layers and photomultipliers. I never heard of any work on lead selenide conducted there.

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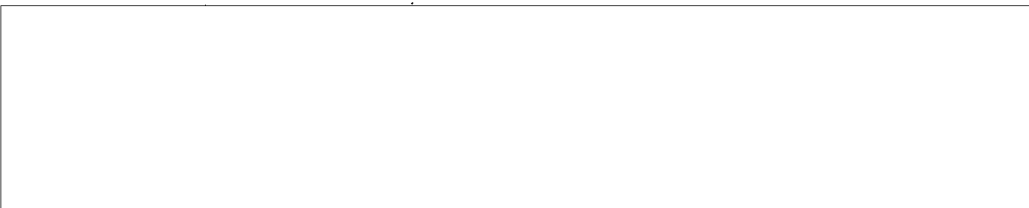
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FOOTNOTES

1. The German Kiel Gerast was originally designed as a bomber exhaust detector for night fighters. Zeiss, Jena, received orders for 50 Kiel devices in the autumn of 1944 from Dr. PLUMEYER of OKL. Twenty to thirty of these were delivered to the German Air Force. Tests were made at Rechlin and a squadron at Goslar was fitted. The main difference of Kiel I, II, III and IV was in the field of view. After some minor modifications [redacted] and the use of more sensitive amplifiers, this identical Kiel IV is currently used [redacted] for passive detection of both air and ground targets. It is used by the Air Force and the Signal Corps for experimental purposes and can be considered a highly useful instrument.
2. Description of German Homing Missile Heads Utilizing Zeiss Optics.
- a. Wasserfall is a lens mirror system, with a lead sulphide photocell. The field is divided into four quadrants each of which is obscured by two revolving shutters to give a pair of characteristic frequency interruptions. Each shutter wheel has two sets of spokes speed at different frequencies and each set travels over half the aperture. The circumferences of the two wheels are at right angles where they pass over the aperture. Thus the quadrant in which the target falls is defined by the frequency characteristics of the signal and the mechanism responds accordingly by correcting the course of the missile.
  - b. Linse is a system similar to Wasserfall but applies to a self-steered boat and therefore has only one revolving shutter creating a left-right coordinate system with characteristic frequencies. Instead of mirrors, Linse has lenses of aperture 1:0.85 f- 3.6 cm. Of the 50 which were delivered at the end of 1944, 10 had lenses of lithium fluoride, 40 had lenses of KRS-5.
  - c. June is a system similar to Linse but with two-dimensional control. One variant had two shutter disks and one lens; another has two lenses placed at the ends of mutually perpendicular radii of a single shutter disk.
  - d. Krebs and Sammler, are lens mirror systems, with similar modulation schemes to Wasserfall.

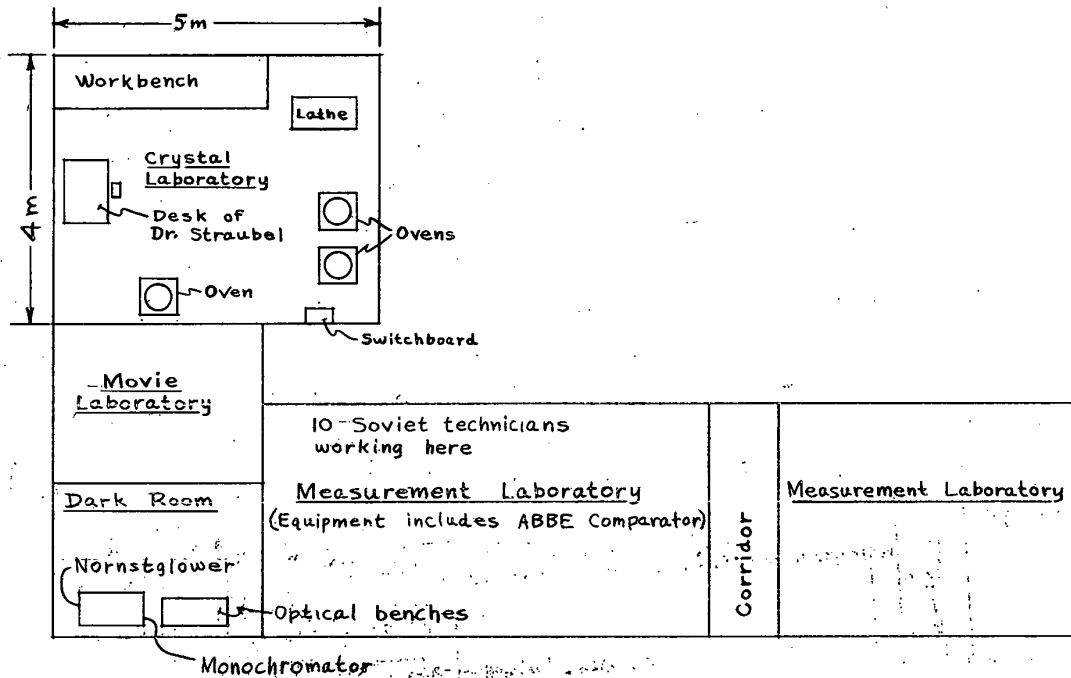
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CRYSTAL AND MEASUREMENT LABORATORY LAYOUT

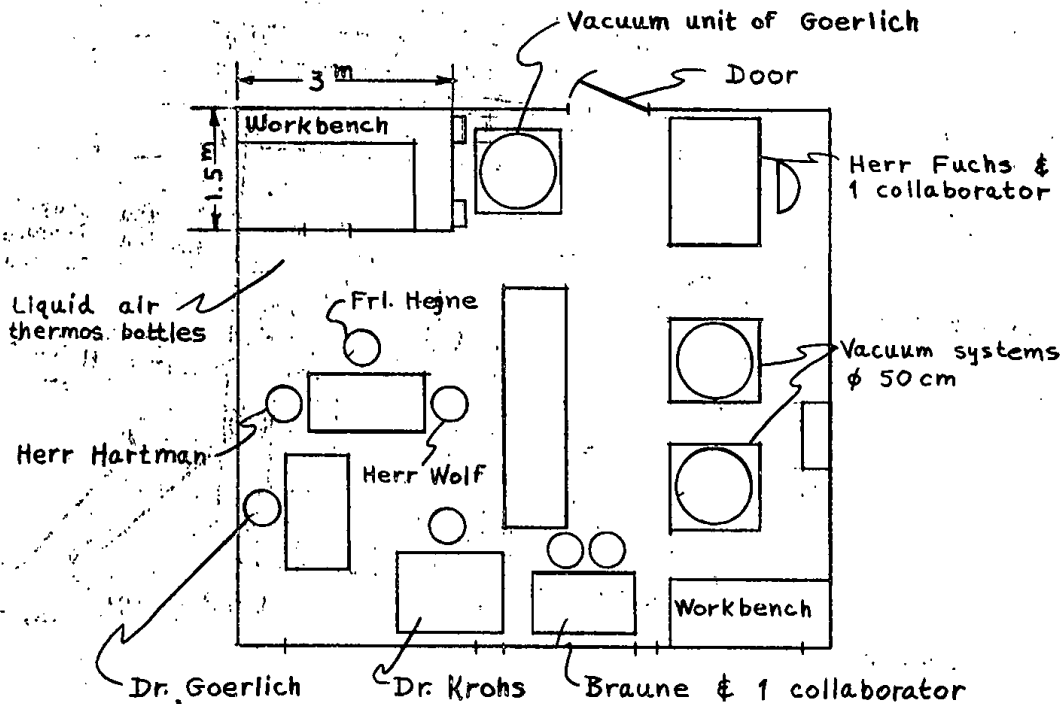
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PHOTOCELL LABORATORY AFTER 1949

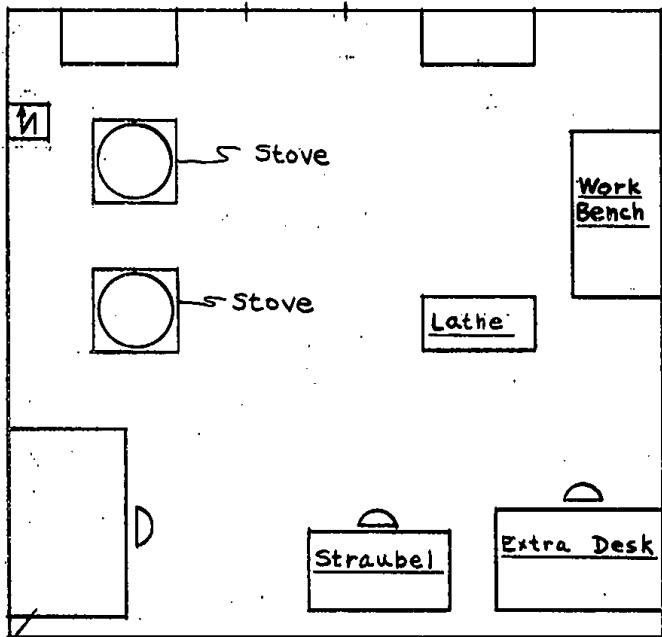
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Dr. Gundlach (Photochemist working independently)

CRYSTAL LABORATORY AFTER 1949

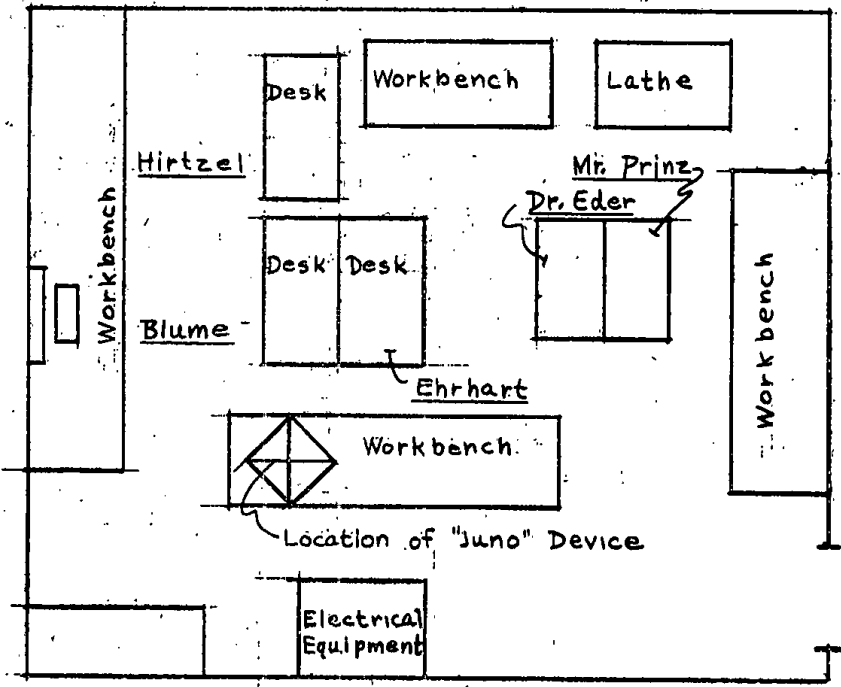
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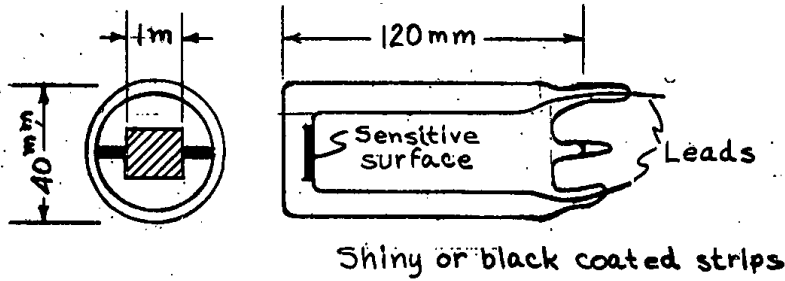
ELECTRICAL LABORATORY

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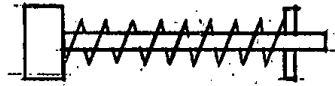
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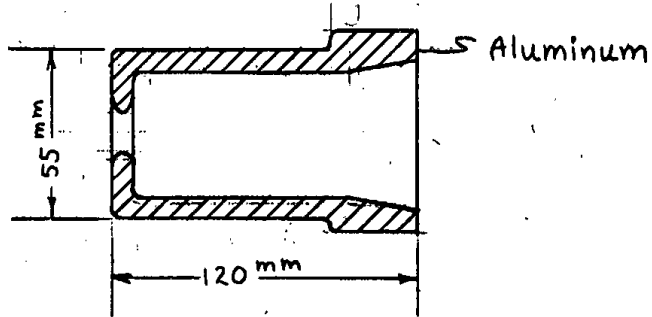
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a. Cell



b. Plunger



c. Cell housing

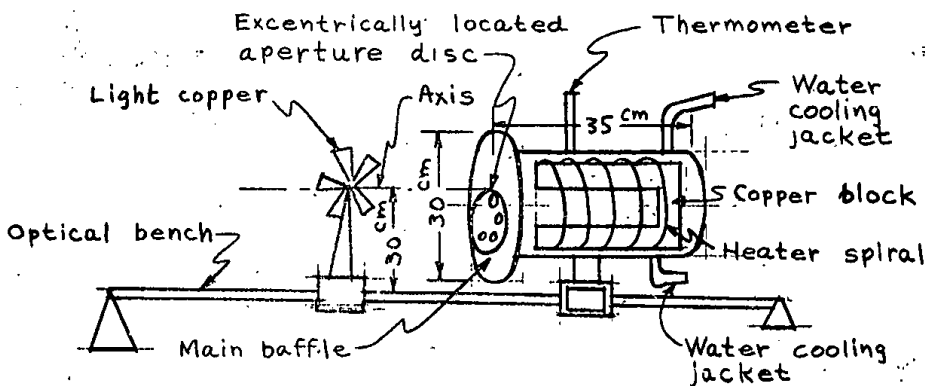
PBS PHOTOCELL

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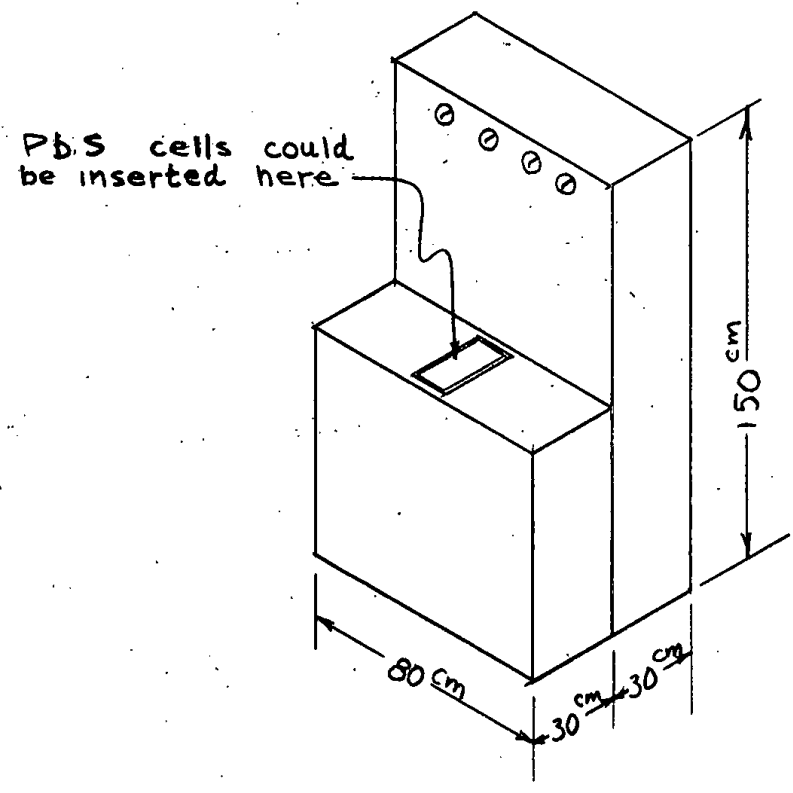


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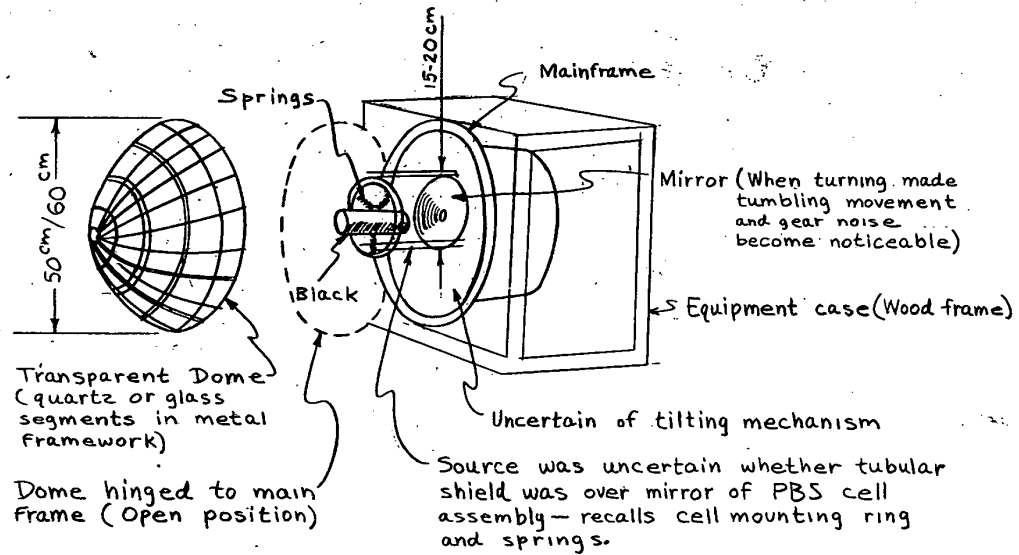
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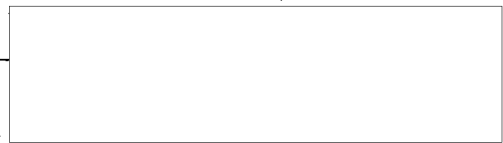


PHOTOCELL TEST SET DESIGN



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SKETCH OF JUNO OR KIEL DEVICE



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