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AN EXPERIENCE IN THE DEVELOPMENT AND TRANSFER OF TECHNOLOGY[1/]

by

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1/ 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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CONTENTS

Introduction

The Engineering and Industrial Design Development Centre was established in Cairo in 1969. The second phase started in 1973. Government contribution: L.E. 832.480; UNDP contribution: US $ 2.056.009; the Executing Agency is UNIDO.

The long-range objectives of the Centre are to develop industrial products design capabilities within the country, and to assist in the development of capacity for manufacture of tools and of capital goods equipment.

According to these long-range objectives, the Centre is organized in six main divisions:

- industrial product design and development
- capital goods equipment design
- production technology and tool design
- process design
- mechanical workshop
- heat treatment workshop and mechanical laboratories.

There are also divisions dealing with training, industrial information and documentation, as well as a financial and administrative division.

The Centre, which is located in Cairo, has:

- about 310 employees (sixty-one engineers, fourty draftsmen, workers, administrative and helping staff)
- six United Nations experts (five UNIDO and one ILO) and from time to time UNIDO consultants and short-term experts
- one Egyptian Director-General and one International Project Manager.

The Centre is working mainly with the public sector companies, but also co-operates with other establishments and with the private sector. Although the Centre is a national one, some work has already been done for other Arab States and still more requests are coming At the end of 1973, the Centre introduced a new system, i.e., all work is on a contract basis and against a nominal payment. The reason for the nominal payment system is to ensure additional inputs and to give the work a more businesslike character. These additional inputs are used now as incentives and for further development of the working conditions in the Centre. In the future, this payment system will be developed, but the main contribution will have to come from different sources.

The present activities and jobs of the Centre are listed in Annex I.

In December 1973, the Centre also introduced specialized training courses; the first one was a course in Tool Room Practice. Later on, the Centre has continued to hold training courses in very specialized practical subjects, chosen according to the problems which the participants have faced in their everyday practice. Due to their very practical orientation, these courses have proved highly successful. Therefore, the programme for the year 1977 includes 16 training courses, which list is given in Annex II.

The training courses are for about twenty-five participants and last for one or two weeks. The participants come from various Egyptian factories, lately also from other Arab States. Participation is against a nominal payment. The courses are prepared and held by the experts and counterpart engineers. The languages used are Arabic and English.

The Centre also accepts engineers and designers for training on the job in various specialized fields. The duration of the training varies from two months to one year. The main fields of specialization are product and tool design. Until now, the Centre has more than 150 man-months trainees.

The Centre has, I feel, acquired increased recognition from the companies and Government authorities due to the fact that:

- the project has been well formulated and the institutional framework is excellent
- all are working as a team in a very friendly atmosphere
- the Centre has full understanding and support from the Government authorities as well as from the UNDP and UNIDO.

Due to the results reached by the Centre and increased demand for further development of it, the Government had decided to attach the previous Institute for Small Scale Industries to the Centre. Therefore, as from 1st January, 1977, the Centre will have two locations:

- Dar El Salam Centre, on the old road to Meady, and
- Pyramids Institute, on the Pyramids Road.

Both sites are staffed and well equipped.

Further development of this Centre is essential for the development of the Egyptian engineering industry. Therefore, I very much hope for continued UNDP assistance in addition to the Government's permanent financial and moral support.

I. THE STATUS OF THE ENGINEERING AND INDUSTRIAL DESIGN CENTRE TODAY AND ITS POLICY

A. The History, Aims, Activities and Development of the Centre

It has been mentioned in the Introduction that the Engineering and Industrial Design Development Centre (hereinafter: EIDDC or Centre) was established in 1969 as a joint project between the Government of A.R.Egypt and United Nation Development Organization (UNDO), executed by United Nation Industrial Development Programme. The second phase of EIDDC's project started in 1973.

The Institute for Small Scale Industries (hereinafter: ISSI) which has been attached to EIDDC was also a joint project between the Government of A.R.Egypt and UNDP, executed by International Labour Office (ILO). The ISSI's project started in 1973 and the second phase in 1968; the project was terminated by the end of 1969.

Phase I of the EIDDC's project had as its main purpose, to train designers in products development. Phase II of the EIDDC's project has as its main objectives: to develop industrial products design capabilities, to assist in development of tools manufacturing capacities and to assist in the development of capabilities for manufacture of processing or capital goods equipment. In Phase I, concentration was mainly on the engineering industries; in Phase II, the work has, expanded to other types of industries. The work of EIDDC is following the main objectives although there are large demands for complementary activities in the field of industrial consultancy. The Work Plan of the project document has been followed as closer as possible due to the changes in the Egyptian industry, and the growing demands. To fulfil the requirements and the main objectives, some new activities have been introduced: plant layout studies, heat treatment and material tests, specialized short-term training courses, lectures as well as technical documentation and information. Also, from time to time, some requirements from other Arab countries in the form of specific assignments or training activities, are accepted. A system of nominal payment for the work done by EIDDC has been introduced and is working satisfactorily. Presently, EIDDC has the following technical divisions: (1) Product Design and Development Division with an additional Industrial Design Section, (2) Processing (or Capital Goods) Equipment Design Division (3) Engineering (or Production Technology and Tool Design) Division (4) Process Design Division (5) Workshop Division for manufacture of prototypes and special tools (6) Heat Treatment and Materials Test Division and (7) Training, Documentation and Information Division. Every division is strictly working in the field of its specialization except the training section whose task is to organize all training activities already technically prepared and to be conducted by the specialized sections or divisions.

Phase I and Phase II of the project of the Institute for Small Scale Industries had as their main objectives to render services in the field of applied technical and economic research, development and implementation of industrial techniques, industrial consultation and management as well as training and extension work. Concentration was on the small and medium scale industries for the Government, cooperatives and private sector. But, since termination of UNDP/ILO assistance, the activity of the previous ISSI was concentrated on very limited training in the form of various training courses, mainly conducted for foremen, workers and draftsmen. Therefore, the Government Authorities have considered the better utilization of the previous investments as well as contributions and accordingly have decided to attach the ISSI to the EIDDC. Presently, the previous ISSI is working as a part of EIDDC having certain technical divisions (3) located at its premises.

The work of the present project of the EIDDC is progressing satisfactorily as it is briefly explained in the following information:

1. Product Design and Development Division. Through Phase I and Phase II, the main objective was to develop the industrial products design capabilities within the country. Although it was a new activity in the country, results have been achieved and a well established Product Design and Development Division exists. Similar design offices have been initiated in several factories. When Phase II of the project is completed, the Product Design and Development Division should continue to work without further assistance. Concentration in the future should be in addition to the existing type of design work, to help the industry in the proper transfer and implementation of documentations for sophisticated licensed products or main components.

2. Processing (or Capital Goods) Equipment Design Division. During Phase II, a processing equipment design division has been established and a work plan has been initiated. Several studies and design work have been undertaken with appreciated results. But, at the present stage, there are still certain difficulties due to the fact that the needs of industry are mainly for complete projects (flow study, design and manufacture as well as in some instances technical supervision of erection and putting into operation). EIDDC is with its present objectives and capacities unable to take over such tasks.

3. Engineering (or Production Technology and Tool Design) Division. During Phase I a good Engineering Division was established concentrating on process planning and tool design. Through Phase II these activities have been continued and expanded to more compl icated products and tools. Certain help was also given to companies to initiate the establishment of similar engineering offices. When Phase II of the project is completed, the Engineering Division should continue its activities without further assistance. Concentration in the future should be on further involvement in design of more sophisticated special tools and process planning for complicated products.

4. Process Design Division. Following the growing demands and completion of engineering design works , a Process Design Division has been recently established from sections working in that field. Activities are: process flow study, production process design, workshops and plant layouts.

5. Workshop Division. A well equipped prototype manufacturing workshop was established during Phase I and certain equipment has been added during Phase II. The main task is to produce prototypes of products as well as special tools. Several prototypes, special tools and special component parts have been manufactured and this type of work should continue. Concentration in the future should continue in manufacturing prototypes and more complicated and sophisticated special tools.

6. Heat Treatment and Materials Test Division. This division has been established recently after receiving the required equipment. The laboratories are already in function and the Heat Treatment workshop is under erection. Main aim is to introduce proper heat treatment and material test technology and practical work for manufacture of sophisticated component parts (for prototypes, tools etc.)

7. Training, Information and Documentation Division. During Phase II specialized short-term engineering oriented training courses have been introduced in addition to training on-the-job of factories personnel. These activities are continuing with the aim to fulfil the demands of factories. There were no special external inputs to these activities, except the participation of the existing experts and two courses financed through UNIDO Voluntary Contribution (Quality Control/Regional and In-Plant-Group Training Courses for participants from East African and Arab Countries) as well as

one bilateral (Management of Maintenance). The Centre has also conducted two training courses in Iraq, one regional on Industrial Product Design and one national on Tools and Dies Design and Manufacture. The previous Institute for Small Scale Industries is also proceeding with training activities. Taking into consideration the industrial development plan of the A.R.Egypt and its aims, as well as the specific requests of the neighbouring Arab States, further extension of training activities is very important. Only a small Information and Documentation Unit has been initiated during Phase II of the project, without any direct input from UNDP. A well organized and equipped Information and Documentation Unit should exist to meet the present and future requirements. Strengthening and expansion of these activities are part of future development scheme.

The present stage of development of the industry in the A.R. Egypt further requires more sophisticated technical and managerial work aiming to achieve an acceptable economy of production. This work has to be done through:

(a) Promotion of transfer and use of appropriate up-to-date technology, (b) Better utilization of capacities, (c) Introduction of new products and/or production methods, (d) Planning and/or replanning and organizing the plants, and (e) Introduction of up-to-date industrial management methods and systems.

During the past period, EIDDC has been receiving requests in these fields, but due to the objectives, present capabilities and capacities it was not possible to accept them. Only very few and more simple requests have been accepted. These assignments were left either to very expensive foreign consulting firms or for the future, on account of keeping the existing situation of production.

The industrial development policy of the A.R.Egypt underlines the great importance of the rationalization of production as well as introduction of new production and industrial management methods and techniques. Therefore, the future development scheme of EIDDC has to have as its main task to fill the existing gap in the requirement of the industries and industrial development with introduction of industrial consulting and at a later stage, contracting services in the field of mechanical engineering for various industries.

The present activities and works of EIDDC are listed in Annex I.

The training courses and seminars held (or to be held during 1977) by EIDDC are listed in Annex II.

B. Institutional Framework, Financing and Manpower

The Engineering and Industrial Design Development Centre is an independant unit with separate legal entity affiliated to the General Organization for Industrialization of the Ministry of Industry and Mining. The Centre has a Higher Administrative Committee whose duties are limited to set the general work policy, to follow-up the execution and to coordinate the Centre's activities with the industry and other institutions concerned. The Management is entrusted to a General Director, who is a member of the Higher Administrative Committee. (Ministerial decree No. 1526 of 1975, date of issue 28.12.1975).

The Centre has adequate governmental budgetary provisions for its current activities. The Centre is relatively well staffed with local personnel and is suitably housed. There are budgetary provisions for all the counterpart facilities required in this respect.

The Centre has UNDP financial assistance, executed through UNIDO. The UNDP financial contribution for the Second Phase was US $ 2.056.009 . UNDP contribution is used mainly for expertise, then for training of counterpart staff through fellowships and delivery of same sophisticated equipment.

The Centre has also income from contracted jobs done for the industry. For the time being, the fees charged by the Centre are on very moderate rate, the monthly average about L.E. 3000. These additional inputs are used now as incentives for the staff and for further improvement of the working conditions in the Centre.

As, already mentioned, the Centre has presently:

- 312 employees (sixtyone engineers, forty draftsmen, workers, administrative and helping staff),
- 6 United Nations experts (five UNIDO and one ILO),
- one Egyptian General Director and one international Project Manager.

C. Industrial Requirements in A.R.Egypt and Future Work Policy of the Centre.

The industrial development plans of the Arab Republic of Egypt indicate the importance of development of industries and a better utilization of the existing capacities as well as the importance of economy of production through up-to-date products and production methods. A large number of the existing enterprises have to be modernized and enlarged. New

investments will be available for the establishment of new enterprises aiming to boost the Country's economy. Following the new economic policy, the industrial development plans include the public and the private sectors as well as gives opportunity to joint-venture investments, with foreign investors.

On the other hand, rapid advances in engineering science, technology and industrial management are permanently opening ways for improvement and further development of the industrial production. The results of such achievements and experiences have to be followed and used in the execution of the industrial development plans of the A.R. Egypt. Therefore, the future work policy of the Centre should be aiming to:

a. render technical and managerial help to achieve lower cost of production (through better utilization of capacities, introduction of new products and production methods, planning and replanning and organizing the plants, etc);

b. promote the transfer and use of appropriate up-to-date technology;

c. develop the highly specialized industrial consultancy and -at a later stage- contracting services; and

d. promote capabilities to render combined services (technical, economical, managerial, etc.) which will have a positive impact on the development of the industry. Promotion of these capabilities should be stressed upon due to the new open-door policy of the country.

II. SOME VIEWS ON DEVELOPMENT

A. How is Manpower Developed at EIDDC

A Centre such as the Engineering and Industrial Design Development Centre must rely to a large extent on building up a large staff of highly skilled individuals in the basic specializations needed.

It is believed that the basic prerequisites of staff to be recruited by the Centre should be for (A) Junior Newcomers:

a. good education and acceptable grades;

b. interest in field of work;

c. readiness to develop and a creative attitude.

For recruitment of (B) Senior Newcomers:

a. educational requirements of post and extensive experience in the field of competence;

b. interest in the activities of the Centre and commitment to its cause;

c. managerial and creative ability.

In the case of junior newcomers who are usually university graduates, development takes place along the following lines:

a) On the job training for approximately one year where the new staff members have a chance to pick up information from their colleagues and from the experts attached to the Centre.

b) Most new staff members attend the Centre's own training courses for industry and can attend other courses if needed.

c) The most useful development is accomplished by actual interaction with industry. Engineers spend a great deal of time within industry on the Centre's assignments.

d) A fellowship is planned for new staff members after about one year from joining. Fellowships vary from six months to one year and are usually within industry in developed industrial countries.

e) Further development is ensured by short-term study tours during their career and which are planned for every second year approximately.

f) Staff are encouraged in addition to their work with industrial projects to make use of the information and documentation Centre, work on translations to the Arabic language of new literature.

B. A Training Philosophy

Does the Centre have a philosophy for its training programmes? Yes. It has indeed. The philosiphy is "training to meet the specific changing needs of engineering design and industrial development". Maybe this is an ambitious statement, but actually training courses and programmes are drawn up according to the following policy:

a. Specialization courses are mainly concentrated on industrial engineering subjects.

b. Flexibility. In so far as new courses are planned annually according to actual requirements of industry, and the particular problem areas as identified in industry.

c. Intensive and relatively short courses. Mainly at the request of industry and short enough not to disrupt production by the absence of staff leaving their jobs.

d. Ample printed material, so as to encourage participants to read the background literature, as well as to make up for local shortage of text and reference books. The material is also designed as future references to be used by participants in their jobs.

e. Case studies and discussions are encouraged. Participants are asked to bring their problems from industry for discussion.

In fact, the Centre relies intensively on its training programmes, which are well advertised for assuring constant contact with industry, establishing its image, and obtaining more design and development consultancy assignments. Lately the percentage of the number of consultancy assignments and contracts awarded, as a result of contacts with technical staff of industrial companies attending courses has greatly increased.

C. Regional Activities

Role in the Arab World

Being situated in Cairo, the hub of the Arab World, the Centre has been directly involved in various activities in the area. This has been directly and also through the different Arab Regional Organizations in the area, as well as through the Bilateral agreements with other Arab Countries. Some of the prominent examples are given below:-

a. Participation in a regional study of the electrical industries in the Arab World in collaboration with the Industrial Development Centre for Arab States IDCAS. This involves sending study teams to Arab Countries for study and information gathering. An Arab Meeting for Electrical Industries was later held in Cairo which discussed and reviewed the situation of the Arab Electrical Industry. One of the recommendations of the meeting was the setting up of an Arab Federation of Engineering Industries.

b. The design and running of a training course in Industrial Product Design for Arab engineers in collaboration with IDCAS in Baghdad, Iraq.

c. The study and design of the specialized Institute for Engineering Industries in Baghdad, which included the organizational set up, area and equipment requirements, workshop and laboratory design etc.; services also included training of personnel.

d. Training of engineers and technicians of the Industrial Development Centre in Riyadh, Saudi Arabia.

e. Preparation and running of a training cours on Tool Design and Manufacture for Iraqi engineers in Baghdad.

f. A working agreement exists between the Centre and the Industrial Development Centre in Khartoum.

g. Participation in a number of regional seminars on industrial information and documentation.

Many other activities on Arab level are on record and the Centre is being increasingly involved in Arab Industry.

The training courses run every year are now well attended by Arab engineers.

D. Suggestions for Closer Co-operation with UNIDO

The co-operation with UNIDO in execution of the existing project is going satisfactorily and it is a hope that the execution of the future project will proceed also smoothly.

But, according to the experience gained a closer co-operation should be effected on a wider scale. The ideas for such co-operation but without further details, are listed here below:

1. Extended help in training activities to ensure possibilities for holding training courses in very advanced technical and managerial fields;

2. Extended work in field of technical information and documentation to be able to follow the up-to-date technical achievements;

3. Regular meetings between the directors of similar design and development institutions from the developed and developing countries, to be able to gain experience. Such meetings should be sponsored by UNIDO.

4. Regular meetings between similar design and development institutions in the region, to exchange the experience. Such meetings also should be sponsored by UNIDO.

5. Financing from special funds, various research works in the developing countries; and

6. Financing from special funds, various works which lead to transfer/modern technology of to developing countries.

ANNEX I

SOME ACTIVITIES OF THE CENTRE

I. PRODUCT DESIGN AND DEVELOPMENT ACTIVITIES

1. Switches, sockets, plugs etc. for household use.
2. Design of various consumer goods (heaters, fans, table type electric cooker, water heaters and irons).
3. Design of various types of trailers from 4 - 24 tons capacity (trailers of 4-, 6-, 8- and 10 tons and semitrailer of 10-, 16- and 24 tons).
4. Design of various types of busbodies (for public transportation, tourists and schools) on various imported chassies.
5. Design of various components for trailers and busbodies (turntable, brake cam, screw jaks, axles, door mechanism, seats, etc).
6. Various industrial design activities upon request (economy housing, furniture, seat design for transportation industry, interior design etc.).

II. PRODUCTION TECHNOLOGY AND TOOL DESIGN ACTIVITIES

1. Production processing and tool design for various products
   - Switches, sockets, plugs etc,
   - Gate valves for water supply.
   - Components parts for fluorescent lamp and TV sets, manufacture,
   - component parts for trailers manufacture,
   - spare parts for textile machines,
   - plastic moulds, etc.

2. Production process planning and layouting for various industries:
   - tool room for electrocable factory,
   - tool room for railway wagons factory,
   - heat treatment workshop for electrocable factory,
   - heat treatment workshop for production of spare parts of textile machines,
   - complete new plant for airconditioners and water coolers production,
   - complete new plant for trailers production,
   - complete new plant for maintenance of diesel engines, etc.

3. Technical assistance and consultation on specialized fields
   - heat treatment process and material testing technology in automotive industry,
   - heat treatment process for manufacture of component parts for processing industry, etc.

III. PROCESSING INDUSTRIES ACTIVITIES

1. General assistance in study and revision of projects for processing industries (technology, specifications, preparation, etc).
2. Assistance in revision of various projects in view of local production facilities.
3. Design and unification of material handling equipment for processing industries.

IV. ENGINEERING CONSULTANCY SERVICES TO INDUSTRIAL COMPANIES

1. Improvement of material handling facilities (study, system design, relayouting, specifications of new equipment) for various industries.
2. Food processing industries (system design, engineering services, equipment design).
3. Modification of tin box production lines.
4. Building material industries (study and system design).

V. WORKSHOPS AND LABORATORIES ACTIVITIES

1. Manufacture of prototypes:
   - complete winch unit for heavy traction,
   - plate bush roller conveyor,
   - components for mobile conveyors,
   - components for trailers,
   - electrical utility components and componont parts, etc.
2. Tool manufacture according to design made by the Centre for various factories.
3. Manufacture of some complicated components or component parts upon request from various factories (gear box, cutters, axles, etc).
4. Heat treatment of some component parts for various factories (valves, punches, parts, etc.).
5. Testing of various component parts and materials for factories (hardness testing, surface testing, material testing etc).

P.S. 1. The Centre is working with about 80 companies whose names do not appear here due to the limitation of space in this paper.

ANNEX II

LIST OF TRAINING COURSES AND SEMINARS

Item	Course No.	Title	Duration Weeks	Language
1.	-	PRODUCT DESIGN		
	1.	Seminar on "Role of Industrial Design"	1	Arabic
	2.	Training Course "Engineering Products Design"	1	Arabic and English
2.	-	TECHNOLOGY AND PRODUCTION		
	1.	Training Course "Production Technology"	1	Arabic, partially English
	2.	Training Course "Press Tools: Design"	1	Arabic, partially English
	3.	Training Course "Press Tools: Planning and Manufacture"	1	Arabic, partially English
	4.	Training Course "Press Tools: Materials Selection and Related Heat Treatment"	1	Arabic, partially English
	5.	Training Course "Plastic Moulds: Design and Manufacture"	1	English
	6.	Seminar on "Selection of Automotive Materials Basic Principle and new Trends"	1	Arabic, partially English
	7.	Practical Training "Heat Treatment and Related Laboratories"	2	English and
3.	-	MATERIAL HANDLING		
	1.	Training Course "Material Handling and Related Equipment"	2	English and Arabic

Item	Course No.	Title	Duration Weeks	Language
4.	-	WORKSHOP PRACTICE		
	1.	Training Course "How to Read the Mechanical Drawings"	4	Arabic
	2.	Training Course "How to Estimate the Working Time in Mechanical Workshop"	4	Arabic
	3.	Training Course "Inspection and Quality Control"	3	Arabic
	4.	Training Course "Mechanical Workshop Management"	2	Arabic
5.	-	INDUSTRIAL DEVELOPMENT		
	1.	Seminar on "Small Scale Industries: Objectives and Work Procedure"	1	Arabic
	2.	Training Course "Factory Planning and Layouting"	1	English
	3.	In-Plant-Group Training Course "Engineering and Industrial Design"	12	English

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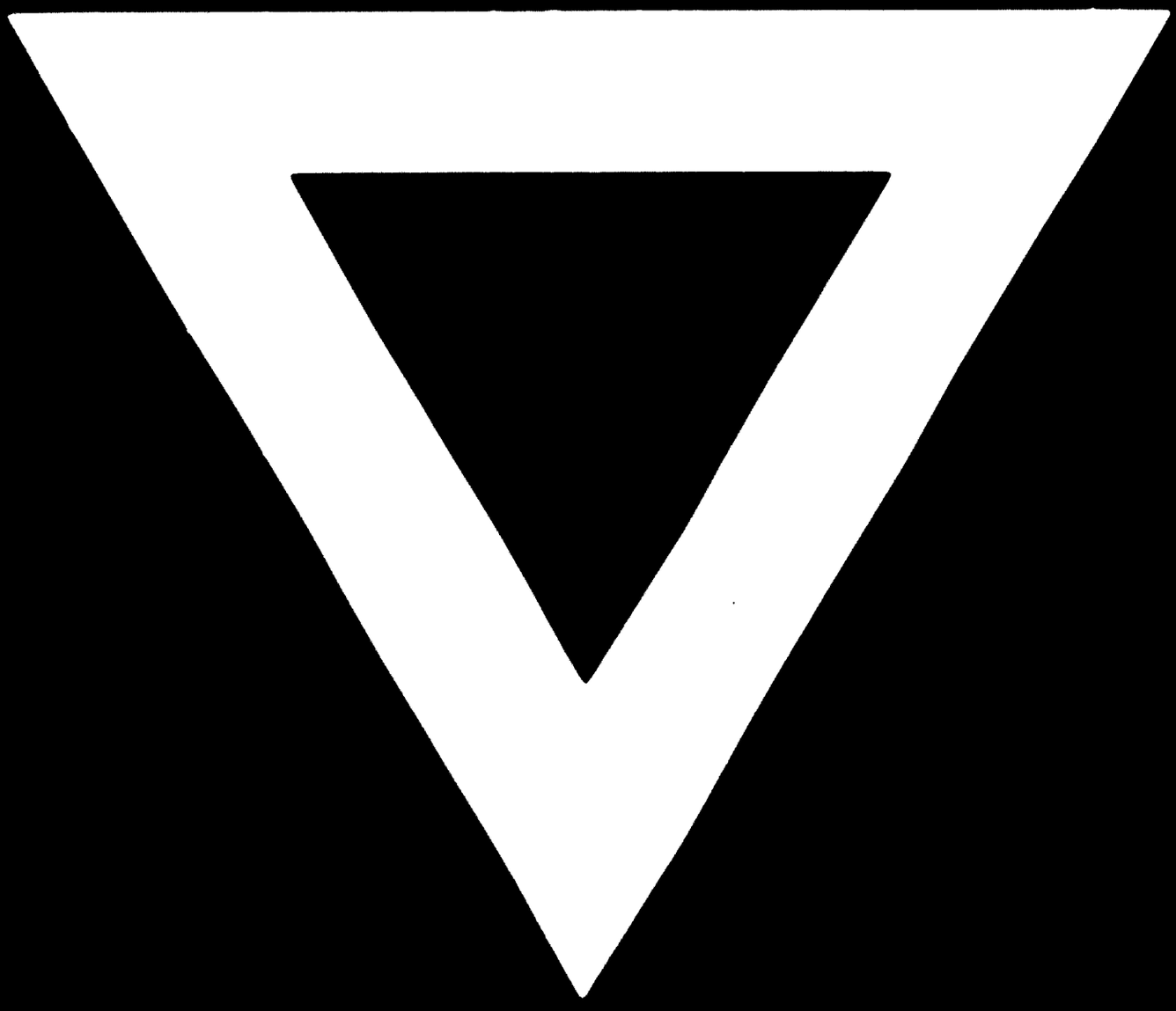

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