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UNIDO/DECHEMA Seminar on Operation,  
Maintenance, Design and Manufacturing  
of Chemical Plants and Equipment in  
Developing Countries

Königsstein (Taunus) near Frankfurt/Main  
Federal Republic of Germany  
25 - 26 June 1970

INSTRUMENTATION AND CONTROL -  
FROM THE SUPPLIERS POINT OF VIEW <sup>1/</sup>

by

G. Moses  
Hartmann & Braun AG  
Frankfurt/Main  
Federal Republic of Germany

<sup>1/</sup> The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

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SUMMARY

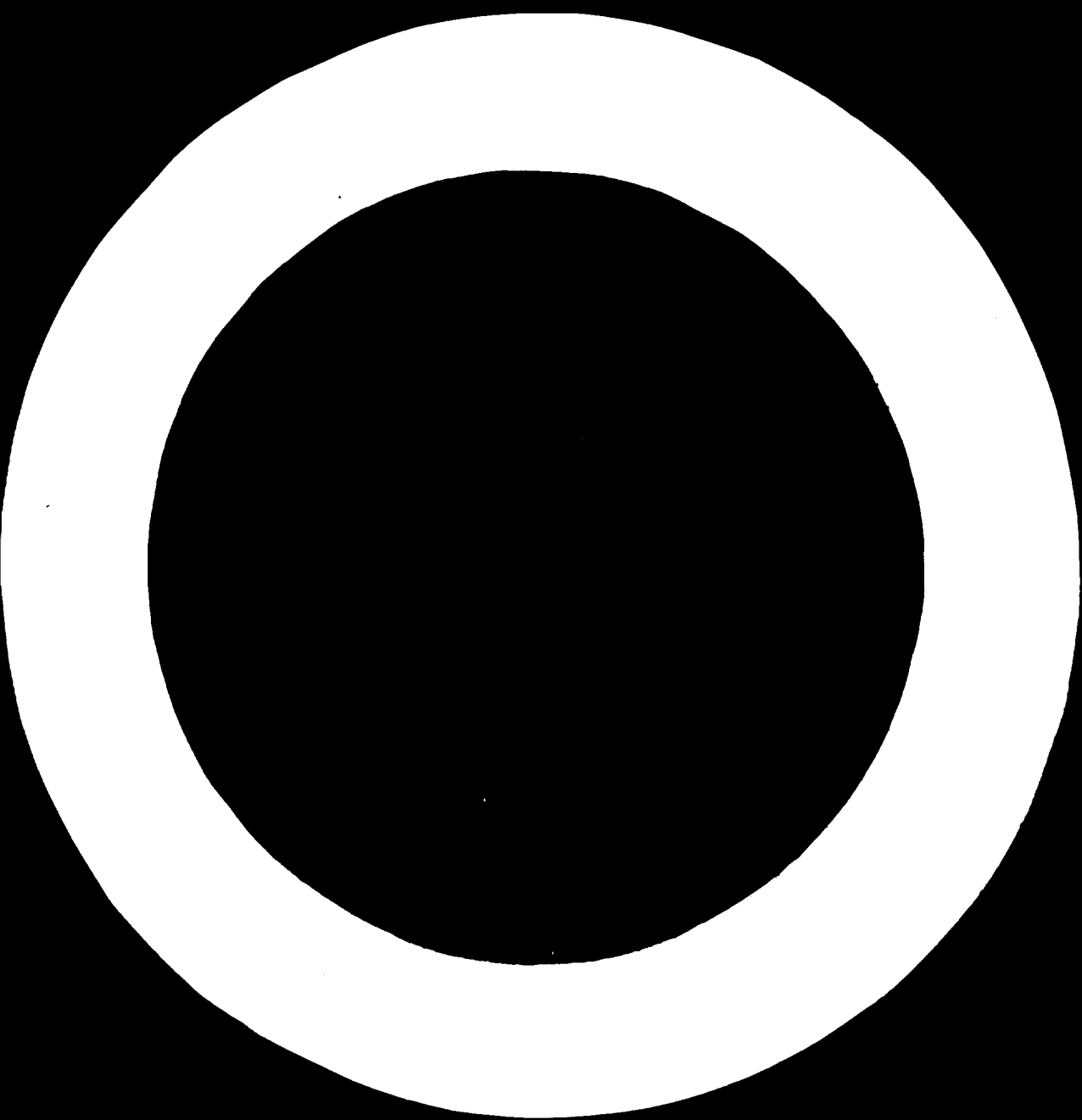
INSTRUMENTATION AND CONTROL -  
FROM THE SUPPLIERS POINT OF VIEW 1/

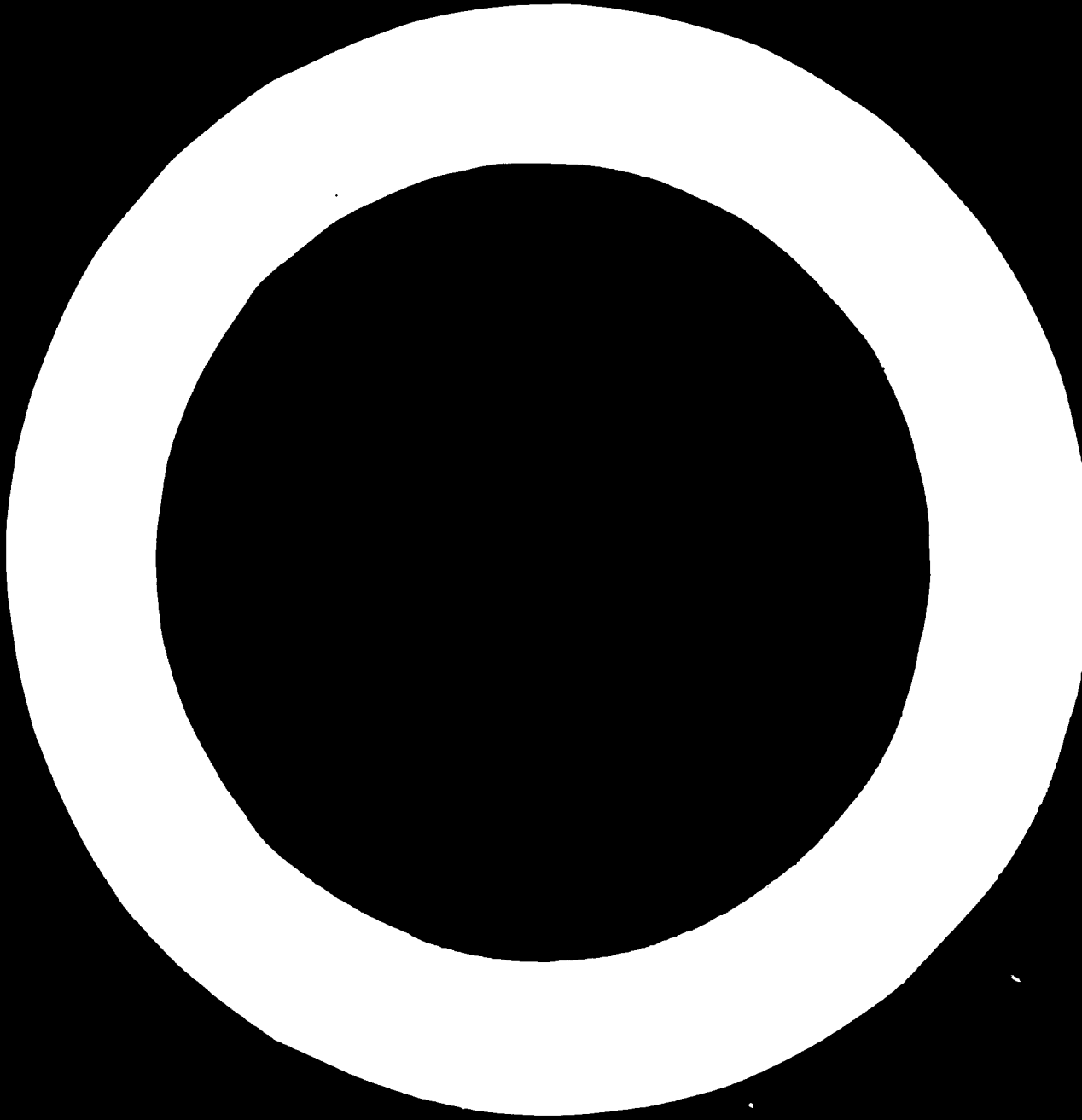
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With regard to my many years' stay in Brazil with a subsidiary of Hartmann & Braun in Frankfurt, as production supervisor, later on sales manager and in the last years of my stay responsible for maintenance and repair of the equipment made and also imported by us, I would like to give an outline on my experience and recognitions in answer to the a.m. question.

In the first years, our production was mainly restricted to the usual switchboard instruments. In the course of the subsequent years, the scope of manufacture was extended more and more. In 1968, we had complete production facilities for switchboard instruments with accessories, indicators for all electrical variables which were specially employed in laboratories and schools, temperature controllers and complete control units for pH-measurement and control in sugar industry.

In the 50ies, Brazil started to build up its own supplying industry for the already existing basic industries, such as iron and steel industry, chemical as well as food and textile industry. Until that time, almost all necessary new facilities, mainly later all spare parts subject to wear had to be imported from industrial countries. Often, such imports involved long delivery times and enormous prices with the result that some production plants were often closed down for a number of months.

Before establishing a supplying firm it has of course to be sounded whether for the years to come a ready market will be ensured for the products to be made, i.e. whether it will pay at all to manufacture the instruments concerned. One should start with those instruments which are the easiest to make without causing any special technical problems as most of the workmen have not any technical qualification and have first to be trained on the job. Last not least, care has to be taken that sufficient raw material will be available.

In Brazil, these conditions have been fulfilled for the most part, on the one hand by the consumption of the steadily increasing population in the towns of a relatively high living standard and on the other by the fact that there was qualified labour in the industries already existing. Also the government did a lot to qualify the young workmen. Industrial schools were established for the training of unskilled personnel into expert workmen in three courses of six months each.

The most decisive point for promoting industrialization was however the desire to be independent of the industrial nations.

One of the major problems was a sufficient electric power supply of the new factories to be settled but this problem, too, was quickly solved by the government.

The foundation of the automobile industry and of factories for power supply equipment suddenly resulted in a considerable demand from many branches for finished parts and for machines necessary for production. Above all, one had to provide for a quicker replacement of parts subject to wear, specially for the small and medium supplying firms. Therefore, Hartmann & Braun decided to participate in that development, and already in 1956 in collaboration with an already existing Brazilian firm we could start the first production job. A considerable part of the necessary production facilities (such as punching, drawing and holding dies) as well as instruments and equipment required for test and calibration were supplied by our parent company in Germany so that theoretically production could be started rather early. However, there the first deficiencies arose. All planning had been based on German standards which soon caused considerable problems with regard to the procurement of raw materials, as at that time there did not exist any uniform system of measures. Therefore, the material was purchased from the aspect of price and not for its suitability. Only the increasing requirements of growing industry forced the suppliers to offer raw materials always of same quality and measures. Specially firms of electrical engineering industry,



like our company, had to make nearly all parts - from screws to molded parts - necessary for production by themselves.

We proceeded in the following way:

Small parts which also our parent company purchased from subcontractors notably of the watch-making industry and which had to meet certain tolerances were continued to be imported, even with special abatements from the side of the government if by their import other new products which until then had to be completely imported could be manufactured in the own country. We even made screws and nuts with metric threads which we needed for manufacture until the day, due to the constantly increasing demand also of other industries, we found a new supplier who could furnish the parts on satisfactory conditions with regard to quality, quantity, and above all to prices.

In the first years, most of our products were sold to the galvanic industry which until that time had to cover its rather considerable demand for measuring instruments by expensive imports from various countries or had to install instruments of the most different dimensions from existing stocks. Only when the instruments were made in the country, such ones after a short time failing because of chemical vapours could be quickly replaced by the same types.

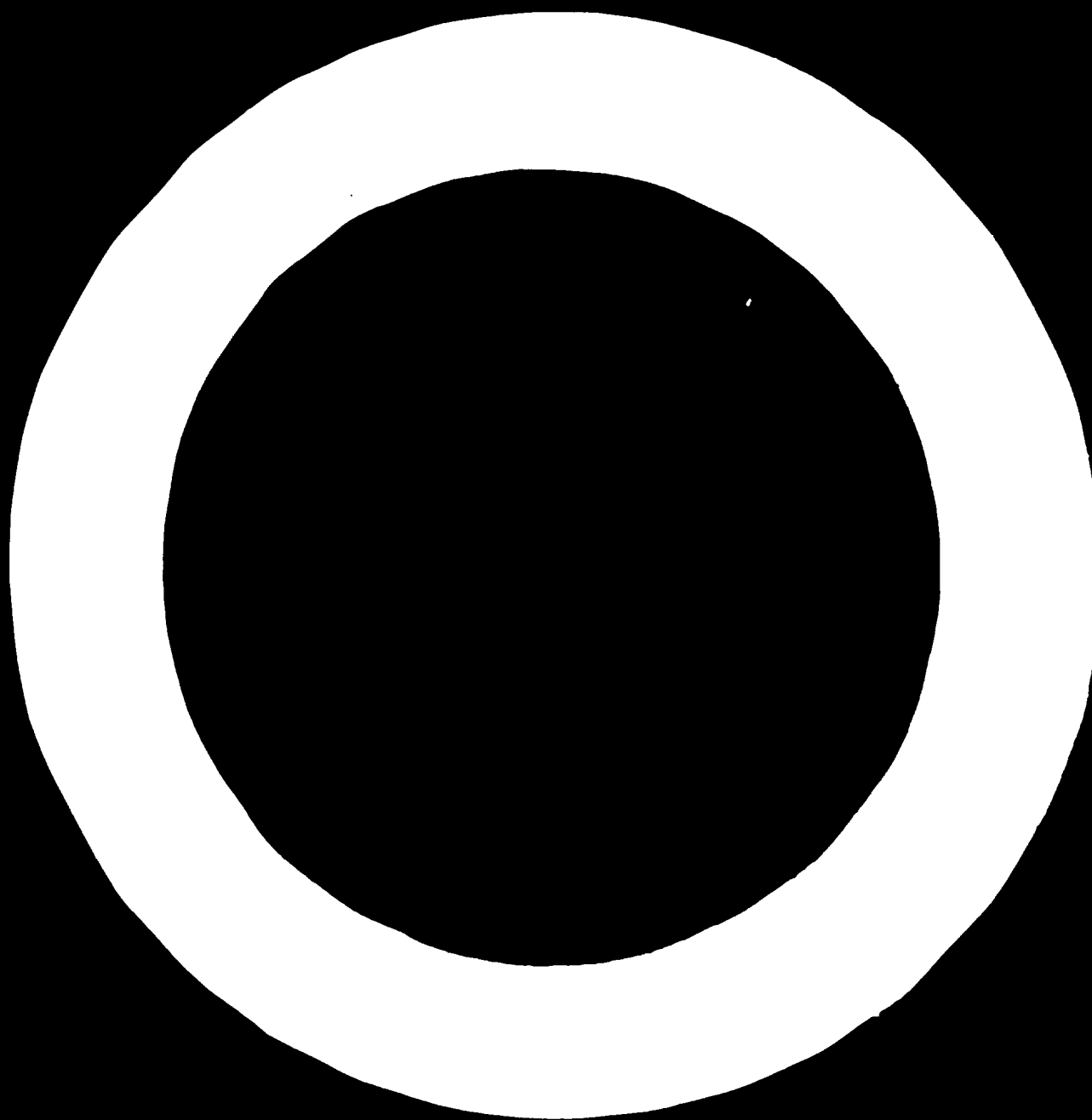
How advantageous a supplying industry can be for certain economic branches was proved by the fact that in the case of switchboards to be furnished for the more and more extending power supply the ordering firms almost made it a condition to install our instruments as we were always endeavouring not only to provide for uniform dimensions but also to adapt the quality of our instruments to the climatic conditions. Last not least, the reason was also that we performed maintenance and repair of the instruments and installations supplied.

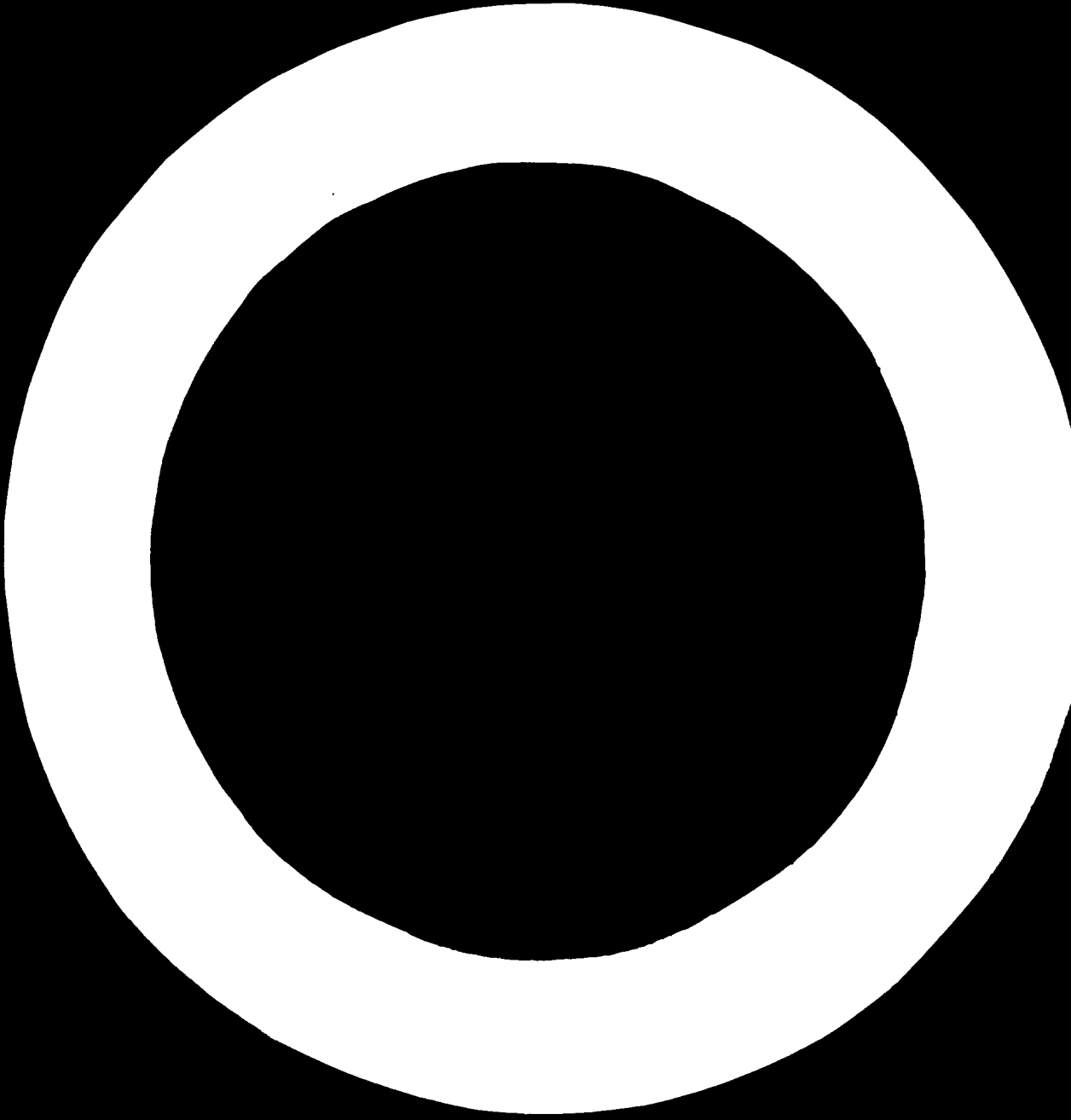
As for some years I worked in the sales department I was in good contact to our customers. One of the first questions they always asked me was whether for our products we also had service facilities for maintenance and repair if necessary. For this purpose we started to train service personnel who at any time was able to fulfil the customers' wishes within a short time. In the beginning, the maintenance was limited only to products made in the country. But very soon we also had to ensure full maintenance for the equipment imported by us. Therefore, some of our

best workmen of the production department had to go over to work in the repair workshop. By a specialized training they were prepared for the jobs to be done.

The task of maintenance was concentrated in the sugar industry. Already before the start of a campaign, all preparatory work was done to ensure a smooth progress. However, with various firms we encountered great difficulties with the maintenance of their installations. Some of them had abandoned the equipment as it had not been completely mounted after having been supplied. Others had in their way installed the instruments into any switch cabinets. The accessories used were makes from all over the world. Because of this non-uniform equipment we often had to spend a lot of time to repair defects which also entailed high costs.

To rationalize maintenance, with some firms we started to completely change their installations and to wire them with the same material according to one uniform circuit diagram. It is true that at that moment the customers had to pay higher prices but in the case of defects we could make a quick repair with the aid of suitable spares. Later, the defective parts were repaired again in our workshop.





Which are the conditions to be fulfilled by Developing Countries if they want to become manufacturing suppliers of electrical equipment and also offer service facilities ?

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With regard to my many years' stay in Brazil with a subsidiary of Hartmann & Braun in Frankfurt, as production supervisor, later on sales manager and in the last years of my stay responsible for maintenance and repair of the equipment made and also imported by us, I would like to give an outline on my experience and recognitions in answer to the a.m. question.

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Only a small part of this equipment was manufactured in the country by small and medium-sized handicraft undertakings by means of difficult and time consuming methods. In addition, the quantities concerned were mostly small so that an extension and increase of the industrial potential was impossible. In addition, working funds were missing because the country suffered already for many years under a current trend of inflation. Market analysis and well planned research and development also did not exist for industrial goods and often the result was simply a matter of chance. The first step taken by some Brazilian firms was to procure manufacturing licences for various consumer goods. As a consequence thereof,

good results were obtained, and also as due to the increase in population it was necessary to secure jobs, the Government made great efforts to induce foreign investment in Brazil.

Before establishing a supplying firm it has of course to be sounded whether for the years to come a ready market will be ensured for the products to be made, i.e. whether it will pay at all to manufacture the instruments concerned. One should start with those instruments which are the easiest to make without causing any special technical problems as most of the workmen have not any technical qualification and have first to be trained on the job. Last not least, care has to be taken that sufficient raw material will be available.

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The most decisive point for promoting industrialization was however the desire to be independent of the industrial nations.

One of the chief problems was the electric power supply for the new industry to be settled. At the beginning the problem could be solved only in the big cities and there even not entirely. When due to the continuous industrial growth the future energy requirements could be estimated, the Government immediately started to promote the industry involved. The erection of hydro-electric generating stations, which so far were only in the stage of planning, has immediately been started and from the year 1960 the problem of electrical energy supply was solved. As however the energy could not be distributed to all places, this resulted in industrial concentration which compared with the size of the country was restricted to a comparatively small area. This however was of great advantage for the industry since all industrial branches were available in the close vicinity.

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An important point is to be added to those outlined above: training of the personnel and employment for the appropriate job according to qualification.

Gradually small groups have been established consisting of the few skilled technicians with high qualification. These groups were in charge of constructing complete components and each member of such a group had to be familiar with a comparatively small scope of work. In this way we were capable of quickly exchanging personnel.

The work at the machines proved to be more difficult. Redisposition was often necessary until the most favourable flow of work was ensured for all employees. Quality was the prime factor to ensure smooth assembly of the components. Jigs and fixtures have been used for the same type as employed in Germany because of the manufacturing tolerances which were of special importance.

Detailed production schedules have been established for all work to be carried out and with indication of the material, designation of the tools and the accurate working procedure. Errors and special manufacturing methods resulting from the raw material were noted therein.

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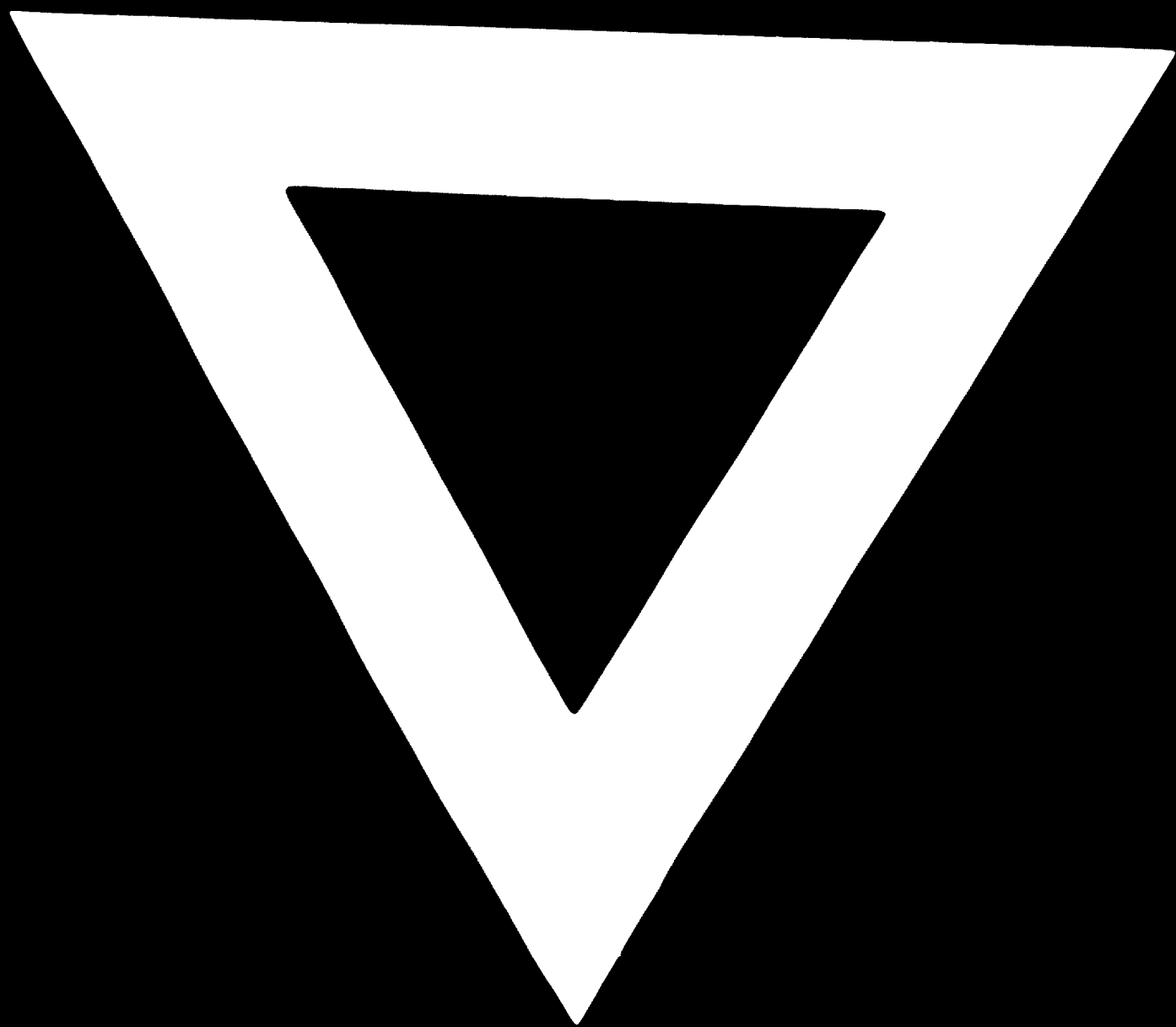
Finally I shortly revert to the financial problem which is one of the essential factors for industrial success.

The first years in Brazil proved to be a losing business. Because of wrong market research we had to change our manufacturing program according to the requirements of the country. As a consequence thereof we lost many sales prospects which at a later time we regained with great difficulties. After about 4 to 5 years the balance showed a positive result for the first time, but at that time it was difficult to export money from Brazil. Several times

the capital has been increased with investment of the profit in the own enterprise.

Today HARTMANN & BRAUN has in Brazil a manufacturing area of more than 4.000 m<sup>2</sup> and a staff of about 180 employees.





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