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ASSISTANCE TO THE FURNITURE AND JOINERY INDUSTRY

SI/TOM/86/873

KINGDOM OF TONGA

Technical report: Assistance in furniture design \*

Prepared for the Government of the Kingdom of Tonga  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Timo Tapiovasa, expert in furniture design

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United Nations Industrial Development Organization  
Vienna

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Timo Tapiovaara, Expert in Furniture Design, undertook a two month assignment in Tonga under project SI/TOM/86/873 to give assistance in Furniture Design to the Kingdom's Furniture and Joinery Industry. He visited the Kingdom of Tonga from 16th February to 1st April 1967.

The main purpose of the Project was to up-grade the furniture industry through the use of improved designs and to investigate the possibilities of establishing aluminium joinery and rattan furniture manufacturing.

The design of the furniture is at a very low level. As there is no tradition in furniture manufacturing, the only way of getting "new designs" is to use old imported furniture (which apparently dates back to the 50's) as models. It is therefore obvious that this type of furniture cannot be exported, even if the level of quality could be raised to meet the international standard.

The expert sees no reason to manufacture furniture of aluminium, which is an expensive imported material and alien to Tongan culture.

The expert recommends the Ministry of Labour, Commerce and Industries to encourage the furniture industry to use coconut wood for production of furniture by giving them assistance in order to overcome certain technical difficulties that exist at present and restrain its use, such as the use of out-dated (slow rotating) machines and cutting blades made of metal that is not hard enough. It is important to encourage and support financially the purchase of modern machinery and provide advice on the correct working methods.

Finally, the expert recommends that the Government of Tonga should be given assistance in furniture design in order to create a complete new range of furniture for production by the Tongan furniture industry.

## I.N.T.R.O.D.U.C.T.I.O.N

The expert arrived in Nuku'alofa on the 16th of February 1967 and met with the Team Leader, Karl Fuchs. He was introduced to the Ministry of Labour, Commerce and Industries the following day and briefed by the Team Leader, who had been in Tonga for four weeks. In co-operation with the Team Leader, the expert prepared a work-plan (Annex 1) which was principally carried out. The only major change was to spend a longer period of time (4 days) in Vava'u at the request of the Ministry, because they considered the factory visited (V J N & Sons, Niukapu) to be one of the most important ones in Tonga. The expert left Tonga on the 1st of April for de-briefing in Suva, Fiji and Vienna, Austria.

The main objectives of his activity were to give design assistance to the furniture industry, primarily by improving existing designs, and not to provide the industry with new designs alien to their culture. The expert was also requested to give a short (two to three day) course to the factory owners on correct approaches. These activities were principally carried out by providing factories with revised drawings of existing designs (Annex 2) or (in most cases) giving a factory ad-hoc advice in dimensioning, detailing and finishing. However, in some cases, when a factory was only starting production, some new designs were produced. These designs strived to form a "South Pacific Style" rather than a "European Style".

Lectures were given by the expert as follows:

26 February	- 2 March	Factory 2
4 March	- 13 March	Ministry of Works Training Centre
3 March		The Dateline Hotel

The use of aluminium for furniture production was studied but rejected, because the material is expensive, imported and alien to the Tongan culture. One company (Jones Industries) has made an experimental series of side-tables of aluminium tube, but with no commercial success.

Most of the time and effort was put to study the possibilities to use coconut wood for furniture production, especially because it is the only local timber available. There are no actual reasons to avoid the use of coconut wood if the factories are sufficiently advised on the special technical processing parameters that should be observed.

During the duration of the visit to Tonga, the team, -with the co-operation of several factories- produced eight furniture prototypes to set a standard for design and quality.

I.

**MAIN DUTIES OF THE ENVIRONMENT DESIGN EXPERT**

The expert was assigned to the Industry Division of the Ministry of Labour, Commerce and Industries in Nuku'alofa, Tongatapu. He and the Team Leader were given a work-room in the Ministry. The expert was expected to give assistance in design to the local furniture industry.

Specifically he was expected to:

1. Conduct a survey on the existing designs and range of products, available raw materials, hardware and other inputs.
2. Develop improved designs with a view to replacing imports and entering regional export markets.
3. Prepare material specifications for the new designs bearing in mind the availability of coconut wood.
4. Assist the producers in the production of prototypes of new designs and give advice to improve existing designs.

**E.I.U.D.I.U.G.S**

**The Business:**

As there is no tradition in furniture manufacturing, all the designs are imported. The imported furniture actually sells in small numbers and in a class of its own, because of its high cost. (A sofa-set comprising a 3-seater sofa and 2 easy chairs cost T\$ 1,500 to 2,000 )/ which means an average Tongan salary of two to three years.

The imports are from New Zealand and Australia and could be described as lower-class mid-European-style of the 60's. According to the Sales Manager of the Jones Industries furniture showroom, the design of the furniture plays little or no part in the decision making process in buying furniture. Price compared to quality (the type of upholstery fabric, the finishing), is the main factor. This explains why the local producers are able to sell their products even at a considerably lower price. Imported furniture functions as a yarding stick for quality and design. These models are openly copied without even trying to change details, etc.

1/ At the time of the mission US\$ : T\$ 1.92

The local manufacturers obtain their designs in two ways, first, as mentioned, by copying imported furniture and second, by trying to copy the design from a sales catalogue (often European, e.g. IKEA). The difficulty they face is in dimensioning and in estimating the correct angles of the seat and back. Also technical details do not show in the pictures, and even if they did, would often be hard to produce with defective machinery and poor workmanship. The design often appears to be "third or fourth generation" i.e. a copy of a copy and at every stage it has the tendency to get worse both technically (joints) and designwise .

The use of plastic laminate (Formica) is very common, not only on table tops but on all sides of cabinets and cupboards. The pattern is often large or an imitation of wood or marble. Glossy finishes are popular. Counter-laminate 1/ is unknown and solid wood edges seldom used. Mirrors are used as a decorative element. Paint is not used as a finishing method, probably because of the lack of proper spraying equipment. Nails or screws are frequently used to "strengthen" badly made joints. Nail heads are never filled before finishing.

Upholstering by using belts on a frame and sheets of plastic foam, with an inner cover is very basic. The fabrics used are of the cheapest quality, which most likely do not last long. In general, they match the design and quality.

#### Range of Products:

A normal Tongan furniture factory does not make furniture for stock the only exception being O.G. Saft who has its own showroom. Generally the furniture is made to order which means short series (one sofa-settee, six dining chairs, etc.). This made it difficult for the expert to give advice to improve existing designs as there usually was only one or two models in production per factory visited. Had the factories had samples of the full range of their products it would have been easier for the expert to study the faults in the design together with the factory's personnel.

Dining-room tables and chairs, sideboards, chests of drawers and beds are the most asked for items.

In the expert's opinion there is a need for a range of really low-cost but still good quality simple basic furniture.

-----  
1/ Laminating the opposite side of the panel to prevent warping.

### **Raw Materials:**

All raw materials used to make furniture are imported thus fairly expensive. Pine is most popular because of its relatively low price. However, in most cases it is used incorrectly to replace hardwood. (For instance if a chair was originally designed to be made of hardwood and is later produced in softwood with the same dimensioning and joints it cannot be strong enough for use).

There seemed to be a good stock of imported blackboard, particle board and plywood.

A limited stock of plastic laminates was available. It was (by European standards) old fashioned. It may well be possible that factories sell their out-dated stocks to Tonga. The colors are often strong (like purple) and the patterns large and striking.

### **Coconut wood:**

Coconut wood is the only local timber, but it is not used for making furniture because of the following reasons:

i. There is some difficulty in selecting the right parts of the log for furniture production. The outer part especially near the ground, is very hard, the inner part and the top near the crown too soft; only the middle part is suitable. The sawmills should select the right pieces during the sawing process in order to provide the furniture industry with an even quality raw material.

ii. One cannot work on coconut wood with old (slow rotating) machines using standard steel blades. With modern machinery and Tungsten Carbide tipped blades there is no difficulty in sawing and machining coconut wood..

iii. The finishing of coconut wood tends to take more time than traditional timbers because of its special (long) grain structure. This problem can also be overcome with the use of modern machinery.

iv. Seasoning is done to some extent in the sawmills, but only for constructional purposes. The furniture industry does not season the timber it receives. It is likely that this is partly compensated by the long time it takes to bring the imported timber from the country of origin to the factory. Coconut wood, when used for making furniture, is taken from sawmills practically unseasoned and used immediately for production, when it should be especially well seasoned by the furniture factory because of its grain structure and hardness. It is likely that negligence in this respect gives coconut wood a bad reputation as a raw material for furniture production.



Coconut wood is particularly suitable for making solid-wood table tops to replace the imported particle board and plastic laminate combination. Coconut wood is slightly oily and could be used for uses similar to those for which teak wood is usually used. It makes a practical and lasting table top material especially for furniture which is likely to come in contact with water (kitchen, bathroom). See drawing in Annex 5.

Coconut wood combined with tapa-cloth, for instance a closet door frame or a table top with tapa surface and coconut edges, would make an attractive and original Tongan product, especially for export.

### **Tapa Cloth:**

Tapa is made from the bark of a Mulberry tree known as "hiapo". The bark is stripped off and the soft white inner bark is hung to dry in the sun. It is then soaked overnight before it is ready to be beaten the following day. Each woman beats out separate pieces which are then stuck together using an arrowroot-based adhesive. The cloth is then ready for the design.

A relief of the pattern is made before the cloth is placed over the relief (or "hupesi") and a dye of raw "koka" is rubbed on leaving a brown/impression of the pattern. The woman then finishes painting the traditional patterns using brushes. They only use different shades of black and brown.

Tapa could be used as such (see above) or it can be laminated by gluing two to three layers of tapa together to make strong and very original material. It can be used for seats and backs like canvas. (See Annex 11). However, this techniques have not previously been used in Tonga and the Team had requested Mr. Tsutomu Nakao of Matthews & Associates Ltd. to experiment in this field. The results of these experiments were not yet available at the time of the Team's departure from Tonga.

## **A.C.I.I.V.I.I.I.E.S**

### **Ethnology:**

After conducting a survey of the designs, the range of products and availability of raw materials, the expert gave assistance in design according to the following principles:

i. The size of the factories (workshops) range from 1 to 27 employees. Therefore, bearing in mind the short duration of his assignment, the expert used his time favouring the largest and most active enterprises.

ii. Although all the designs and all the factories were poor and outdated, the expert tried to follow his briefing instructions and, whenever possible, correct or revise the existing models. (See Annexes 7, 8, 10 and 13).

Moreover, some new designs were also made (see Annexes 6, 9, 11, 12 and 14) at the specific request of the factories. It was also essential to design one piece of furniture of coconut wood to show its suitability for furniture production.

iii. The Design Expert contributed to the Technical Expert's workshops by giving lectures in his field of specialization.

The Design Expert's time was equally divided between visits to the workshops and preparation of the work drawings.

Because of the shortness of the mission, it was not possible to check in all cases, if that advice given was appropriate, because a revised model was not always produced. The expert underlines therefore, that the only way to get permanent factual results is to have the prototypes or revised models made.

### **Prototypes:**

Five of the eleven working drawings (indicated by an asterisk) of the new or revised designs made by the expert were produced.

Drawing No. 1\*: A dining table with plastic laminate top, hardwood edges. (Commodities Board, Construction Division). (Annex 6).

Drawing No. 2\*: Revision of a dormitory-type bed (Talakai Enterprises). (Annex 7).

Drawing No. 3\*: Revision of a traditional chair (Commodities Board, Construction Division). (Annex 8).

Drawing No. 4\*: Wardrobe of coconut wood and tapa. (Only door completed) (Matthews and Associates). (Annex 9).

- Drawing No. 5: Revision of a tubular metal chair with a plywood seat and back (not followed-up) (Oceanic Enterprises). (Annex 10).
- Drawing No. 6: Chair of coconut wood and tapa cloth (Matthews and Associates). (Annex 11).
- Drawing No. 7: Easy chair, coconut wood or softwood, fabric upholstered, loose pillows. (O/G/Saif Industries). (Annex 12).
- Drawing No. 8: Revision of a table with metal legs. Formica top. (Original model by Talohai Enterprises). (Annex 13).
- Drawing No. 9: Light easy chair, coconut wood and canvas. (Ministry of Works Furniture Workshop). (Annex 14).
- Drawing No. 10: Modular kitchen unit system. (V.J.M. & Sons). (Annex 15).
- Drawing No. 11: Modular kitchen unit system, cupboard details (V.J.M. & Sons). (Annex 16).

Prototypes of the designs 5, 7, 8, 9 and 10 were not completed during the expert's stay in Tonga. Full size (A3) copies of all 11 drawings and 2 ergonomics drawings (Annexes 3 and 4) were made by the Ministry and distributed to all the companies who took part in the Workshops.

#### LECTURES:

The lectures given on 26 February and 3 March were originally meant to be given to factory owners and/or Managers. However, the audience was almost entirely composed of foremen and senior craftsmen. Because of this, the contents of the lectures had to be modified at the last minute to correlate better with the level of the audience. Some headlines of the lectures were:

- Introduction in furniture design
- The designing process
- Copying designs and ethics
- Furniture design in a developing country
- Practical hints to improve furniture design when professional help is not available  
(This part was emphasized).

The lectures given on 4 and 13 March at the Ministry of Works Training Centre were given to woodworking students. Some of the headlines mentioned above were used in the first lecture bearing in mind the professional level of the trainees. The second lecture covered: "How to read work drawings and international standards and symbols in drawings".

**Background information and comments on the models:**

One of the project's main aims was to study the possibilities of using coconut wood. Mr. Tsutomu Nakao, as newcomer in the furniture manufacturing business, was willing to make this experiment. He also promised to study the use of Tapa on the seat as he is familiar with the product in his other factories. The choice to make a dining chair was Mr. Nakao's. The chair given in Annex 11 was designed and prototypes constructed.

The design aims at simplicity (even primitivity), partly because the machinery in the factory is not suitable for making curved shapes, partly to use the coconut wood with no joints as in the construction of "fale's" (Tongan huts). The finished products proved that coconut wood is suitable for furniture production.

The chair in Annex 8 is in production at the Commodities Board. It is presumably a second or even third generation copy of a hardwood dining chair now produced of pine wood. The dimensioning is quite correct, but the back is too upright and the design is rugged and ugly. Technical details (use of screws, bad joints) and seat made of particle board were unacceptable. The chair constructed would have not resisted a 100 Kg. Tongan.

The revised design aimed at preserving (or restoring) the original design but at the same time make it more elegant. The joints were made in the traditional way and the seat was of 12 mm plywood. (Solid wood could not be used because the necessary machinery for planing and gluing solid wood pieces to produce the seat were not available). It was also suggested that, whenever possible, the chair should be made of hardwood.

The Commodities Board had at the time it was first visited, an order for a number of dining tables (main dimensions given, table top of Formica). The existing model was not worth correcting, so the team decided to make a new design.

The legs and frame are made of softwood hence the relatively massive dimensioning. The well finished hardwood edge with the Formica gives it an attractive overall appearance.

The dormitory-type bed (Annex 7) is a good selling product for Talakai Enterprises. For ease in transportation it is collapsible. Since dormitory-beds are often used for sitting, it was too high (600 mm). The construction was unnecessarily heavy.

The dimensioning was corrected, the construction lightened with some finishing details and the ends were closed for better appearance. A bright color-scheme was recommended.

Another Talakai Enterprises product, a dining table (Annex 13), had legs made of 25 x 25 mm. steel tube. Diagonal steel supports were added to stabilize the construction which was made from (the only available size at the moment of the mission). This size was not stable enough without any additional reinforcement. Wooden pieces were added on both sides of the legs to make the legs look more massive in relation to the tabletop. The height was reduced from 85 to 75 cm. the original dimensions were 190 x 190 cm., while the prototype's dimensions were 123 x 83 cm.

O. G. Sanft had previously made some easy-chairs using an IKEA catalogue as their design model handbook. They have had difficulties in dimensioning. No examples were available to be studied. The expert made several sketches according to the producers' description and bearing in mind the limited possibilities of production. Of these, the drawing given in Annex 12 was chosen by the producer. The model is meant to compete with the imported models (in a considerably lower price range) this also influenced the design.

Easy-chair II (Annex 16) was designed for the Ministry of Works. Its origin lies in a series of easy chairs produced to order before. The model was as simple as possible because the technical level of the students is not yet high enough for anything more complicated. An open tenon joint was used, because it is easy to make, even with handtools.

V. J. N. & Sons (Vava'u) was interested in making a modular system-based kitchen cupboard. A system, shown in Annex 15 (drawings 10 and 11) was designed). As the production series are small and the demand for precision not so high, the system was based on two plus three units (500 and 800 mm wide) only. Two width wall unit with shelves, two width cupboard unit with shelves and a 500 mm wide drawer unit.

Two wall units with shelves (500 and 800 mm wide) and two cupboard units with shelves (500 and 800 mm), one one cupboard unit with drawers (500 mm wide), i.e. two wall units plus three cupboard units. With these units a range of combinations of various lengths can be made: for example 150, 160, 180, 200 cm. etc.

The wardrobe made by Matthews & Associates (see Annex 9) was based on the idea of using coconut wood and tapa-cloth combined. Because of lack of time only a door was completed to serve as an example.

### **CONCLUSIONS AND RECOMMENDATIONS**

The traditional Tongan culture does not know furniture, as a matter of fact a large number of people still today eat and sleep on pandanus mats, which, combined with tapa-cloth on the walls make a harmonious surrounding. Bringing in western-style furniture is, in the expert's opinion troublesome. However, this is what is happening today in Tonga. The people respect and foster the traditions and, at the same time want to adopt modern ways of life, partly by purchasing new furniture. Because Tonga has few natural raw-materials, which usually give a country (or largely a culture) a certain base (a tradition to build upon), it is trying to find its way amongst a multitude of influences from different cultures. This, and the fact that almost anything fit for making furniture is also used, combining different materials and colors at random, makes the general expression tangled and to the expert's eyes, unappealing.

In short, the furniture industry is in its infancy both technically and designwise. There is no "Tongan style" or "typical Tongan" furniture. At this stage the industry feels a little helpless and is open to any new influences and ideas. A gentle guidance in the right direction now, could give the furniture industry in Tonga a sound base to build on in the future.

#### **Possible Introduction of Rattan**

Although rattan is normally found in natural tropical forests, work is proceeding in the Forest Research Institute, Kepong, Malaysia for its cultivation. Once results have been achieved, attempts could be made to transfer the technology to Tonga. Therefore the expert strongly advises the Ministry of Labour, Commerce and Industries in cooperation with the Ministry of Agriculture, Fisheries and Forestry to investigate, once the results of the tests in Malaysia are promising, the possibilities of cultivating rattan in Tonga as a raw-material for the furniture industry. At that point in time there would be a need to use the services of a furniture designer to study the possibility of making knock-down rattan furniture for the export market in order to lower transportation costs.

#### **Use of Coconut Wood:**

For the reasons mentioned earlier in this report, coconut wood is not used by the furniture industry. However, with the right processing and information coconut wood could become a major timber raw-material for the industry. The expert therefore recommends that the Ministry of Labour, Commerce and Industries should take the following steps to encourage the industry in using coconut wood:

i. Inform the sawmills on how to select the right part of the log to be used especially for furniture and how to season the timber properly.

ii. Inform the industry on the right kind of machinery and working methods (material and shape of blades, cutting and feed speeds, etc.) and also the correct techniques for surface finishing coconut wood.

iii. Inform the industry on the positive characteristics of this raw-material (price, availability, appearance, etc.).

This could be done by printing an information booklet which would record the information and advice given by the experts during the workshops within the project. The proposed table of contents of this information booklet is:

1. Seasoning of coconut wood.
2. Selection of coconut wood for use by the furniture industry.
3. Machinery: types of machines to be used in producing furniture of coconut wood, giving minimum requirements (cutting speeds, feed speeds, special blades, sand-paper grades, maintenance, etc.).
4. Working methods: special characteristics of coconut wood, finishing techniques.

This booklet should be entirely technical and therefore it should be made by a person who is an expert in machinery and woodworking techniques. Its presentation might call for the services of an expert for four to six weeks.

#### **Co-operative Unit:**

The Industry is so small -actually only a group of workshops- that they should form a co-operative unit in order to rationalise their production and marketing. Each factory could -in addition to its normal production based on individual orders- have a special line of production for the Unit, for instance:

- i. metal frames
- ii. tabletops and laminated panels
- iii. solid wood parts
- iv. seats and upholstery, etc.

This Unit could have a common assembly and sales service (maybe even a showroom). If export is to be considered in the future, this is the only way to reach large enough series to attain economic production.

#### **Possibilities for Export:**

It is natural that the export market (especially New Zealand) interests the Tongan furniture industry. However the expert sees no possibilities to achieve this at present due to the following reasons:

- i. Design: There are no original designs in furniture. All existing models are copies of imported furniture (some copies from photographs). While these can be sold on the local market, it would be absurd to export them, especially to the country of origin.

ii. Quality: As mentioned before it is low. The difference between imported and locally made furniture is striking. Low-quality furniture can sometimes be successfully exported, but it must attain a minimum standard of quality and the price must be really low.

iii. Price: The price structure of the Tongan-made export furniture would consist mostly of imported material and transportation. Unless these major expense items can be reduced, Tongan furniture cannot be competitive. Low cost of labour will not suffice to overcome these high costs.

To enter successfully the export market in the future consideration should be given to the following aspects:

i. Design: Before embarking on designing products for export, research on the furniture markets of potential countries in the region should be made to find out the local "taste". This can also be done by interviewing visiting businessmen who could be potential dealers of furniture abroad.

The design should specifically be made for the export market. It means that it should at least be stackable but preferably be a knock-down type of furniture. Coconut wood and Tapa cloth should be used because of their local character and availability. The utilization of traditional wood carving techniques should be further investigated. Handcarved wooden furniture will become more and more desirable in the industrialized world.

ii. Price: Products should be competitive in the medium to high price range. Low-cost furniture involves automatic machinery and large production series and is thus not suitable for the Tongan production potential.

iii. Quality: There is no excuse for bad quality. Bad quality does not sell in the export market. This is partly a technical problem; the industry needs badly new machinery but it is also a matter of attitude. One must learn to strive for good quality and be proud of it.

#### **Extended Assistance in Furniture Design:**

The Tongan furniture industry should have a whole new range of design for:

- i. schools and institutions
- ii. home furniture
- iii. export

To give the industry a basic range of models specially designed for their needs and (technical) possibilities in production, the expert recommends that the Kingdom of Tonga should be given further assistance in furniture design.



**During this extended period the Designer should:**

- i. Follow up the design practices given within this project and report on the results.**
- ii. Train one or two draughtsmen to give assistance in the future to the furniture industry in making working drawings.**
- iii. Prepare a "Tailor-made" range of furniture models for each of the factories selected geared at the use of coconut wood.**
- iv. Give the industry advice in producing prototypes of the above to set a new standard for design and quality.**

**This assistance should total 6 months, (split missions, over a two year period).**

**It is the expert's opinion that this technical assistance should not start before there is an improvement in the number and quality of woodworking machinery installed.**

**The assistance in design should be a continuous process. In order to assure the continuity of this process the expert recommends that the Government of Tonga should consider sending artistically gifted students abroad to be trained as designers for the industry.**

**In this way, Tonga could gradually become self-sufficient in the design of furniture.**

WORK PLAN FOR TIME REPRESENTATIVE  
 EXPERT IN FUTURE DESIGN / UNIT 70  
 PROJECT 51/ 100/ 03 / 073 : FEB. 18 TH 1987

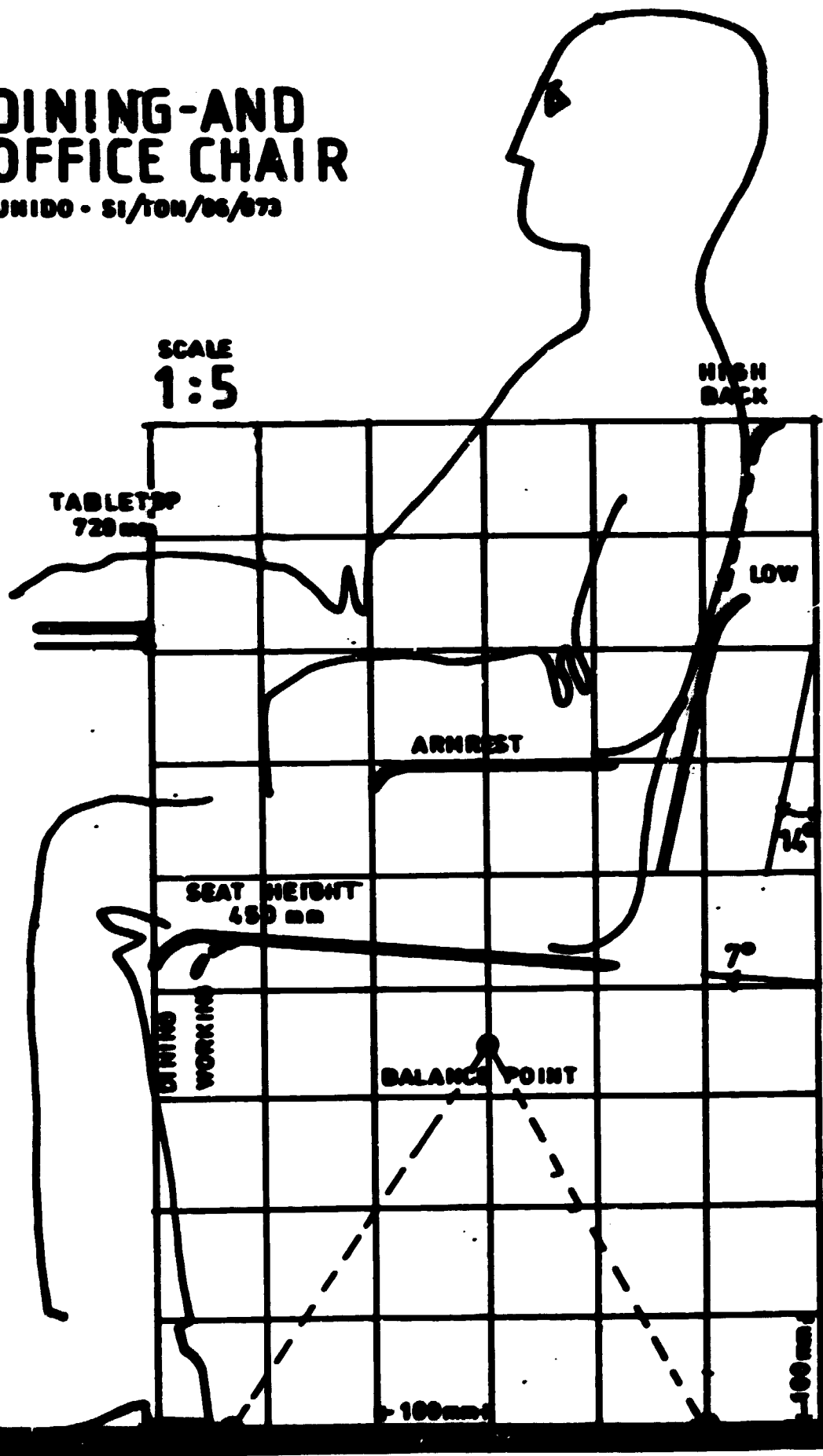
ACTIVITIES	FEBRUARY - 87	MARCH - 87	APRIL - 87
UNIT 70 VISIT TO VENEZUELA AND PUJ AND TOWER TO POLY STATION (TOWER)	[Hatched]		
INTERVIEW WITH INDUSTRY REPRESENTATIVES AND SUBMITTERS	[Hatched]		
FIRST VISIT TO (10-12) UNIT 70 VISITING MEMBERS & FUTURE DESIGNERS	[Hatched]	[Hatched]	
MEETING ON DESIGN WITH PROJECT MEMBERS & AVAILABLE BUS MEMBERS	[Hatched]	[Hatched]	
MEETING MEMBERS TO PREPARE INITIAL DESIGN/ QUALITY CONTROL	[Hatched]	[Hatched]	
REQUIREMENT FOR ABOVE UNIT MEMBERS FOR ABOVE MEMBERS	[Hatched]	[Hatched]	
MEETING ON PROJECTS OF MEMBERS MEMBERS AND MEMBERS	[Hatched]	[Hatched]	
PRESENTATION OF MEMBERS PRESENTATION OF MEMBERS (MEMBERS)	[Hatched]	[Hatched]	[Hatched]
TRAVEL TO PUJ & VENEZUELA TO PREPARE - TRAVEL AND MEMBERS (MEMBERS)	[Hatched]	[Hatched]	[Hatched]

**FURNITURE FACTORIES AND WORKSHOPS VISITED BY THE  
FURNITURE DESIGN EXPERT IIHQ IAP10Y0000 IN 1964**

<b>-----F.O.O.P.S.O.V.-----</b>	<b>..Main Line of Production..</b>
1. Commodities Board, Construction Division	Solid wood chairs, church benches, tables, etc.
2. Matthews and Associates	Previously toys, starting furniture production.
3. Talaki Tu'ipuletu Enterprises	Metal furniture.
4. Ministry of Works Furniture Workshop	Woods chairs, tables, cabinets.
5. T & T Builders	Not started production.
6. Jones Industries	Plastic laminated particle-board products, also aluminium joinery.
7. Oceanic Industrial Enterprises	Contract furniture, metal chairs.
8. O. G. Sanft Industries	Cabinets, beds, upholstered furniture (also showroom).
9. Natoliku Sannill (NAFF)	Sannill (coconut wood).
10. Pacific Construction	Cabinets, tables.
11. V. J. N. & Sons (Vava'u)	Sofa seats, cabinets. (Also building elements).

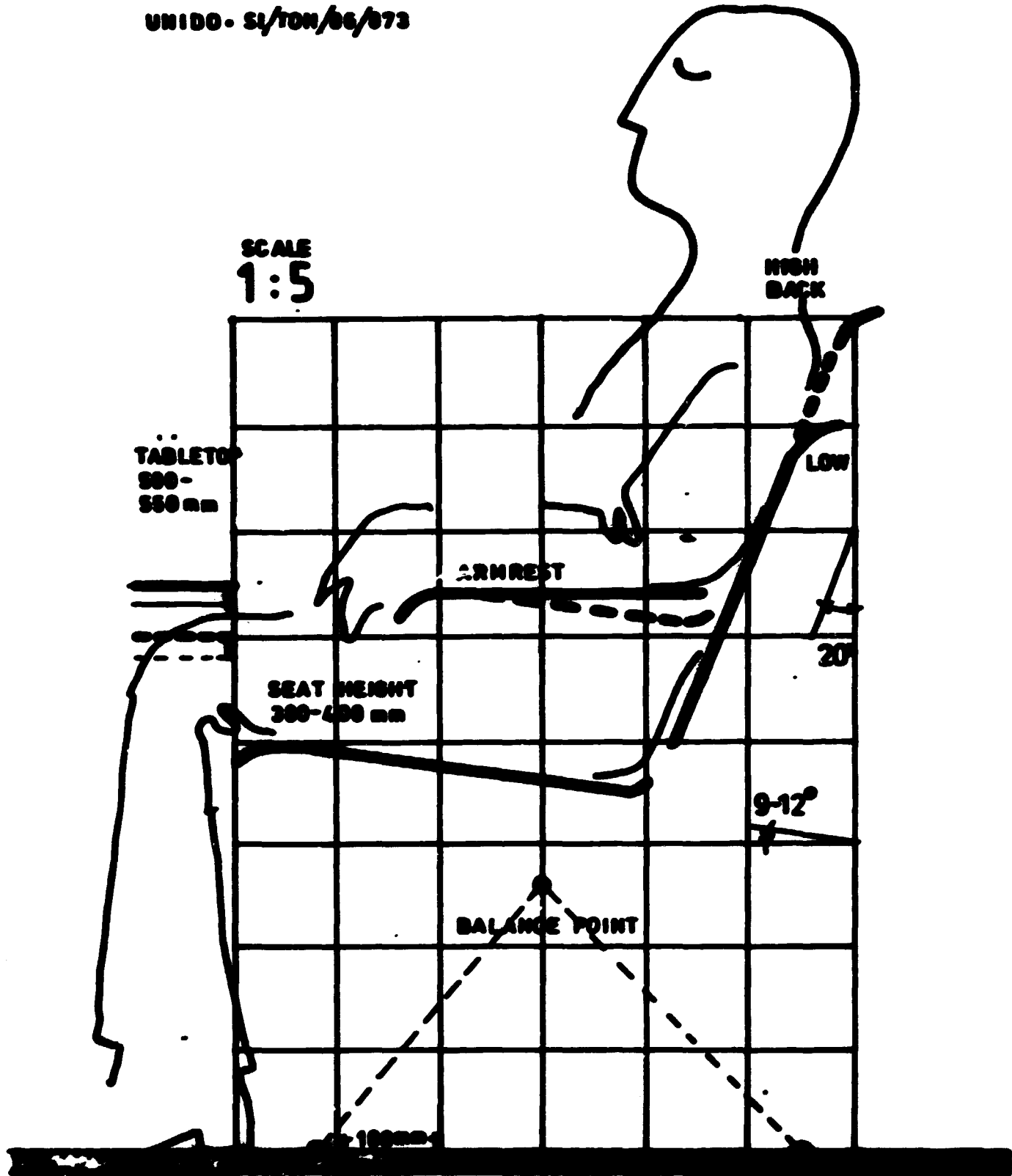
# DINING-AND OFFICE CHAIR

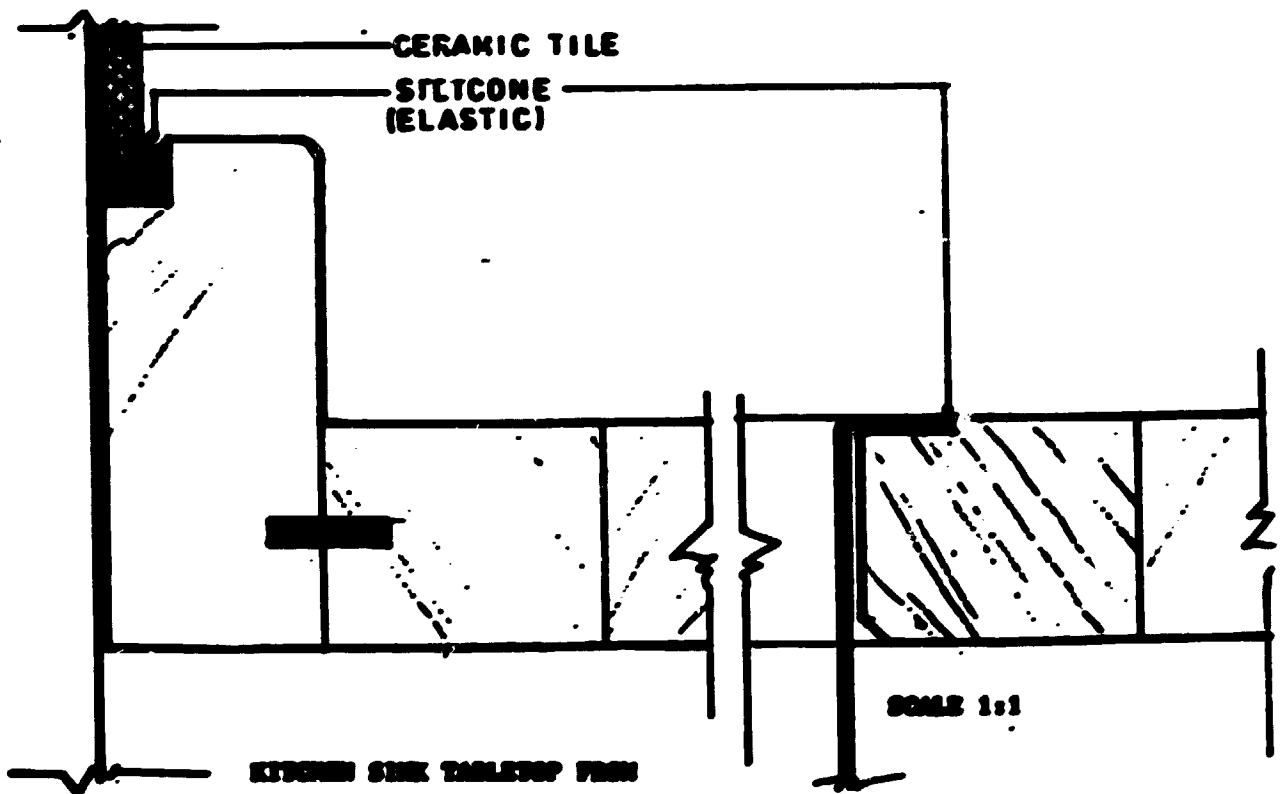
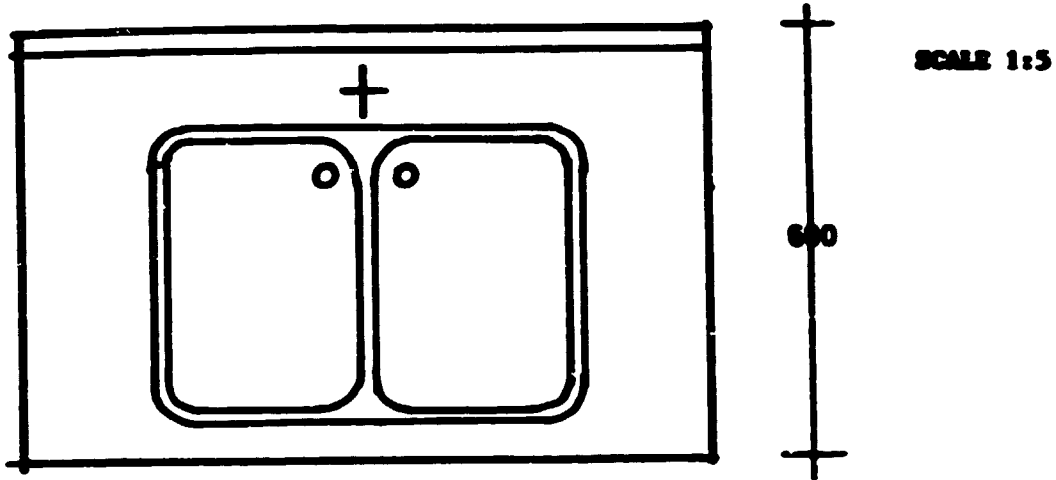
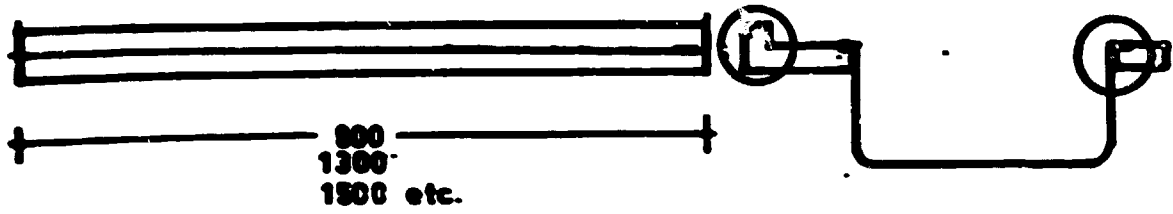
UNIDO - SI/TON/06/073



# EASY-CHAIR AND SOFA

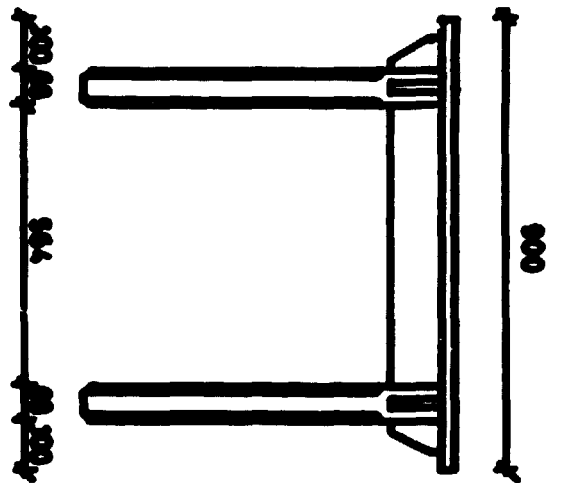
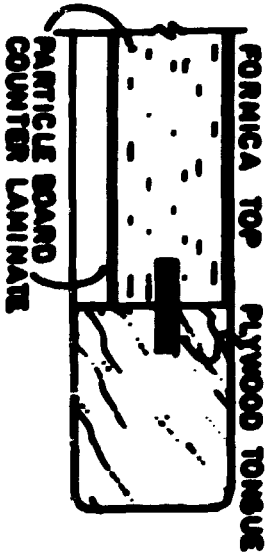
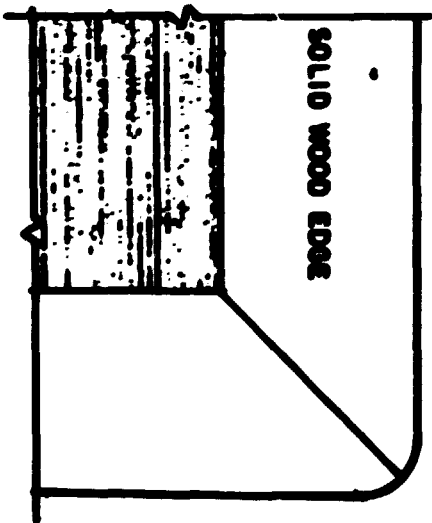
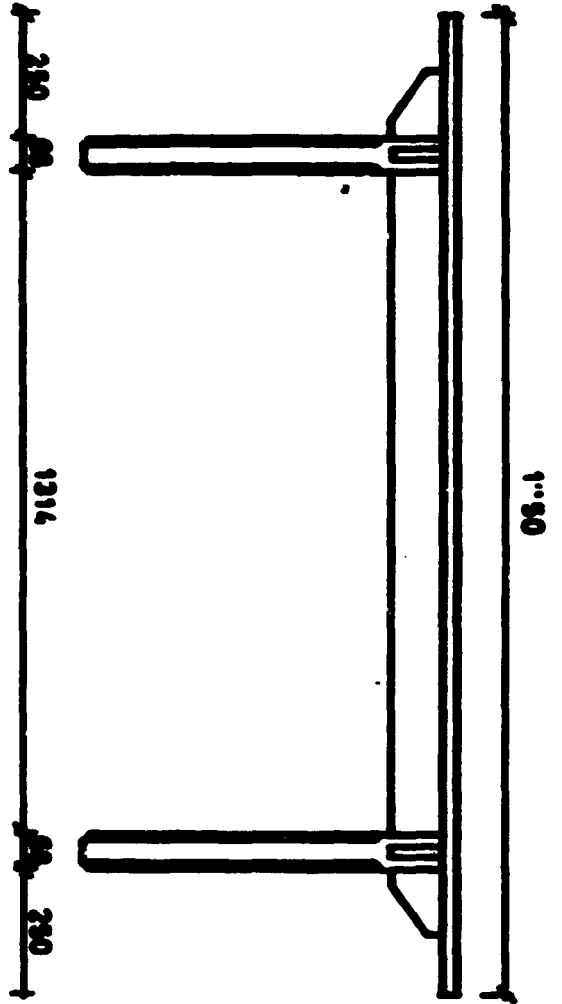
UNIDO - SI/TOM/66/073



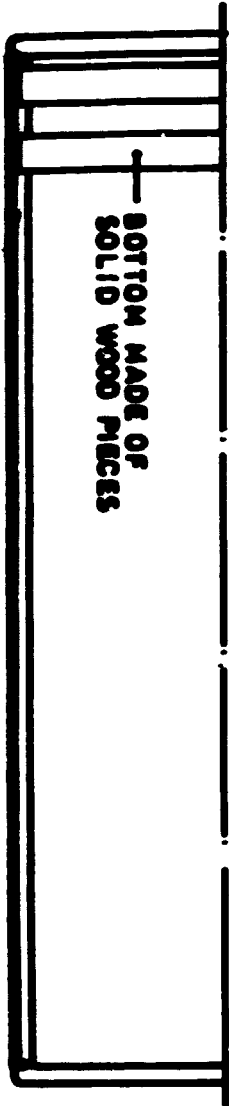


KITCHEN SINK TABLETOP FROM  
SOLID COLOURED WOOD AND  
IMPORTED BLACKBOARD

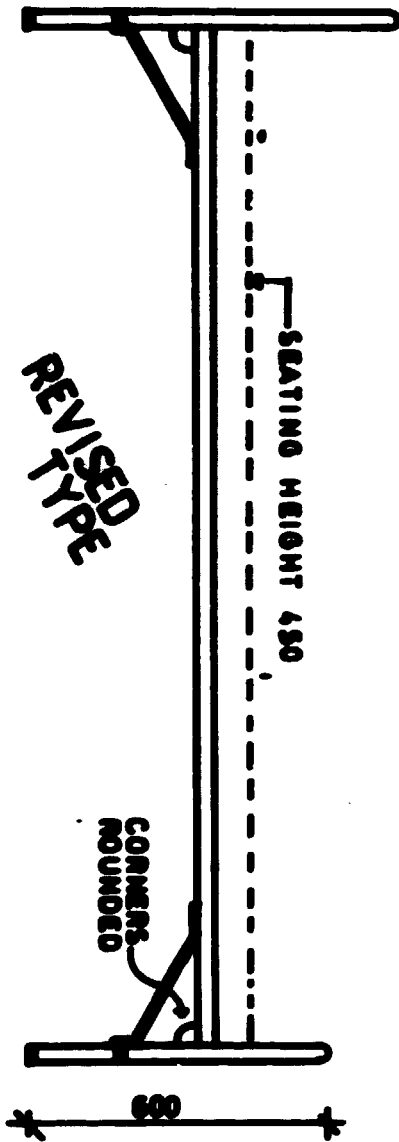
MAIN DIMENSIONS GIVEN BY:  
COMMODITIES BOARD CONSTRUCTION DIVISION  
SUGGESTED ALTERNATIVE SIZE:  
1200 x 900



UNIDO	DRAWN BY: [illegible]	SCALE: 1/20, 1/11	01
8/20/73	DATE: 7/2/73	DATE: 7/2/73	NO



BOTTOM MADE OF SOLID WOOD PIECES

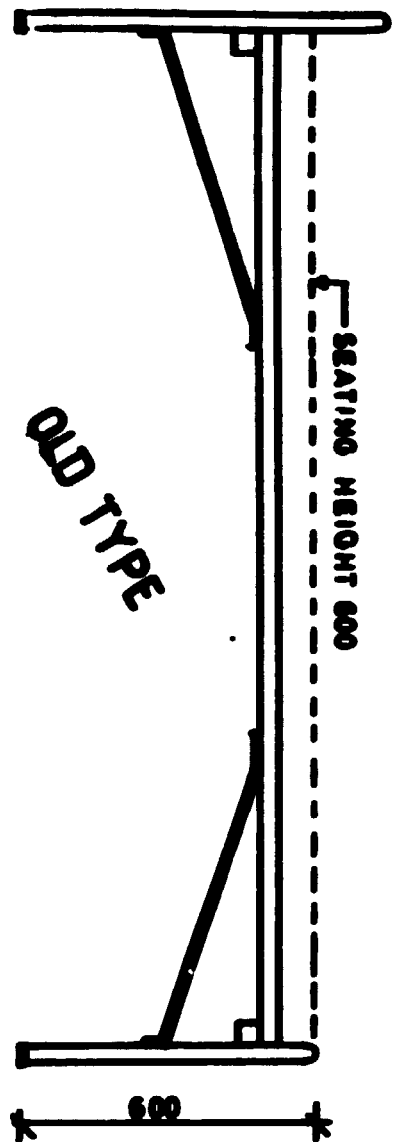


REVISED TYPE

SEATING HEIGHT 430

CORNERS ROUNDED

68



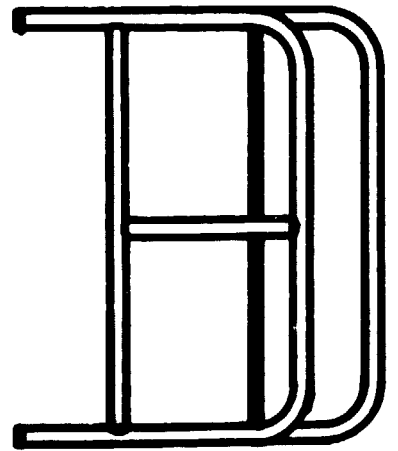
OLD TYPE

SEATING HEIGHT 600

68

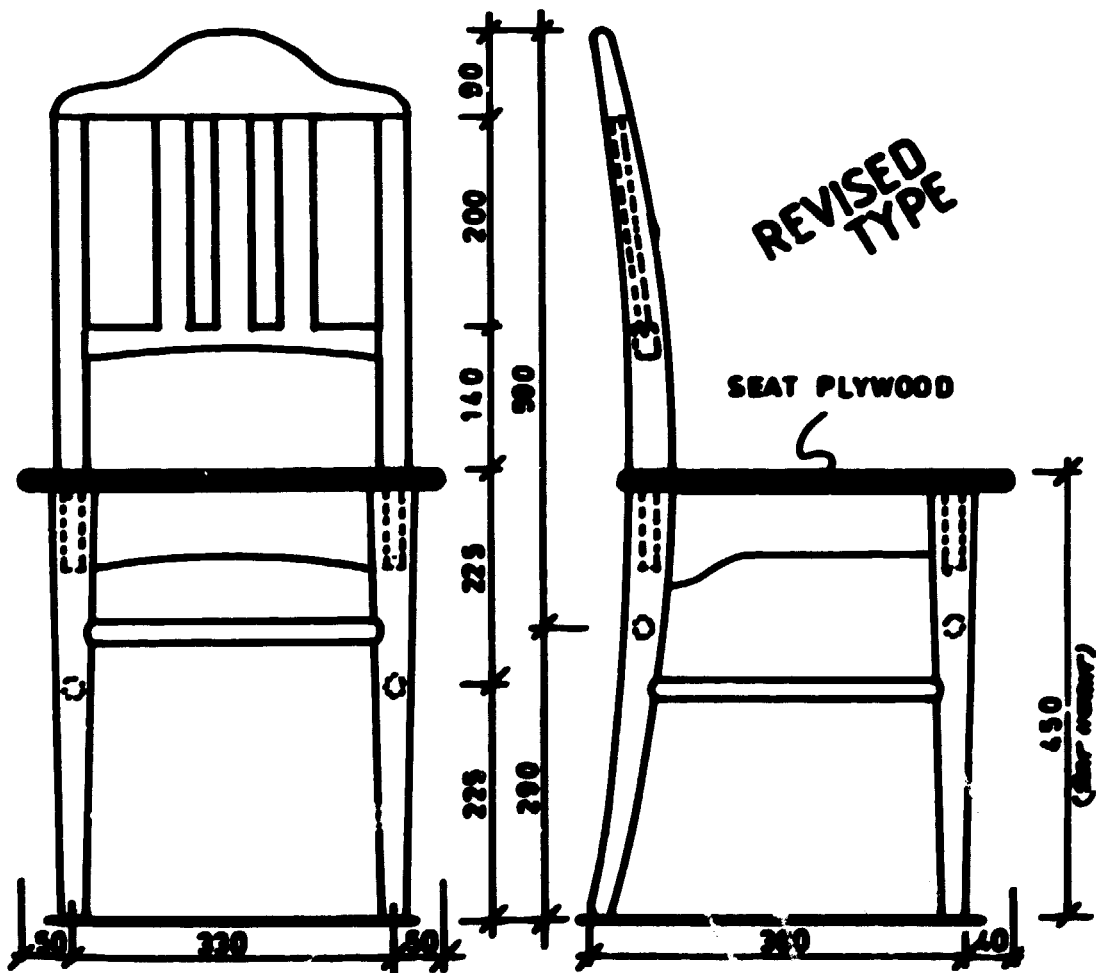
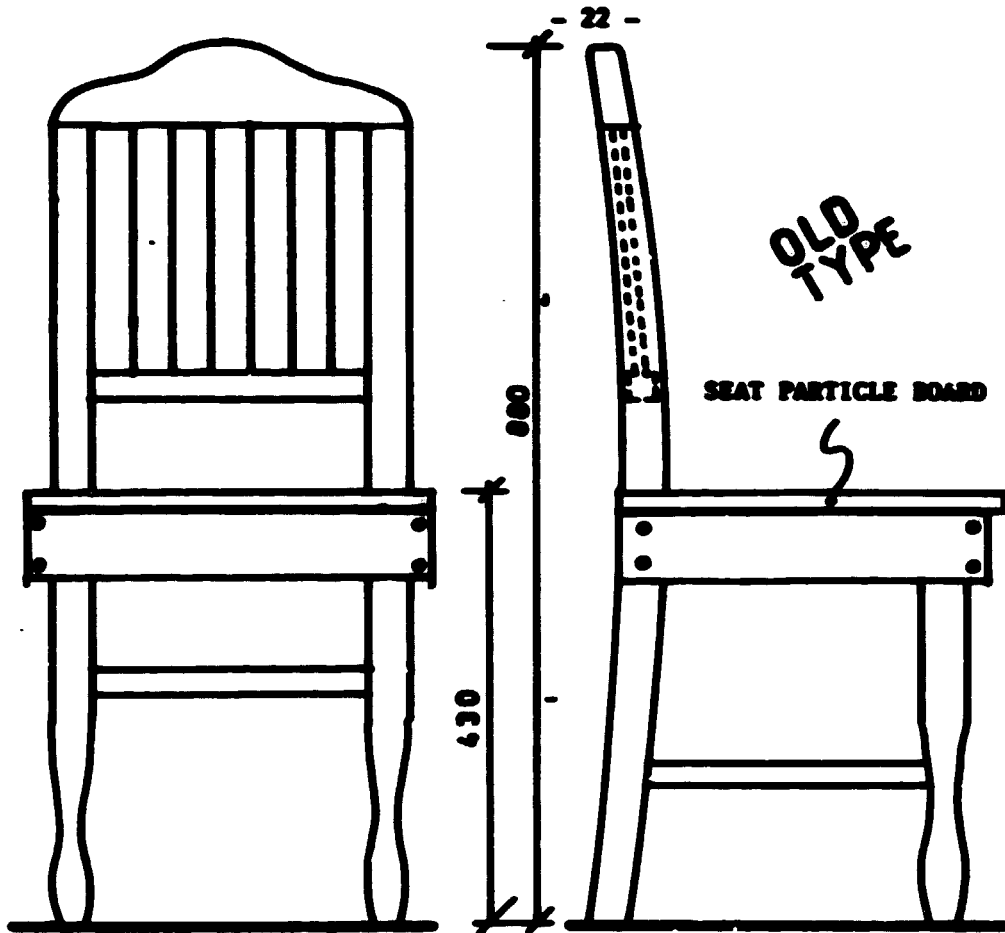


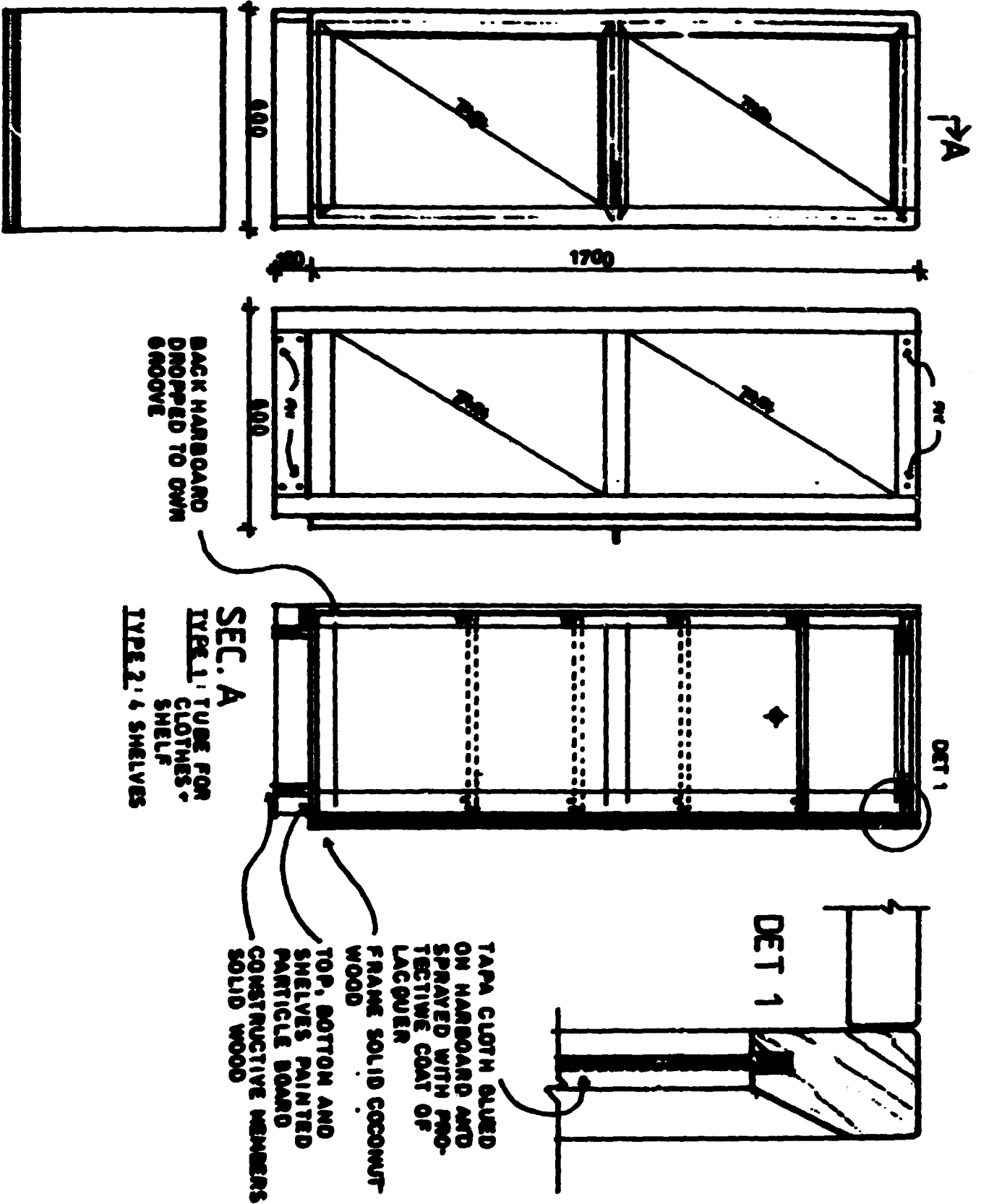
- BOTH ENDS CLOSED;  
 CHIPPBOARD WITH PORNICCA  
 ON BOTH SIDES (WHITE)  
 - COLOR OF TUBE: BLUE &  
 YELLOW



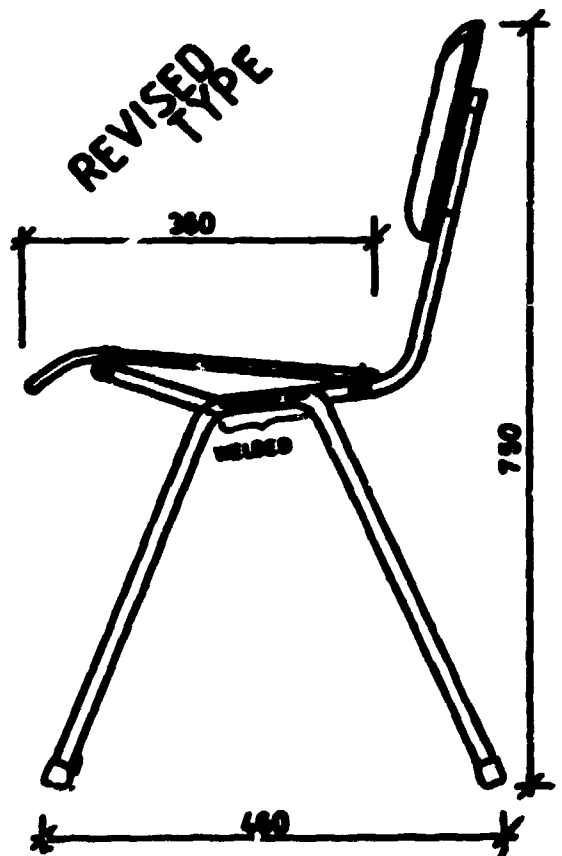
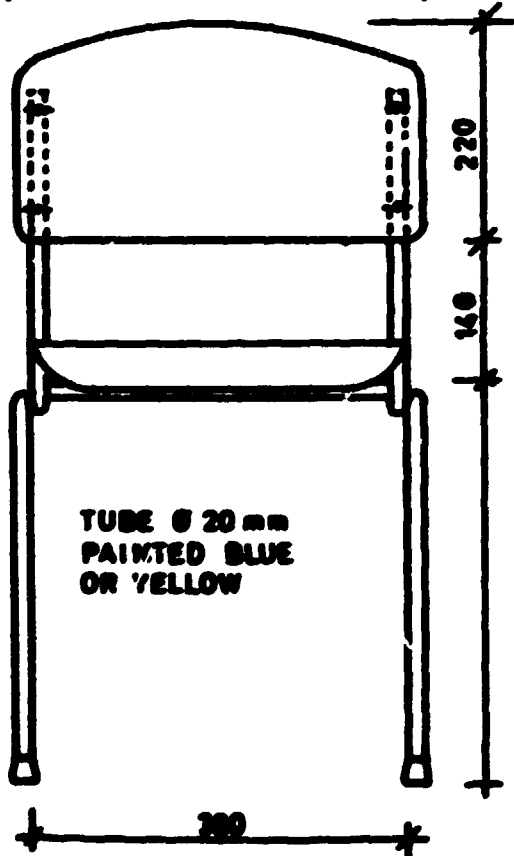
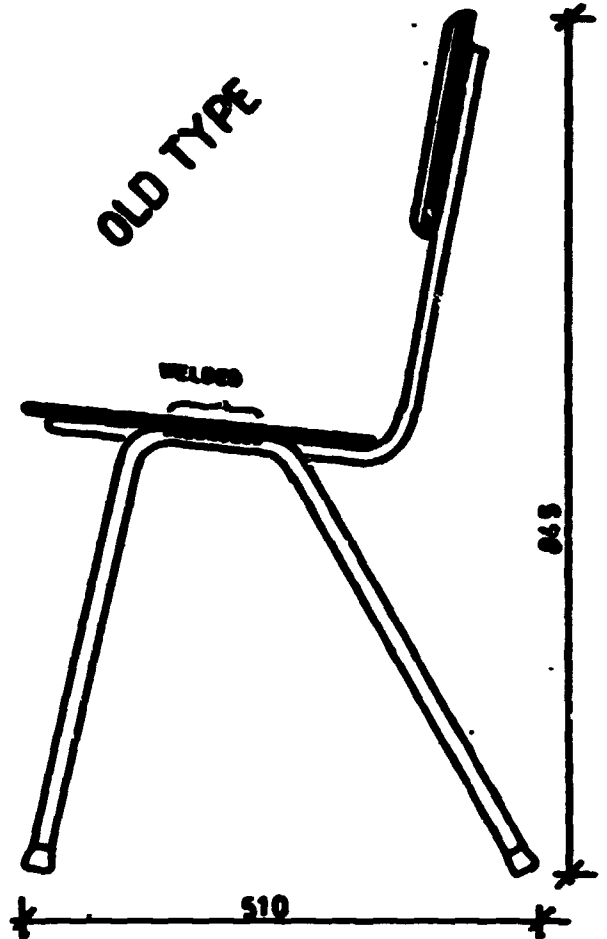
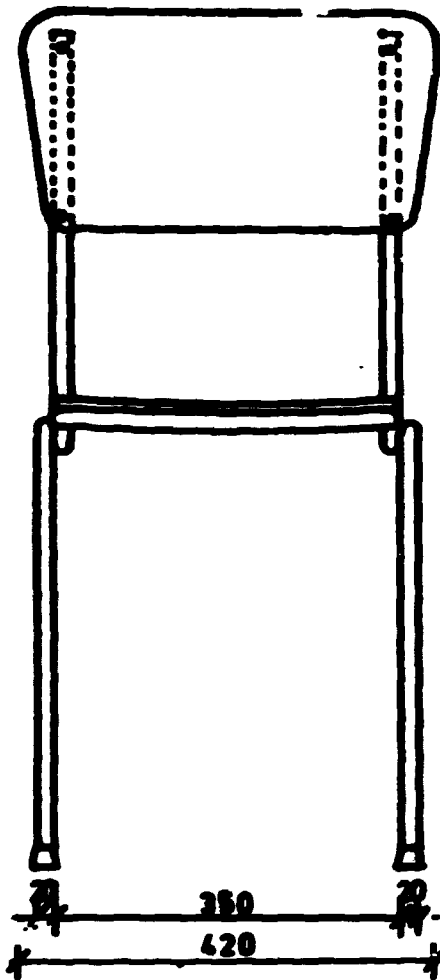
BOTH ENDS OPEN  
 COLOR OF TUBE: BLACK







<p>UNIDO 17/07/77</p>	<p>17/07/77 17/07/77</p>	<p>SCALE 1/10 DATE 17/77 DW 1/10</p>	<p>04 NO</p>
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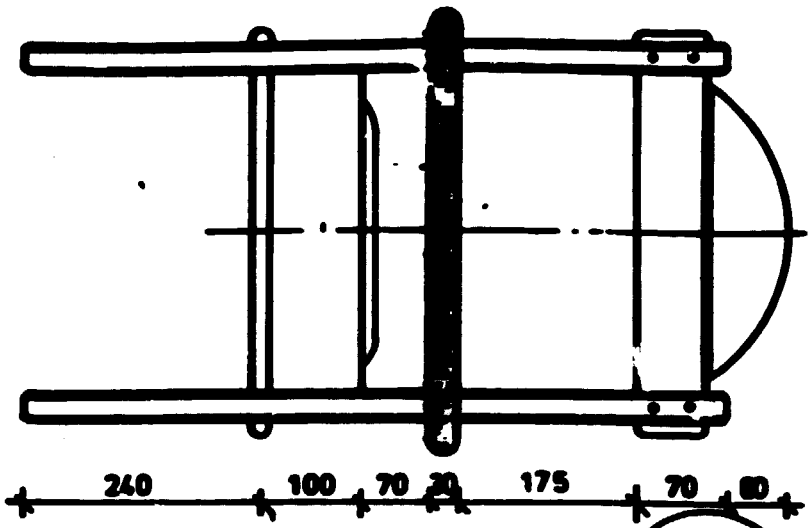
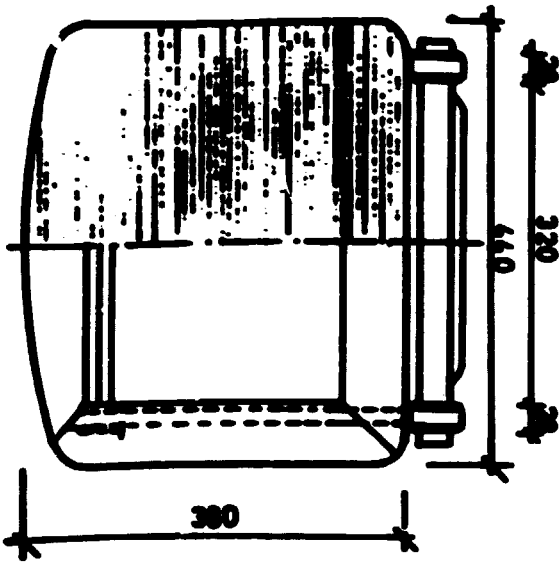


**UNIDO**  
E/1982/073

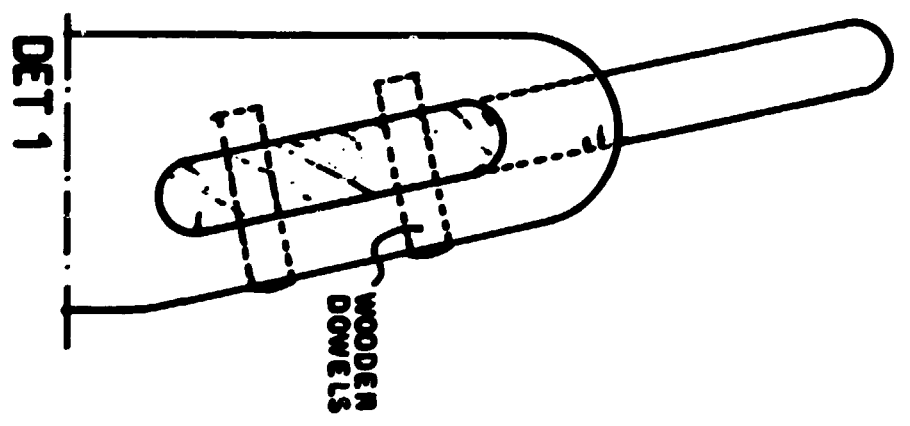
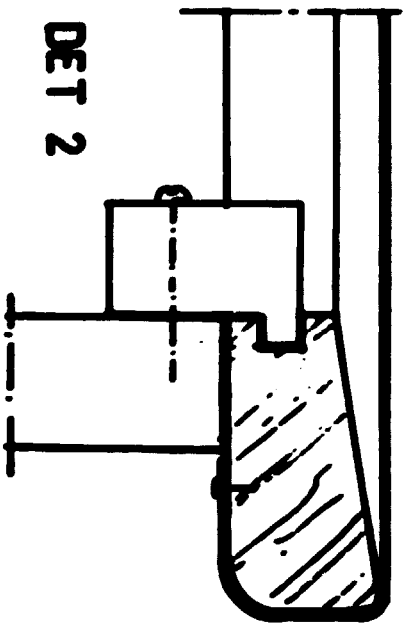
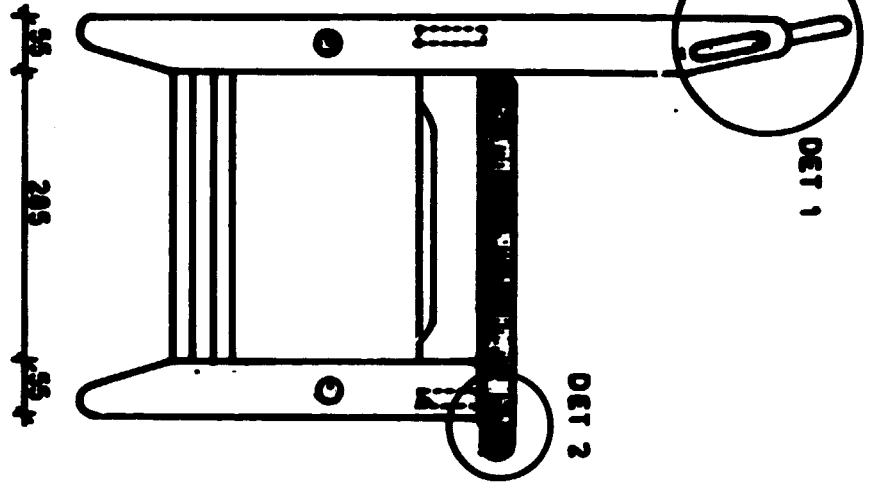
Division of Technical Cooperation, UNCTAD/20  
Technical Cooperation Centre

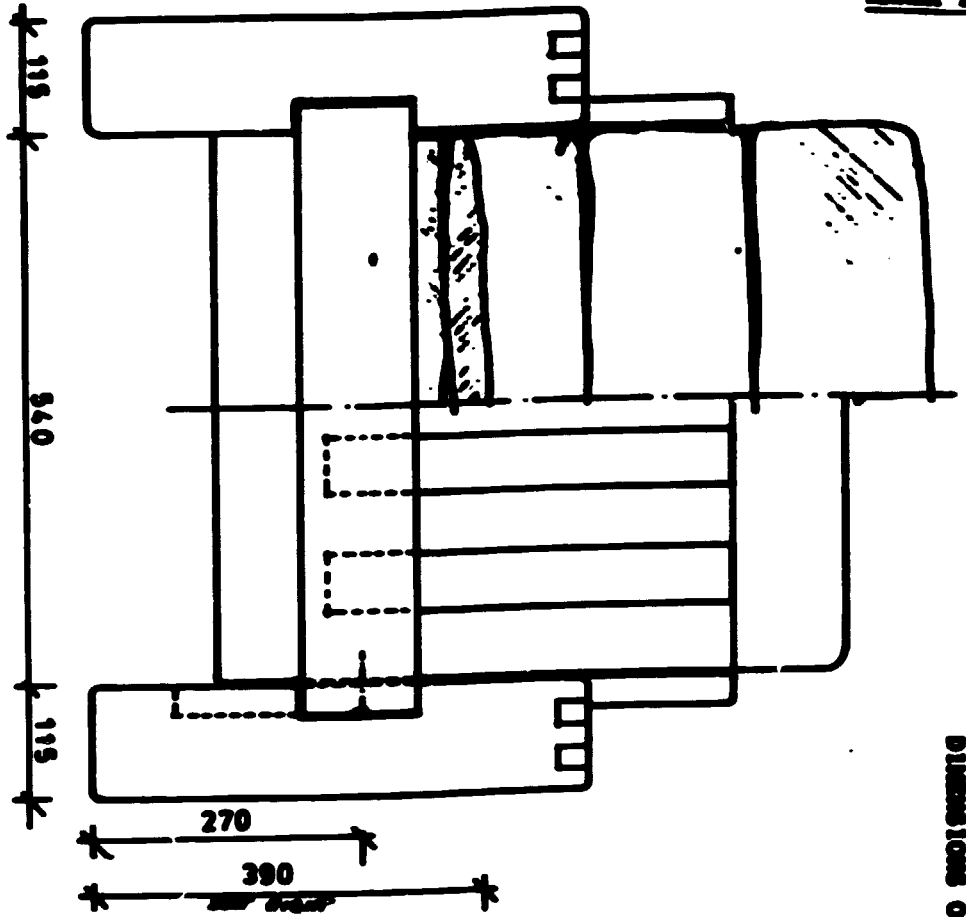
SCALE 1/8"  
DATE 6.2.1977  
DND

**05**  
170

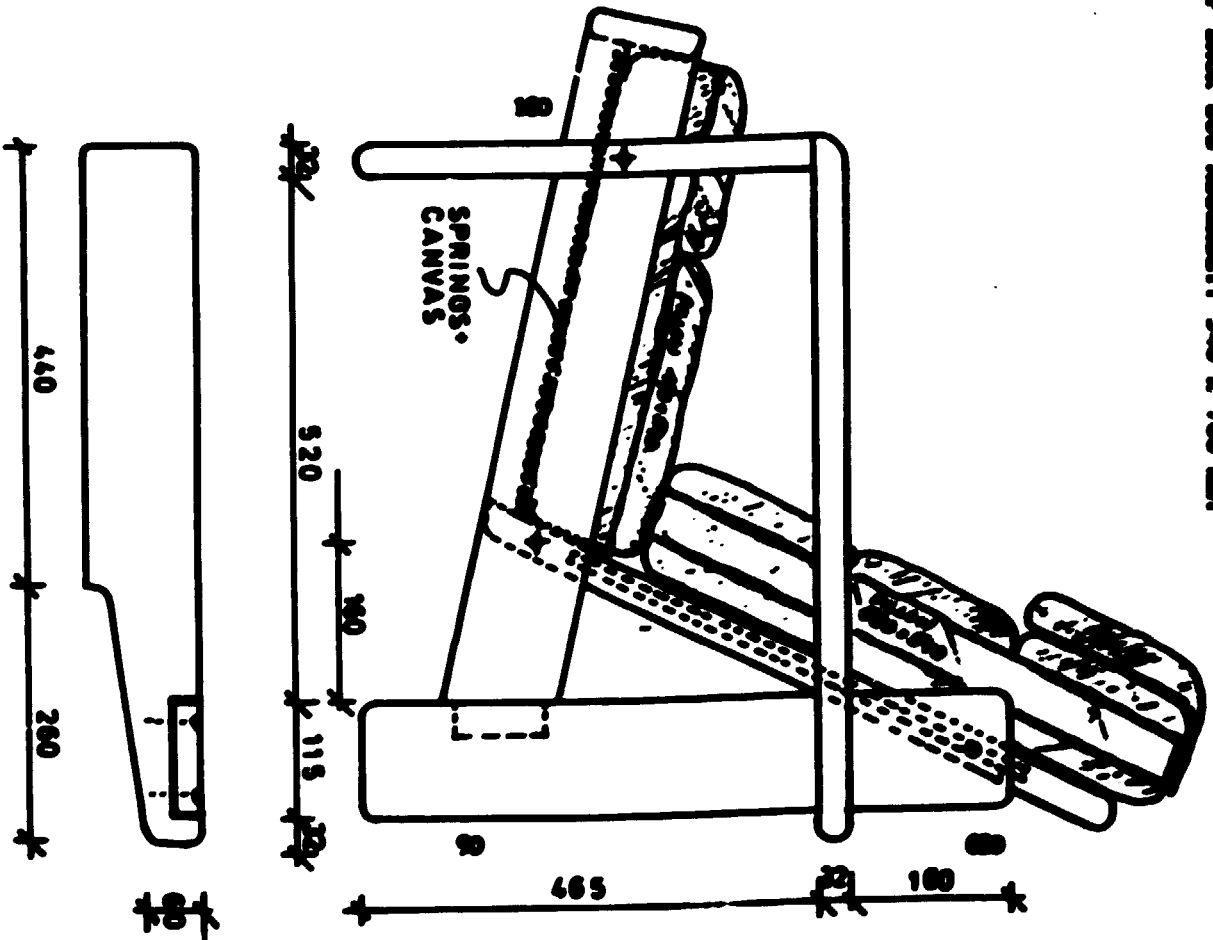


SEAT MADE OF WOVEN TAMP-CLOTH



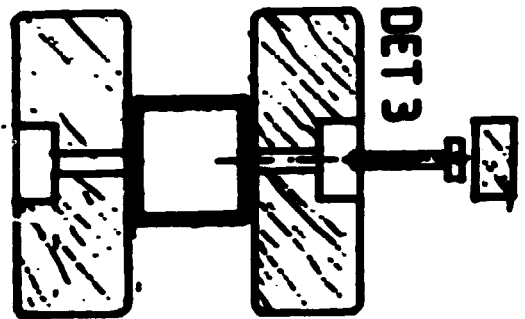
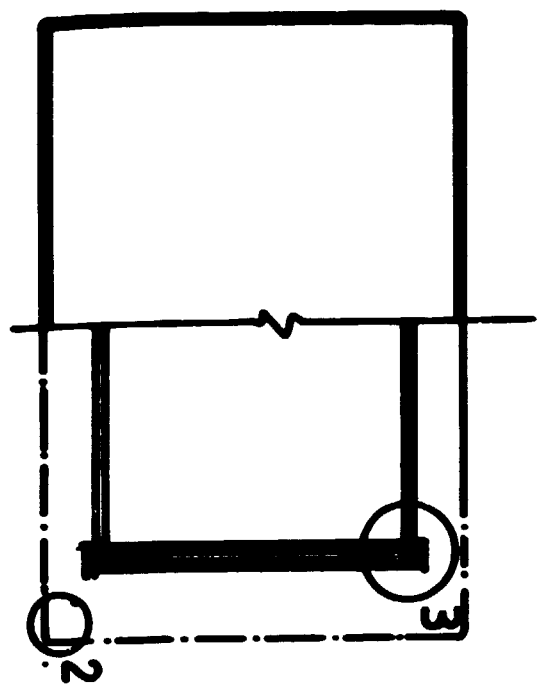
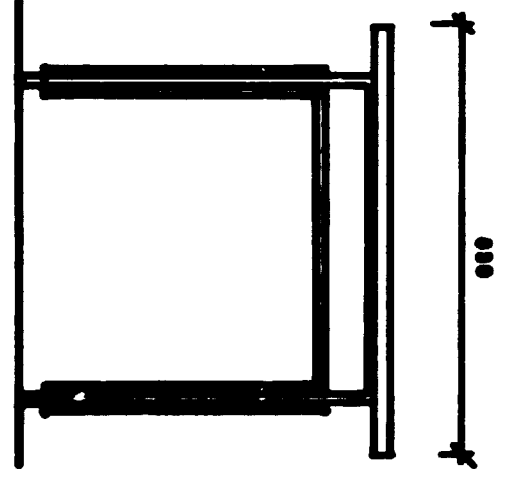
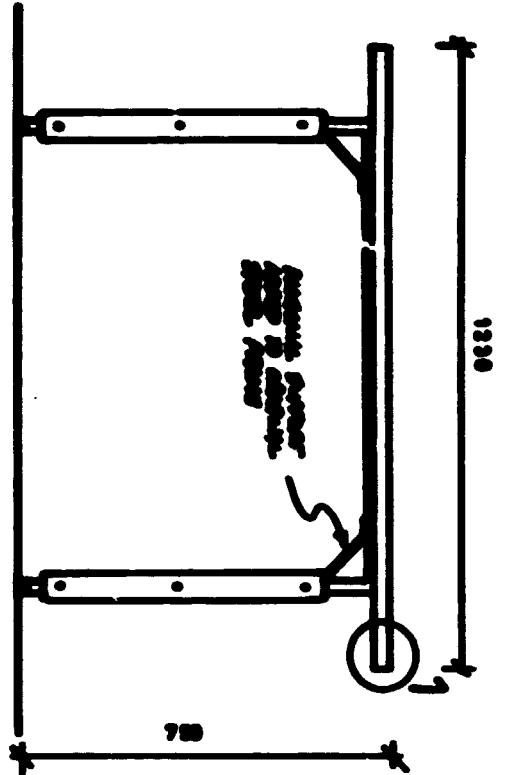


DIMENSIONS OF SEAT SIZE: 15 X 600 mm.  
 DIMENSIONS OF BACK SUB ASSEMBLY: 340 X 700 mm.



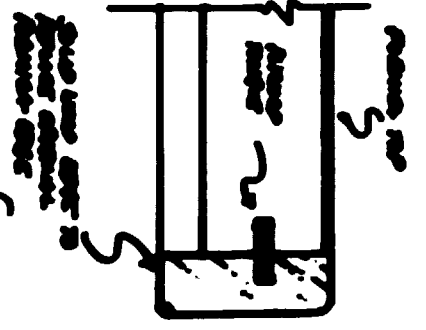
<b>UNIDO</b> SI/TON/6/673	<b>SEY CANE</b> CROUCH UP AS SHOWN FRAME UNFOLDING AND FOLDING	SCALE 1/5 DATE 7/11/67 DW NUMBER 00	<b>07</b> 00
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ANEXO 13

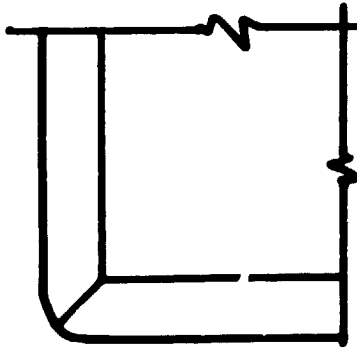


Este tipo de unión se usa en los casos de unión de elementos de estructura metálica/acerada con otros tipos de estructura.

DET 1

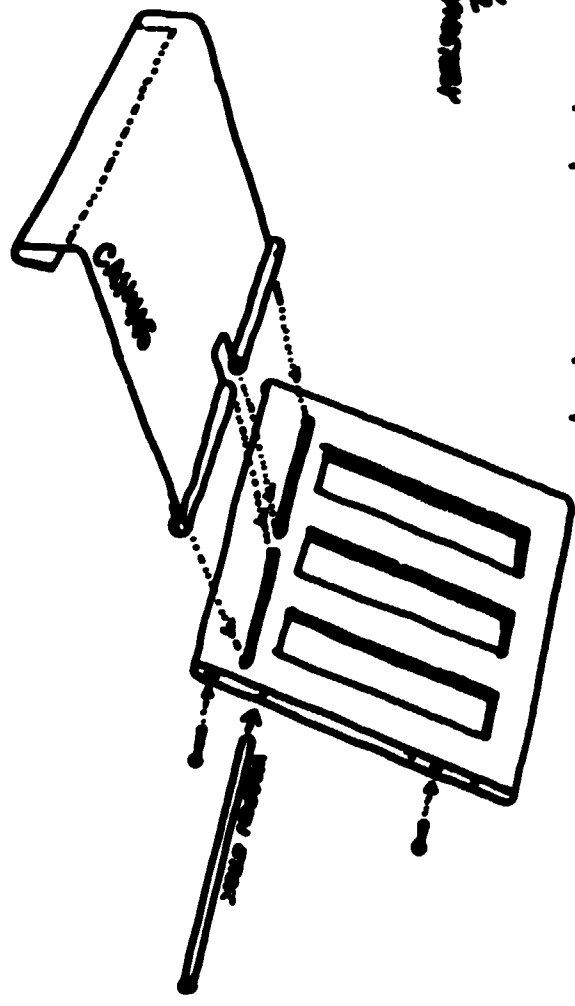
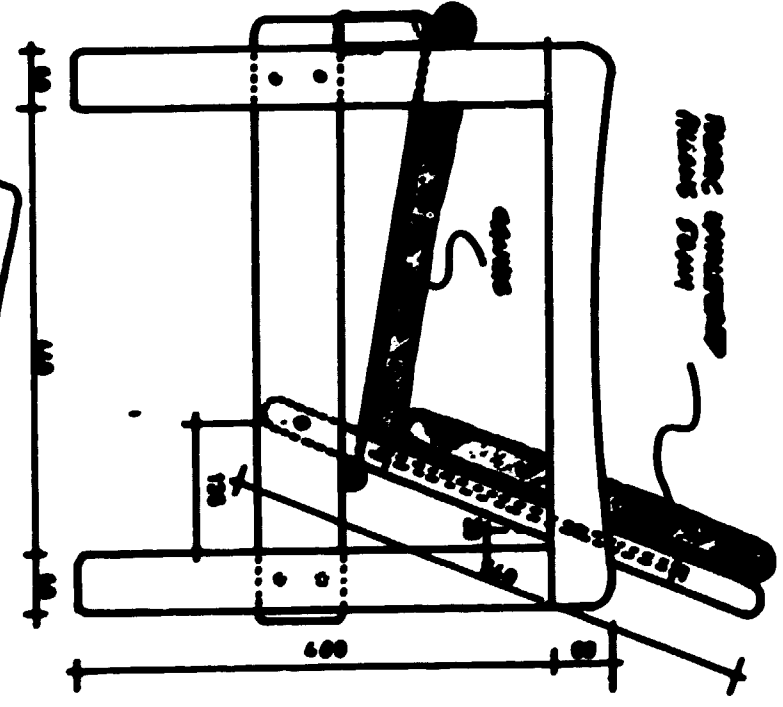
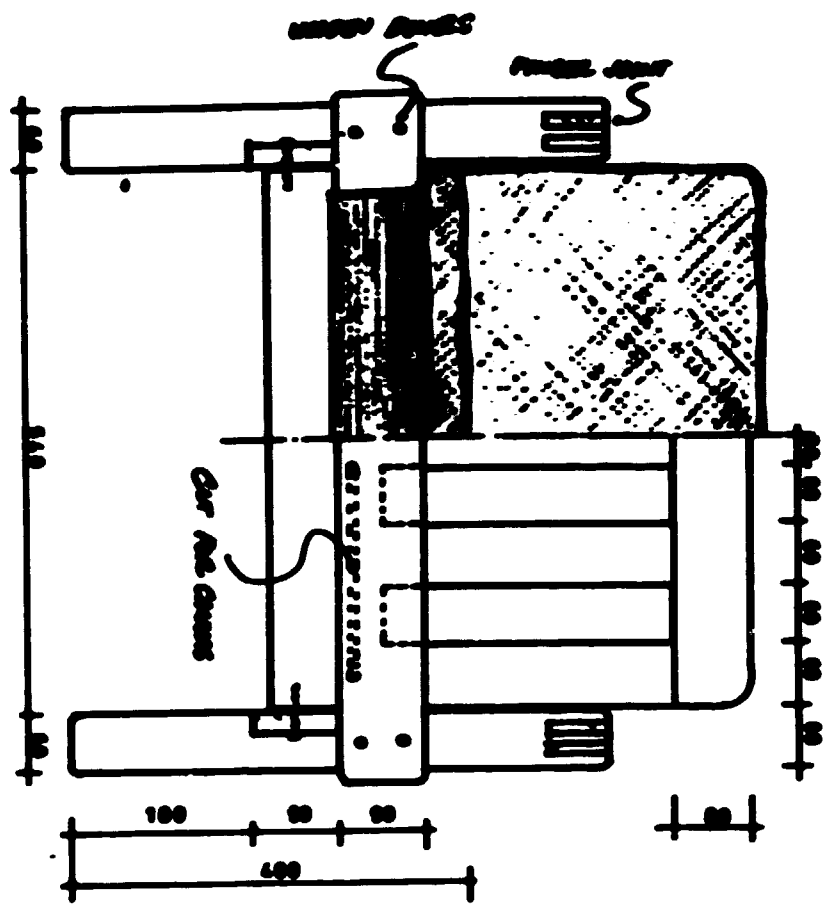


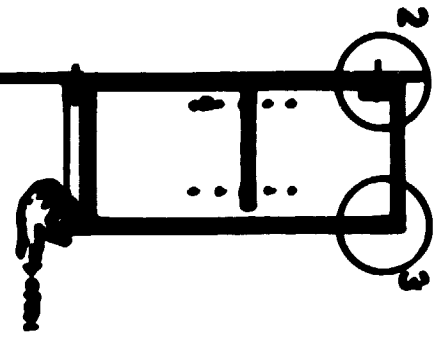
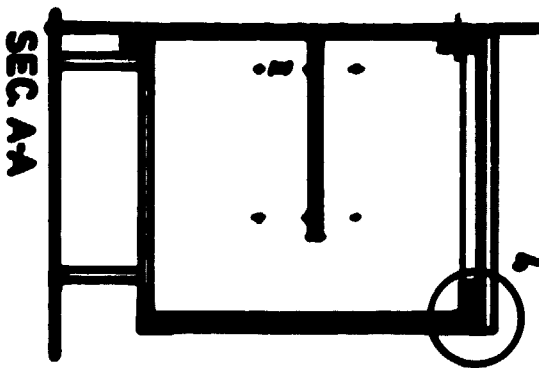
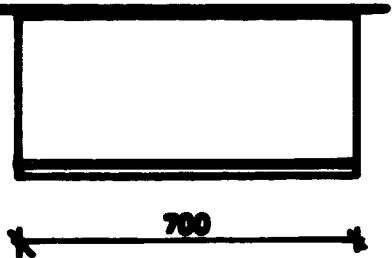
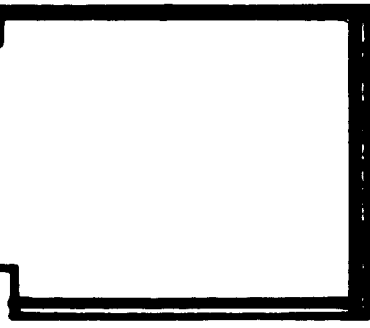
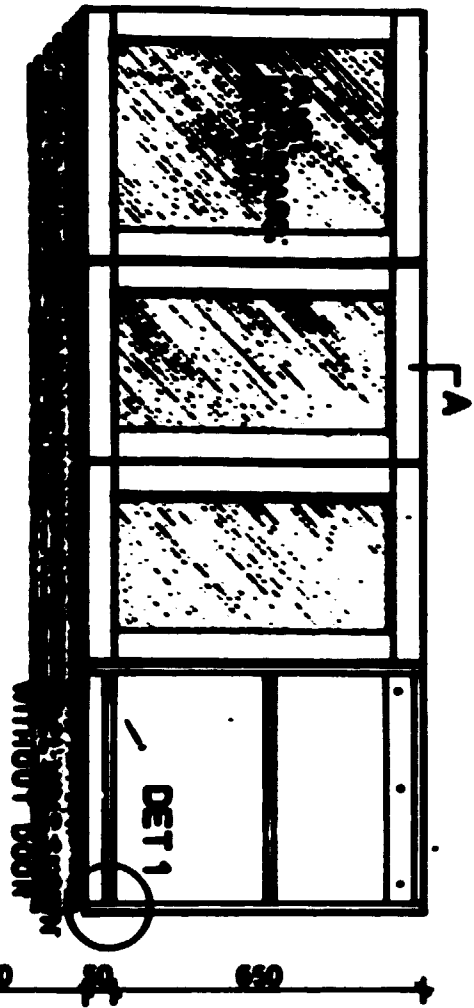
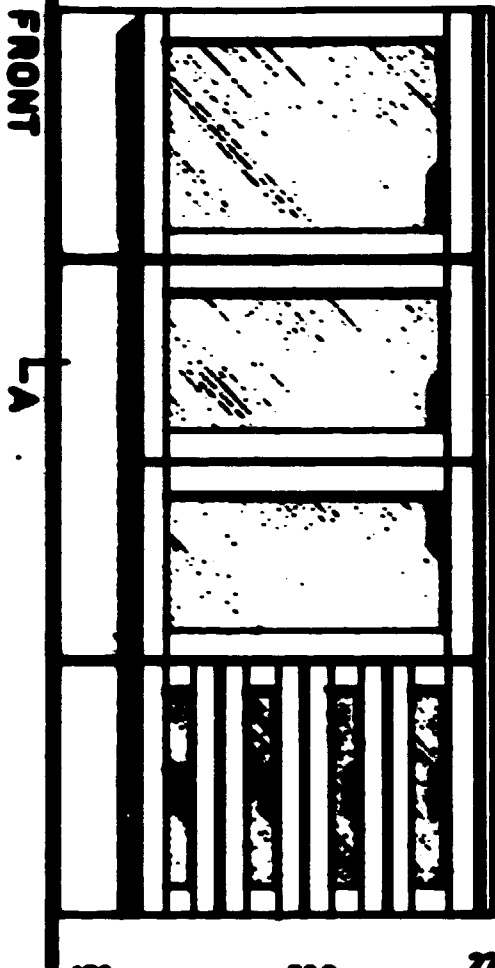
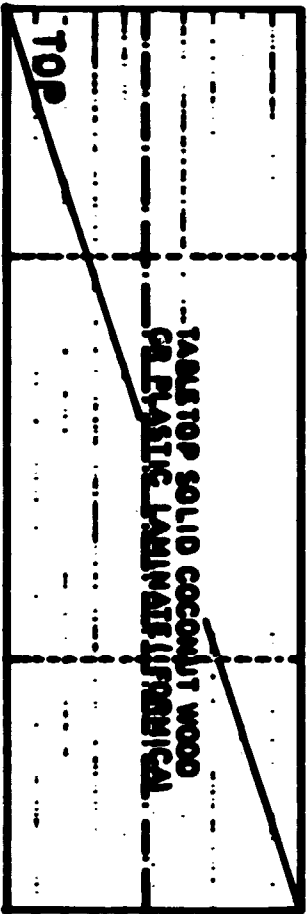
DET 2



FRONT 1/2  
WITH WINDOW

FRONT 1/2  
WITHOUT WINDOW

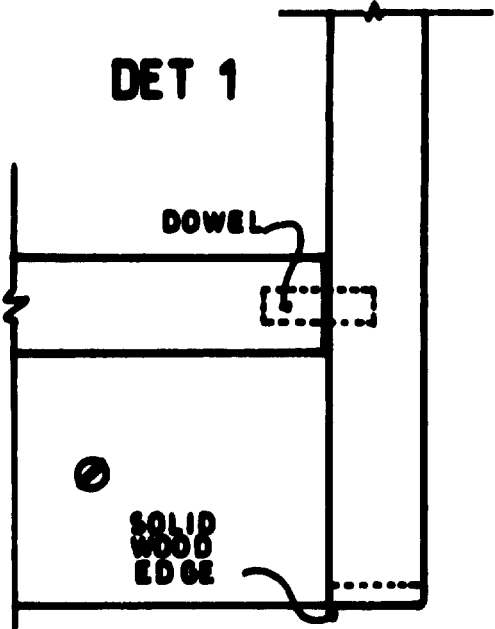




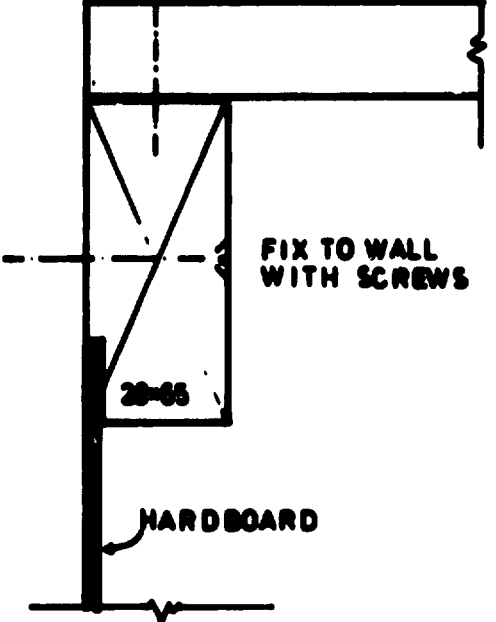


ANEX 15

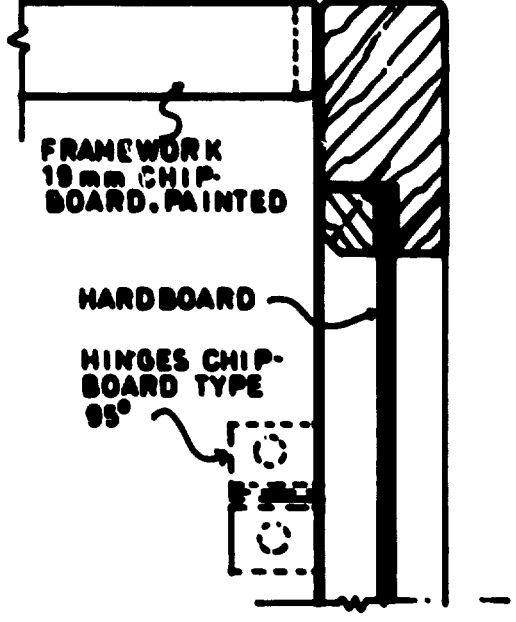
DET 1



DET 2



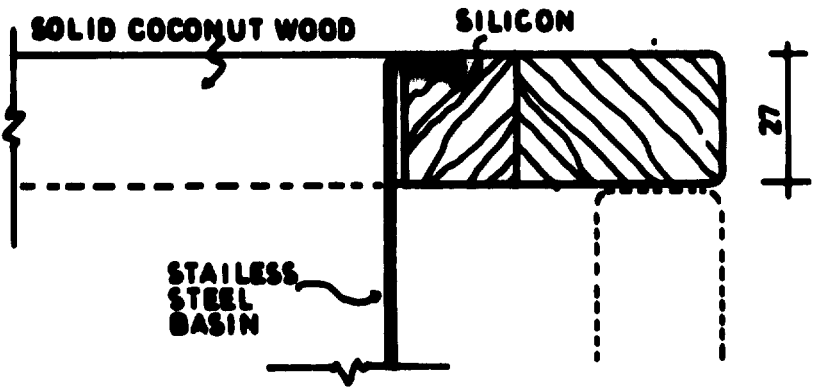
DET 3



20

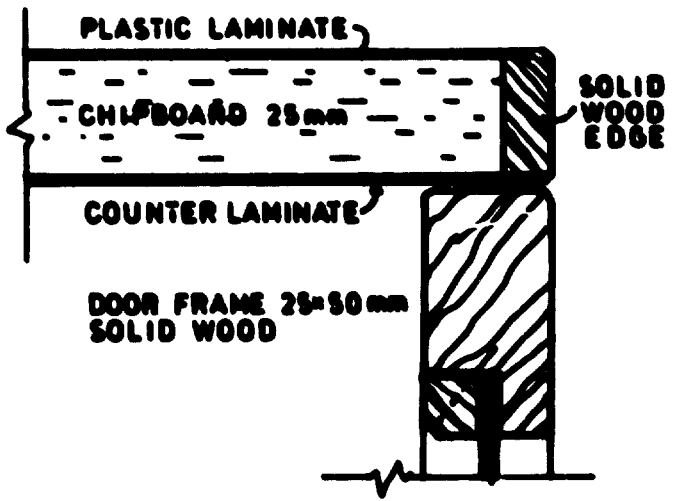
DET 4

TABLETOP ALT. NO. 1 (SHOWN WITH BASIN)



DET 4

TABLETOP ALT. NO. 2



11  
 SCALE 1/1  
 UNIVERSAL DRAWING OFFICE  
 UNIDO

Doc. 05/2/21/1937



**MINISTRY OF LABOUR, COMMERCE & INDUSTRIES  
NUKUALOFA, TONGA.**

**COBLE ADDRESS : NIULAB  
NUKUALOFA.**

**27th March 1937**

Dear Sir,

**Subject : Workshop on Hotel Furniture Designs  
Dateline Hotel, 30 March 1937 at 3p.m.**

As you are aware, two UNIDO consultants - Mr Karl Fuchs and Mr Timo Topiovaara have been in Tonga for the past few weeks. Some of you have attended the workshops conducted by them on the production and design aspects. A few model prototypes have been made out of the designs/instruments suggested by the experts. You are requested to please write it convenient to attend workshop and view these products on 30 March 1937 at 3.00 p.m. in Kallie Lounge Dateline Hotel. Please confirm attendance on per the enclosed form. With regards.

Yours sincerely,

(D. B. Schae)

for Secretary for Labour, Commerce  
& Industries.

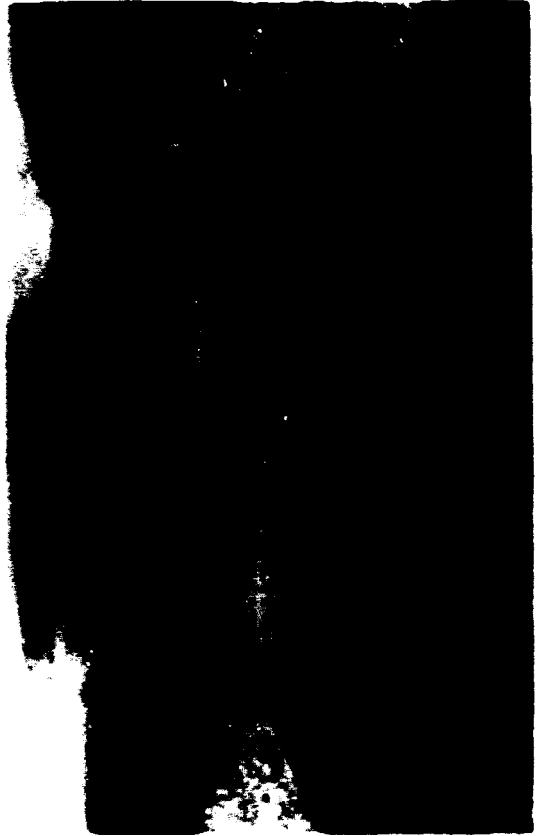
Encl.

DSE/epab



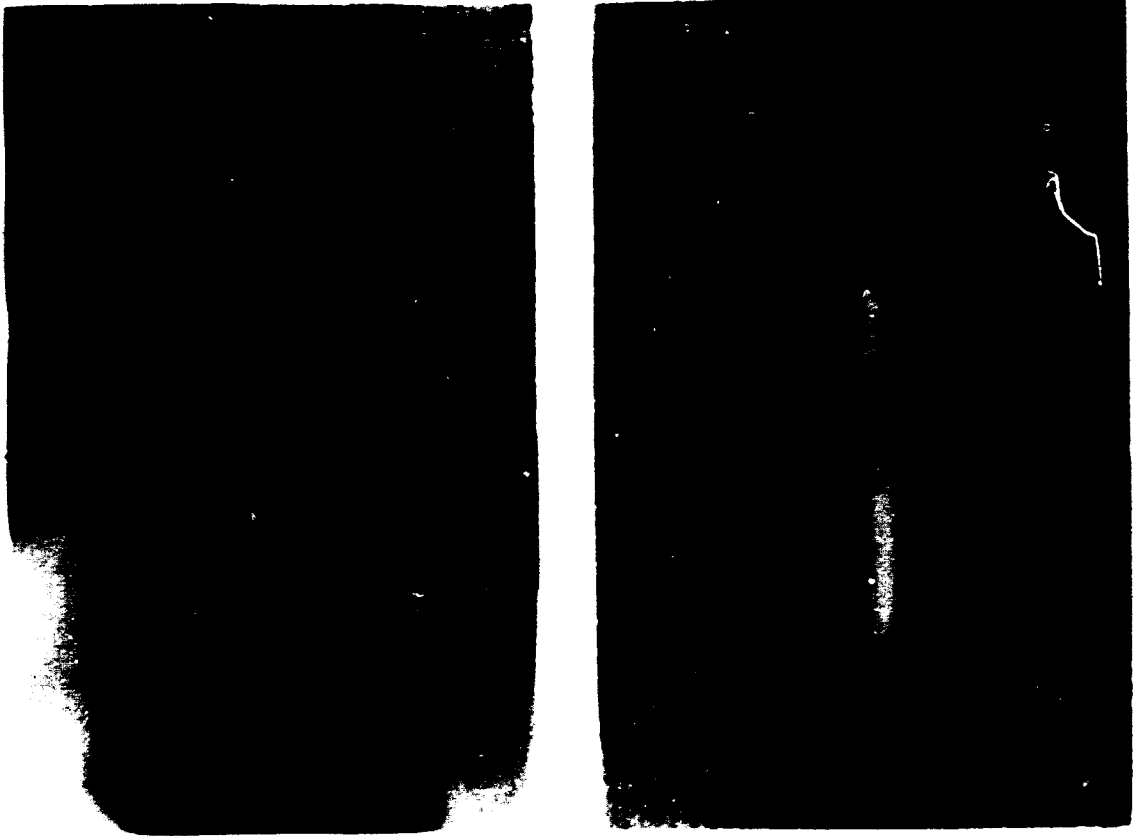
**SAMPLES OF PROTOTYPES PRODUCED**





**SAMPLES OF PROTOTYPES PRODUCED**





**SAMPLES OF PROTOTYPES PRODUCED**

