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ASSISTANCE TO SATEX, SARAJEVO

SI/YUG/73/814

YUGOSLAVIA

Technical report:
ASSISTANCE IN THE DESIGN
AND MANUFACTURE OF GALON LACE

Prepared for the Government of Yugoslavia by the
United Nations Industrial Development Organization,
executing agency for the
United Nations Development Programme

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Technical report: Assistance in the design and manufacture of galon lace

Prepared for the Government of Yugoslavia by the
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Based on the work of Brian Smith, expert in lace

United Nations Industrial Development Organisation
Vienna, 1977

Explanatory notes

References to "dollars" indicate United States dollars unless otherwise stated.

The monetary unit in Yugoslavia is the dinar (Din). During the period covered by the report, the value of the dinar in relation to the United States dollar was $US 1 = Din 18.35.

Galon (or galloon) lace is the term applied to a style of lace produced in the region of St. Gall, Switzerland. Usually made in narrow bands across the lace machine, it is more suitable as a trimming than a fabric from which to produce garments.

Kohler, Switzerland, manufacture machines specifically for the lace, braid and allied products industries.

Saurer-Arbon manufacture embroidery machines which produce fabric in duplex form, usually 15-16 m in length.

Mercerization is the process of modifying natural cotton in a vat of caustic soda by burning off the fibrous hair and giving the yarn more lustre and a higher absorption capacity for moisture or dyestuff.

Scouring is the industrial term for washing fabric or loose fibre.

In warp knitting the direction of the stitch loop is formed parallel to the fabric; in weft knitting the stitch loop is formed across the fabric.

ABSTRACT

SATEX is the leading firm in Yugoslavia in the field of knitted novelty fabrics and, because of its geographical location, it plays a special role in the Government's development programmes. Its initial capital came from the Government of Yugoslavia from a fund for financing development of the under-developed regions.

The Government requested from the United Nations Development Programme (UNDP) the services of three experts to introduce new production methods and products related to machine embroidery, production of galon lace and the dyeing of cotton yarn and sewing thread.

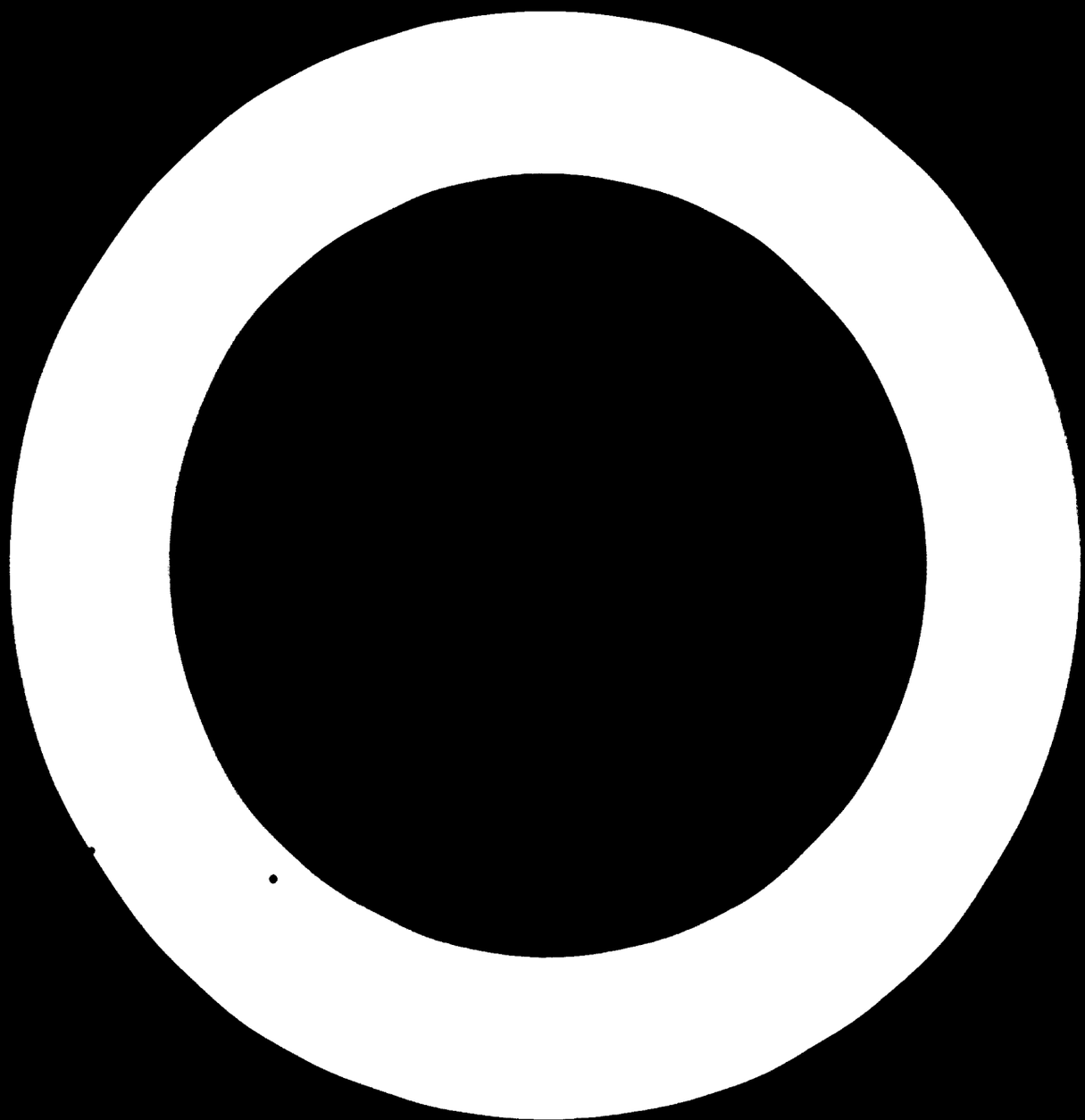
This request was approved and the project "Assistance to SATEX, Sarajevo" (IS/YUG/73/014[1/]) became operational on 20 July 1975. The United Nations Industrial Development Organization (UNIDO) was the executing agency and the Republic Office for Technical Co-operation in the Republic of Bosnia and Herzegovina (BiH), was the co-operative agency. The UNDP contributed $22,000 to the project, including $4,000 for the part devoted to galon lace.

The expert in galon lace was in Yugoslavia for one month from 1 March 1977. The main reasons for his being attached to SATEX were (a) to assess their produots; (b) if possible, to make alternative, more varied fabrics; and (c) to suggest markets for these fabrics, perhaps outside the normal area of utilisation.

His recommendations are as follows:

1. Substantial amounts of chain linkages should be obtained immediately.
2. The chains should have a higher value of links.
3. More storage receptacles should be obtained.
4. A special work-top on which to build the chains should be made.
5. Guide tubes for the machines should be obtained immediately.
6. SATEX should subscribe to various trade journals.
7. A simple framework should be added to the machines to simplify the collection of the lace and prevent it being soiled.
8. Various yarns could be used to improve the produots.
9. SATEX should obtain the services of a designer.

1/ On 1 January 1977, the project number was changed from IS/YUG/73/014 to SI/YUG/73/814.



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INTRODUCTION

SATEX is the leading firm in Yugoslavia in the field of knitted novelty fabrics and, because of its geographical location, it plays a special role in the Government's development programmes. SATEX is situated in the regional capital of the Republic of Bosnia and Herzegovina (BiH), Sarajevo, in a two-storey building. The plant, comprising galon lace machines together with a yarn preparation and production unit, was formed by the amalgamation of Sarajka and Sarajevo Carpets. These enterprises used to produce carpets by original methods, but this production has been completely phased out.

The initial capital for SATEX came from a Government fund for financing development of the underdeveloped regions. Part of this capital was allocated for a plant of Kohler lace-knitting machines as the responsibility of SATEX to the Government for the introduction of industry to an agricultural and rural-craft area.

The Government requested from the United Nations Development Programme (UNDP) the services of three experts to introduce new production methods and products related to machine embroidery, production of galon lace and the dyeing of cotton yarn and sewing thread.

This request was approved and the project "Assistance to SATEX, Sarajevo" (IS/YUG/73/014)[1/] became operational on 20 July 1975. The United Nations Industrial Development Organization (UNIDO) was the executing agency and the Republic Office for Technical Co-operation in the Republic of Bosnia and Herzegovina (BiH), was the co-operative agency. The UNDP contributed $22,000 to the project, including $4,000 for the part devoted to galon lace.

The expert in galon lace was in Yugoslavia for one month from 1 March 1977. On his arrival in Belgrade it was discovered that the job description (annex I) was too vague and unspecific in technological terms. Also, the position regarding the training of staff had changed as a result of the machinery installed by Kohler in November 1976, and the basic training necessary for a good shop-floor manufacturing process had already been established. Therefore, after an appraisal of the situation, the expert, with the agreement of the resident representative, rewrote the job specifications (annex II).

1/ On 1 January 1977, the project number was changed from IS/YUG/73/014 to SI/YUG/73/814.

The main reasons for the expert's being attached to SATEX were (a) to assess their products; (b) if possible, to make alternative, more varied fabrics; and (c) to suggest markets for these fabrics, perhaps outside the normal area of utilization.

His recommendations are contained in the body of the report. The expert emphasized that in order to compete in sophisticated markets, the fullest range of equipment is required and if the recommendations to supply this are not followed, any export potential will be lost.

I. FINDINGS

A. The plant

SATEX had no experience with the production of galon laces prior to the introduction of the Kohler machines as part of the development of the textile industry within BiH. The plant, before the project was initiated, had produced lace on circular-braiding type machinery, the specification and construction of which is completely different in both design and quality. This machinery is uneconomical on floor-space and considered unproductive by modern standards.

It was decided to introduce labour-intensive, technologically-orientated machinery capable of further development and to progressively utilize available labour as the projected expansion takes place.

The Kohler knitted lace plant was, in fact, in production at SATEX for four months before the arrival of the expert; the machinery comprises four new 6-gauge machines with seven pattern bars, two 7-gauge machines with twelve pattern bars and a unit for winding the yarn onto bobbins utilized by the machine.

This is considered a pilot plant to assess the demand for a product of this nature, which is not in production elsewhere in Yugoslavia. Future development of manufacturing capacity is to be based on the performance of this initial installation. Eventually, exportation of these laces will account for part of the total output of the firm.

Yarns

The company also produces yarns and, as it is company policy to use these whenever possible, yarn production will increase as laces are produced in greater quantities. This, in turn, will increase the demand for unskilled labour for quality control and the packaging division.

Yarns in use at the company are restricted to cottons in both mercerized and unmercerized varieties. These yarns are used to produce the pattern on a ground structure of synthetic thread of the polyamide/polyester groups. As they produce edgings of lace for trimming garments, there is no necessity for further handling of the lace on the machine.

Quality control

Fabric quality control is by the use of thread-break indicators that automatically stop the machine should breakage occur. At this stage of manufacture it is not deemed necessary for further examination of the lace to take place as any holes that may have formed will be minimal and can be removed at the packaging stage.

The whole of the Kohler lace plant is in excellent order. The work area is well-organized with adequate working space, ventilation and lighting and the working conditions are compatible with good fabric production. They are especially relevant to the production of this type of lace which should not undergo further processing because of soiling.

An increase in the profitability of the Kohler lace plant - not in terms of total output as this would be difficult to achieve in any significant quantity, but in terms of quality produced on the existing machines - can only come about by higher standards of design and the introduction of colour within practical limits. These, in turn, can only be achieved by specialized knowledge which SATEX does not have at the present time.

B. Production

The plant is operated on a two-shift system on a five-day week basis. Production consists of trimming for garments and a fabric netting that is used as a base for plaster of Paris bandages; there is no production of an all-over type lace for the garment industry. It is envisaged that excess production will be for export, but at present all production is utilized by the home market.

In order to attempt to improve the quality of production it was necessary to establish:

(a) The number and type of Kohler machines together with any ancillary equipment;

(b) The potential of these machines;

(c) The availability of suitable yarns in order to assess their possible utilisation.

Number and type of Kohler machines and ancillary equipment

Galon lace is produced on OT/7 type Kohler machines, the newer ones being designated FL and having 7 guide bars for the control of yarn over a pre-ordained path; they have knitting elements at the rate of 6 needles/cm and a working width of fabric of 150 cm. The two second-hand machines had possibilities of 12 guide bars and knitting elements at the rate of 7 needles/cm and a

working width identical to the others. These machines were in production at the rate of approximately 200 stitches/min giving fabric production figures of approximately 57 m with a corrected figure for stoppages due to yarn breakage, machine maintenance and adjustments of an estimated 51-52 m.

The method of gathering the ends of fabric, once it is produced, is mainly an efficient one; however in one instance this was being hampered by the utilization of unsuitable containers.

The yarn preparation necessary for these machines is carried out on Kohler ancillary equipment and is adequate for the available capacity of the machinery.

Potential of the machines

The expert's assessment of the present capacity is that it is severely handicapped by the number of chain links that are available for the interpretation of the design into finished lace. These links, together with connecting rods are necessary for the manipulation of the guide bars controlling the yarn in a pre-arranged order. The sequence is obtained by preparing a graph on which the manipulation of the bars is mapped out in whatever manner the technicians think will interpret the creation of the designer best. Any restriction in this manufacturing process and the whole machine is unable to operate to its fullest capacity. To supplement these links, additional supporting framework on the machine may be advisable, together with the organized storage of the links when the present shortage is overcome. This will lead to the need for a re-organized work area, with greater utilization of wall space.

Availability of suitable yarns

The yarns suitable for Kohler machinery are of four main varieties: (a) cotton (domestic and imported fibre) is used in counts of 100/2, 100/3, 50/2, 40/2 and 16 single and all in natural colour, i.e., unbleached; (b) polyamides/polyesters in 100 denier, in modified form for crimp yarns and staple fibres (strands of fibre chopped into small lengths and then spun into yarn) produced in Yugoslavia; (c) acrylic yarn of various deniers not specifically used in this type of knitting machine, in both single and twofold varieties; (d) polypropylene imported from Canada as raw fibre and spun into yarn by SATEX. This yarn was intended for use in the tufted-carpet industry, but in certain deniers it can be used quite sucoessfully in the Kohler machine.

There is also a facility at the Sarajevo complex for doubling and twisting yarns which is used as a means of blending coloured threads. The yarn is stored in a suitable area adjacent to the knitting machines and is adequate for present requirements.

All of the operative tasks are carried out by relatively unskilled labour which was a significant factor in the selection of equipment.

II. RECOMMENDATIONS

A. Equipment

1. Of paramount importance is the acquisition by SATEX of substantial amounts of chain linkages and the pins or clips necessary to complete these chains. Without these, the machines are severely handicapped and if increased demand should occur as a result of the samples already created, there is a risk that the existing chains may break down, with a consequent loss of production.

2. The need is not only for a greater number but also for a higher value of links. The present ones accommodate a needle position of 20 needle spaces; this should be increased to 40. There should also be a small increase of chain links for the warp guide bars to achieve a greater degree of flexibility.

3. An increase of chain links and pins will lead to more storage being required, the most satisfactory method being of wall-mounted receptacles. These can be made locally, usually in wood in order not to damage the links. The needle value of each link should be marked on the receptacle.

4. The chain links are assembled into the completed pattern on a piece of cardboard on the floor. This is very unsatisfactory as oil carried by the links becomes deposited on the work floor and the area subsequently becomes hazardous. A special work-top on which to build the chains is required as the present work-top has a vice fastened to it, which encourages its use as a bench for fitting rather than one specifically set aside for assembly.

5. With the advent of more sophisticated designs, any successful sales will be severely hampered by the urgent need for guide tubes for fitment onto the bars controlling the passage of threads through the machine. Any attempt to circumvent this requirement will lead to poor production and ruined fabric. These tubes are made on an ad hoc basis but this will be impracticable when greater numbers are required. They are produced with great precision by Kohler. The existing tubes are few and it is anticipated that until further quantities are obtained, it is not feasible to attempt the high quality field of fabrics open to exploitation by SATEX. Should these tubular guides not be forthcoming, there is no alternative that has any guarantee of success.

No further training is needed for the implementation of the designs that would be facilitated by the use of the additional chain links or guide tubes as such designs are an extension of the techniques of the machine rather than an up-grading of it.

6. SATEX should subscribe to various trade journals (annex III) to enable key personnel to keep abreast of technological innovations and to create an awareness of what is being produced by the brand leaders in the field.

The implementation of these recommendations will enable SATEX to achieve a product that, with the existing machinery, will increase its potential profitability. However, as elaborate design is one of the main features of machine-produced laces, without the fullest range of equipment nothing can be made as sophisticated as the fabrics already available in other markets. Therefore, any export potential will be lost if the pertinent recommendations are not followed.

B. Modifications to machines

The technical operation of the machines producing narrow lace edgings occupies more of the operative's time than the production of the lace because modifications are required to prevent the frequent stoppages during which there is the possibility of producing damaged lace.

7. At the rear of the machine there are three containers that are subdivided into sections in order to collect one individual length of lace per section. If the operative is busy producing the lace, as is frequently the case, the lace gets inadvertently caught up on this roller and starts to build up, creating a larger area of circumference on this part of the roller. This parts the two friction surfaces allowing the other bands of lace to slip and causes additional build up resulting in a domino effect that, if left, chokes the machine. This can easily be remedied without any great expenditure by the addition to the rear of the machine of a simple framework made from Dexion-type sections. Such a framework would carry three additional rollers with surfaces covered in a friction material enabling the lace to be drawn over the original roller but allowing only every fourth band to drop into the container's present position - the other bands would be drawn further on to one of the additional rollers and then deposited into containers. The main feature of this system is that it would allow each container to be exactly under the roller from which the lace is being deposited, making it a simple matter to gather the lace. Each roller could be driven from the previous one by the means used on the original, that is, by a leather belt and pulley.

8. The containers could be made of a more suitable material such as the plastic tube supplied as downpipe section for domestic surface water disposal of approximately 7-8 cm diameter, bought in bulk supplies and cut up by local labour. These containers could easily be changed as they became full.

C. Product improvements

One of the main reasons for the expert's attachment to SATEX was for him to assess their product, to suggest and, if possible, make alternative, more varied fabrics, and to suggest markets for these fabrics, perhaps outside the normal area of utilization.

9. Previously, the fabric produced by the galon lace plant used only two types of yarn, usually a polyamide base of 100/1 denier yarn with the pattern bars of either mercerized or unmercerized cotton. As acrylic yarn is easily available in Yugoslavia, it was decided to produce a range of designs using a great percentage of, or only, this fibre. This resulted in a variety of fabrics that had the desirable properties of minimum laundering and the appearance of lacey knits, were suitable for intermediate apparel and could also be produced in the form of bands as a mode of trimming. These fabrics have a high resistance to fading because the colour is incorporated when the yarn is produced.

10. The use of rayon was next introduced as a medium for the manufacture of trimmings. This has a high lustre and creates tactile qualities not found in any other variety of yarn. One of these trimmings was well received by the lace-making trade when exhibited at a fabrics fair at Belgrade from 10 to 12 March 1977. Rayon is well suited to the trimming of polyamide and polyester garments as they both have minimum care properties. It is capable of being knitted on the Kohler machine in quantity and at relatively high speed. It is also relatively easy for unskilled workers to handle once a technique has been established. This was felt to be a worthwhile innovation that contributed to the all round development of the laces produced.

11. The last category of yarn utilized was the polypropylenes, in multi-filament and multicoloured varieties. These are particularly strong, abrasive resistant and non-absorbent with permanent colour fastness. The laces produced with yarn of this nature are limited by the colours at present available within SATEX, and the almost non-existence of the tubes necessary

to cope with this heavier type of yarn. The samples achieved despite these handicaps gave an indication of the end usage which could be by the sandal and handbag industries and the hold-all and accessories trade. This fabric has the advantage that it need not necessarily be stitched together but will lend itself to heat-welding processes.

If smaller sizes of yarn become available at a later stage, watchstraps, fancy glove fabrics and trimmings for the swimwear industry can be made from this yarn.

12. One utilization that has not been developed but could quite well facilitate the usage of cotton laces already in production is their incorporation into the manufacture of curtain nets. These laces can be let into a fabric produced on warp knitting machinery or supplement the products already being made by SATEX on the Saurer-Arbon Schiffli embroidery machine. This would give the machine a wider range and bring its usage into line with that of manufacturers in the Common Market.

D. Design

13. The type of design that is required by this industry is a naturalistic yet stylized form that takes into account the limitations and ability of the machinery. It cannot be overstressed that the formulation of original ideas must be based on the products of the region of Bosnia and Herzegovina. This is an area rich in ornamental design reflecting the characteristic regional quality and national heritage. It is evident from the applied art that has been developed in this area, which has had so many varying cultural influences, that there is enough material indigenous to the region to give designers basic research ideas from which to create commercial designs.

To ignore these sources in the pursuit of existing designs, of which only imitations or variations can be made, will lead to the status of copyist rather than creator, and the copyist can compete in only one area, price.

People with the required design training are required to exploit this potential with feeling and perception. To develop these qualities in the three-week period available was an impossible task; to do so with someone who does not have a natural feeling as an artist is quite out of the question even if they are willing and have the technical knowledge and mechanical

dexterity to interpret ideas once an original idea has been produced. Therefore it is recommended that designers (a single designer leads to a regular pattern that becomes stylized) are recruited by SATEX as soon as possible. They should be employed on a free-lance basis to generate ideas (it is emphasized that these should be only ideas) that the already available technicians can modify into mechanical pattern forms. This will lead to a good system that is capable of amplification and flexibility in the eventual long-term needs of the company.

To employ a designer on a full-time basis would be impracticable for two reasons: (a) the full utilization of the designs that could be produced on a day-to-day basis by a designer would not be feasible by a lace plant the size of SATEX as a practical ratio is one designer to fifty machines; and (b) stylization or a particular characteristic may predominate. A large variety of designs at the disposal of a company will ensure that this does not happen.

The immediate short-term requirements for design formulation can be fulfilled by commercial design offices who can be contacted through their advertisements in magazines (annex III). These studios tend to supply designs of an international flavour. They supply anyone subscribing to their company which means that no exclusiveness is implied or given; should a design be successful there is every possibility that it will be supplied to other manufacturers.

Perhaps the most satisfactory solution is to come to an arrangement with a consultant designer who will guarantee that no manufacturer will be given permission to copy his ideas. Should that consultant be able to supply designs and samples of fabrics and colours, it would be even more beneficial as all available machinery within the lace plant can then be fully occupied with production until the next pattern is required. Obviously, the consultant would require the fullest background knowledge of the areas in which the design would be utilized and of the latest types of yarns available to the company.

In conclusion there is no reason, if these recommendations are implemented, why SATEX should not be made more progressive and profitable.

It may be that the programme for SATEX, which has within a very short period of time achieved its initial aims, might be satisfactorily implemented in other developing countries.

Annex I

JOB DESCRIPTION

Post:	Expert in the production of galon lace
Duration:	One month
Commencement date:	As soon as possible
Duty station:	Zvornik - Sarajevo
Purpose of project:	To assist the textile industry in Yugoslavia to introduce new products.
Duties:	The expert will be attached to the SATEX textile factory in Zvornik, and will instruct the staff of the factory in the operation of the new lace machines now being installed.
Qualifications:	Textile technologist with extensive experience in lace production with Kohler machines.
Language:	English, German an asset.
Background information:	A team of two experts is requested to assist the firm SATEX in Zvornik, Sarajevo, in putting into production techniques related to mechanical embroidery and production of galon lace.

Annex II

REVISED JOB DESCRIPTION

Duties:

1. Supervision and control of current production; evaluation of the present maximum use of the machines with proposals for their optimal use; evaluation of materials for present production; and quality control.

2. Introduction of new patterns and decomposition of galon lace samples; provision of technical data for mounting the lace samples on the machines; and supervision of operations during the mounting of new patterns on the machines.

3. Introduction of new assortments of over-lapped lace; control of present production; decomposition; and mounting new patterns on the machines.

Annex III

RECOMMENDED TRADE JOURNALS

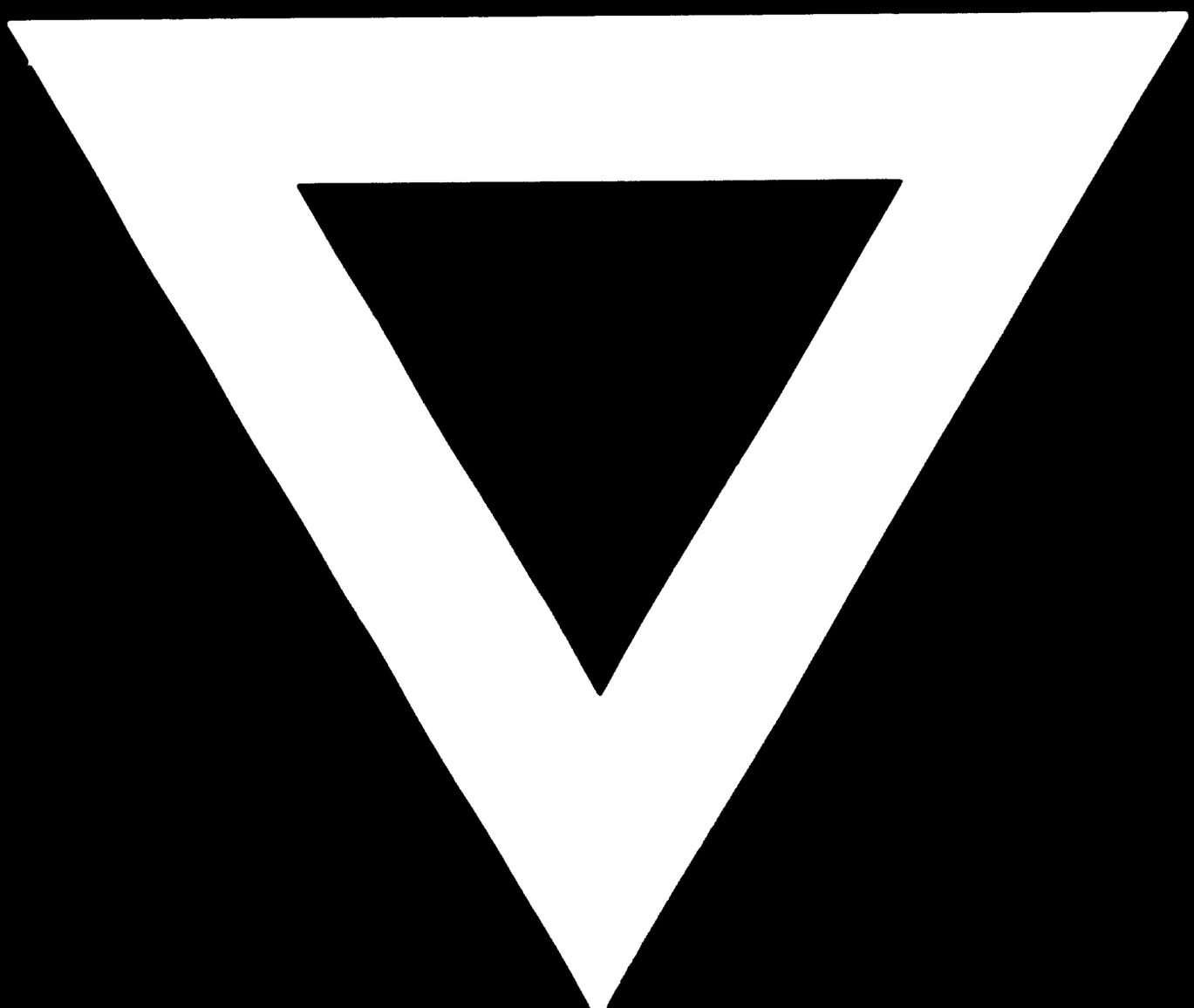
American Fabrics
New York Publishing Co., New York, United States of America

Household Textiles
International Publishing Co., Amsterdam, Holland

International Textiles
International Publishing Co., Amsterdam, Holland

Knitting News
Hosiery Trades Journal House, Leicester, England

G-331



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