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LOW-COST PREFABRICATED ELEMENTS FOR SMALL SCALE INDUSTRIAL STRUCTURES IN POLAND 1/

by

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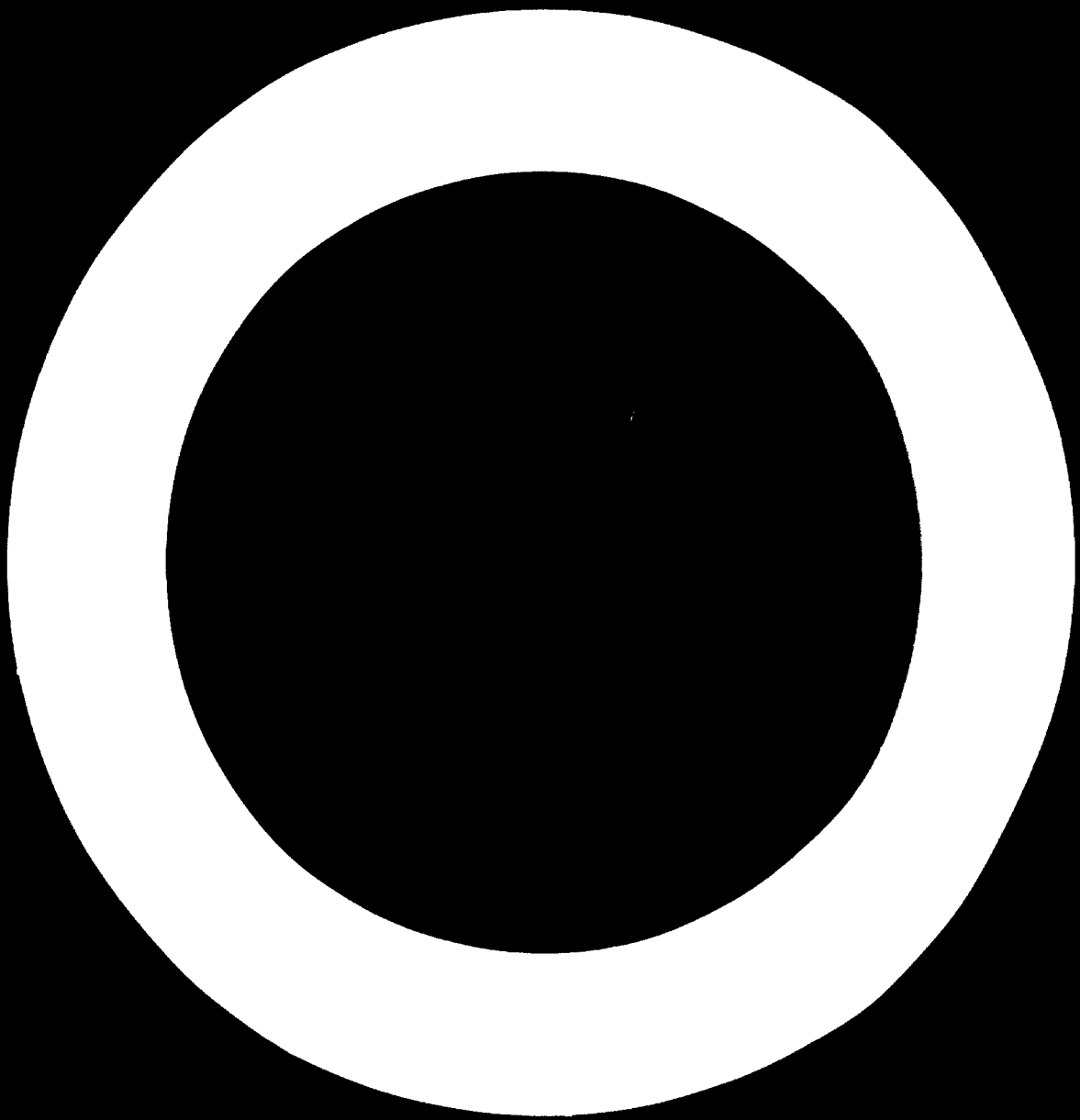


Although in many countries throughout the world, engineers have developed factories manufacturing very sophisticated and heavy building prefabricated elements, e.g. frames, girders, purlins, walls and even total flat units, prefabrication on a small scale without use cranes and machinery still is of significant meaning, especially suitable for towns and rural area for people with low income.

The main idea of this modern and simple system of prefabrication lies on some transformation in the process of production and erection which leads to industrialisation of buildings.

For basic examination of the validity of this industrial process, therefore, it is necessary to formulate objective general criteria refered to the process of production.

There are as follows:

a/ MODULAR COORDINATION, because every simplification of various components reduces costs.

b/ STANDARIZATION in order to reduce the number of different types of components. This criterion seems to be the most important one.

c/ REDUCTION IN WEIGHT OR LIGHTNESS which leads to reduction of costs and facilates transportation and erection.

d/ MASS-PRODUCTION on the base of local available raw materials.

e/ SIMPLICITY in technological process very suitable for unskilled workers.

Taking into account all mentioned above criteria a group of Polish engineers has been working since early sixties on the development of a set of prefabricated elements for rapid buildin service and manufacturing in rather primitive conditions.
They have elaborated a low-cost versatile construction system for small scale industrial structures, agricultural buildings and housing. A number of pre-engineered concrete components is very limited, nevertheless they have been creatively applied to fit building owners particular needs throughout the country. And every building satisfies owner confident of the fact that he has made a wise investment.
Structural system based on low-cost prefabricated elements is ideally suited for manufacturing facility construction for small scale industry.
The building systems offer the widest possible freedom of operation while saving money though the use of standard components. They permit to plan a practical efficient atructure that lets use every available foot of enclosed space. And as owners' business grows, buildings can be easily and economically expanded. Most additions can be made without interruption of business operations.
These building systems cover a wide range of applications including :

1. Low- or flat roof buildings for small manufacturing plants, garages, warehouses, storages, retail buildings.

2. Two - or three story buildings for offices, community and club committees.

3. Canopies for weather protection

4. Small agricultural buildings

5. Housing of different types.

Clear-span widths are available of 3.60 m. thru 9,00 m.
Heights of 2,40 thru 4,50 m.
Roof slope is 1 to 12.
The standard increments of length are in module 30 cm.
Basic universal elements of components are hollow blocks for walls, columns, lintels and even beams as well as staircases and chimneys.
There are also some elements for one-span beams. For large span over 6.00 m it is economically to use steel frames or beams.
The main prefabricated element looks in channel like fashion based on modulus 30x30 cm.
Approximate weight of one piece varies from 9 to 12 kgs depending on the density and kind of used materials.

There are also double elements available with the weight from 16 to 26 kgs.

In walls these elements like arbitrary briks are displaced towards themselves by half of the height. It assures walls from causing draught and eliminates so called thermal bridges. Discontinuity in joints influences on heat preservation of the wall not making worse its durability. In this manner multilayered wall can be easily constructed in which elements of inner layer are displaced by half of the height in comparison with external layer.

Empty interiors of elements suite as thermal insulation /air insulation/ or depending on special climate needs , they can be also filled out with filler made from heat preserving local materials.

There is possibility to construct layer walls even with 12 gaps air. It seems to be very suitable for tropic weather conditions.

The material used for hollow blocks depends on static requirements and local raw material resources. It can be for instance: gravel-concrete, slag-concrete, lime-sand mass, plaster and even red ceramic.

Whether construction seasons require stiffening of the walls reinforcement can be easily added in hollow blocks without additional shuttering.

In this way we can construct pillars and columns as well as walls for earth quake region.

The second important elements are beams for flooring and roofing. They are also formed from in channel like fashion blocks with additional reinforcement or are monolithic.
Up to 4,50 m long span the beam can be easily transported manualy. All beams are self supporting and needs no timbering and supporting construction while erection.
Girders between beams are formed with concrete in situ.
It permits to eliminate any displacement of floor or roof elements.
For long span growing from 6,00 m steel frames or beams covered with sheets are more economical.
All prefabricated elements can be manufactured manually by unscilled people. In 1972 special movable vibration hollow block machinery production started. It can produce within 8 hour a set of wall components for one story building of 100,0 sq m. effective area.
The whole building system has become popular in German Democratic Republic also.
We would like to emphasise that above mentioned system is perfectly suitable for rapid building service in primitive conditions. This system can be developed in a simple way with the help of minimum quantity of equipment such as moulds for manuel production of prefabricated elements, vibration tables, concrete mixers as well as concrete plate for prefabricated elements production and maturity, depending on local needs and possibilities.

Whether investor is anxious to reduce on site time and cut its cost down each separate phase of production of concrete can be made automatically in long series.

The best economical effects are achieved when concrete factory is located near future site area.

Two movable vibration hollow clay block machines working on concrete plate of 4,000 sq m. surface are in a position to provide with elements production for 6 to 8 buildings per 24 h.

The one story building can be build up from these prefabricated elements in a raw state by 6 persons withhin one week only.

Polish engineers have also elaborated a large variety of designs for service and industrial structures. In the case of need they can quickly meet all requirements suitable for specific local needs and possibilities as well as cultural tradition of interested countries.

Our experience shows that :

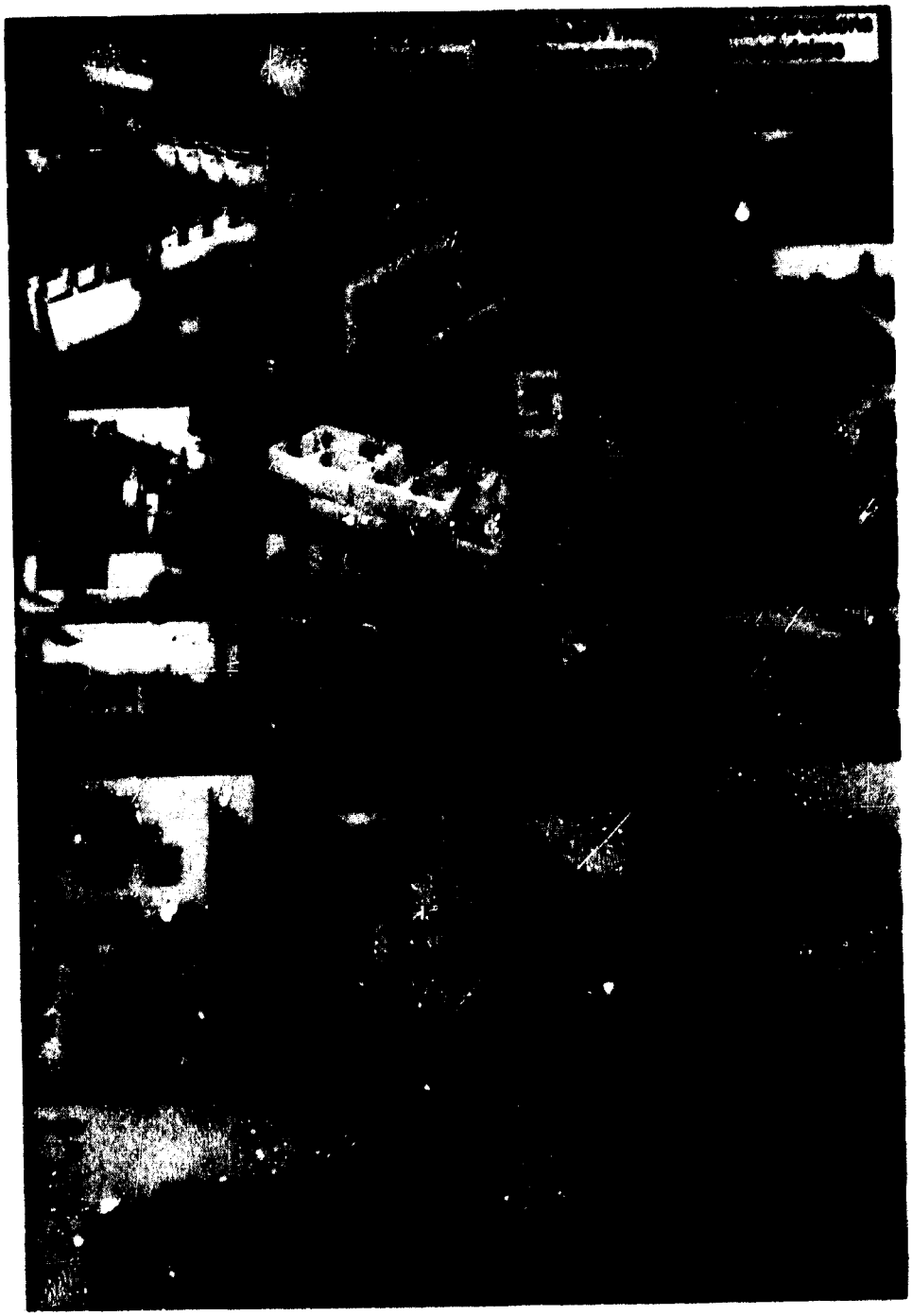
It is very economical system of building reducing to minimum material transportation, using up a big quantity of local raw material and employment of non skilled workers. The small industrial building and houses could be erected entirely from these prefabricated elements which are universal for erection of foundations, walls, roofs, staircases and partitions. It has to be emphasised that this system is perfectly suitable for quick building service and manufacture structures even in very primitive conditions.

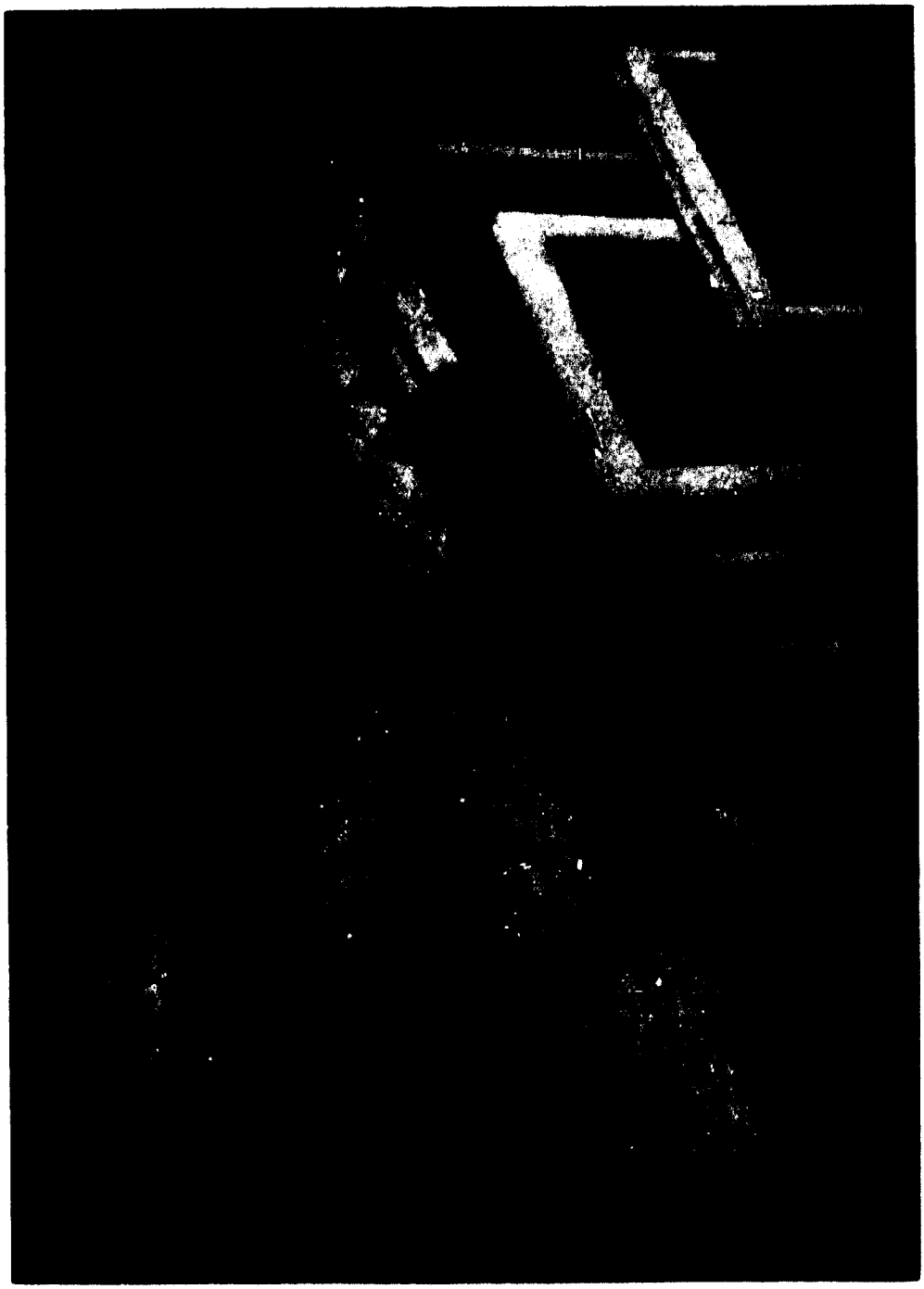
A P P E N D I X

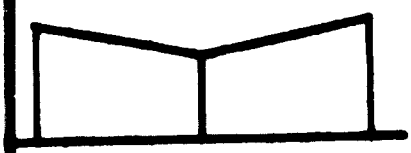
ILLUSTRATIONS ON POLISH SYSTEM OF LOW COST PREFABRICATION

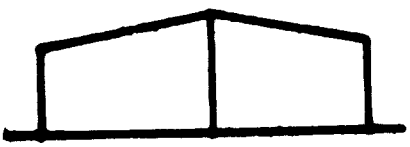
" BUILD YOUR HOUSE WITH US "

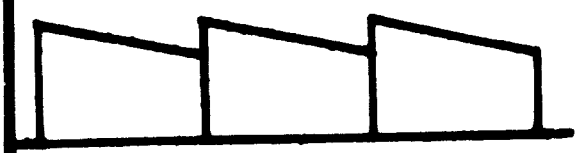
General idea of prefabrication system

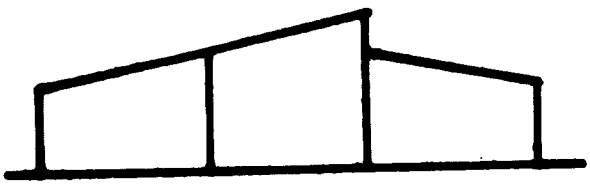


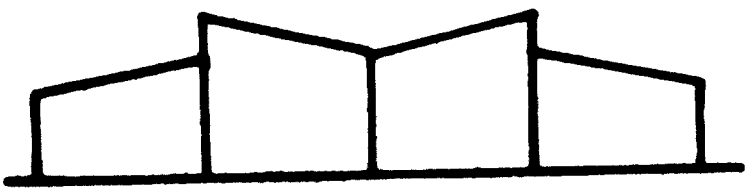


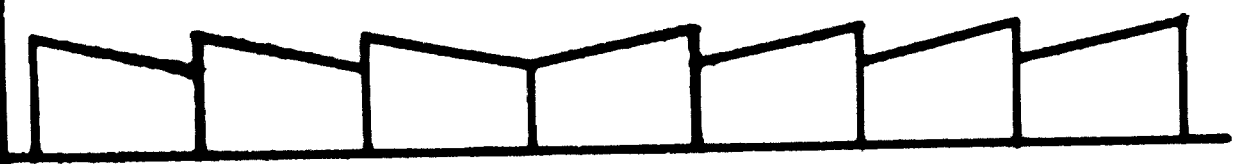


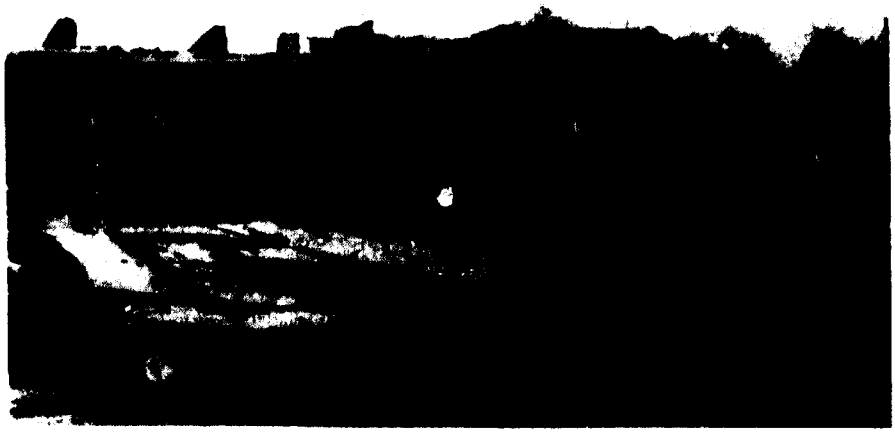


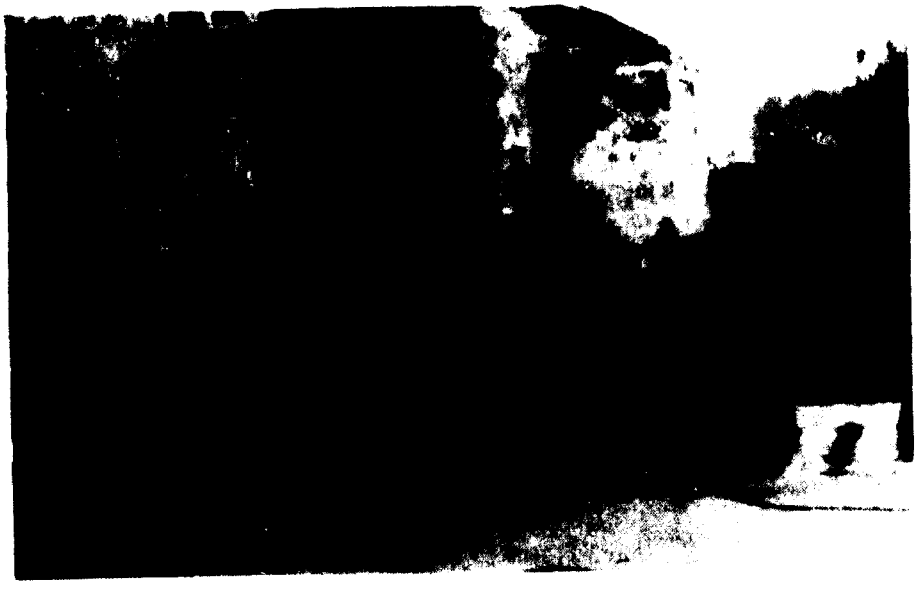


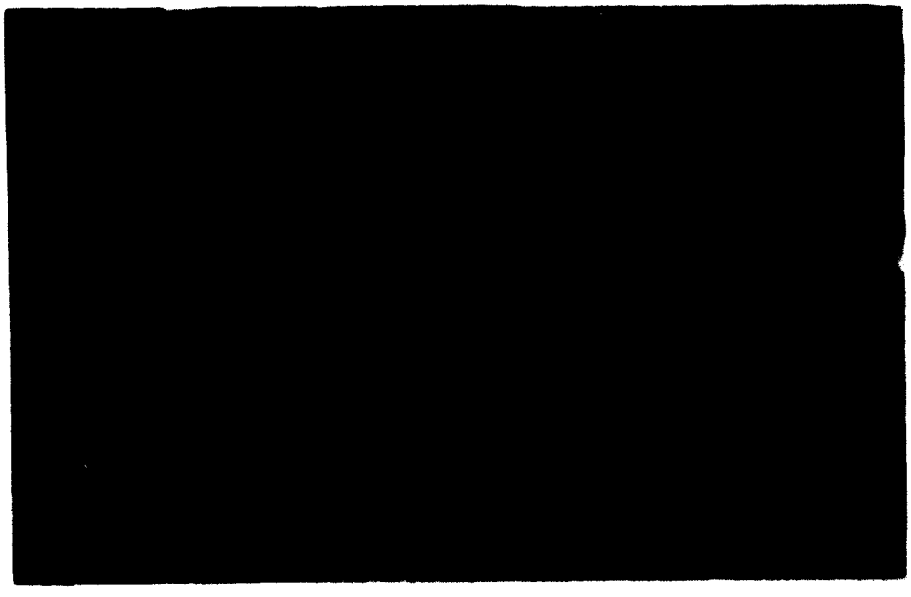


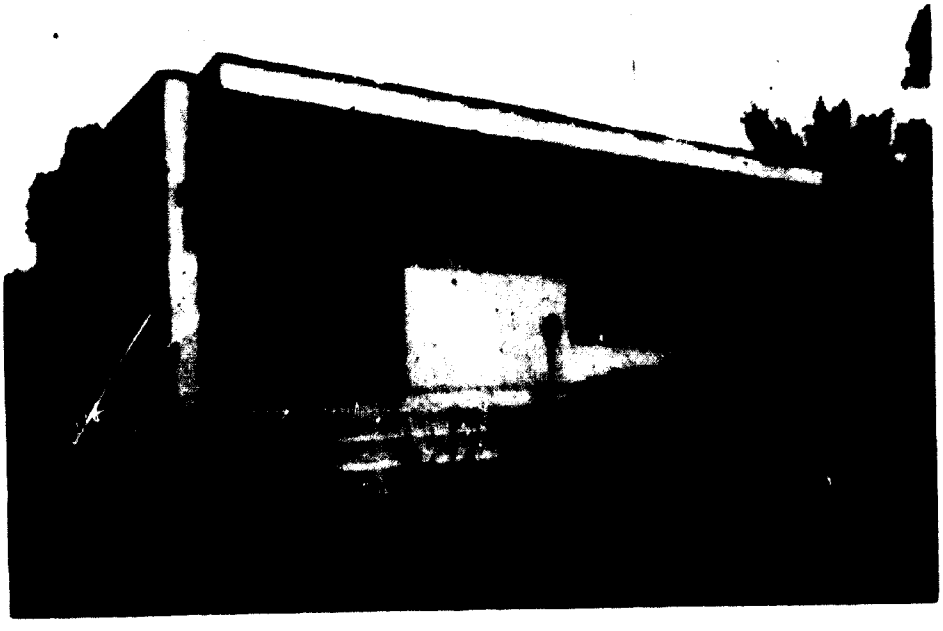


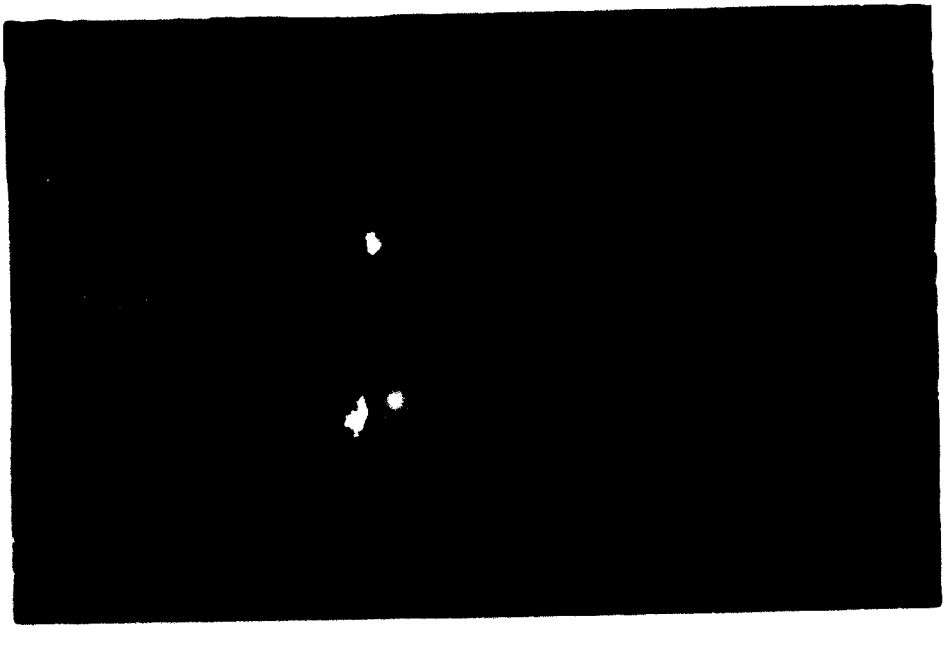


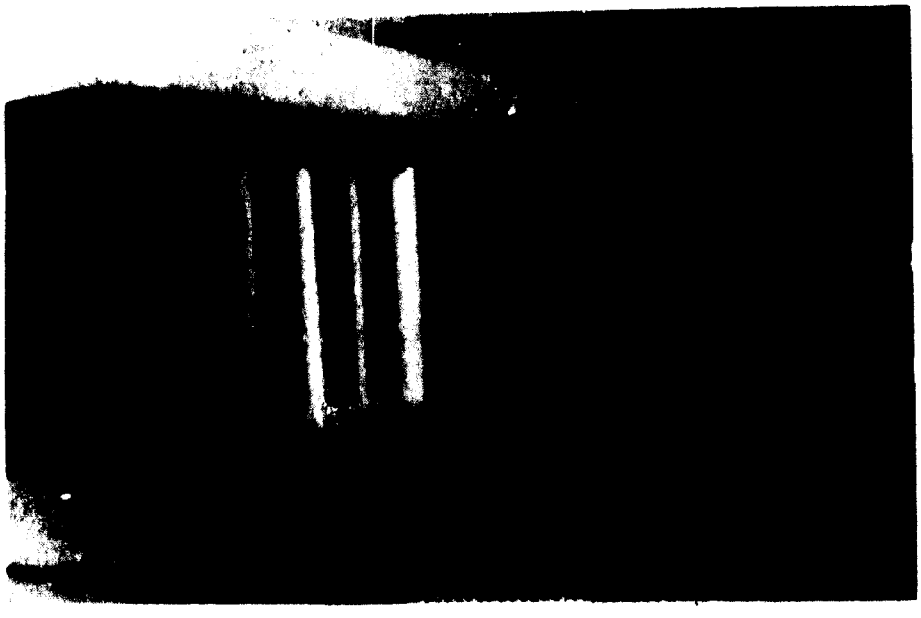


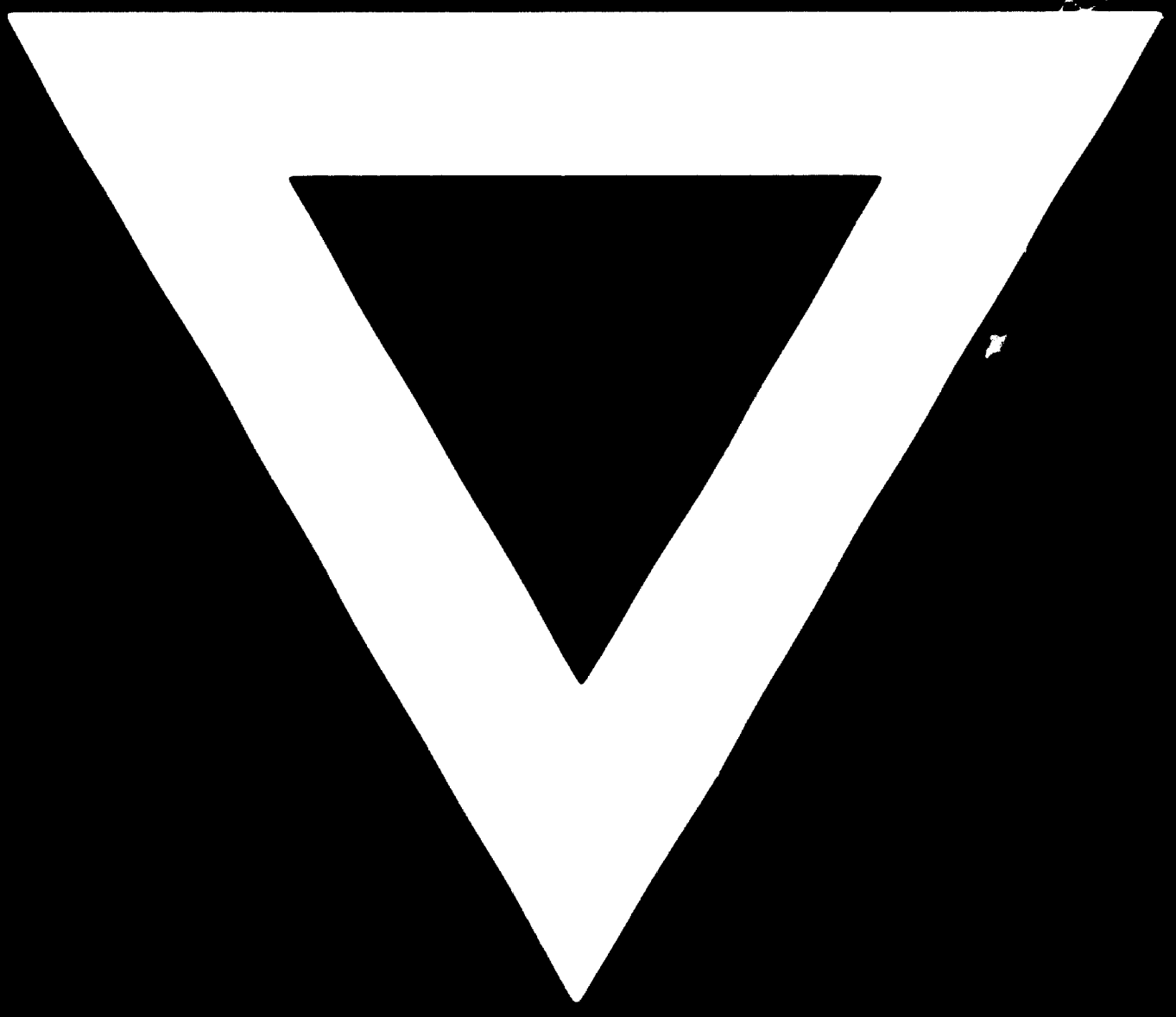












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