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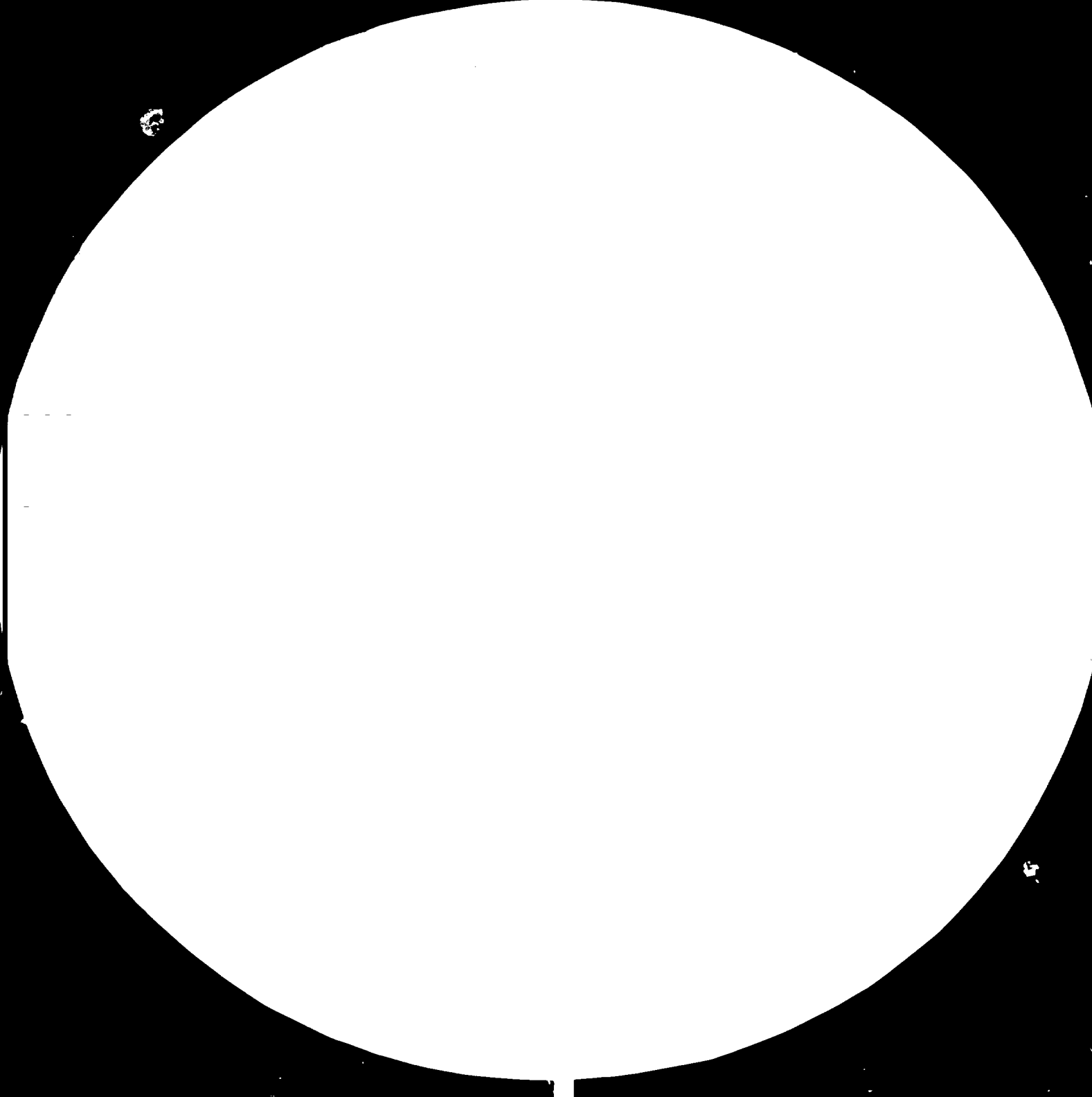
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ASSISTANCE TO THE COASTAL STRIP CARPENTRY CO-OPERATIVE
IN MUKALLA

RP/PDY/82/003

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN

PDR Yemen.

Terminal Report : The Consolidation and Expansion of the
Manufacturing and Marketing Operations of the
Coastal Strip Carpentry Co-operative in Mukalla *

Prepared for the Government of the
People's Democratic Republic of Yemen
by the United Nations Industrial Development Organization

Based on the work of Horatio P. Brion,
Expert in the Production of Furniture and Joinery

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EXPLANATORY NOTES

The monetary unit of the People's Democratic Republic of Yemen is the Dinar (YD). The current rate of exchange for the Dinar is YD 0.343 = US\$1.00.

The following acronyms are used in this Report :

| | | |
|----------|---|---|
| P.D.R.Y. | - | People's Democratic Republic of Yemen |
| CSCC | - | Coastal Strip Carpentry Co-operative, Mukalla, PDRY |
| Hd.G. | - | Hadhramout (V) Governorate, PDRY |
| Co-op | - | The Coastal Strip Carpentry Co-operative, Mukalla, PDRY |

A hyphen between dates (e.g. 1986 - 1995) indicates the full period involved, including the beginning and ending year.

A full stop (.) is used to indicate decimals.

A comma (,) is used to distinguish thousands and millions.

The following symbols and/or abbreviations are used in this Report :

| | | |
|-----------|---|--|
| YD | - | Yemen Dinars, currency unit of PDRY |
| US\$ | - | US Dollars, currency unit of the United States of America |
| PHP | - | Philippine Pesos, currency unit of the Republic of the Philippines |
| dia. or Ø | - | diameter of a circle |
| m or mtr. | - | meter, unit of length |
| kms. | - | kilometers |
| sq. m. | - | square meter |
| w/ | - | with |
| etc. | - | et cetera (and so forth) |
| TCT | - | Tunstun Carbi de Tipped (cutting holes) |

| | | |
|----------|---|--|
| gal. | - | U. S. gallon |
| kg. | - | kilogram |
| ft. | - | feet |
| gpm | - | gallons per minute, fluid rate of flow |
| Q. C. | - | Quality Control |
| Fig. No. | - | Figure Number |
| No. | - | Number |
| mm | - | millimeters, 1/1000 of a meter |
| cm | - | centimeter, 1/100 of a meter |
| FOB | - | Free-on-Board, cost basis for import tenders |
| CIF | - | Cost, insurance and freight, cost basis for import tenders |

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A B S T R A C T

A. FINDINGS AND OBSERVATIONS

1. A rough estimate of the market potential for school furniture and furnishings, home and office furniture and furnishings and selected construction woodworks items such as doors and windows in the IV, V and VI Governorates of the Republic, indicate an annual demand of at least FIVE times the current production capacity of the Coastal Strip Carpentry Co-operative, Mukalla, Hd.G., on the basis that CSCC will be expected to produce only 60% of the total market demand in the three Governorates ;
2. The current work force and the management and supervisory staff of the CSCC are not adequately prepared to undertake the planning and implementation of a Project of the magnitude indicated by the market study ;
3. The current manufacturing techniques and facilities of the CSCC are not enough to produce the volume of products indicated by the market study ;
4. While the concept of consolidating the production operations of the CSCC Mukalla units in one compound is highly meritorious, the state of the Project to-date indicates lack of planning, inadequate knowledge of the market, and generally haphazard implementation ; and
5. The present level of technology used in the manufacturing operations of CSCC units has lagged far behind current manufacturing technology, to the point that even spare parts for existing antiquated machinery are not available anymore as these machines are not being manufactured today, and utilization of supporting technologies become wasteful as these are applied under very unfavorable manufacturing conditions. Thus, unless the CSCC, in particular, and the Republic, as a whole, take serious steps now to develop the industry to a point which will enable it to efficiently use the changing technology on the manufacture of furniture and other woodworks products, it is

feared that the industry will stagnate to a point which will require huge (much bigger than the present requirements) capital outlays to put it at a level which will enable it to effectively utilize available resources and technologies for the benefit of the Republic and its people.

B. RECOMMENDATIONS

1. PROVIDED the pre-requisite preparatory steps calling for immediate formulation and implementation of four Programmes on Manpower Training are satisfied, it is recommended that the CSCC Consolidated Woodworks Plant Project be re-activated and implementation activities be resumed under the concepts and guidelines set forth in this Report ;
2. External technical assistance, possibly from the UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION, should be sought in the finalization of plans, their implementation, including Project Management and Plant Operations, until such time when the local UNDERSTUDIES have been sufficiently trained to take over management and operation of the new woodworks plant ;
3. Based on the basic assumptions and considerations used in the financial projections and analysis, the Project is deemed economically viable ; and
4. Financial assistance should be extended to the Coastal Strip Carpentry Co-operative in the implementation of the revised Project plans as its current financial position cannot support the capital outlay required by the revised plans.

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

TERMS OF REFERENCE

This is a study, including marketing aspects, for determining the future development plans, investment and training needs of the Coastal Strip Carpentry Co-operative's plans to consolidate and expand the manufacturing operations of the three member units in Mukalla, hereinafter known as the "Project". The following topics are covered in this study :

- i - Markets and Plant Capacity ;
- ii - Raw Materials Situation ;
- iii - Location and Site ;
- iv - Project Engineering ;
- v - Organization ;
- vi - Manpower Requirements ;
- vii - Training Needs
- viii - Implementation Scheduling ;
- ix - Requirements for Technical Assistance ; and
- x - Financial and Economic Evaluation.

Recommendations for corresponding actions to be taken by the Co-operative's management, the local and central authorities of PDRY and possible future technical assistance for the proper implementation of the revised plans for the consolidation and expansion of the Co-operative's operations, based on the Expert's findings, are also submitted in this study.

PROJECT BACKGROUND

The Coastal Strip Carpentry Co-operative, with head offices in Mukalla, Hadhramaut Governorate, was established in 1973 when 150 members pooled their resources to form the Co-operative. Manufacturing operations under CSCC started in 1974. Government supervision of the Co-op's activities at that time was exercised by the Ministry of Agriculture. CSCC, since then, has engaged in the manufacture of fishing boats, construction woodworks and furniture products. Its

manufacturing units have grown from three to six in 1980 : 4 units in Mukalla City; one unit in Ghail Bawazir (40 kms. northeast of Mukalla) and one in Shihir (65 kms. east). The manufacturing units in Mukalla were : the fishing boat manufacturing unit in Baabood; the Bajaber unit producing bedroom furniture; the Radfan unit producing school, office and home furnishings; and the 26th of September unit producing doors and windows and other construction woodworks products. However, the manufacture of fishing boats was abandoned in 1981. The 26th of September unit was thus moved from the city to Baabood, the location of the former fishing boat manufacturing unit.

Sales volume increased from YD305,000 in 1976 to YD922,300 in 1980. In 1979, the CSCC's management took note of the increasing demand for their products. With the approval of the Ministry of Agriculture, the CSCC launched a programme to consolidate the manufacturing units in one compound at Al-Jol Mashah, about 15 kms. east of the City proper, on the road to the new Riyan Airport. Increase in production capacity was expected on the basis of a larger plant area and additional new equipment (of the same combination type of machines as those currently used by the Co-op's units) to be used in the new site, but using the same production techniques as they still use to-date.

Implementation of the consolidation project was launched without the benefit of a market study, nor a pre-feasibility study. It appears that the new project is expected to produce the same lines of products (more than 120 items) which are being manufactured by the Co-op at present. Whatever conceptualization on the Project existed, were all in the mind of the General Manager of CSCC, Mr. Ahmed Salem Aldigel.

However, the increase in annual sales diminished from 1980 to 1981, so that by 1982 the total sales are expected to be at just about the same level as in 1981 --- a little over one million Yemen Dinars. (see Table I). Lack of production space and old machinery have been claimed as the principal causes for this negative trend in the Co-op's earning performance.

T A B L E I

ANNUAL SALES VOLUME

C. S. C. C., 1976 - 1982

| <u>Year</u> | <u>Total Sales Volume</u> | <u>% Change vs. Previous Year</u> |
|-------------|-------------------------------|---------------------------------------|
| 1976 | US\$ 890,426 | |
| 1977 | 1,409,101 | + 58.3 % |
| 1978 | 1,628,475 | + 15.6 % |
| 1979 | 1,965,691 | + 20.7 % |
| 1980 | 2,688,975 | + 36.8 % |
| 1981 | 2,939,889 | + 9.3 % |
| 1982 | 2,629,305 * | - 10.6 % |

Note : * Extrapolated from January to June
1982 Sales.

In 1980 supervision of the Co-operative's activities was transferred to the Ministry of Industry. At the instance of the Assistant Deputy Minister (for Production), a team of Ministry officials and UNDP experts

led by Mr. K. P. Mahalingam, UNIDO Industrial Expert, was dispatched to Mukalla to conduct a survey of the Co-op's manufacturing facilities, to identify its problems and submit appropriate recommendations for its future activities. The team's findings led to the recommendation, among others, for the conduct of this study on the Co-op's expansion project. Upon the request of the Government, UNIDO recruited an expert in the production of Furniture and Joinery, Mr. Horatio P. Brion, who was in the PDRY from 12 August to 9 November 1982. His duties are given in the job description annexed as Appendix I.

RE-ORIENTATION OF THE STUDY

During a series of meetings with high officials of the Ministry of Industry in late August, this Expert was requested to view the Mukalla carpentry project within the context of the industry as a whole in the Republic.

The decision to look into the Mukalla carpentry project in relation to the Republic's woodworking industry later proved to be well taken and relevant to this mission, for it was confirmed during the market study phase of this mission that a significant portion of the CSCC output serve the construction woodworks and furniture needs of the neighboring IV and VI Governorates of the Republic.

1.0 CURRENT STATUS OF THE INDUSTRY

1.1 The Industry on the National Level

Visits to all the carpentry shops (see Appendices II to IV within the public and co-operative sectors (Aden Carpentry Enterprise, all units of the Coastal Strip Carpentry Co-operative, and all units of the Seihum Carpentry Co-operative) showed the following general characteristics of the industry in the Republic :

- i - Technology Level - All units are operating at the craftsman/artisan level, in spite of the use of some basic woodworking machinery. Manufacturing activities are still principally based on the skill of the carpenter to repair or revise machined parts to make them fit together.
- ii - Product Quality - There is no Quality Control at all. Thus, all products are generally of much lower quality compared to the currently accepted international standards for furniture and joinery products of equivalent price ranges.
- iii - Workshop Outputs - The Units' outputs are much lower than those shops of the same sizes operating on more advanced technological levels in other developing countries.
- iv - Product Costs - In view of the low labour productivity, the high rate of materials wastage, and the complete dependence of the industry for imports of raw materials, product cost is high.
- v - Product Lines and Designs - The product lines of each workshop unit is highly diversified. Although some manufacturing units have restricted their production activities to specific types of products, still the number of variations in the design of the products

being produced does not allow "serial production" at a level which can bring benefits from economies of scale. While the aesthetic aspects of the design is acceptable to the local market, it can not be considered as truly representative of Arabian art to make the furniture marketable in foreign markets. Furthermore, the functional and structural aspects of the furniture design have to be improved to give them better and longer service life. The product range of C.S.C.C. is given in Table :

- vi - Machinery Utilization and Maintenance - Inadequate machinery maintenance, poor maintenance of cutting and surfacing tools, lack of spare parts and proper maintenance supplies lead to frequent and prolonged machinery breakdown, and, hence, idle time. Improper usage of machinery and equipment also contributed greatly to machinery damage and break-down. Techniques of feeding materials into the machines do not make use of the total productive capability of the machines.

- vii - Housekeeping and Organization of Process Flow - All Units are handicapped with the extensive clutter of production wastes (sawdust, ripping and trimming offals, etc.) so that valuable manufacturing space is wasted to hold such woodwaste materials. Machinery and work station lay-outs in almost all Units do not permit smooth flow of work-in-process from one work station to another ; and, further aggravated by the low levels of machine utilization, lead to low production outputs. Solutions to these immediate problems could easily provide another 15% to 20% additional output from the same old machines and available floor space.

1.2 The Consolidated Woodworks Plant Project of the CSCC

As best as could be gleaned from information and construction plans made available by officials of the Co-operative, it appears that the new factory operations will be a magnified

T A B L E II
SALES BREAKDOWN BY THE PRODUCT
C. S. C. C., 1981 - 1982

| Item No. | Products/Services Sold | Average Unit Price * US\$ | No. of Units | 1 9 8 1 | | 1 9 8 2 (Jan. - June) | |
|-------------------|--|------------------------------|--------------|-----------------------|--------------|--------------------------|--|
| | | | | Total Sales (US\$) | No. of Units | Total Sales (US\$) | |
| 1. | Boats | 3,086 | 15 | 46,288 | --- | --- | |
| 2. | Clothes Cabinet | 266 | 1,298 | 345,124 | 735 | 195,429 | |
| 3. | Beds | 159 | 1,130 | 179,298 | 407 | 64,579 | |
| 4. | Desks/Tables | 76 | 1,423 | 107,808 | 1,085 | 82,201 | |
| 5. | Chairs | 93 | 3,104 | 288,859 | 826 | 76,869 | |
| 6. | Bathroom Cabinets | 123 | 1,026 | 126,587 | 522 | 64,404 | |
| 7. | Shelves | 89 | 616 | 55,113 | 345 | 30,867 | |
| 8. | Office Cabinets | 129 | 253 | 32,552 | 340 | 43,745 | |
| 9. | Kitchen Cabinets | 145 | 572 | 83,097 | 187 | 27,166 | |
| 10. | Curtain Blinds | 20 | 1,360 | 27,390 | 930 | 18,730 | |
| 11. | Billboards | 17 | 78 | 1,316 | 668 | 11,268 | |
| 12. | Picture Frames | 14 | 401 | 5,480 | 1,871 | 25,567 | |
| 13. | Ladder | 59 | 4 | 236 | 788 | 46,566 | |
| 14. | Electrical Switch Boxes | 15 | 1,941 | 29,353 | 3 | 45 | |
| 15. | Bread Dough Rolling Pin and Plate | 144 | 525 | 75,380 | 563 | 80,836 | |
| 16. | Coffins | 106 | 18 | 1,913 | 4 | 425 | |
| 17. | Doors with Jambs | 97 | 3,369 | 326,469 | 1,784 | 172,876 | |
| 18. | Widnows with Sills | 84 | 6,726 | 562,729 | 3,860 | 322,957 | |
| 19. | Truck Frames/Bodies | --- | 63 | 98,570 | 14 | 21,904 | |
| 20. | Novelties | --- | 20 | 562 | 3 | 84 | |
| 21. | Decors | --- | 33 | 25,093 | 37 | 28,134 | |
| 22. | Furniture Repair Jobs | ? | 190 | 95,364 | ? | --- | |
| 23. | Lumber Re-sawing and re-trimming Services | ? | 216 | 54,004 | ? | --- | |
| 24. | Hardware Item Sales, including Assembling Services | ? | 508 | 79,061 | ? | --- | |
| 25. | Other Income, e.g. Sale of wood- wastes, etc. | ? | --- | <u>292,245</u> | ? | <u>---</u> | |
| T O T A L S ----- | | | | <u>2,939,889</u> | | <u>1,314,653</u> | |

Notes : a) Translated from Arabic text furnished by C. S. C. C.

b) *Based on 1981 average unit prices, rounded off to nearest US\$1.00.

c) ? unknown.

replica of the present craftsman level of operations of the workshop units within the Co-operative. Considering the sizable amount of money already spent for the acquisition and development of site at Al-Jol Mashah, the cost of the materials for five buildings imported from France, and the cost of erection of three of the five buildings, preliminary calculations indicate that for the Project to be economically viable, the new factory's target outputs should be several times more than the current production volume of the entire Co-operative.

Thus, the following moves are essential to a rational planning and development of the Project :

- i - Selection of product lines which will provide a continuous market for the Co-operative ;
- ii - A review and revision of the designs of these products to facilitate serial production ;
- iii - Preparation of the current work force for the transition from craftsman type of production operations to industrial manufacturing ;
- iv - Preparation of the current managerial and supervisory staff for adequate and effective management and control of manufacturing operations under the new plans ; and
- v - The introduction of new types of basic technologies in wood processing which are suitable to local conditions in the country, and the up-grading of existing technologies which are to be used in the new scheme of manufacturing operations.

2.0 CONCEPTUALIZATION FOR THE NEW PROJECT PLANS

A determined effort towards development of the woodworking industry in the Republic will require a serious rationalization of the manufacturing operations through the following :

- 2.1 The production of STANDARD PRODUCT LINES which have assured markets, such as school furniture and furnishings, construction woodworks (doors, windows, etc.), and home and office furniture and furnishings. This concept will help the industry maximize the use of its manufacturing facilities and help keep down unit product costs through a more intensive and planned use of labor and primary raw materials (sawn-timber and wood-based panels).
- 2.2 Distance coverage of the marketing and distribution activities of the industry's products will be extended through the manufacture and transport of "knocked-down" (not completely assembled) products, to be assembled at assembling centers strategically located within the areas served by the industry (see Figure 1).
- 2.3 A quasi-formal delineation of areas of marketing activities of the industry's three major manufacturing groups (The Aden Carpentry Enterprise, the Seihun Carpentry Co-operative and the CSCC) will help the respective management staffs formulate workable and more realistic marketing and manufacturing programmes. This concept suggests the following scheme and spheres of marketing activities (see Figure 1) :

- i - The Aden Carpentry Enterprise, based in Aden, I Governorate, will supply the furniture and construction woodworks needs of I, II and III Governorates ;
- ii - The Coastal Strip Carpentry Co-operative, based in Mukalla, Hd.G., will attend to the needs of the southern areas of the IV, V and VI Governorates ; and
- iii - The Seihun Carpentry Co-operative, based in Seihun, Hd.G., will serve the needs of the northern and northeastern areas of the IV, V and VI Governorates.

Under this plan, the CSCC is expected (as recommended by the Office of the Governor, Hd.G) to produce about 60% of the woodworks products needs of the IV, V and VI Governorates,

- LEGEND:**
- Country Boundaries
 - - - Governorate Boundaries
 - - - District Boundaries
 - Highways
 - Main C.S.C.C. Factory
 - * Assembling Centers
 - ⊙ National Capital
 - Major Towns

- GOVERNORATES & DISTRICTS:**
- 1st Gov. - ADEN
 2nd Gov. - LAHEZ
 2- Toben Dist.
 3- Redfan Dist.
 4- Dhalee Dist.
 5- Yaffee Dist.
 3rd Gov. - ABEN
 6- Khanter Dist.
 7- Leder Dist.
 8- Medie Dist.
 4th Gov. - ATAZ
 9- Melle Dist.
 10- Sylee Dist.
 11- Neseb Dist.
 12- Behan Dist.
 13- Mafed Dist.
 5th Gov. - NADHRAMAUT
 14- Mofehager Dist.
 15- MUKALLA Dist.
 16- Govee Dist.
 17- Quteen Dist.
 18- Aber Dist.
 19- Themoud Dist.
 20- Selhun Dist.
 21- Shihir Dist.
 6th Gov. - ALGHIDA
 22- Shihout Dist.
 23- Qulshen Dist.
 24- Alghida Dist.
 25- Noel Dist.

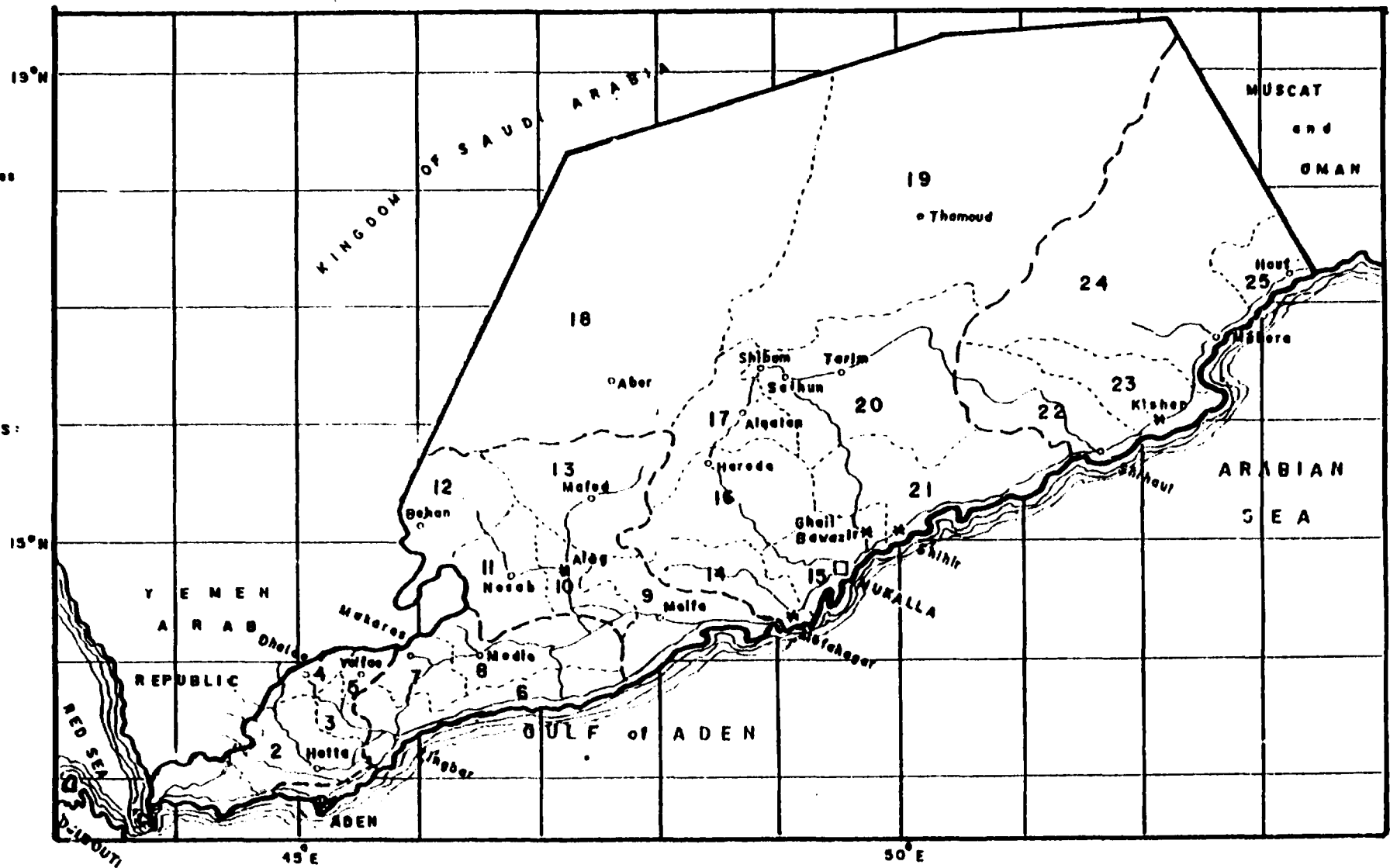


FIGURE 1

Locations and Distribution of Manufacturing and Marketing Facilities, C.S.C.C.

Note : Adopted from P.D.R.Y. Map Prepared by the Central Statistics Office, Ministry of Planning, Aden

Scale-1 : 2,000,000 kms.
 December 1980

while the Seihum Carpentry Co-operative will take care of the remaining 40%.

3.0 THE MARKET

Limited studies (see Appendices V to VI), based on the available data for the IV, V and VI Governorates were conducted to determine the market potential for selected furniture and construction woodworks products currently being produced and sold by the CSCC. The calculated market potential for the V Governorate (Hd.G) was confirmed by statistics furnished by the branch office of the Ministry of Education in the governorate and other government agencies, such as the Central Statistics Office, the National Company for Home Trade, etc.

Thus, it is held that the basic assumptions used in the calculations of the market potential are reliable enough to provide a basis for the rationalization of the revised Project plans.

Table III shows the maximum annual market potential as estimated from the above-mentioned calculations for the period 1986 - 1995.

Table IV lists the calculated plant capacities for the new CSCC factory based on 60% of the market volumes indicated in Table I.

4.0 THE PLANT CAPACITY AND MANUFACTURING SCHEME

Under the concepts set forth in the preceding paragraphs the following scheme will be followed in the planning and design of the CSCC consolidated woodworks plant at Al-Jol Mashah :

- i - The manufacturing facilities will include a primary line for standard woodworks products and a secondary smaller line for special products.
- ii - Standard woodworks products will be manufactured on a regular "mass production" basis and will be sold from inventory ; while special products will be

T A B L E I I I

ANNUAL MAXIMUM MARKET POTENTIAL
OF SELECTED WOOD PRODUCTS IN
IV, V AND VI GOVERNORATES

| <u>Products</u> | <u>F o r</u> <u>V Gov., Only</u> | <u>F o r</u> <u>IV, V and VI Gov.</u> |
|-------------------------|-------------------------------------|--|
| Pupil's Desk | 8,300 Units | 12,100 Units |
| Pupil's Stool/Chair | 11,100 Units | 15,900 Units |
| Teacher's Table | 150 Units | 210 Units |
| Teacher's Chair | 160 Units | 230 Units |
| Classroom Cupboard | 160 Units | 230 Units |
| Doors w/Jamb Assembly | 6,500 Units | 9,500 Units |
| Windows w/Sill Assembly | 13,000 Units | 19,000 Units |
| Clothes Cabinet | 4,700 Units | 6,800 Units |
| Folding Chair | 6,400 Units | 9,200 Units |
| Filing Cabinet | 600 Units | 800 Units |

(Note : The projection for the market potential for filing cabinets is based on CSCC sales for 1980 - 1982. No data for a more reliable projection is available.)

T A B L E IV

CALCULATED MAXIMUM PLANT CAPACITIES

FOR SELECTED WOOD PRODUCTS

C. S. C. C. CONSOLIDATED WOODWORKS PLANT PROJECT

| <u>Products</u> | <u>F o r V Gov., Only</u> | <u>F o r IV, V and VI Gov.</u> |
|-------------------------|-------------------------------|------------------------------------|
| Pupil's Desk | 5,000 Units | 7,300 Units |
| Pupil's Stool/Chair | 6,700 Units | 9,500 Units |
| Teacher's Table | 100 Units | 150 Units |
| Teacher's Chair | 100 Units | 150 Units |
| Classroom Cupboard | 100 Units | 150 Units |
| Doors w/Jamb Assembly | 3,900 Units | 5,700 Units |
| Windows w/Sill Assembly | 7,800 Units | 11,400 Units |
| Clothes Cabinet | 2,800 Units | 4,100 Units |
| Folding Cabinet | 3,800 Units | 5,500 Units |
| Filing Cabinet | 400 Units | 500 Units |

designed to use some basic components common with standard products and will be produced and sold on a "Job Order" basis. Under this scheme special products are expected to cost more than the corresponding standard product and thus require a higher selling price.

iii - Production facilities at the CSCC consolidated wood-working plant will be based on a 1-shift, 7-hours per day, 264 days per year work schedule. Initial plant capacity will serve the needs of the V Governorate. Production targets will be gradually increased later as the workers gain proficiency in the use of the newly acquired skills and machines, to meet the needs of the IV, V and VI Governorates through the installation of a second, and if needed, a third work shift.

iv - The manufacturing technology to be used in the new plant will be based on maximum possible utilization of machinery and equipment, and will include the following basic technologies necessary for the growth and advancement of the industry, but which are not heretofore used effectively in PDRY. :

- a - Proper choice and use of adhesives ;
- b - Proper choice and use of production abrasives ;
- c - Finishing/surface coating (Painting Material systems and Application Techniques) ;
- d - Product engineering* ;

*Involves the translation of the designer's ideas and presentation drawings of the furniture and woodworks items in terms of production parameters, e.g. the preparation of working drawings, choice of economic sizes of material inputs, preparation of operations sequence sheets, determination of minimum economic size of production runs, etc.

- e - Quality Control, covering :
 - raw materials and major production supplies ;
 - materials-in-process ;
 - finished goods ;
 - materials testing and development ; and
 - design, fabrication and proper use of metal gauges for component parts of standard product lines.

f - Upholstery ;

g - "Knocked-down" furniture fittings ; and

h - Tool and machinery maintenance.

v - The scheme also requires that the following technologies currently being used on a limited and/or lower levels of development will be up-graded :

a - Design, fabrication and proper use of production fixtures ;

b - Panel lamination (for special products' major components) ;

c - Materials handling and storage ;

d - Materials management ;

e - Production control ;

f - Cost control and costing system for multi-product manufacturing systems ; and

g - Upholstery techniques.

4.1 Annual Plant Production Targets

Based on the working habits and ability to assimilate new technology, as determined by this Expert during four weeks of observations and limited actual involvement in the manufacturing operations of the three units in Mukalla, the

gradual escalation of annual production targets as shown in Table IV is recommended.

It is suggested that the above-mentioned production targets be reviewed annually, at least 4 months before the end of each year, with a view to ascertaining realistic target levels for the following year. Furthermore, additional woodworks items will be included in the STANDARD PRODUCTS LINE, provided the market demand assures the judiciousness of such action. In this connection, certain parameters must be established to help determine whether a product type is eligible to be included in the Standard Products Line. Special Products will continue to be manufactured at up to 20% of the target total annual volume of sales.

4.2 Alternative Product Lines

The production facilities of the proposed woodworking plant will also be capable of manufacturing such other woodworks products as : vegetable packing crates, soft drinks and beer cases, curtain blinds, beds, etc., which are all in demand in PDRY. Eventually, a small shop for wooden toy manufacturing may be erected within the compound with the following major objectives : a) to convert trimming, ripping and sizing off-cuts into marketable products, and b) to expose and familiarize young boys (most possibly children of factory workers) to woodworking production techniques.

Maximization of the utilization of production woodwaste may be further realized in the future by converting sawdust and shavings into marketable products such as fuel brickettes, extender material for glue mix, etc.

5.0 PRE-REQUISITES FOR APPROVAL OF RESUMPTION OF IMPLEMENTATION ACTIVITIES UNDER THE REVISED PROJECT PLANS

The results of an evaluation of the capabilities of the production and supervisory personnel at the various workshop units and the head offices of CSCC indicated that its personnel and its current system of management ARE NOT ADEQUATELY PREPARED to undertake

the implementation of a Project of the magnitude indicated by the market potential.

Thus, certain steps should be taken simultaneously with the decision to continue the Project under the plan recommended in this Report. PARTIAL or NON-FULFILLMENT of the PRE-REQUISITE PREPARATORY STEPS WILL JEOPARDIZE the TECHNICAL FEASIBILITY and ECONOMIC VIABILITY of the Project. Resumption of the Project under the new programme of activities and production levels should NOT BE ALLOWED unless there is assurance that the following Pre-requisite Preparatory Steps will be implemented :

----- Prepare the workers, the supervisory and managerial staffs to undertake the new methods of manufacturing operations under the proposed scheme, thus helping accelerate the assimilation of the technical and managerial "KNOW-HOW" which will be made available under the assistance programme described in succeeding paragraphs. It is VITAL and NECESSARY to the success of the Project, and to help assure sustained growth of the Industry in the Republic, as a whole, for the following training programmes to be formulated and implemented even before the resumption of the pre-operating activities of the Project :

- i - Machinery Maintenance and Repair ;
- ii - Tool Grinding (Sharpening) Techniques and Maintenance, including Machine Set-up ;
- iii - The Design, Fabrication and Proper Use of Production Jigs and Fixtures ;
- iv - Product Design and Product Engineering ; and
- v - Modern Management and Supervisory Techniques.

----- Technical assistance from external sources, most possibly the UNIDO, on the finalization of the detailed plans for the Project under the new concepts of operation set in previous paragraphs, its implementation, and the training of the local personnel in all aspects of woodworks manufacturing,

as stated above, until such time as they attain the necessary skills and proficiency levels to operate and manage the woodworks plant themselves. This technical assistance programme should cover the following :

- i - The formulation and subsequent implementation of plans for up-grading of skills set as Pre-requisite Preparatory Steps to the resumption of the Project as described in the preceding paragraph ;
- ii - Management of the implementation activities of the Project ;
- iii - Technical ADVICE on and SUPERVISION of the :
 - a - Selection and acquisition of new machinery and equipment ;
 - b - Design and construction of the required additional buildings and structures ;
 - c - Design, fabrication and installation of a woodwaste disposal system ;
 - d - Design, fabrication and installation, and the proper use of production jigs and fixtures ;
 - e - Design, fabrication and installation of the following ;
 - electric power supply system ;
 - water supply system ;
 - compressed-air supply system ; and
 - materials handling and storage system, both in-doors and out-doors.;
 - f - Design, development and installation of the following management control and information systems ;
 - production control and materials management systems ;

- quality control and materials testing systems ;
- cost reporting and control system ; and
- product engineering and product development programme.

which are all geared to be adequately responsive to the needs of a multi-product manufacturing scheme of operations ;

- iv - The training of the work force in the proper operation and maintenance of the machinery and equipment new to them, and in maximizing the utilization of all pieces of machinery and equipment in the new factory ;
- v - The selection and training of UNDERSTUDIES for key factory positions from among the available qualified local staff of the Co-operative, and if necessary, from sources other than the Co-op's manpower resources, to enable them to efficiently manage and operate the new factory eventually ; and
- vi - Direction, administration, control and management of the operations in the new factory until such time when the local UNDERSTUDIES are deemed sufficiently trained to manage and operate the plant by themselves.

5.1 Rationale for Pre-Requisite Conditions

Detailed observations of all the five member workshops units and the head office management staff of CSCC, (Appendices II to IV) indicate that they are not adequately prepared to plan, implement such plans and operate a woodworking plant of the magnitude indicated by the market study. The absence of an engineering staff (see Figures 2 & 3) further denies CSCC of the technical support required in the rationalization and implementation of plans for the proposed consolidated woodworks plant.

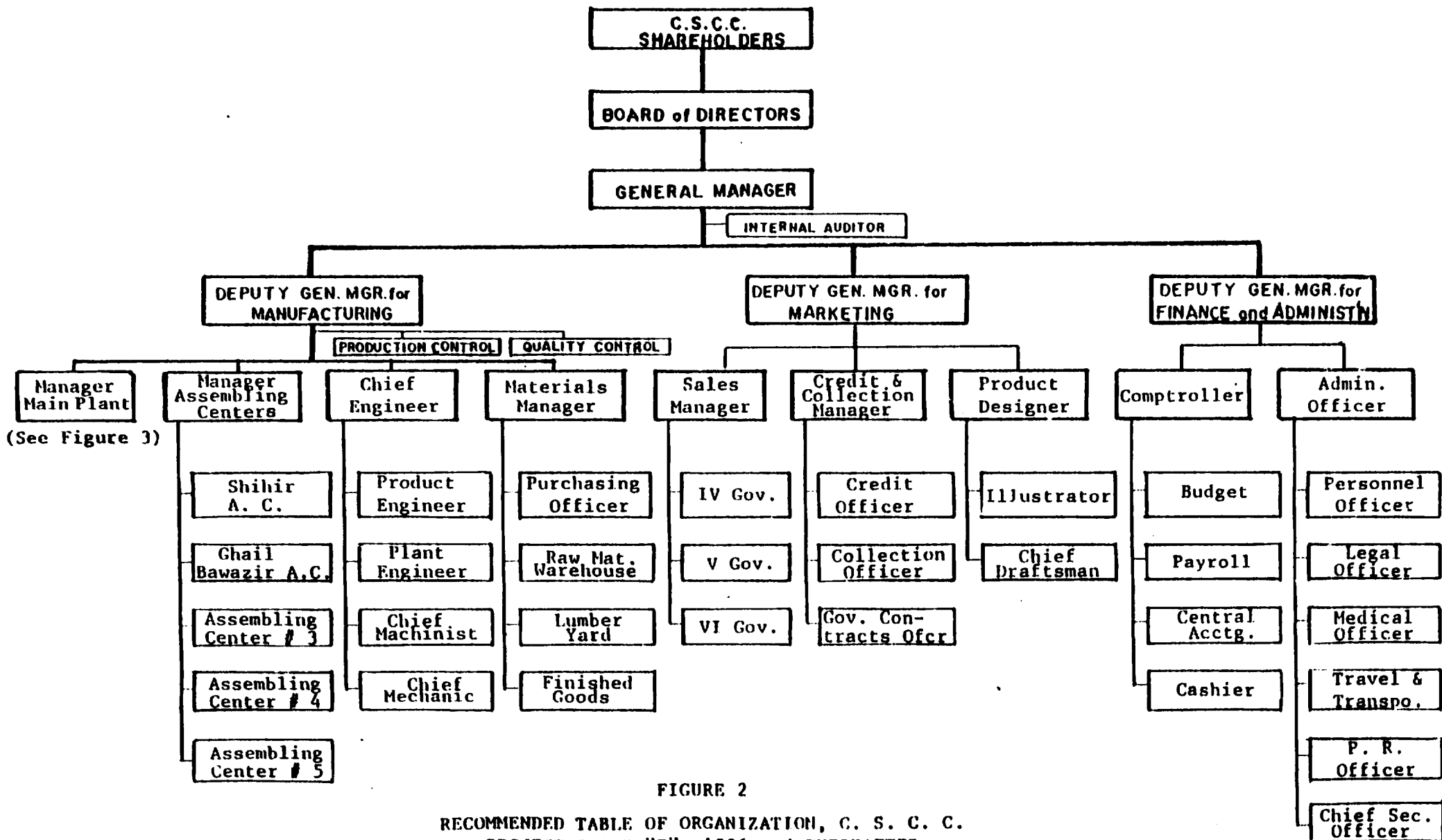
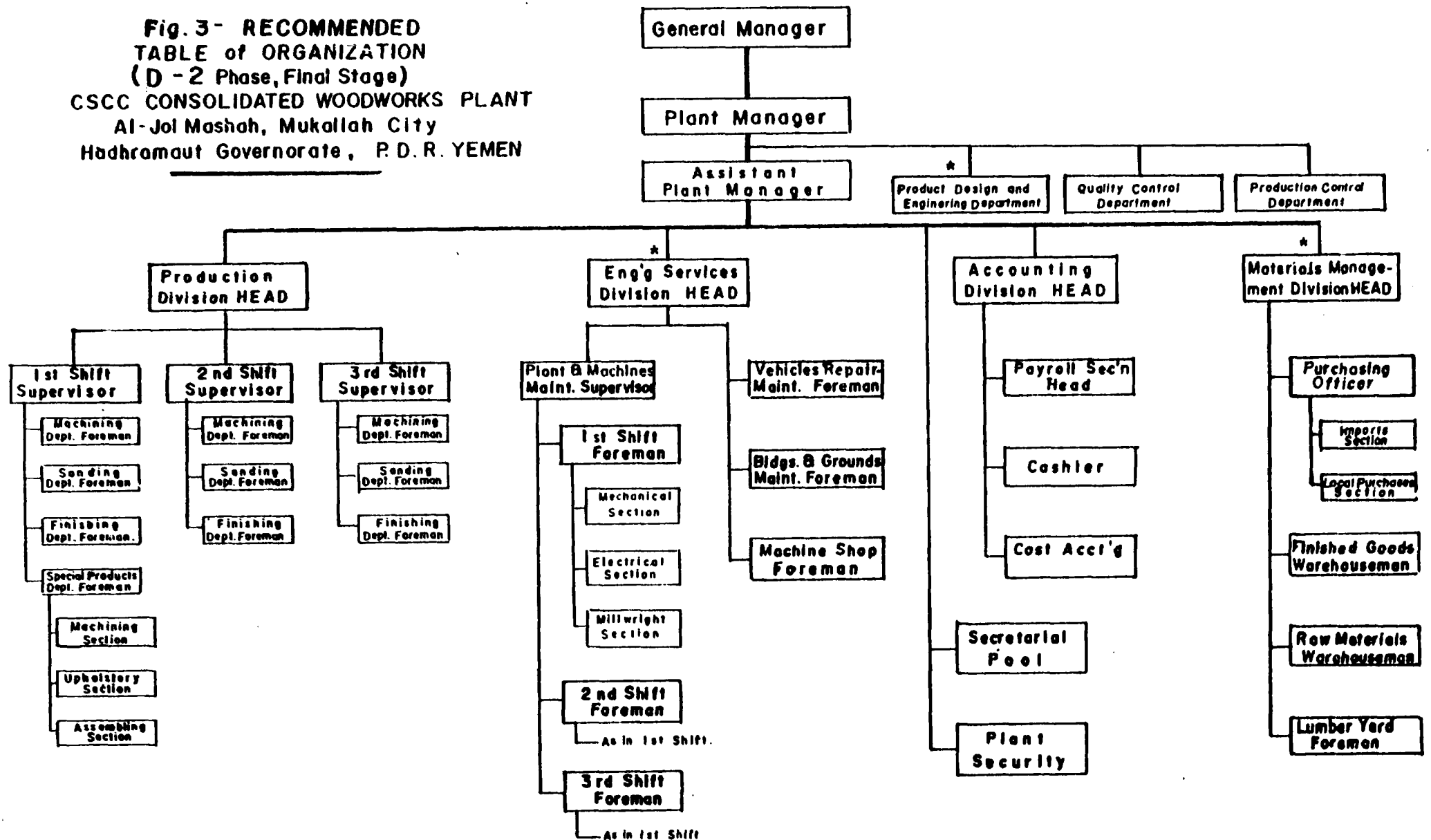


FIGURE 2
 RECOMMENDED TABLE OF ORGANIZATION, C. S. C. C.
 PROJECT STAGE "E", 1996 and THEREAFTER

**Fig. 3- RECOMMENDED
TABLE of ORGANIZATION
(D - 2 Phase, Final Stage)
CSCC CONSOLIDATED WOODWORKS PLANT
Al-Jol Mashah, Mukallah City
Hadhramaut Governorate, P. D. R. YEMEN**



- Note :
- a) *To be transferred to other CSCC Divisions under PROJECT STAGE "E", FULL and SUSTAINED OPERATIONS.
 - b) One work shift only for Phases C-1, C-2 and C-3, Project Initial Stage
 - c) Second and Third Shifts to be installed, if needed, only in Phases D-1 and D-2, Project Final Stage

Furthermore, about 85% of the machinery and equipment complement of the new woodworks plant will be totally new to the present personnel complement of CSCC. These new machinery will require production techniques, cutting tools design, grinding and maintenance, and machinery maintenance procedures which have never been practiced by the current work force.

It will be a very expensive and time-consuming proposition to introduce the modern production, and tools and machinery maintenance techniques after the new woodworks plant has been erected and the new machinery and equipment complement is already installed because the high production machines will magnify the cost of errors which are expected to occur during the training period. It is expected that the preparatory training programmes will help minimize such errors.

Thus, the pre-requisite preparatory training conditions have been imposed to help accelerate the assimilation of new technology and assure the technical feasibility and economic viability of the Project.

5.2 PDRY Government's Role in the Development of the Industry

The present level of development of PDRY's furniture and joinery industry has lagged far behind current manufacturing technology of the industry. The need for steps to put the industry in a position to avail of the cost-saving features of modern manufacturing techniques is made more imperative by the fact that except for certain nail sizes and some paint products, all the material inputs of the industry are imported. Furthermore, PDRY has been importing significant quantities of builders' woodworks and furniture (see Table V).

The seriousness of the situation is indicated by the inability of the furniture and joinery manufacturers to maintain properly the old pieces of machinery and equipment as these machines are not manufactured any more and likewise,

T A B L E V

P.D.R.Y. ANNUAL IMPORT OF WOODEN FURNITURE
AND BUILDERS' WOODWORKS PRODUCTS

=====

| Imported Items | <u>1 9 7 8</u> | | <u>1 9 7 9</u> | | <u>1 9 8 0</u> | | <u>1 9 8 1</u> | |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|
| | <u>YD</u> | <u>US\$</u> | <u>YD</u> | <u>US\$</u> | <u>YD</u> | <u>US\$</u> | <u>YD</u> | <u>US\$</u> |
| Builders' Woodworks | 52,577 | 153,286 | 25,819 | 75,274 | 109,496 | 319,230 | 116,635 | 340,044 |
| Wooden Furniture | <u>34,731</u> | <u>101,257</u> | <u>162,736</u> | <u>474,449</u> | <u>106,664</u> | <u>310,974</u> | <u>1,000,216</u> | <u>2,916,081</u> |
| Total | <u>87,308</u> | <u>254,543</u> | <u>188,555</u> | <u>549,723</u> | <u>216,160</u> | <u>630,204</u> | <u>1,116,851</u> | <u>3,256,125</u> |

Note : Data furnished by the Central Statistics Office, P.D.R.Y.

there are no spare parts for the machines. Furthermore, the production techniques currently used by the industry are still at the artisanal level, i.e., machined parts still have to be reworked and fitted by hand to form the complete product assembly, thus resulting to wasteful utilization of material, machines and labour. Inadequate and improper maintenance of cutting tools further compound the problem.

The CSCC Project provides a very good opportunity for the industry to take a meaningful forward step to put it in a position to avail of the benefits to be derived from modern woodworking technology, which is expected to develop further and faster than it has been developing during the last five years. Thus, unless concrete steps are taken now by the PDRY Government, and the CSCC, in particular, to develop the local furniture and joinery industry to a point which will enable it to efficiently use the changing technology on the manufacture of furniture and woodworks products, the local industry may stagnate and require huge capital outlays (much bigger than the present requirements) to put the industry on a level which will enable it to utilize effectively the available resources and technologies for the benefit of the Republic and its people.

The PDRY government's decision on the CSCC Project to consolidate, up-date and expand its manufacturing operations will greatly affect the future of the industry in the Republic.

Of prime importance, regardless of whatever decision the PDRY government will make on the proposed CSCC Project, is the implementation of the preparatory training programmes for the work force and managerial staff of the co-operative, for these are deemed very essential to the development of the industry whether the Project is continued or not.

6.0 MARKETING AND DISTRIBUTION

Some initial customer resistance to the new line of Standard Products may be expected. Special efforts are therefore necessary to promote these products at the start of the marketing operations under the new CSCC programme of activities. Display rooms, highlighting the Standard Products lines should be established in the capitals of the three Governorates and the towns where assembling centers are located. Display rooms may eventually be opened in other towns as required by the local marketing situation.

Under this program assembling centers will be strategically located, based on the geography, population and economic conditions of the area. The present workshop units in Ghail Bawazir and Shihir will be converted to assembling centers, with limited production facilities for Special Products. Similar assembling centers are required initially at another location east of Shihir, possibly at the capital town of the VI Governorate, and at two other towns west of Mukalla city (one each at the capital and another large town of the IV Governorate).

The marketing and distribution activities will be planned and controlled at the CSCC head offices in Mukalla City.

Studies on market potential, plant capacity and annual production target for the CSCC project are given in Appendices VII to VIII.

Marketing data on furniture and joinery products were not readily available during this Expert's tour of duty in PDRY. Data on the future needs of the Republic for the products could not be made available for it appears that the period of interest to the CSCC Project is too far in the future.

The limited time available to the Expert did not make it possible to conduct market surveys on quantity requirements, customers' likes and dislikes about designs and styles, price levels, etc. of furniture and joinery products. The methodology used to determine the market potentials for the various groups of furniture and joinery products is principally based on the growth of the national and school populations of PDRY for the period 1986 - 1995.

Preparation of the four studies presented in Annexes V to VIII relied mainly on demographic data obtained from the Statistical Yearbook 1980, PDRY, prepared by the UN/ECWA in cooperation with the PDRY Ministry of Planning. Other relevant information gathered from both government and private sectors were also used to supplement the data provided by the Statistical Yearbook. Visits to three Schools (primary, secondary and trade schools) gave an idea on the type, quantity and design requirements of school furniture and furnishings. Visits to private homes, arranged by officials of the CSCC, provided information on the home furniture and furnishings requirements of typical Yemeni families in government-owned residential flats. These visits also provided information on the doors and window requirements of typical flats. Interviews with occupants of these flats also provided valuable information on the life styles of the people pertinent to home furniture needs.

The results of these limited studies are by no means held very accurate in view of the approximate nature of the basic assumptions and considerations used in the calculations of projected figures for the period 1986 - 1995. However, for purposes of establishing acceptable levels of plant capacity and annual production targets for the proposed CSCC plant, the calculated values are deemed sufficient and reliable.

7.0 THE RAW MATERIALS AND SUPPLIES SITUATION

Except for common wire nails and some paint materials, all production raw materials and supplies are imported.

Local distribution of the imported items is done through the National Company for Home Trade. Sawnwood and wood-based panels (plywood, hardwood, etc.), glue, sandpaper, etc. are purchased by the Co-operative from the National Company for Home Trade; while Formica (melamine formaldehyde base), furniture hardware and woodscrews are directly imported (duty free) by the Co-op under the law which grants Co-operatives such privilege. A major portion of the sawnwood imports come from Malaysia, some from India and white wood (pine) from Austria.

Hardware (locks, hinges, etc.) and woodscrews are imported from the People's Republic of China; while Formica comes mainly from Japan. Finishing materials not available from the paint factory in Aden, are imported from the United Kingdom and other European countries.

The National Company for Home Trade, through the National Company for Foreign Trade, imports sawnwood and wood-based panels mainly to supply the buildings and construction needs of the country. In view of the Republic's strict policies on the conservation of foreign exchange, unit prices of the imported production materials and supplies have become the predominant parameter for the choice of these items. Thus, the sizes and grades of the sawnwood and wood-based panels available to the Co-operative are mainly for the building and construction industry. This condition adds to the myriad of problems the Co-operative has to tackle in its efforts to produce the furniture and construction woodworks needs of the nation.

All sawnwood imported and distributed by the National Company for Home Trade is ungraded lumber. Plywood panels are chiefly in the "D" and "E" grades, and at times, shop grade.

The Co-op could not import sawnwood and plywood directly as its annual requirement for the materials is too small for shipment purposes. Thus, at the moment, it is therefore impossible to introduce the concept of "quality materials for quality finished goods" in the Co-operative for the present materials supply conditions allow this to be done only by descriptive means, rather than the most effective way through physical illustration of the need for better grade materials for the furniture industry, there being no better grade materials available locally. It is thus a common occurrence during a day's (7-hours) production run to find hard, medium and soft species sawnwood being processed on the same machine, using the same cutting blade, which is not conducive to proper machining of the wooden components of the furniture product.

However, this situation may be expected to improve as a result of two factors : a) the higher volume requirements of the new factory will put the Co-operative in a position to import directly all its production materials and supplies requirements ; and b) direct shipment to Mukalla (instead of the present method using Aden as port of discharge for imported items) has now become almost a reality, for the activities to construct an international seaport in Mukalla has been recently resumed. The port is expected to be operational in 2 or 3 years time. Then and only then, can materials quality control be instituted within the Co-operative.

8.0 PROJECT ENGINEERING

8.1 Plant Site and Lay-Out



Figure 4 is a location map of the new factory compound at Al-Jol Mashah. Figure 5 shows the proposed plant site lay-out under the new scheme of operations and using the existing three buildings. The salient features of the proposed lay-out are as follows :

- i - Further site development activities to include the construction of 15,000 square meters of sawnwood yard (out-door storage for sawnwood and air-drying area) and adequate drainage system ; and
- ii - The construction of the following buildings and structures using locally available materials as much as possible :
 - A 20,000 gallon, 60-feet high elevated water tank, for fire-fighting and domestic use ;
 - A warehouse of light construction materials for in-door storage of air-dried sawnwood, plywood and other production materials and supplies, with 7,500 sq.m. floor area and 4.5 meters floor-to-ceiling space ;
 - A totally enclosed and isolated storage shed for finishing materials, approximately 3 x 5 x 10 meters, with clay brick walls and galvanized iron

Figure 4
SITE LOCATION PLAN
 C.S.C.C. Consolidated Woodworks Plant
 Project, Al-Jol Mashah, Mukalla

Scale:- 1 : 8,000

Legend:-

-  Electric Power Transmission Poles
-  Abandoned Old Highway

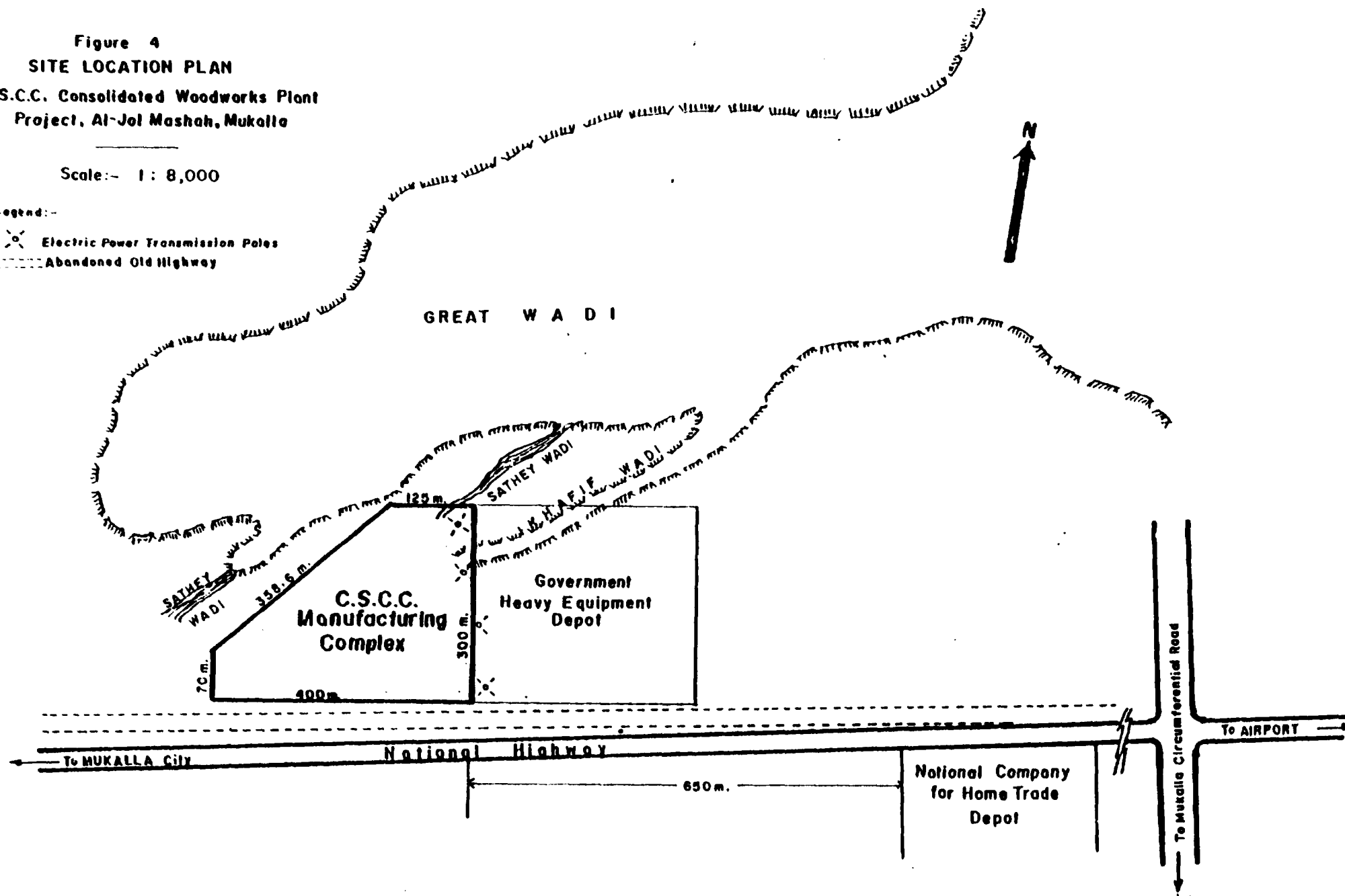


Fig. 5 - PLANT SITE LAY-OUT

CSSC CONSOLIDATED WOODWORKS PLANT

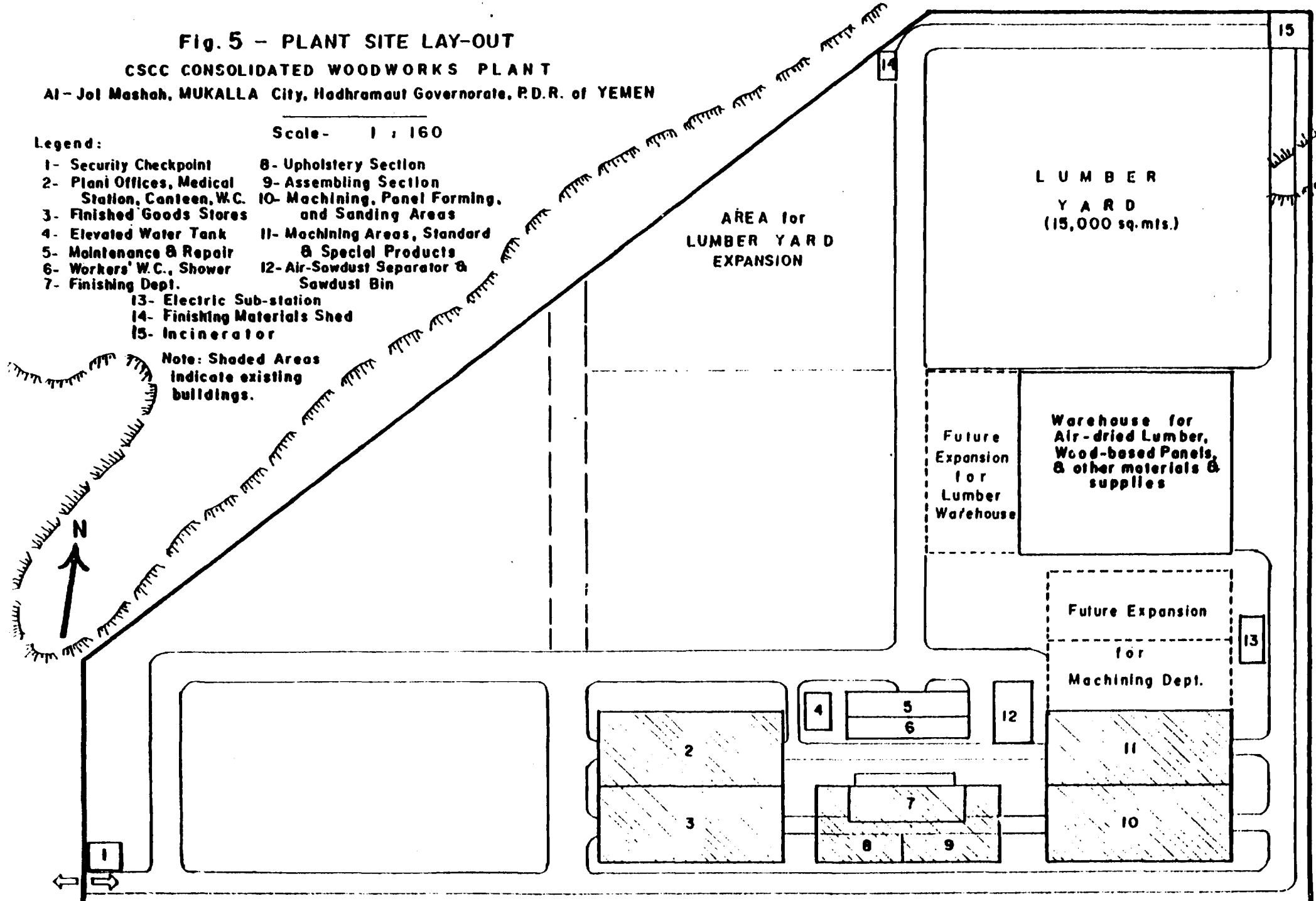
Al - Jol Mashah, MUKALLA City, Hadhramaut Governorate, P.D.R. of YEMEN

Scale - 1 : 160

Legend:

- | | |
|--|--|
| 1- Security Checkpoint | 8- Upholstery Section |
| 2- Plant Offices, Medical Station, Canteen, W.C. | 9- Assembling Section |
| 3- Finished Goods Stores | 10- Machining, Panel Forming, and Sanding Areas |
| 4- Elevated Water Tank | 11- Machining Areas, Standard & Special Products |
| 5- Maintenance & Repair | 12- Air-Sawdust Separator & Sawdust Bin |
| 6- Workers' W.C., Shower | |
| 7- Finishing Dept. | |
| 13- Electric Sub-station | |
| 14- Finishing Materials Shed | |
| 15- Incinerator | |

Note: Shaded Areas indicate existing buildings.



roofing, adequately ventilated ;

- Connecting covered ramps between the existing three buildings, approximately 3 meters wide, with a slope of not more than 4 per cent, and with reinforced concrete floors to allow passage of loaded production trucks weighing approximately 1,000 kg;
- An incinerator for burning unrecoverable wood-waste and combustible trash daily ;
- A machine maintenance and repair shop, approximately 8 x 40 meters floor area, using light construction materials ;
- A shed, made of light construction materials, with concrete hollow blocks or clay brick walls to house the workers' comfort rooms, shower stalls and dressing area, approximately 8 x 40 meters floor area ;
- A road network to allow access of a 3-ton fork-lift from the sawwood yard to the machinery building, and from one building to another ;
- Isolation (for fire-security purposes) of the northern half of the existing middle building (25 x 60 meters), with locally made clay bricks or concrete hollow blocks, and with a collecting system for overspray dust, to house the Finishing (painting) Department ; and
- Installation of a fire-hydrant pipework system for fire-security purposes.

8.2 The Machinery and Equipment Complement

Working drawings were prepared for the recommended initial set of Standard Products. Corresponding Operations Sequence Sheets were drawn-up based on the working drawings and the Operations List given in Appendix IX. Using the outputs

and machine usage indicated in the Operations Sequence Sheets, the machinery requirement given in Table VI was calculated to match the corresponding annual production targets under each Phase given in Table VII.

As examples, the working drawings given in Appendix X and the corresponding Operations Sequence Sheets (Appendices for the Pupil's Desk, Clothes Cabinet and Raised Panel Doors with Jamb Assembly are illustrated.

The scheme of manufacturing operations, material inputs, final dimensions, machinery used, production outputs and other relevant data for the manufacture of component parts (as given in the Product Parts Lists) of three woodworks products (Pupil's Desk, Clothes Cabinet and Raised Panel Doors) are presented in the Appendices as illustrative examples of some of the Product Engineering activities indicated for the rationalization of the manufacturing activities for products recommended to be included in the standard products line.

During the Initial Stage of the Project (Phases C-1, C-2 and C-3, Figure 6), attention should be given to the review and updating of production outputs and material specifications, for these manufacturing parameters are expected to change significantly during the Stage as the workers gain more skill in their jobs, better techniques are developed and new materials are found to give more economic production costs. In the future, periodic reviews of the Operations Sequence Sheets, at least once a year, should be conducted to up-date the standard parameters of production operations.

The following symbols and/or abbreviations were used in these Appendices :

| | | |
|------|---|-----------------------------------|
| EMC | - | Equilibrium Moisture Content |
| NGR | - | Non-Grain Raising (Type of Stain) |
| S | - | Skilled Labour Grade |
| SS | - | Semi-Skilled Labour Grade |
| US | - | Unskilled Labour Grade |
| Rev. | - | Revised |
| DF | - | Double Flute, Router Bit |
| SF | - | Single Flute, Router Bit |

pc./s. - piece per second
mm - millimeter
" - inch

All sawnwood and plywood dimensions given are in millimeters.

The machinery and equipment lay-out is given in Figure 7.

The corresponding flow process chart is given in Figure 8.

The disposition of the existing machinery and equipment in the three manufacturing units in Mukalla (Bajaber, Radfan and 26th September) is given in Tables IV-A, IV-B, IV-C in Appendix IV.

9.0 ORGANIZATION AND MANPOWER REQUIREMENTS

Based on the man-hours requirements calculated in the Operations Sequence Sheets the new woodworks plant is expected to employ 216 workers at the Initial Stage, increasing to 437 workers during the Final Stage of the Project. These do not include the manpower complement of the Head Office and the Assembling Centers.

Fig. 2 (page 23) shows the recommended Table of Organization of the CSCC, while Fig. 3 (page 24) shows the recommended Table of Organization for the consolidated manufacturing plant at the Final Stage of the Project. The same scheme applies to the Initial Stage except that the principal activities will be confined to one work shift only.

The detailed list of manpower requirements of the new factory for the Initial and Final Stages of the Project are given in Appendix XI.

9.1 Quality Control System

Initially (at C-1 Phase, Figure 6), the manufacturing

TABLE VI

MACHINERY AND EQUIPMENT REQUIRED
FOR THE VARIOUS PHASES AND STAGES OF THE PROJECT

| <u>Number of Units</u> | | | | | <u>Description of Machinery/Equipment</u> | <u>EUMABOIS Machine</u> Classification Number |
|------------------------|-----|-----|----------------------|-----|---|--|
| <u>Initial Stage</u> | | | <u>Initial Stage</u> | | | |
| <u>Phases</u> | | | <u>Phases</u> | | | |
| C-1 | C-2 | C-3 | D-1 | D-2 | | |

MACHINING AND SANDING DEPARTMENTS

| | | | | | | |
|---|---|---|----|----|--|------------|
| 1 | 1 | 1 | 1 | 1 | Hydraulic Swing Saw, Foot Operated | 12.131.122 |
| 1 | 1 | 2 | 2 | 2 | Radial Arm Saw, Manually Operated | 12.131.26 |
| 1 | 1 | 2 | 2 | 3 | Straight Line Edger, Chain Feed | 12.131.351 |
| 1 | 1 | 2 | 2 | 2 | Tilting Arbor Saw | 12.131.36 |
| 1 | 2 | 2 | 3 | 3 | Tilting Arbor Saw w/Sliding Table Extension | 12.131.36 |
| 1 | 1 | 1 | 1 | 1 | Multi-Rip Saw | 12.132.332 |
| 1 | 1 | 2 | 2 | 3 | 4-Side Planer | 12.241 |
| 1 | 1 | 2 | 2 | 3 | Planer Thicknesser | 12.211.11 |
| 1 | 1 | 1 | 1 | 1 | 4-Head Moulder | 12.34 |
| 1 | 2 | 2 | 3 | 3 | Heavy Duty Router | 12.314 |
| 2 | 2 | 3 | 3 | 4 | Portable Router | 61.231 |
| 1 | 1 | 2 | 2 | 2 | Shaper (Vertical Spindle Moulder) | 12.311 |
| 1 | 1 | 1 | 2 | 2 | Oval Double End Tenoner | 82.2 |
| 1 | 1 | 1 | 1 | 1 | Single End Tenoner | 82.1 |
| 6 | 6 | 8 | 8 | 10 | Electro-Pneumatic Drills | 12.49 |
| 1 | 1 | 1 | 2 | 2 | Louvre Slotting Machine | 12.531.2 |
| 1 | 1 | 1 | 2 | 2 | Louvre Slats Upsetting Machine | 91.24 |
| 1 | 1 | 1 | 2 | 2 | Dowel Making, Cutting, Chamfering Machine Set | 91.37 |
| 1 | 1 | 1 | 2 | 2 | Horizontal Oscillating Edge Belt Sander | 12.721.1 |
| 1 | 1 | 2 | 2* | 3 | Double Belt Stroke Sander | 12.721.21 |
| 1 | 1 | 1 | 1 | 1 | Sanding Belt Skiving Machine | N.A. |

PANEL MAKING DEPARTMENT

| | | | | | | |
|---|---|---|---|---|--------------------|------------|
| 1 | 1 | 1 | 1 | 1 | Vertical Panel Saw | 12.131.261 |
| 1 | 1 | 1 | 1 | 1 | Mechanical Press | 31.331.1 |
| 1 | 1 | 1 | 1 | 1 | Glue Mixing Tank | 54 |

SECTION 2

| | | | | |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

| | | | | |
|---|---|---|---|----|
| 4 | 4 | 6 | 8 | 10 |
| 2 | 2 | 2 | 3 | 3 |
| 2 | 2 | 4 | 5 | 6 |
| 1 | 1 | 1 | 2 | 2 |

| | | | | |
|----------|---|---|----------|---|
| Assorted | | | Assorted | |
| 2 | 2 | 2 | 3 | 3 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

| | | | | |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

| | | | | |
|----|----|----|----|----|
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 25 | 30 | 35 | 40 | 45 |

| | | | | |
|----|----|----|----|----|
| 10 | 15 | 15 | 20 | 25 |
| 8 | 10 | 12 | 14 | 16 |

| | | | | |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |
| 0 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 2 | 2 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 2 | 2 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

PANEL MAKING DEPARTMENT

| | |
|---------------------------|------------|
| Vertical Panel Saw | 12.131.261 |
| Mechanical Press | 31.331.1 |
| Glue Mixing Tank | 54 |
| Double Face Glue Spreader | 34.112 |

FINISHING (PAINTING) DEPARTMENT

| | |
|---|-------|
| Spray Guns, Pressure Feed | 61.42 |
| Spray Gun, Suction Type | 61.42 |
| Fluid Tanks, 5-gal. Capacity | N.A. |
| Stainless Steel Tank Inserts for Pressure Feed Tanks | N.A. |
| Accessories for Spray Guns | 61.42 |
| Spray Booth, Dry Type | N.A. |
| 55-gallon-drum Tumbler | N.A. |
| Paint Agitator for 5-gal. Can | N.A. |

SPECIAL PRODUCTS MACHINING LINE

| | |
|------------------------------------|-----------|
| *Bandsaw | 12.121.51 |
| *Planer-Thicknesser | 12.81 |
| *Jointer-Planer | 12.211.1 |
| *Shaper (Vertical Spindle Moulder) | 12.311 |
| *Tilting Arbor Saw | 12.131.36 |

MATERIAL HANDLING EQUIPMENT

| | |
|---|------|
| Forklift, 3-ton Capacity | 51.9 |
| Forklift, 1-ton Capacity | 51.9 |
| Machining Department Production Trucks/Dollies | 51.9 |
| Finishing Department Production Trucks/Dollies | 51.9 |
| Offal Bin Trucks | N.A. |

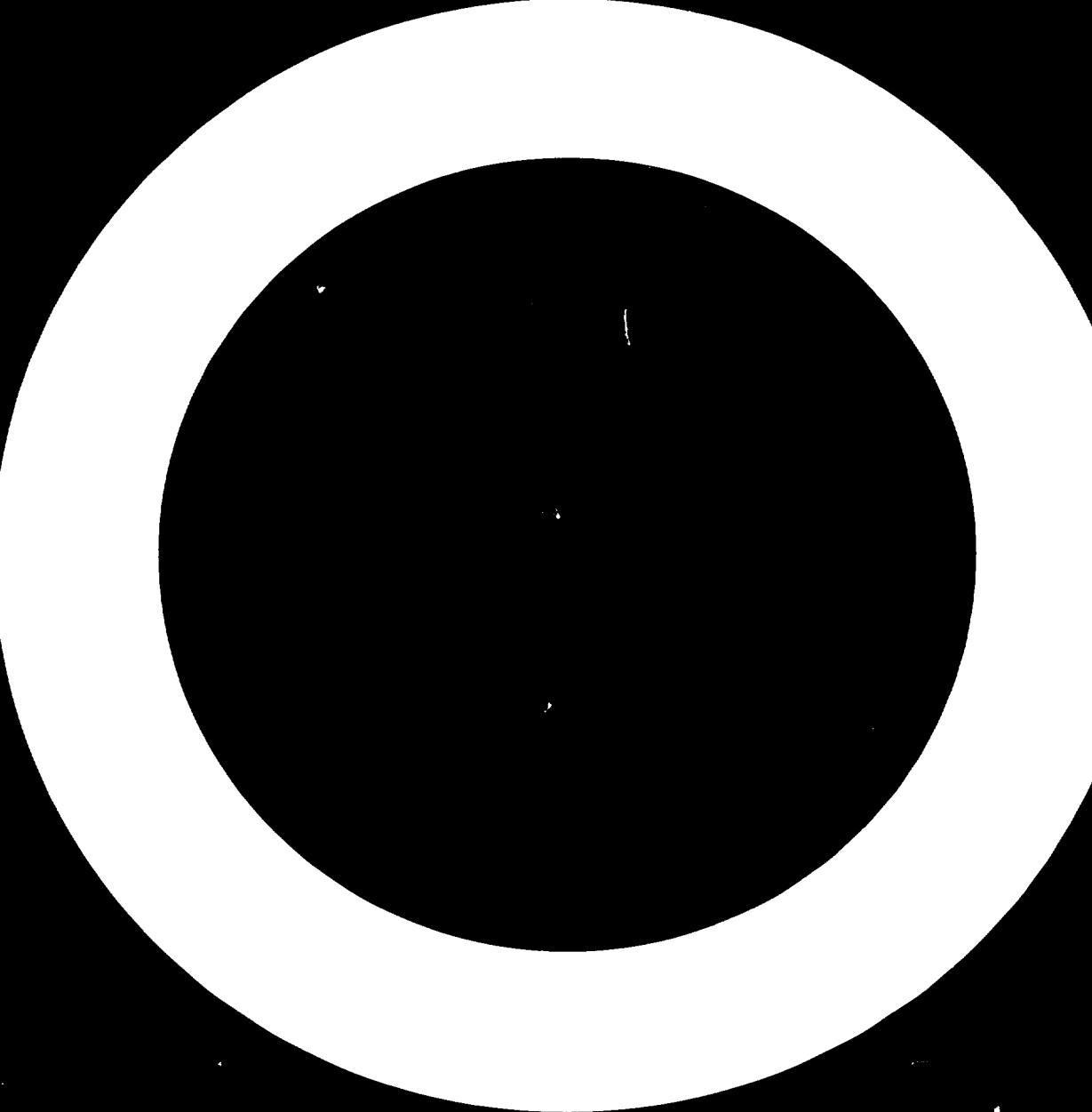
SUPPORTING MACHINERY AND EQUIPMENT

| | |
|--|---------------|
| Deep-Well Pump, 100 gpm | N.A. |
| Stand-by Diesel-Electric Generator Set | N.A. |
| *Straight Knife Grinder | 55.21 |
| Knife Profile Grinder | 55.3 |
| Circular Saw-Blade Grinder/Filer | 55.17 |
| *Bench Grinder | 55.11 |
| *Bandsaw Blade Filing and Setting Machine | 55.12 & 55.13 |
| *Bandsaw Blade Brazing Machine | 55.14 |
| Sawdust and Shavings Collection | |

SECTION 3

| 8 | 10 | 12 | 14 | 16 | Trucks/Tractors | |
|---|----|----|----------|----|--|---------------|
| | | | | | Offal Bin Trucks | N.A. |
| <u>SUPPORTING MACHINERY AND EQUIPMENT</u> | | | | | | |
| 1 | 1 | 1 | 1 | 1 | Deep-Well Pump, 100 gpm | N.A. |
| 0 | 0 | 1 | 1 | 1 | Stand-by Diesel-Electric Generator Set | N.A. |
| 1 | 1 | 1 | 2 | 2 | *Straight Knife Grinder | 55.21 |
| 1 | 1 | 1 | 1 | 1 | Knife Profile Grinder | 55.3 |
| 1 | 1 | 1 | 2 | 2 | Circular Saw-Blade Grinder/Filer | 55.17 |
| 1 | 1 | 1 | 1 | 1 | *Bench Grinder | 55.11 |
| 1 | 1 | 1 | 1 | 1 | *Bandsaw Blade Filing and Setting Machine | 55.12 & 55.13 |
| 1 | 1 | 1 | 1 | 1 | *Bandsaw Blade Brazing Machine | 55.14 |
| 1 | 1 | 1 | 1 | 1 | Sawdust and Shavings Collection and Exhaustion System | 51.512 |
| 1 | 1 | 1 | 1 | 1 | Electric Arc Welding Machine | N.A. |
| 1 | 1 | 1 | 1 | 1 | Power Hack-Saw | N.A. |
| 1 | 1 | 1 | 1 | 1 | Oxy-Acetylene Welding Set | N.A. |
| 1 | 1 | 1 | 1 | 1 | Drill Press | 12.41 |
| 2 | 2 | 2 | 2 | 2 | Electric Drill, Portable | 61.24 |
| 2 | 2 | 2 | 3 | 3 | Hand Tools Set | N.A. |
| 1 | 1 | 1 | 1 | 1 | Air Compressor | N.A. |
| <u>TRANSPORT VEHICLES</u> | | | | | | |
| 1 | 1 | 1 | 2 | 2 | Service Cars | N.A. |
| 2 | 2 | 2 | 3 | 3 | 3/4-Ton Pick-up Truck | N.A. |
| 4 | 4 | 4 | 5 | 6 | 10-Ton Delivery Trucks | N.A. |
| 1 | 1 | 1 | 2 | 2 | 3/4-Ton Panel Truck | N.A. |
| <u>Q. C. TESTING LABORATORY EQUIPMENT</u> | | | | | | |
| 1 | 1 | 1 | 1 | 1 | Laboratory Oven | 58 |
| 1 | 1 | 2 | 2 | 2 | Moisture Meter, Portable | 58 |
| 1 | 1 | 1 | 1 | 1 | Analytical Balance | 58 |
| 1 | 1 | 1 | 1 | 1 | Platform Balance | 58 |
| 1 | 1 | 1 | 1 | 1 | Shear Block Testing Machine | 58 |
| Assorted | | | Assorted | | Laboratory Tools and Accessories | N.A. |
| <u>OTHER ITEMS</u> | | | | | | |
| Assorted | | | Assorted | | Spare Parts, 1-year | N.A. |
| Assorted | | | Assorted | | Sawblades, Router Bits and other Cutting Tools | N.A. |
| Assorted | | | Assorted | | Sanding Belts, Grinding Stones and other Abrasive Supplies | N.A. |

Note : 1) All machines marked (*) will come from existing machinery.
 2) Machines marked N.A. do not have EUMABOIS classification numbers.



T A B L E VII

PROPOSED ANNUAL PRODUCTION TARGETS FOR
SELECTED PRODUCTS IN THE INITIAL STANDARD PRODUCTS LINE
C. S. C. C. CONSOLIDATED WOODWORKS PLANT

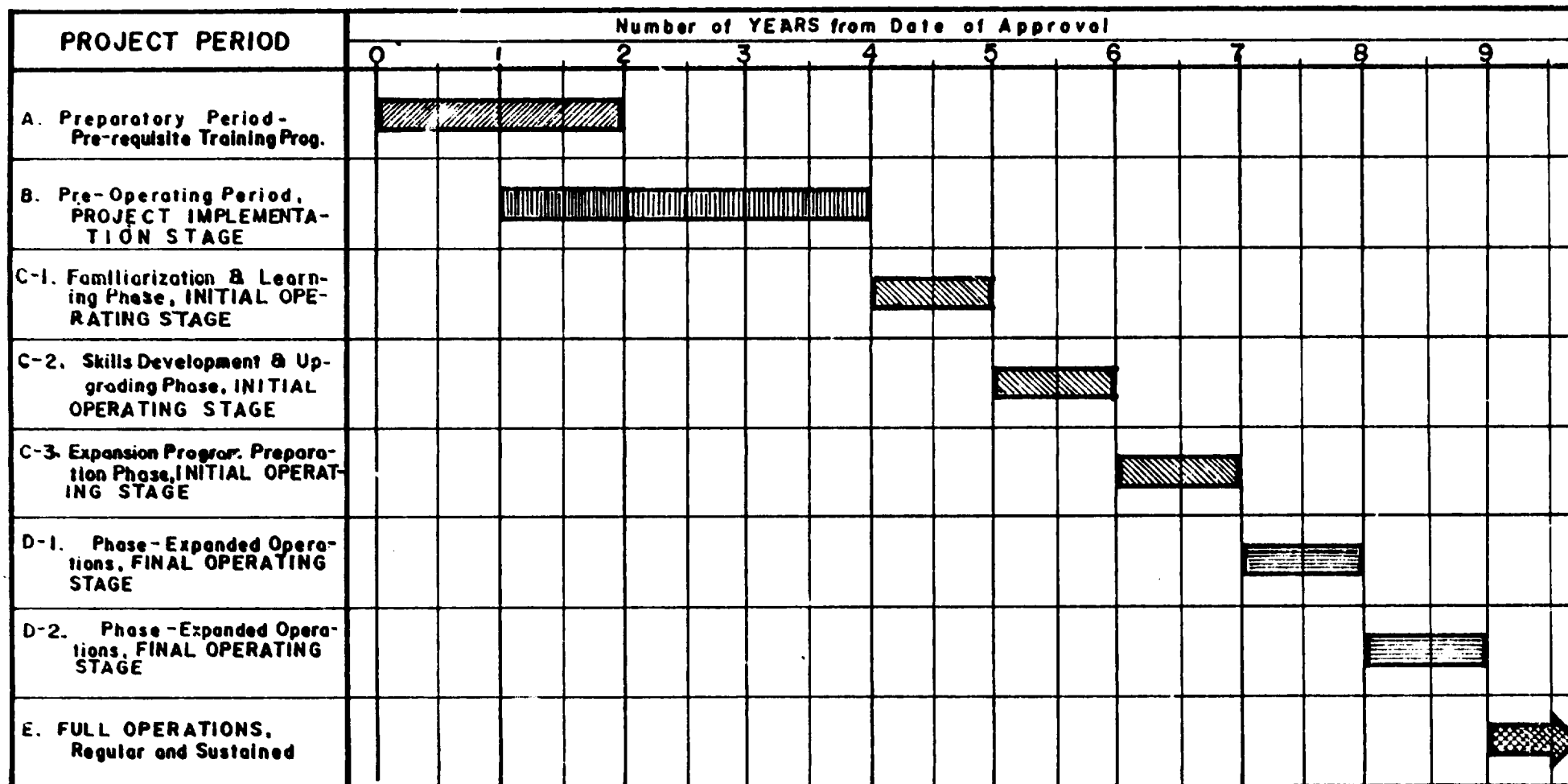
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| P r o d u c t s | <u>I N I T I A L S T A G E</u> | | | | | | <u>F I N A L S T A G E</u> | | | |
|--------------------------|--------------------------------|-------------------|------------------|-------------------|------------------|-------------------|----------------------------|-------------------|------------------|-------------------|
| | <u>C-1 Phase</u> | | <u>C-2 Phase</u> | | <u>C-3 Phase</u> | | <u>D-1 Phase</u> | | <u>D-2 Phase</u> | |
| | No. of Units | % Final Target | No. of Units | % Final Target | No. of Units | % Final Target | No. of Units | % Final Target | No. of Units | % Final Target |
| Pupil's Desk | 2,500 | 34 | 3,750 | 51 | 5,000 | 68 | 6,150 | 84 | 7,300 | 100 |
| Pupil's Stool/ Chair | 3,350 | 35 | 5,030 | 53 | 6,700 | 70 | 8,100 | 85 | 9,500 | 100 |
| Teacher's Table | 50 | 33 | 75 | 50 | 100 | 66 | 125 | 83 | 150 | 100 |
| Teacher's Chair | 50 | 33 | 75 | 50 | 100 | 66 | 125 | 83 | 150 | 100 |
| Classroom Cupboard | 50 | 33 | 75 | 50 | 100 | 66 | 125 | 83 | 150 | 100 |
| Doors w/Jamb Assembly | 1,950 | 34 | 2,930 | 51 | 3,900 | 68 | 4,800 | 84 | 5,700 | 100 |
| Windows w/Sill Assy. | 3,900 | 34 | 5,850 | 51 | 7,800 | 68 | 9,600 | 84 | 11,400 | 100 |
| Clothes Cabinet | 1,400 | 34 | 2,100 | 51 | 2,800 | 68 | 3,450 | 84 | 4,100 | 100 |
| Folding Chair | 1,900 | 34 | 2,850 | 51 | 3,800 | 69 | 4,650 | 84 | 5,500 | 100 |
| Filing Cabinet | 200 | 40 | 300 | 61 | 400 | 80 | 450 | 90 | 500 | 100 |

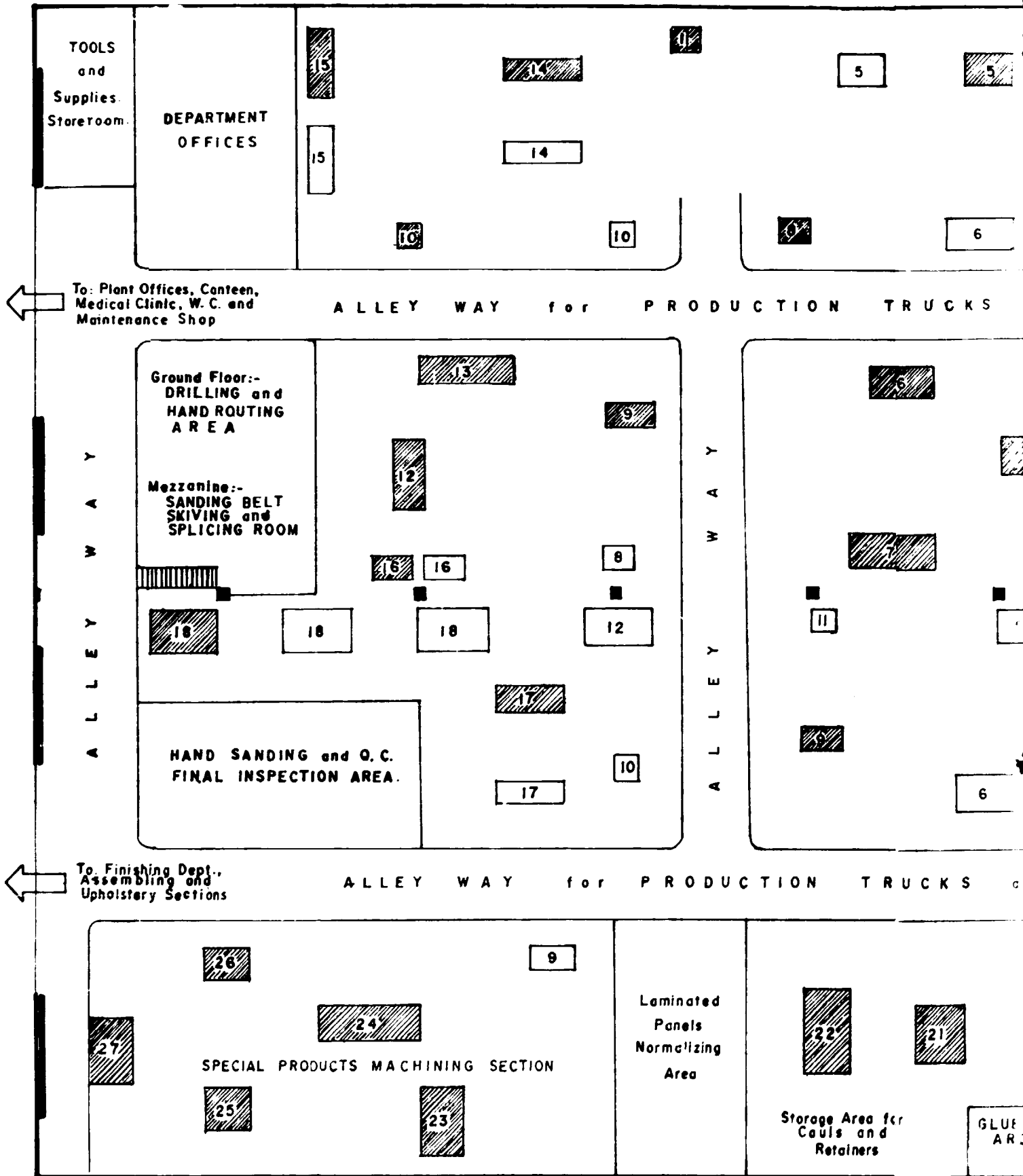
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- 14 -

Fig. 6.
PROJECT TIMETABLE
CSSC CONSOLIDATED WOODWORKS PLANT PROJECT
 Al-Jol Mashah, MUKALLA City, Hadhramaut Governorate, People's Democratic Republic of YEMEN



Note: ZERO-Date of TIMETABLE is tentatively set at 1st JULY 1983, assuming Project approval by 30 JUNE 1983.
 Please refer to App. XV for details.



SECTION 1

Fig. 7

**MACHINERY & EQUIPMENT
L A Y - O U T**

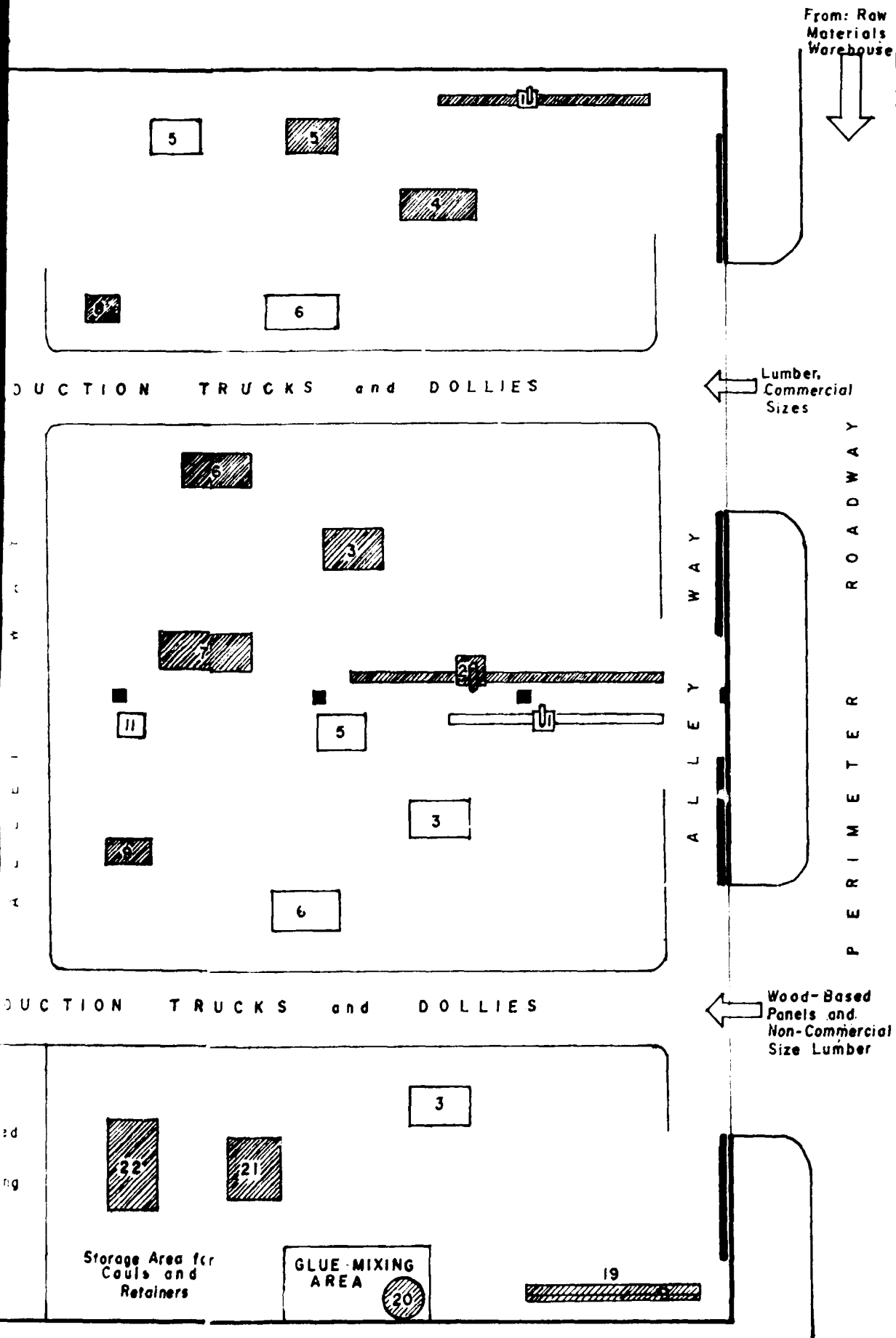
CSCC Consolidated Woodworks
Plant, Al-Jol Mashah, Mukalla,
Hadhramout Governorate,
P. D. R. of YEMEN

Legend:-

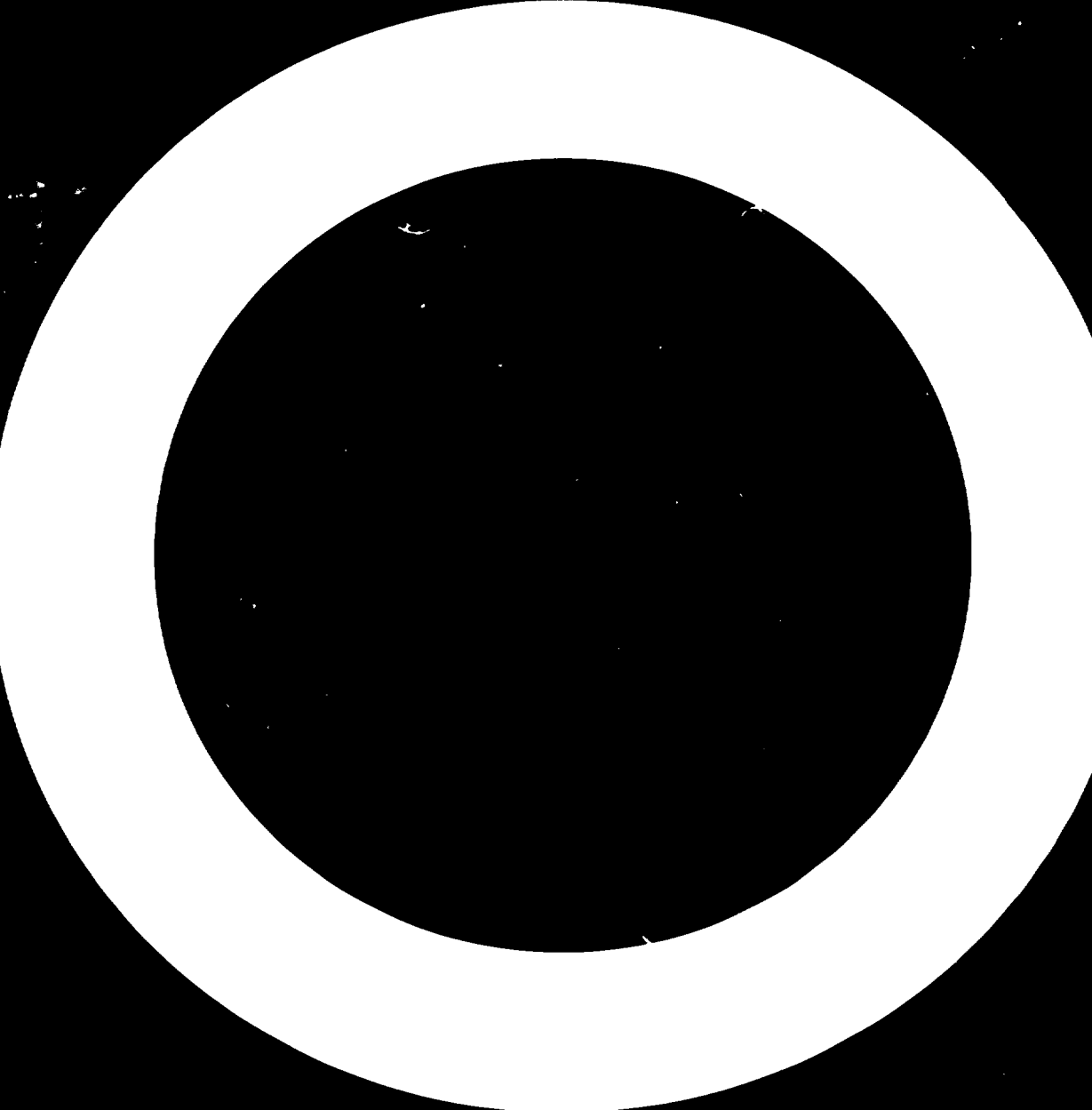
- 1 Radial Arm Saw
- 2 Hydraulic Swing Saw
- 3 Straight Line Edger
- 4 Gang Ripsaw (Multi-blade)
- 5 Planer - Thicknesser
- 6 Four-Side Planer
- 7 Four-Head Moulder
- 8 Tilting Arbor Saw
- 9 Tilting Arbor Saw, with sliding table
- 10 Heavy Duty Router
- 11 Shaper
- 12 Oval Double-End Tenoner
- 13 Single-End Tenoner
- 14 Louvre Slotting Machine
- 15 Louvre Slats Upsetting Machine
- 16 Dowel Making, Cutting and Chamfering Machine Set
- 17 Oscillating Edge Belt Sander
- 18 Double Belt Stroke Sander
- 19 Vertical Panel Saw
- 20 Glue Mixer
- 21 Glue Spreader
- 22 Mechanical Press
- 23 Bandsaw *
- 24 Jointer *
- 25 Planer *
- 26 Tilting Arbor Saw *
- 27 Shaper *

Note:- a) Machines marked * to come from Co-op Units.

b) All machines drawn with shadings are required for FIRST PHASE, INITIAL STAGE.



SECTION 2



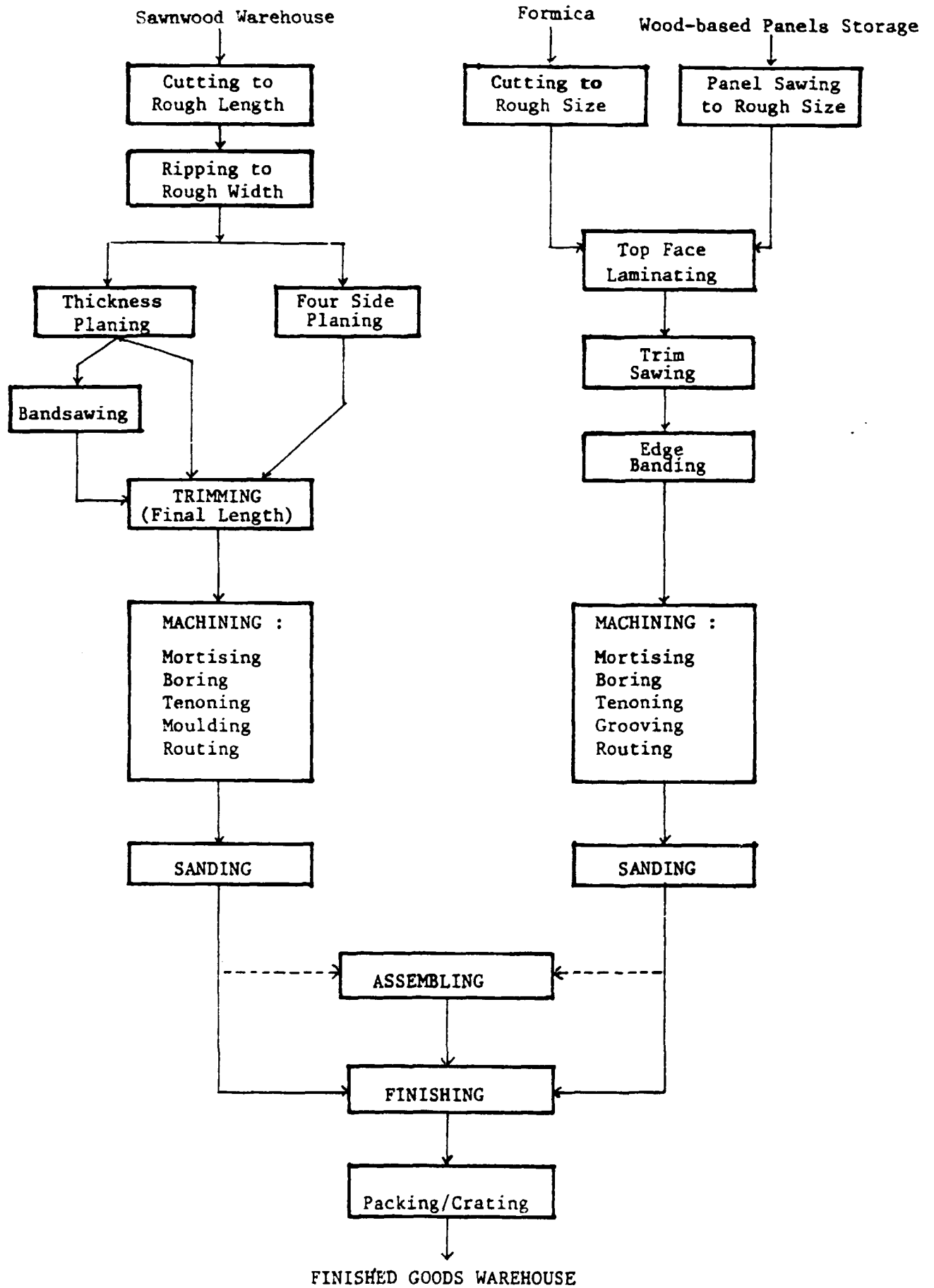


FIGURE 3

GENERAL FLOW PROCESS CHART

activities of CSCC is centered in the main factory at Al-Jol Mashah where all Standard Product Lines will be produced, together with a limited volume of special products. At the same time, the assembling centers at Shihir and Ghail Bawazir are also expected to produce limited volumes of special products, in addition to assembling the "knocked-down" products produced at the main factory. Additional assembling centers will gradually be established, so that at the Final Phase (D-2 Phase, Figure 6) another three assembling centers (one east of Shihir and two west of Mukalla City) will be performing similar assembling activities and limited production of special products.

Thus, the problem of maintaining a uniform level of product quality at the main factory and the five assembling centers may be expected to arise.

A centralized quality control system, controlled and administered from the main factory at Al-Jol Mashah is indicated. Implementation of policies on quality level and specifications set by Management will be monitored and checked by the central Quality Control Department. The successful operations of the recommended quality control system therefore revolves around a well-trained crew of Q. C. Inspectors whose principal responsibility is to assist the Production Department Heads in the main factory and the Unit Directors in the assembling centers in maintaining the desired quality level of furniture and joinery products.

All Q. C. inspectors will be trained in all phases of quality control activities, from raw materials, in-process and finished goods quality check. They will be assigned on a rotation basis, to the various phases of quality inspection and station, in the main factory and the assembling centers. The assembling centers will be supplied by the main factory with raw materials (for special products) and "knocked-down" product component for final assembling (and painting, if required) which have passed quality checks at the main factory.

The brunt of quality inspection work therefore will be borne by the "In-process Q. C. Inspectors" who will be assigned at the main factory and the assembling centers. Their regular reports to the central Q. C. Department office will be of great value to Management's efforts to improve the Co-op's product quality to meet the market's requirements.

The manpower requirements of the recommended centralized quality control system is given in Appendix XI.

9.2 Machinery and Equipment Repair

The initial capital outlay requirements for an adequately equipped machine shop which can carry out repair jobs requiring precision machining works is deemed too large for the CSCC Project. Thus, the recommended equipment complement for machinery repair and maintenance at the main factory and the assembling centers are limited to basic and simple repair equipment.

Arrangements are recommended to be made with two well-equipped machine shops in the City ; 1) The Government Central Machine Shop and 2) The Central Training Institute (a trade school) machine shop department, so that all precision machining requirements of CSCC will be done at these two shops.

9.3 Central Shop for Grinding TCT Cutting Tools

All Tungsten-Carbide-Tipped (TCT) tools from the assembling centers will be repaired, ground and maintained at the central tool maintenance shop in the main factory at Al-Jol Mashah. This is made necessary in view of the fact that the small volume of TCT tools in each assembly center can not justify the establishment of TCT servicing equipment in each Assembling Center unit.

10.0 PROJECT TIMETABLE AND PHASE OBJECTIVES

Assuming final approval of the recommended plans by the parties

concerned (the PDRY government and the agency providing technical assistance) by June 1983, the Project Timetable is given in Figure 6 (Note: This timetable is still subject to review and updating during the finalization activities for the Project Plans.)

The Operations Part, according to the recommended Timetable, covers a period of 5-years up to the time when the furniture and construction woodworks needs of the three Governorates (VI, V and VI) are fully met by the new factory. This is further divided into two main Stages : The Initial and Final Stage. The Initial Stage is further sub-divided into three Phases with corresponding Phase Objectives as follows :

- i - C-1 Phase : To familiarize the workers with the new production machinery and methods - 1 year
- ii - C-2 Phase : To further develop and up-grade the skills learned by the workers in Phase C-1, and prepare them for higher levels of production as required by the succeeding phases of the Project - 1 year
- iii - C-3 Phase : To train deserving workers for supervisory or higher skilled jobs, and new recruits for jobs required by the expansion program; to finalize and initiate implementation of the expansion program under the Final Stage of the Project ; to meet the needs of the V Governorate completely - 1 year

The Final Stage of Operations is divided into two phases, (D-1 and D-2, see Figure 6), each covering a period of 12 months, with objectives of meeting the planned increase in annual production to satisfy the needs of the IV, V and VI Governorates. A more detailed sequence of activities is given in Table IV-A in Appendix IV .

10.1 UNIDO Technical Assistance

Technical assistance should be sought from external sources as there is none available within the Republic. Should UNIDO be requested for technical assistance, the following inputs to the Project are indicated.

| No. of Personnel | Job Title | Required Work Input |
|---|---|---------------------|
| <u>Stage A - Preparatory Period (See Appendix XV and Figure 6)</u> | | |
| 1 | Woodworking Machinery Maintenance and Repair Expert | 18 Man-Months |
| 1 | Woodworking Tool Maintenance Expert | 12 Man-Months |
| 1 | Furniture Designer | 3 Man-Months |
| 1 | Product Engineering Expert | 9 Man-Months |
| 1 | Production Management and Costing Expert | 12 Man-Months |
| <u>Stage B - Pre-Operating Period (See Appendix XV and Figure 6)</u> | | |
| 1 | Project Manager | 36 Man-Months |
| 1 | Industrial Engineer | 12 Man-Months |
| 1 | Woodworks Plant Engineer | 18 Man-Months |
| As Needed | Consultants | 6 Man-Months |
| <u>Stages C and D - Operating Period (See Appendix XV and Figure 6)</u> | | |
| 1 | Project Manager | 60 Man-Months |
| 1 | Production Engineer | 60 Man-Months |
| 1 | Tool and Machinery Maintenance Specialist | 60 Man-Months |
| As Needed | Consultants | 18 Man-Months |

The corresponding Timetable for UNIDO Technical Assistance is given in Figure 9. The Job Descriptions of the various positions involved in the Technical Assistance Program are given in Appendix XII.

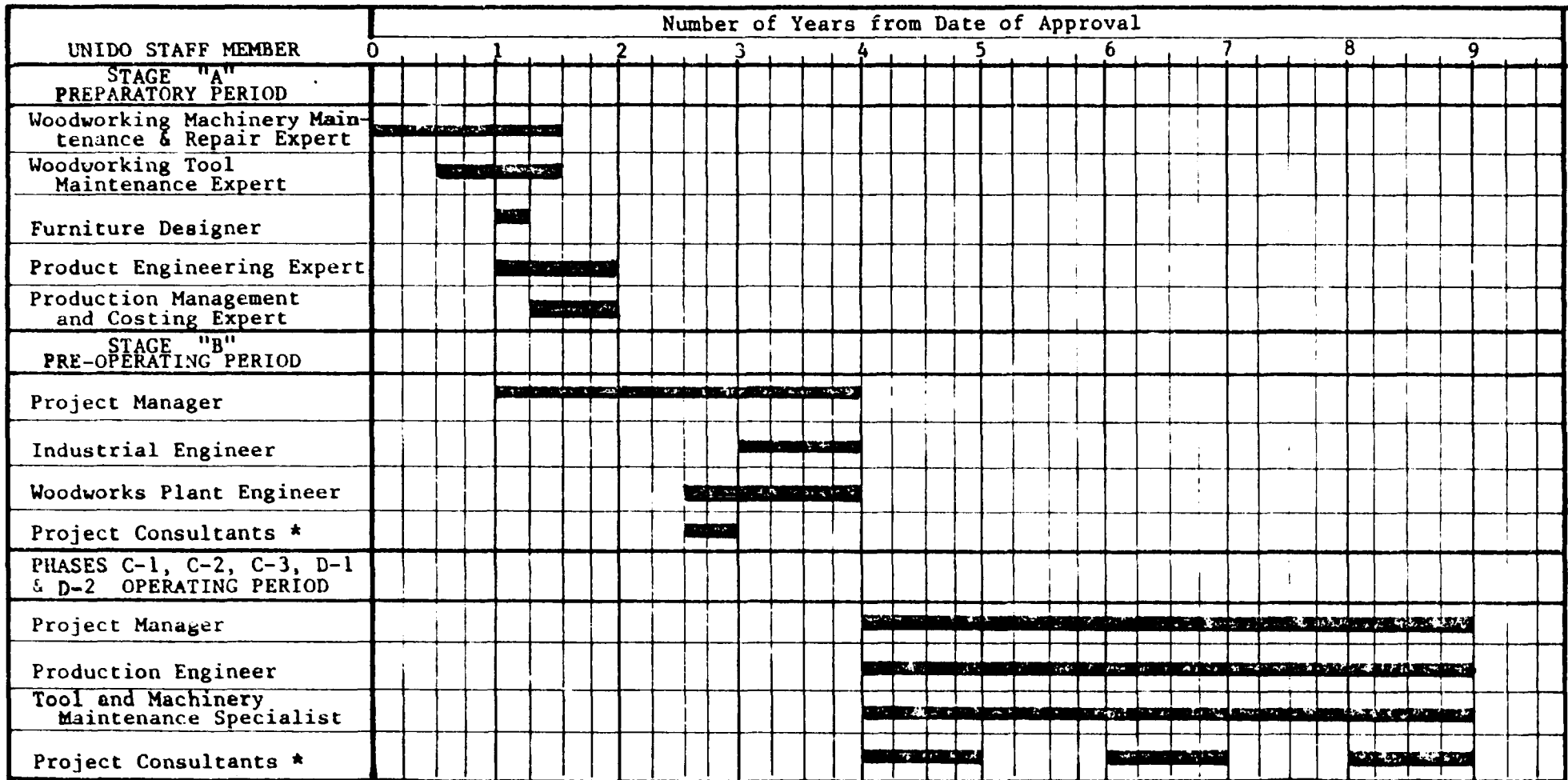
As mobility will be required of the UNIDO personnel assigned to the Project, the following schedule of Project vehicles requirement is recommended as part of the UNIDO input to the Project.

| <u>Project Period</u> (Refer to Figures 6 and 9) | <u>No. of Project Vehicles Required</u> | | |
|---|---|-----------------------------------|----------------------------|
| | <u>Existing</u> | <u>New Require- ments</u> | <u>Total Available</u> |
| Stage A - Preparatory Period | 0 | 1 | 1 |
| Stage B - Pre-Operating Period | 1 | 1 | 2 |
| Stage C - Initial Operating Period | 2 | 2 | 4 |
| Stage D - Final Operating Period | 4 | 0 | 4 |

Local costs corresponding to vehicles fuel maintenance; housing and living facilities for UNIDO personnel and their families; official domestic travel expenses; office facilities and supplies; interpreters; drafting personnel, facilities and supplies; communications, postage and other office needs of the UNIDO Technical Assistance Team shall be provided by the PDRY according to current UNIDO policies on the matter.

FIGURE 9

PROPOSED TIMETABLE, UNIDO TECHNICAL ASSISTANCE PROGRAM



Note: a) ZERO-Date of TIMETABLE is tentatively set at 1st October '83 assuming Project Approval by 30 June 1983. Please refer to Appendix XVI for details.

b) *FINAL SCHEDULE OF NEED SUBJECT TO PROJECT MANAGER'S DECISION.

11.0 INVESTMENT COSTS

A total investment of US\$4,108,020.00 (YD1,409,050.000) is required during Stage B (Pre-Operating Period) of the Project, of which US\$1,638,690.000 (YD562,070.000) is in foreign currency and US\$2,469,330.00 (YD846,980.000) is in local currency. (See Table VIII.)

Additional capital outlays are needed for balancing and expanding the production, marketing and distribution facilities of the Co-operative during the Operations Period of the Project. This includes the costs connected to the establishment of a third Assembling Center in 1986 (to be operational in 1987) and two other Assembling Centers in 1988 (to be operational in 1989). The annual itemized breakdown of the additional capital outlays is given in Table IX. The total additional capital outlay is estimated at US\$748,412.00 (YD257,704.000). The foreign currency requirement for these additional capital outlays is estimated at US\$391,412.00 (YD134,254.000); while the local currency portion is about US\$357,000.00 (YD122,451.000).

11.1 Civil Works Cost Estimates

The cost of buildings and structures (see Table X) were based on Philippine designs of similar structures, using some materials and labour cost data provided by CSCC (see Table XI). Philippine cost data, converted to PDRY cost levels (which is roughly 1.485 times Philippine costs) were used for construction items not included in the list furnished by CSCC.

11.2 Machinery and Equipment, Tools and Vehicles Cost Estimates

All imported machinery and equipment, tools, vehicles and spare parts were considered to be duty-free, in view of the privileges granted to Co-operatives under PDRY laws. FOB costs available in the Philippines were used and corresponding CIF-Mukalla costs were calculated based on shipping cost data obtained from machinery and shipping agents in the Philippines.

SECTION 1

INITIAL
C. S. C.

| C o s t I t e m | T o t a l US\$ (Equiv.) |
|---|----------------------------|
| Actual Project Expenditures as of 30 June 1982 | 1,349,082.00 |
| Cost of Additional Buildings and Structures | 550,000.00 |
| Cost of Additional Production Machinery and Supporting Equipment | 345,420.00 |
| Cost of Vehicles and Material Handling Equipment | 135,630.00 |
| Cost of Machinery and Equipment Installation* | 48,105.00 |
| Cost to complete three Existing Buildings | 150,000.00 |
| Cost of Internal Infra- structures (water, electric power, compressed- air supply systems, etc.) | 320,000.00 |
| Cost of production accessories (production trucks and dollies, work benches, metal gauges, jigs and fixtures, etc.) | 60,000.00 |
| Cost of completion of Site Development | 40,000.00 |
| Cost of New Production Supplies, 1-year supply | 20,000.00 |
| Project Administration Cost, Pre-Operating Period (Stage B)** | 150,000.00 |

T A B L E VIII

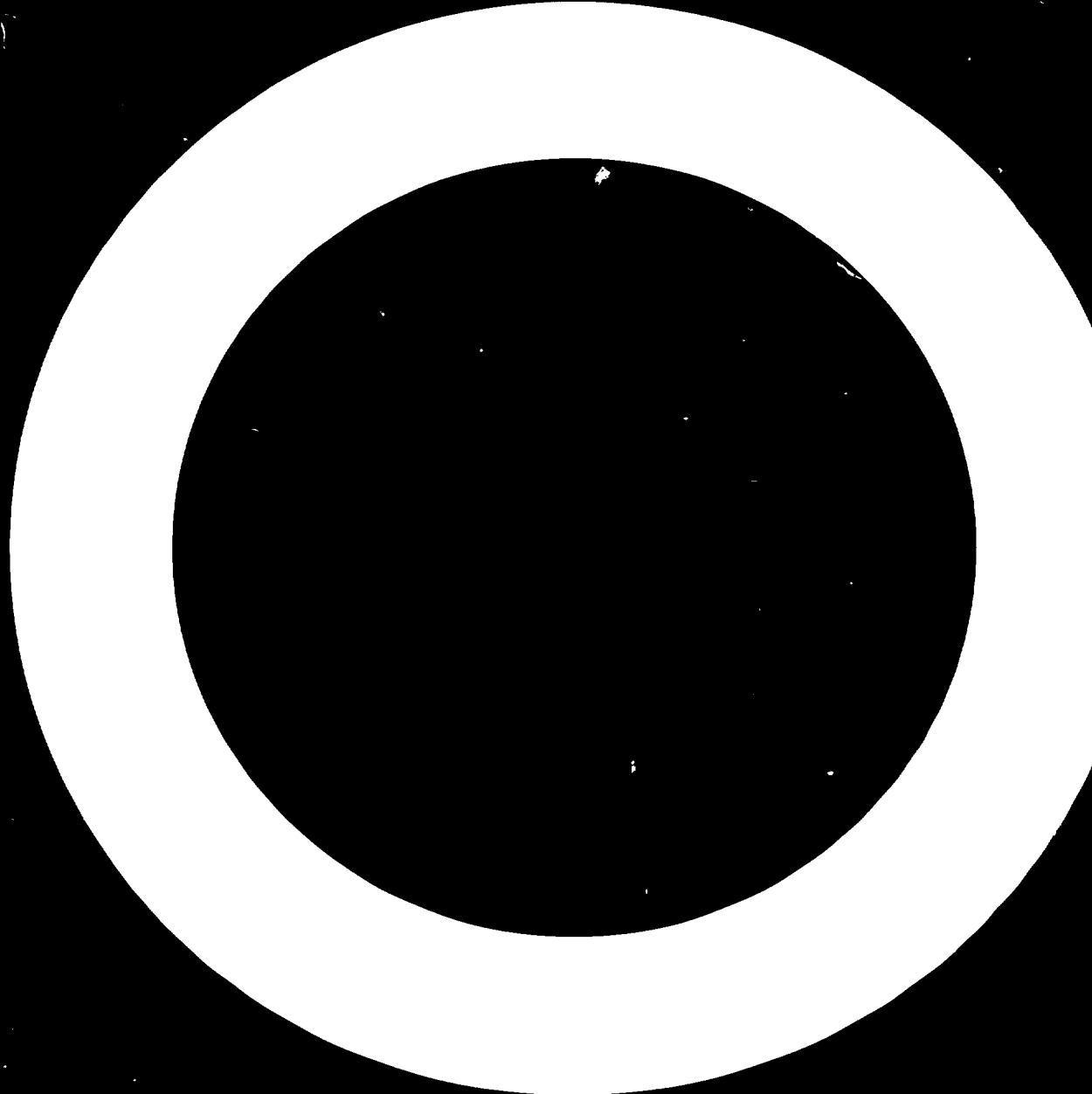
CAPITAL OUTLAY, STAGE B (See Figure 48)

C. CONSOLIDATED WOODWORKS PLANT PROJECT

| C o s t s | Foreign Currency Portion | | Local Currency Portion | |
|-------------|--------------------------|---------------|------------------------|---------------|
| | YD | US\$ (Equiv.) | YD | US\$ (Equiv.) |
| 462,735.000 | 655,977.00 | 225,000.000 | 693,105.00 | 237,735.000 |
| 188,650.000 | 385,000.00 | 132,055.000 | 165,000.00 | 56,595.000 |
| 118,480.000 | 385.420.00 | 118,480.000 | ---- | ----- |
| 46,520.000 | 135,630.00 | 46,520.000 | ---- | ----- |
| 16,500.000 | ---- | ----- | 48,105.00 | 16,500.000 |
| 51,450.000 | ---- | ----- | 150,000.00 | 51,450.000 |
| 109,760.000 | 256,000.00 | 87,808.000 | 64,000.00 | 21,952.000 |
| 20,580.000 | ---- | ----- | 60,000.00 | 20,580.000 |
| 13,720.000 | ---- | ----- | 40,000.00 | 13,720.000 |
| 6,860.000 | 20,000.00 | 6,860.000 | ----- | ----- |
| 51,450.000 | ---- | ----- | 150,000.00 | 51,450.000 |

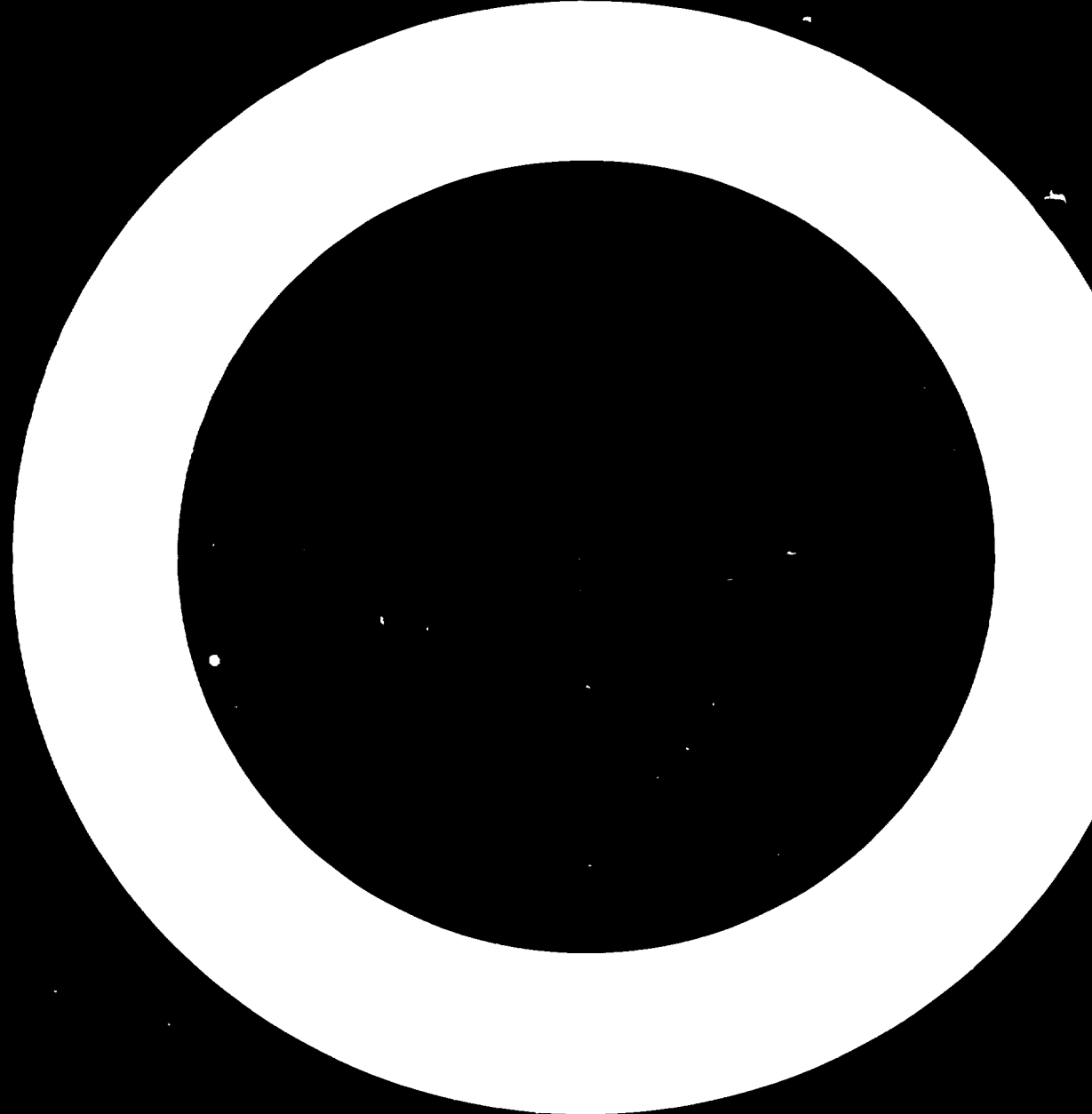
| | | | | | | |
|---|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| air supply systems, etc.) | 320,000.00 | 109,760.000 | 258,000.00 | 87,898.000 | 64,000.00 | 21,262.000 |
| Cost of production accessories (production trucks and dollies, work benches, metal gauges, jigs and fixtures, etc.) | 60,000.00 | 20,580.000 | ---- | ---- | 60,000.00 | 20,580.000 |
| Cost of completion of Site Development | 40,000.00 | 13,720.000 | ---- | ---- | 40,000.00 | 13,720.000 |
| Cost of New Production Supplies, 1-year supply | 20,000.00 | 6,860.000 | 20,000.00 | 6,860.000 | ---- | ---- |
| Project Administration Cost, Pre-Operating Period (Stage B)** | 150,000.00 | 51,450.000 | ---- | ---- | 150,000.00 | 51,450.000 |
| Additional Working Capital, 3 months | <u>874,635.00</u> | <u>300,000.000</u> | <u>----</u> | <u>----</u> | <u>874,635.00</u> | <u>300,000.000</u> |
| T o t a l s | <u>4,042,872.00</u> | <u>1,386,705.000</u> | <u>1,798,027.00</u> | <u>616,723.000</u> | <u>2,244,845.00</u> | <u>769,982.000</u> |
| Less : | | | | | | |
| Expected selling price of materials for two imported buildings now on hand, but not needed under new Project Plans | <u>308,309.00</u> | <u>105,750.000</u> | <u>308,309.00</u> | <u>105,750.000</u> | <u>----</u> | <u>----</u> |
| Net Project Cost Before Contingencies | 3,734,563.00 | 1,280,955.000 | 1,489,718.00 | 510,973.000 | 2,244,845.00 | 769,982.000 |
| Add : | | | | | | |
| 10% Conringencies | <u>373,457.00</u> | <u>128,095.000</u> | <u>148,972.00</u> | <u>51,097.000</u> | <u>224,485.00</u> | <u>76,998.000</u> |
| Estimated Project Cost | <u><u>4,108,020.00</u></u> | <u><u>1,409,050.000</u></u> | <u><u>1,638,690.00</u></u> | <u><u>562,070.000</u></u> | <u><u>2,469,330.00</u></u> | <u><u>846,980.000</u></u> |

Note : * Includes cost of transferring existing pieces of machinery to new plant site at Al-Jol Mashah.
 ** Does not include UNIDO portion of the Technical Assistance Programme expenses.



T A B L E IX
ADDITIONAL CAPITAL OUTLAY TO MEET
EXPANSION REQUIREMENTS OF PRODUCTION OPERATIONS
C. S. C. C. WOODWORKS PLANT

| Needed for | Description | Estimated Cost CIF, New Plant | |
|---|---|----------------------------------|------------------|
| | | US \$ | YD Equivalent |
| C-1 Phase 1986 | Buildings and Structures, Assembling Center No. 3 | US\$120,000 | YD 41,160 |
| | Vehicles and Material Handling Equipment, Assembling Center No. 3 | 3,650 | 1,252 |
| | Sub-Total ----- | <u>US\$123,650</u> | <u>YD 42,412</u> |
| | | | |
| C-2 Phase 1987 | Production Machinery and Equipment | 12,828 | 4,400 |
| | Material Handling Equipment | 644 | 221 |
| | Sub-Total ----- | <u>US\$ 13,472</u> | <u>YD 4,621</u> |
| C-3 Phase 1988 | Buildings and Structures, Assembling Center No. 4 & 5 | 240,000 | 82,320 |
| | Production Machinery and Equipment | 81,516 | 27,960 |
| | Vehicles and Material Handling Equipment | 7,625 | 2,615 |
| | Laboratory Equipment | 759 | 260 |
| | Auxiliary Machinery and Equipment | 75,015 | 25,720 |
| | Sub-Total ----- | <u>US\$404,915</u> | <u>YD138,885</u> |
| D-1 Phase 1989 | Production Machinery and Equipment | 66,618 | 22,850 |
| | Vehicles and Material Handling Equipment | 43,210 | 14,821 |
| | Auxiliary Machinery and Equipment | 15,247 | 5,230 |
| | Sub-Total ----- | <u>US\$125,075</u> | <u>YD 42,901</u> |
| D-2 Phase 1990 | Production Machinery and Equipment | 62,578 | 21,464 |
| | Vehicles and Material Handling Equipment | 18,722 | 6,421 |
| | Sub-Total ----- | <u>US\$ 81,300</u> | <u>27,885</u> |
| GRAND TOTAL ADDITIONAL CAPITAL OUTLAY ----- | | <u>US\$748,412</u> | <u>YD257,704</u> |



T A B L E X

C. S. C. C. CONSOLIDATED WOODWORKING PLANT
ADDITIONAL CIVIL WORKS, BUILDINGS AND STRUCTURES

COST ESTIMATES

(x 1,000)

| | | <u>US\$</u> | <u>YD</u> |
|--|-----------|-------------|-----------|
| I. <u>SITE DEVELOPMENT COMPLETION</u>, including Lumber Yard (15,000 sq.m.) and Roadworks (Gravel-Topped) | | | |
| Labour ----- | P 85.00 | | |
| Materials ----- | 68.00 | | |
| Heavy Equipment Rental ----- | 119.00 | | |
| Administration ----- | 34.00 | | |
| Other Costs ----- | 34.00 | | |
| Total ----- | P 340.00 | US\$ 40.00 | YD 13.720 |
| | | ===== | ===== |
| II. <u>ADDITIONAL BUILDINGS AND STRUCTURES</u> | | | |
| A. <u>RAW MATERIAL WAREHOUSE</u> | | | |
| 1. <u>General Specifications</u> | | | |
| 7,500 sq.m. floor area, treated wooden posts and trusses, 100 mm reinforced concrete (RC) flooring, interlink wire sidings on 3/4 of building, concrete hollow block (CHB) walls on 1/4 of building with two sliding doors, including shelvings as per drawings. | | | |
| 2. <u>Cost Estimate</u> | | | |
| Labour ----- | P1,010.73 | | |
| Materials ----- | 1,684.55 | | |
| Administration ----- | 336.91 | | |
| Other Costs ----- | 336.91 | | |
| Total ----- | P3,369.10 | US\$396.36 | YD135.953 |
| | | ===== | ===== |
| B. <u>FINISHING MATERIALS SHED</u> | | | |
| 1. <u>General Specifications</u> | | | |
| 150 sq.m. floor area, CHB walls, galvanized iron roof, sliding doors as per drawings | | | |
| 2. <u>Cost Estimates</u> | | | |
| Labour ----- | P 25.31 | | |
| Materials ----- | 60.73 | | |
| Administration ----- | 10.12 | | |
| Other Costs ----- | 5.06 | | |
| Total ----- | P 101.22 | US\$ 11.91 | YD 4.085 |
| | | ===== | ===== |

1. General Specifications

150 sq.m. floor area, CHB walls, galvanized iron roof, sliding doors as per drawings

2. Cost Estimates

| | |
|----------------------|---------|
| Labour ----- | P 25.31 |
| Materials ----- | 60.73 |
| Administration ----- | 10.12 |
| Other Costs ----- | 5.06 |

| | | | |
|-------------|----------|------------|----------|
| Total ----- | P 101.22 | US\$ 11.91 | YD 4.085 |
| | ===== | ===== | ===== |

C. CONNECTING RAMPS1. General Specifications

RC retaining walls, earth and gravel fill, 150 mm concrete flooring, and GI roofing on wooden posts and trusses, two units.

2. Cost Estimate

| | |
|----------------------|---------|
| Labour ----- | P 34.77 |
| Materials ----- | 69.55 |
| Administration ----- | 9.27 |
| Other Costs ----- | 2.32 |

| | | | |
|-------------|----------|------------|----------|
| Total ----- | P 115.91 | US\$ 13.64 | YD 4.677 |
| | ===== | ===== | ===== |

D. MAINTENANCE AND REPAIR BUILDING1. General Specifications

150 sq.m. floor area; concrete hollow block walls; 100 mm reinforced concrete floor, galvanized iron (GI) roof, as per drawings

2. Cost Estimate

| | |
|----------------------|---------|
| Labour ----- | P 40.57 |
| Materials ----- | 97.37 |
| Administration ----- | 16.23 |
| Other Costs ----- | 8.11 |

| | | | |
|-------------|----------|------------|----------|
| Total ----- | P 162.28 | US\$ 19.09 | YD 6.548 |
| | ===== | ===== | ===== |

E. EMPLOYEES COMFORT AND LOCKER ROOMS BUILDING1. General Specifications

200 sq.m. floor area; CHB walls; 75 mm concrete floor, GI roof, with W.C. facilities, as per drawings.

2. Cost Estimate

| | |
|----------------------|---------|
| Labour ----- | P 49.45 |
| Materials ----- | 160.73 |
| Administration ----- | 24.73 |
| Other Costs ----- | 12.36 |

| | | | |
|-------------|----------|------------|----------|
| Total ----- | P 247.27 | US\$ 29.09 | YD 9.978 |
| | ===== | ===== | ===== |

F. WALLS, DOORS and EXHAUST SYSTEM TROUGH, FINISHING DEPARTMENT1. General Specifications

Walls : 60 m x 4 m x 6 cm, CHB, plastered

Doors : Two sets, 50 mm x 1200 mm x 2500 mm, angle iron frame, plain GI sheet, swinging

SECTION 3

1. General Specifications

Walls : 60 m x 4 m x 6 cm, CHB, plastered

Doors : Two sets, 50 mm x 1200 mm x 2500 mm,
angle iron frame, plain GI sheet, swinging

Exhaust System Trough : RC construction, 300 mm depth x
1.50 m width x 25 m long

2. Cost Estimate

| | |
|----------------------|---------|
| Labour ----- | P 34.77 |
| Materials ----- | 69.55 |
| Administration ----- | 9.27 |
| Other Costs ----- | 2.32 |

| | | | |
|-------------|----------|------------|----------|
| Total ----- | P 115.91 | US\$ 13.64 | YD 4.677 |
| | ===== | ===== | ===== |

G. CONSTRUCTION OF PLANT OFFICES, MEDICAL, CLINIC AND CANTEEN AREAS

1. General Specifications

Wood and plywood partitions, as per drawings,
excluding furnishings and fixtures.

2. Cost Estimate

| | |
|----------------------|----------|
| Labour ----- | P 135.23 |
| Materials ----- | 193.18 |
| Administration ----- | 38.64 |
| Other Costs ----- | 19.31 |

| | | | |
|-------------|----------|------------|-----------|
| Total ----- | P 386.36 | US\$ 45.45 | YD 15.591 |
| | ===== | ===== | ===== |

H. GUARDHOUSE AND WATCH TOWERS

1. General Specifications

Guard House : CHB walls, 75 mm RC floor, GI roofing,
one unit, 4 m x 5 m x 2.25 m, with
sleeping quarters.

Watch Towers : two units, 7 m elevation from ground
level; 1.5 m x 1.5 m x 2.25 m wooden
housing; timber posts.

2. Cost Estimate

| | |
|----------------------|---------|
| Labour ----- | P 61.82 |
| Materials ----- | 106.25 |
| Administration ----- | 19.32 |
| Other Costs ----- | 5.80 |

| | | | |
|-------------|----------|------------|----------|
| Total ----- | P 193.19 | US\$ 22.73 | YD 7.796 |
| | ===== | ===== | ===== |

| | | |
|--|------------|-----------|
| GRAND TOTAL COSTS, Additional Buildings and Structures (Rounded-off to nearest US\$5,000)----- | US\$550.00 | YD188.650 |
| | vvvvvvvv | vvvvvvvv |
| | vvvvvvv | vvvvvvv |

III. COST TO COMPLETE EXISTING BUILDINGS, concrete floorings on existing two buildings.

1. General Specifications

Warehouse Wing, Building 3 (see Figure 5):
300 sq.m., 150 mm thick RC passageway for forklift.

Offices Wing, Building 2 (see Figure 5) :
2,700 sq.m., 75 mm thick RC floor.

Finishing, Assembling and Upholstery Areas, Buildings 7, 8 and 9 (see Figure 5) :
1,500 sq.m., 75 mm thick RC.

2. Cost Estimate

| | |
|------------------------|----------|
| Labour ----- | P 382.50 |
| Materials ----- | 637.50 |
| Equipment Rental ----- | 127.50 |
| Administration ----- | 89.25 |
| Other Costs ----- | 38.25 |

| | | | |
|-------------|------------|------------|-----------|
| Total ----- | P 1,275.00 | US\$150.00 | YD 51.450 |
| | ===== | ===== | ===== |

IV. INTERNAL INFRASTRUCTURES

A. WATER SUPPLY SYSTEM (Excluding Deep-Well Pump)

1. Elevated Water Tank, General Specifications

20,000 gals. (U.S.), 18.30 m elevation from ground level, mild steel construction with :
150 mm dia. discharge pipe, 50 mm dia., intake pipe, warning light on top and ladder; fabricated and installed according to standard engineering practice.

2. Cost Estimate

| | |
|----------------------|---------|
| Labour ----- | P 75.80 |
| Materials ----- | 138.97 |
| Administration ----- | 25.27 |
| Other Costs ----- | 12.67 |

| | | | |
|-------------|----------|------------|-----------|
| Total ----- | P 252.71 | US\$ 29.73 | YD 10.196 |
| | ===== | ===== | ===== |

3. Pipeworks, Valves, Taps and Hydrants, General Specifications

As per design and drawings.

4. Cost Estimate

| | |
|----------------------|----------|
| Labour ----- | P 108.38 |
| Materials ----- | 216.75 |
| Administration ----- | 25.29 |
| Other Costs ----- | 10.83 |

| | | | |
|-------------|----------|------------|-----------|
| Total ----- | P 361.25 | US\$ 42.50 | YD 14.578 |
| | ===== | ===== | ===== |

B. ELECTRIC POWER AND COMMUNICATIONS SUPPLY SYSTEMS (Excluding Power Sub-Station)

1. General Specifications

As per design and drawings.

SECTION 5

3. Pipeworks, Valves, Taps and Hydrants, General Specifications

As per design and drawings.

4. Cost Estimate

| | |
|----------------------|----------|
| Labour ----- | P 108.38 |
| Materials ----- | 216.75 |
| Administration ----- | 25.29 |
| Other Costs ----- | 10.83 |

| | | | |
|-------------|----------|------------|-----------|
| Total ----- | P 361.25 | US\$ 42.50 | YD 14.578 |
| | ===== | ===== | ===== |

B. ELECTRIC POWER AND COMMUNICATIONS SUPPLY SYSTEMS (Excluding Power Sub-Station)

1. General Specifications

As per design and drawings.

2. Cost Estimate

| | |
|----------------------|----------|
| Labour ----- | P 139.72 |
| Materials ----- | 363.27 |
| Administration ----- | 33.53 |
| Other Costs ----- | 22.36 |

| | | | |
|-------------|----------|------------|-----------|
| Total ----- | P 558.88 | US\$ 65.75 | YD 22.552 |
| | ===== | ===== | ===== |

C. WOODWASTE DISPOSAL SYSTEM (Excluding Fan and Motor)

1. Ductings, Connector, Valves and Separator System, General Specifications

As per design and drawings.

2. Cost Estimate

| | |
|----------------------|----------|
| Labour ----- | P 115.88 |
| Materials ----- | 182.09 |
| Administration ----- | 24.49 |
| Other Costs ----- | 8.62 |

| | | | |
|-------------|----------|------------|-----------|
| Total ----- | P 331.08 | US\$ 38.95 | YD 13.360 |
| | ===== | ===== | ===== |

3. Woodwaste Silo, General Specifications

CHB walls, 5 m x 5 m x 10 m, with 4.25 m clearance of silo floor from ground level, with access holes and discharge door, as per design and drawings.

4. Cost Estimate

| | |
|----------------------|----------|
| Labour ----- | P 262.55 |
| Materials ----- | 412.57 |
| Administration ----- | 60.01 |
| Other Costs ----- | 15.00 |

| | | | |
|-------------|----------|------------|-----------|
| Total ----- | P 750.13 | US\$ 88.25 | YD 30.270 |
| | ===== | ===== | ===== |

5. Incinerator, General Specifications

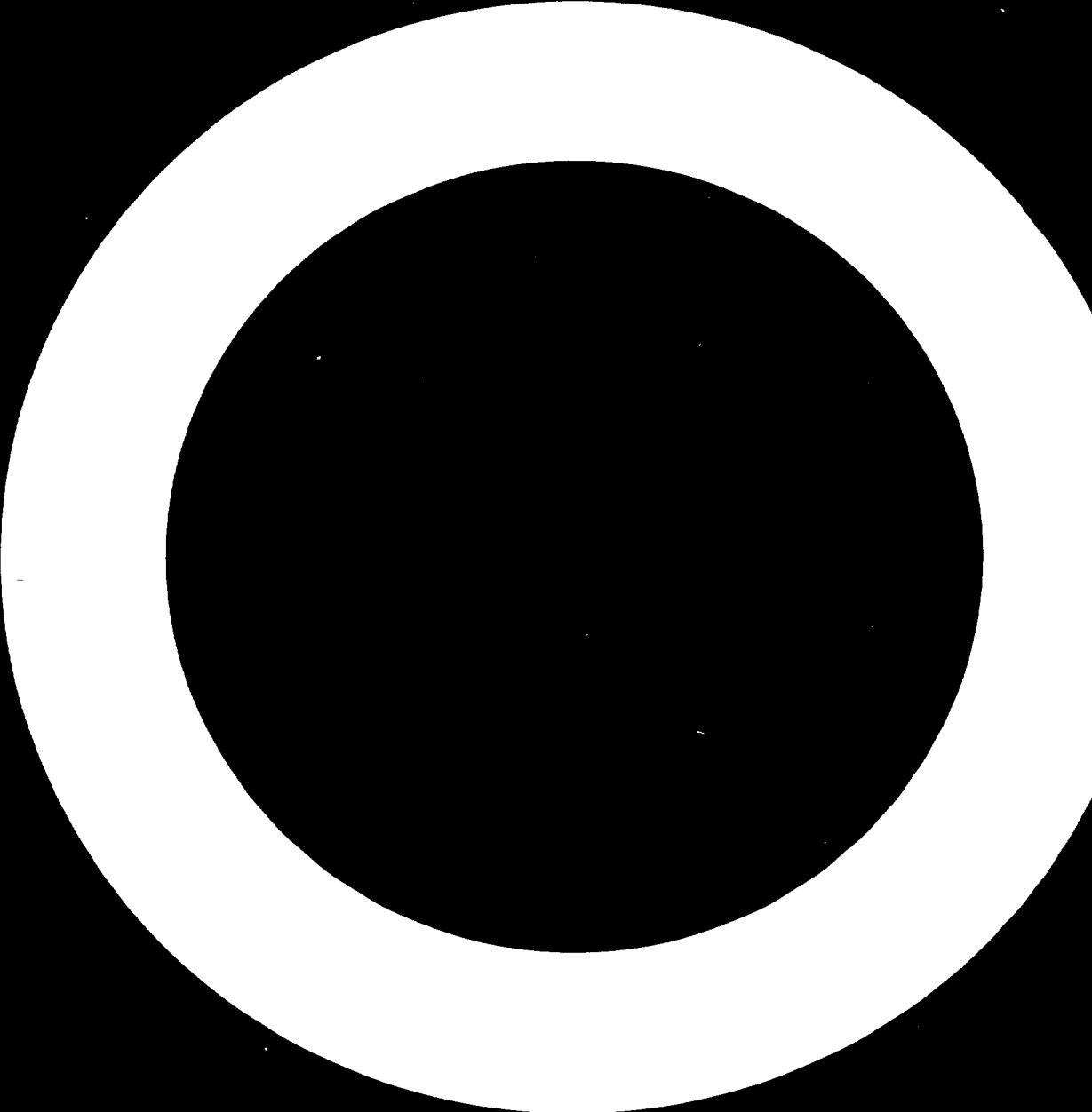
Concrete hollow blocks construction; 8 m dia. RC base; 5 m height; mild steel door, as per drawings.

6. Cost Estimate

P 56.00

SECTION 6

| | | | |
|---|----------|------------------------|-----------|
| Admin. Costs ----- | 24.49 | | |
| Other Costs ----- | 8.62 | | |
| Total ----- | P 331.08 | US\$ 38.95 | YD 13.360 |
| | ===== | ===== | ===== |
| 3. <u>Woodwaste Silo, General Specifications</u> | | | |
| CHB walls, 5 m x 5 m x 10 m, with 4.25 m clearance of silo floor from ground level, with access holes and discharge door, as per design and drawings. | | | |
| 4. <u>Cost Estimate</u> | | | |
| Labour ----- | P 262.55 | | |
| Materials ----- | 412.57 | | |
| Administration ----- | 60.01 | | |
| Other Costs ----- | 15.00 | | |
| Total ----- | P 750.13 | US\$ 8 ² 25 | YD 30.270 |
| | ===== | ===== | ===== |
| 5. <u>Incinerator, General Specifications</u> | | | |
| Concrete hollow blocks construction; 8 m dia. RC base; 5 m height; mild steel door, as per drawings. | | | |
| 6. <u>Cost Estimate</u> | | | |
| Labour ----- | P 56.22 | | |
| Materials ----- | 134.92 | | |
| Administration ----- | 22.49 | | |
| Other Costs ----- | 11.23 | | |
| Total ----- | P 224.86 | US\$ 26.45 | YD 9.074 |
| | ===== | ===== | ===== |
| D. <u>COMPRESSED AIR SUPPLY SYSTEMS (Excluding Air-Compressor, Motor and Receiver System)</u> | | | |
| 1. <u>General Specifications</u> | | | |
| As per drawings and design. | | | |
| 2. <u>Cost Estimate</u> | | | |
| Labour ----- | P 84.64 | | |
| Materials ----- | 133.00 | | |
| Administration ----- | 19.35 | | |
| Other Costs ----- | 4.84 | | |
| Total ----- | P 241.83 | US\$ 28.45 | YD 9.758 |
| | ===== | ===== | ===== |
| GRAND TOTAL COST, | | | |
| Internal Infrastructure Systems, (Rounded-off to nearest US\$5,000) ----- | | US\$320.00 | YD109.76 |
| | | vvvvvvvv | vvvvvvv |
| | | vvvvvvv | vvvvvvv |



T A B L E X I

CURRENT COSTS OF PRODUCTION

MATERIALS AND SUPPLIES

C. S. C. C., October 1982

| Materials and Specifications | Units | Unit Cost US\$ |
|---|-------|-------------------|
| Hard Fiberboard, 3 mm x 4 ft. x 8 ft. | cu.m. | \$1,253.62 |
| Plywood, 3 mm x 4 ft. x 8 ft. | cu.m. | 1,044.68 |
| Plywood, 4 mm x 4 ft. x 8 ft. | cu.m. | 940.22 |
| Plywood, 6 mm x 4 ft. x 8 ft. | cu.m. | 1,044.68 |
| Plywood, 9 mm x 4 ft. x 8 ft. | cu.m. | 835.75 |
| Plywood, 12 mm x 4 ft. x 8 ft. | cu.m. | 744.34 |
| Plywood, 15 mm x 4 ft. x 8 ft. | cu.m. | 741.73 |
| Plywood, 18 mm x 4 ft. x 8 ft. | cu.m. | 713.67 |
| Plywood, 25 mm x 4 ft. x 8 ft. | cu.m. | 658.15 |
| Sawn timber, Red, 30 mm thick | cu.m. | 444.78 |
| Sawn timber, White, 40 mm thick | cu.m. | 132.00 |
| Contact Glue, rubber-based, for Formica, 1-kg. can (Net) | kg. | 6.44 |
| Contact Glue, rubber-based, for Formica, 1-1/2-lb. can (Net) | kg. | 3.85 |
| Contact Glue, rubber-based, for Formica, 8-lbs. can (Net) | kg. | 7.02 |
| PVA (White) Glue, 1-kg. can (Net) | kg. | 5.25 |
| Formica (Melamine Formaldehyde) sheets, 4 ft. x 8 ft | sq.m. | 7.37 |
| C.W. Nails, 1-3/4 in. long, 7-lb. packet | kg. | 3.21 |
| C.W. Nails, 1-1/2 in. long, 7-lb. packet | kg. | 2.11 |
| C.W. Nails, 2-1/2 in. long, 7-lb. packet | kg. | 2.11 |
| C.W. Nails, 3 in. long, 7-lb. packet | kg. | 2.11 |
| C.W. Nails, 4 in. long, 7-lb. packet | kg. | 1.78 |
| Locks for Door, with handle | set | 5.10 |
| Locks, one-way, latch-type | set | 6.11 |
| Woodscrew, Flathead, Slotted, No. 5 x 3/4 in. | kg. | 2.19 |
| Woodscrew, Flathead, Slotted, No. 7 x 1 in. | kg. | 1.09 |
| Woodscrew, Flathead, Slotted, No. 8 x 1-1/2 in. | kg. | 2.29 |
| Woodscrew, Flathead, Slotted, No. 10 x 1-1/2 in. | kg. | 1.46 |
| Woodscrew, Flathead, Slotted, No. 10 x 2 in. | kg. | 2.41 |
| Glass, mirror, 4 mm x 2-1/2 ft. x 4 ft. | sq.m. | 2.85 |
| Glass, plain, 3 mm x 2-1/2 ft. x 4 ft. | sq.m. | 1.63 |
| Glass, plain, 4 mm x 2-1/2 ft. x 4 ft. | sq.m. | 1.08 |
| Glass, plain, 5 mm x 2-1/2 ft. x 4 ft. | sq.m. | 2.44 |
| Glass, plain, 6 mm x 2-1/2 ft. x 4 ft. | sq.m. | 2.57 |
| Glass, embossed, 3 mm x 2-1/2 ft. x 4 ft. | sq.m. | 1.29 |
| Round Bar, Mild Steel, 12 mm Ø x 40 ft. | m. | 0.67 |
| Round Bar, Mild Steel, 14 mm Ø x 40 ft. | m. | 0.92 |
| Round Bar, Mild Steel, 16 mm Ø x 40 ft. | m. | 1.21 |

The resulting CIF-Mukalla costs compared reasonably with the only CIF-Mukalla cost data made available to this Expert (the cost of one unit BAUERLE automatic straight knife grinder, acquired in 1982).

11.3 Machinery Installation Costs

Machinery installation costs were placed at 10% of machinery and equipment value, based on industry experience in comparable situations in other developing countries.

11.4 Cost of Internal Infrastructures

The cost of setting up water, electric power, compressed-air and other internal infrastructure systems, including labour and materials, are based on Philippine costs adjusted to PDRY conditions as in Section 11.1 above.

11.5 Machinery and Equipment for Additional Assembling Centers

No provision was made for this cost item as the machinery and equipment for the new assembling centers will come from the equipment complement of the three Workshop Units (26th September, Radfan and Bajaber Units) which are projected to be completely phased out by 1986. See Tables A, B and C in Appendix IV for the disposition of these machinery and equipment.

11.6 Contingencies

Provision for contingencies was set at 10% of the Project Cost, which is about the lowest estimate used in the industry.

The grand total investment cost is summarized as follows :

| Project Period | Foreign Currency Portion | Local Currency Portion | Totals |
|---------------------------------|--------------------------|------------------------|----------------------|
| Stage B, Pre-Operating Period | US\$1,638,690 | US\$2,469,330 | US\$4,108,020 |
| Stages C and D Operating Period | <u>391,412</u> | <u>357,000</u> | <u>748,412</u> |
| Total | <u>US\$2,030,102</u> | <u>US\$2,826,330</u> | <u>US\$4,856,432</u> |
| Local Currency Equivalent | YD 696,325 | YD 969,431 | YD 1,665,756 |

12.0 PROJECT FUNDING

The project funding scheme recommended in this study is fitted to the local conditions and existing PDRY policies on the establishment of industries. PDRY authorities view this Project for its foreign exchange savings aspects and as a public service endeavor for the PDRY population rather than a profit-making activity.

This was confirmed by the Republic's generous donation amounting to about 49% of the Project expenses as of 30 June 1982 and the sincere interest in proceeding with the Project, if found economically viable, expressed by high officials of the Ministry of Industry during the de-briefing conference held on 7 November 1982 at the office of the Deputy Minister of Industry.

12.1 Debt/Equity Ratio

As of 30 June 1982, Project expenses amounted to approximately US\$1,349,100 (YD462,740), funded as follows :

| | US \$ Equivalent | Local Currency |
|--------------------------|----------------------|------------------|
| PDRY Government Donation | US\$ 656,000 | YD225,000 |
| Bank Loan | 525,000 | 180,000 |
| C. S. C. C. Equity | <u>168,100</u> | <u>57,740</u> |
| T o t a l | <u>US\$1,349,100</u> | <u>YD462,740</u> |

Industry development policies of various developing countries visited by this Expert indicated Debt/Equity Ratio requirements ranging from 60:40 to 80:20, depending on the type of industry and the Project's impact on the nation's economy. This Project is aimed to minimize the country's importation of furniture woodworks products which has increased annually and stood at about US\$3,250,000 in 1981 (see Table XII). It is also expected to provide more jobs for the people of the IV, V and VI Governorates, PDRY.

Thus, a Debt/Equity ratio of roughly 70:30 is recommended. The indicated funding scheme is approximately as follows :

| | US \$ Equivalent | Local Currency |
|--------------------|----------------------|--------------------|
| Debt | US\$3,348,000 | YD1,148,400 |
| Equity | <u>1,508,330</u> | <u>517,360</u> |
| Total Project Cost | <u>US\$4,856,430</u> | <u>YD1,665,760</u> |

12.11 Equity Portion

The additional Equity required of CSCC amount to US\$684,250 (YD234,700) calculated as follows :

| | US \$ Equivalent | Local Currency |
|---|---------------------|-------------------|
| Total Required Equity | US\$1,508,330 | YD517,360 |
| Less : | | |
| PDRY Donation -- | US\$656,000 | |
| CSCC Equity as of 30 June 1982 | <u>168,080</u> | <u>YD282,660</u> |
| Total Additional Equity Required ----- | <u>US\$ 684,250</u> | <u>YD234,700</u> |

The balance of additional equity required can be met by the sale (at cost) of the imported structural

T A B L E XII

P.D.R.Y. ANNUAL IMPORT OF WOODEN FURNITURE
AND BUILDERS' WOODWORKS PRODUCTS

=====

| Imported Items | <u>1 9 7 8</u> | | <u>1 9 7 9</u> | | <u>1 9 8 0</u> | | <u>1 9 8 1</u> | |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|
| | <u>YD</u> | <u>US\$</u> | <u>YD</u> | <u>US\$</u> | <u>YD</u> | <u>US\$</u> | <u>YD</u> | <u>US\$</u> |
| Builders' Woodworks | 52,577 | 153,286 | 25,819 | 75,274 | 109,496 | 319,230 | 116,635 | 340,044 |
| Wooden Furniture | <u>34,731</u> | <u>101,257</u> | <u>162,736</u> | <u>474,449</u> | <u>106,664</u> | <u>310,974</u> | <u>1,000,216</u> | <u>2,916,081</u> |
| Total | <u>87,308</u> | <u>254,543</u> | <u>188,555</u> | <u>549,723</u> | <u>216,160</u> | <u>630,204</u> | <u>1,116,851</u> | <u>3,256,125</u> |

Note : Data furnished by the Central Statistics Office, P.D.R.Y.

materials for two buildings which are on hand but are not needed under the new Project plans. This amounts to at least US\$308,300 (YD105,750). The balance of about US\$376,000 (YD128,970) will come from Net Income generated during 1982 to 1984 CSCC operations estimated at an average of US\$174,900 (YD60,000) per year or a 3-year total of US\$524,700 (YD180,000), based on the 1981 level of operations. (Note : The PDRY government's donation of US\$656,000 (YD225,000) has been included as Equity since this amount is not expected to be re-paid to the PDRY Government.)

12.12 Debt Portion

The outstanding loans fully availed as of 30 June 1982 are :

| | US \$ Equivalent | Local Currency |
|---|----------------------|-------------------|
| Loan for Project Civil Works Expenses, National Bank of PDRY | US\$ 525,000 | YD180,000 |
| "No-interest Drawing Line" for Operating Capital, National Bank of PDRY | <u>548,100</u> | <u>188,000</u> |
| T o t a l | <u>US\$1,073,100</u> | <u>YD368,000</u> |

The amount of additional loan required to finance the Project therefore is :

| | US \$ Equivalent | Local Currency |
|---|----------------------|-------------------|
| Total Projected Debt Portion of Project | US\$3,348,100 | YD1,148,400 |
| Less : Loans already availed | <u>1,073,100</u> | <u>368,000</u> |
| Additional Loans Required | <u>US\$2,275,000</u> | <u>YD 780,400</u> |

It is proposed that this amount be arranged by the PDRY Government from sources at its disposal.

For purposes of conservative financial projections, the loan will be assumed at current industrial loan terms and conditons, i.e.

Principal : US\$2,275,000 (YD780,000)
Interest Rate : 14% per annum, compounded annually
Payment Terms : 3 years Grace Period; Interest
for first 3 years collected
in advance ; 8 years to pay
Collateral : Machinery and Equipment to be
acquired

The financial projections in the following sections of this Report assume that there will be no restructuring of the first loan of US\$525,000 (YD180,000). For purposes of identification in this study, this loan is referred to as the "first loan" while the proposed loan of US\$2,275,000 (YD780,400) will be referred to as the "second loan".

The amortization schedule for the First Loan is given in Table XIII while that for the Second Loan is given in Table XIV.

13.0 INCOME PROJECTIONS

The Projected Annual Income Statements given in Table XV prepared on the basis of the assumptions and considerations discussed in the following paragraphs.

13.1 Projected Annual Sales

Based on the machinery and equipment complement (Table II) and the limited market studies conducted during the mission (Appendices VI - VIII an ultimate annual sales target of US\$15,000,000 is set for the Project. This is about five

T A B L E X I I I I
AMORTIZATION SCHEDULE
FOR CURRENT LOAN OF YD180,000

=====

I. TERMS AND CONDITIONS OF LOAN :

| | | |
|--------------------------|-----|---|
| <u>B a n k</u> | --- | NATIONAL BANK OF YEMEN |
| <u>P r i n c i p a l</u> | --- | YD180,000.000 (US\$524,781.34) |
| <u>T e r m s</u> | --- | 4 years Grace period ending 1982 8 years to pay, starting 1983 3% interest per year |
| Annual Total Payment | --- | YD25,642.150 (US\$74,758.45) |

II. PAYMENT SCHEDULE :

=====

| <u>Year</u> | <u>Payment on Principal</u> | <u>Payment on Interest</u> | <u>Total Annual Payment</u> | <u>Balance on Principal At Year End</u> |
|-------------|---------------------------------|--------------------------------|---------------------------------|---|
| 1982 | ---- | ---- | ---- | US\$524,781.34 |
| 1983 | US\$59,015.01 | US\$15,743.44 | US\$74,758.45 | 465,766.33 |
| 1984 | 60,785.46 | 13,972.45 | 74,758.45 | 404,980.87 |
| 1985 | 62,609.02 | 12,149.43 | 74,758.45 | 342,371.85 |
| 1986 | 64,487.30 | 10,271.15 | 74,758.45 | 277,884.55 |
| 1987 | 66,421.92 | 8,336.53 | 74,758.45 | 211,462.63 |
| 1988 | 68,414.57 | 6,343.88 | 74,758.45 | 143,048.06 |
| 1989 | 70,467.01 | 4,291.44 | 74,758.45 | 72,581.02 |
| 1990 | 72,581.02 | 2,177.43 | 74,758.45 | ----- |

=====

T A B L E XIV

AMORTIZATION SCHEDULE FOR
ADDITIONAL LOAN OF US\$2,275,000.00

I. TERMS AND CONDITIONS OF LOAN :

| | | |
|-----------------------------|-----|---|
| <u>B a n k</u> | --- | (As chosen by the P.D.R.Y. Government) |
| <u>P r i n c i p a l</u> | --- | US\$2,275,000.00 |
| <u>T e r m s</u> | --- | 3 years Grace period from 1985 8 years to pay starting 1988 14% interest per year |
| <u>Annual Total Payment</u> | --- | US\$490,421.80 |
| <u>Initial Draw-down</u> | --- | At least 60% of Loan in 1984 |

II. PAYMENT SCHEDULE :

| <u>Year</u> | <u>Payment on Principal</u> | <u>Payment on Interest</u> | <u>Total Annual Payment</u> | <u>Balance on Principal At Year End</u> |
|-------------|-----------------------------|----------------------------|-----------------------------|---|
| 1987 | --- | --- | --- | US\$2,275,000.00 |
| 1988 | US\$171,921.80 | US\$318,500.00 | US\$490,421.80 | 2,103,078.20 |
| 1989 | 195,990.85 | 294,430.95 | 490,421.80 | 1,907,087.35 |
| 1990 | 223,429.57 | 266,992.23 | 490,421.80 | 1,683,657.78 |
| 1991 | 254,709.71 | 235,712.09 | 490,421.80 | 1,428,948.07 |
| 1992 | 290,369.07 | 200,052.73 | 490,421.80 | 1,138,579.00 |
| 1993 | 331,020.74 | 159,401.06 | 490,421.80 | 807,558.26 |
| 1994 | 377,363.64 | 113,058.16 | 490,421.80 | 430,194.62 |
| 1995 | 430,194.62 | 60,227.25 | 490,421.87 | --- |

T A B L E XV

PROJECTED INCOME STATEMENT

C. S. C. C., 1986 - 1995

(x US\$1,000)

| Project Phase (See Figure 48) | C-1 | C-2 | C-3 | D-1 | D-2 | E | E | E | E | E |
|--|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Y e a r | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| % of Plant Capacity | 35% | 50% | 70% | 85% | 100% | 100% | 100% | 100% | 100% | 100% |
| A. Total Sales of All Product Lines (See Table XVI) | 5,250 | 7,500 | 10,500 | 12,750 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 |
| Less : | | | | | | | | | | |
| B. Total Cost of Goods Sold (See Table XVII) | <u>4,527</u> | <u>6,656</u> | <u>9,410</u> | <u>10,973</u> | <u>12,900</u> | <u>12,866</u> | <u>12,830</u> | <u>12,778</u> | <u>12,726</u> | <u>12,673</u> |
| NET INCOME BEFORE TAXES | 723 | 844 | 1,090 | 1,777 | 2,100 | 2,134 | 2,170 | 2,222 | 2,274 | 2,327 |
| Less : | | | | | | | | | | |
| C. Taxes | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| NET INCOME AFTER TAXES | <u>723</u> | <u>844</u> | <u>1,090</u> | <u>1,777</u> | <u>2,100</u> | <u>2,134</u> | <u>2,170</u> | <u>2,222</u> | <u>2,274</u> | <u>2,327</u> |

times the volume of annual sales attained by CSCC in 1981 and 1982. The schedule of Projected Annual Sales given in Table XVI was prepared on the basis of the following assumptions and considerations :

- i - The population growth and economic development of the target market areas (IV, v and VI Governorates, PDRY) will continue on at least the same rate as they have attained during the last 5 years ;
- ii - 80% of the total sales volume will be products under the Standard Products Line and 20%, Special Products Line ;
- iii - New products will be included in the Standard Products Line starting in 1987, Phase C-2, such that at full capacity the additional Standard Products will contribute approximately 10% of the total annual sales ;
- iv - Three additional Assembling Centers will be established to augment the distribution network of CSCC products. One such Center is scheduled to start operations in 1987, while the other two Centers will start operations in 1989. All the 5 Assembling Centers (including the present Shihir and Ghail Bawazir Workshop Units) will be allowed to produce special products up to a maximum of 20% of their respective annual sales volume targets ;
- v - Considering the present status of technology at the CSCC production units, and the ability of the workers to assimilate new technologies that will be introduced during the first two years of operations, a very conservative build-up of sales volume targets is recommended as follows :

| Year | Project Period | % of Full Capacity | Target Sales Volume | |
|------|----------------|--------------------|---------------------|----------------|
| | | | US\$ Equivalent | Local Currency |
| 1986 | C-1 Phase | 35 % | US\$ 5,250,000 | YD1,801,000 |
| 1987 | C-2 Phase | 50 % | 7,500,000 | 2,573,000 |
| 1988 | C-3 Phase | 70 % | 10,500,000 | 3,602,000 |
| 1989 | D-1 Phase | 85 % | 12,750,000 | 4,373,000 |
| 1990 | D-2 Phase | 100 % | 15,000,000 | 5,145,000 |

These sales targets are deemed realistic and attainable.

13.2 Cost of Goods Sold

The UNIDO format for determining the "Cost of Goods Sold" (Table 10-12, UNIDO Manual ID/206) was used as a guide in the calculation of the component cost items.

Actual production cost figures were not made available to this Expert. Thus, the production cost structure adopted is based on the Expert's experience in developing countries, particularly in Southeast Asia and Africa. The following ranges of production cost structure have been used to guide the financial planning of Project, similar to that of CSCC :

| | |
|-----------------------------|---|
| Direct Materials ----- | 60% to 70% of Production Cost |
| Direct Labour ----- | 12% to 18% of Production Cost |
| Indirect Materials ----- | 10% to 15% of Direct Materials |
| Indirect Labour ----- | 10% to 17% of Direct Labour |
| Administration Expenses --- | 8% to 15% of Sales |
| Selling Cost ----- | 3% to 7% of Sales |
| Repair and Maintenance ---- | Equal to 35% to 50% of Administration Expenses |
| Power and Fuel ----- | Equal to 10% of 15% of Administration Expenses |

Considering local conditions of material supply, labour and energy cost levels, and the production systems recommended for the Project, the following cost structure is recommended for

the CSCC Project :

| | |
|------------------------------|---|
| Direct Materials ----- | 65% of Total Production Cost |
| Direct Labour ----- | 15% of Total Production Cost |
| Indirect Materials ----- | Equal to 15% of Direct Materials |
| Indirect Labour ----- | Equal to 15% of Direct Labour |
| Administration Costs ----- | 10% of Sales |
| Selling Costs ----- | 3% of Sales |
| Repair and Maintenance ----- | Equal to 45% of Administration Expenses |
| Power and Fuel ----- | Equal to 10% of Administration Expenses |

As prescribed by PDRY rules and regulations covering the operations of Co-operative in the country, a maximum mark-up of 14% of Sales is used.

The estimated "Cost of Goods Sold" during the Operations Period of the Project was thus calculated and is presented in Table XVII.

The following calculated cost elements were used in the preparation of Table XII.

--- Cost of "Direct Materials" calculated from material usage data given in Operations Sequence Sheets, illustrative examples of which are given in Appendices XIII - XVI for three of the products included in the initial Standard Products Line, and the unit cost data for production materials and supplies given in Table XI.

--- Cost of "Direct Labour" calculated from labour usage data given in Operations Sequence Sheets (as above mentioned) and the current estimated CSCC pay rates (based on actual payroll) for the various labour grades converted to hourly basis, as follows :

| | |
|----------------------|---------------|
| Highly Skilled ----- | US\$1.45/hour |
| Skilled ----- | 1.00/hour |
| Semi-skilled ----- | 0.75/hour |

T A B L E XVII

ESTIMATED COST OF GOODS SOLD

(x US\$1,000)

| <u>l t e m</u> | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---------------------------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1. Direct Materials | 2,366 | 3,430 | 4,638 | 5,703 | 6,805 | 6,805 | 6,805 | 6,805 | 6,805 | 6,805 |
| 2. Direct Labour | 546 | 792 | 1,070 | 1,316 | 1,570 | 1,570 | 1,570 | 1,570 | 1,570 | 1,570 |
| 3. Other Plant Costs : | | | | | | | | | | |
| a. Indirect Materials | 355 | 515 | 696 | 855 | 1,021 | 1,021 | 1,021 | 1,021 | 1,021 | 1,021 |
| b. Indirect Labour | 82 | 119 | 161 | 197 | 235 | 235 | 235 | 235 | 235 | 235 |
| c. Land Rent | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| d. Repair and Maintenance | 236 | 538 | 473 | 574 | 675 | 675 | 675 | 675 | 675 | 675 |
| e. Power and Fuel | 53 | 75 | 105 | 128 | 150 | 150 | 150 | 150 | 150 | 150 |
| TOTAL PRODUCTION COST | <u>\$3,652</u> | <u>\$5,483</u> | <u>\$7,517</u> | <u>\$8,787</u> | <u>\$10,470</u> | <u>\$10,470</u> | <u>\$10,470</u> | <u>\$10,470</u> | <u>\$10,470</u> | <u>\$10,470</u> |
| 4. Administrative Expenses | 525 | 750 | 1,050 | 1,275 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 |
| 5. Selling Cost | 158 | 225 | 315 | 383 | 450 | 450 | 450 | 450 | 450 | 450 |
| TOTAL OPERATIONS COST | <u>\$ 683</u> | <u>\$ 975</u> | <u>\$1,365</u> | <u>\$1,658</u> | <u>\$ 1,950</u> | <u>\$ 1,950</u> | <u>\$ 1,950</u> | <u>\$ 1,950</u> | <u>\$ 1,950</u> | <u>\$ 1,950</u> |
| 6. Interest and Bank Charges | 11 | 9 | 325 | 299 | 269 | 236 | 200 | 160 | 113 | 60 |
| 7. Depreciation | 181 | 189 | 204 | 234 | 211 | 210 | 210 | 198 | 193 | 193 |
| TOTAL COST OF GOODS SOLD | <u>\$4,527</u> | <u>\$6,656</u> | <u>\$9,410</u> | <u>\$10,973</u> | <u>\$12,900</u> | <u>\$12,866</u> | <u>\$12,830</u> | <u>\$12,778</u> | <u>\$12,726</u> | <u>\$12,673</u> |

Unskilled ----- 0.60/hour

Table XVIII shows the "Direct Costs" component of the "Cost Goods Sold" during the various phases of the Project ;

--- The Depreciation Schedule, Table XIX, was prepared using the basic data on depreciable assets listed in Table XX and applying the Straight Line Depreciation scheme as allowed by the PDRY Government for the following depreciation periods :

| Type of Asset | Depreciation Period |
|--|---------------------|
| Buildings and Structures | 25 years |
| Machinery and Equipment | 10 years |
| Vehicles, Furniture and Office Equipment | 4 years |

--- The Amortization Schedule for the First and Second Loans are given in Tables XIII and XIV, respectively.

13.3 Projected Income Statement

CSCC enjoys tax-free privileges under PDRY laws. Thus, the Projected Income Statement, Table XXI was prepared using Table XIII, "Projected Annual Sales" and Table XV, "Cost of Goods Sold". It should be noted that the "Net Income After Taxes" is about 14% of sales throughout the Project's Operations Period.

14.0 STATEMENTS OF ASSETS AND LIABILITIES

The Projected Annual Statements of Assets and Liabilities for CSCC for the period 1984 - 1995 (see Table XXI) were prepared on the basis of the following assumptions and considerations :

T A B L E XVIII

SUMMARY OF PROJECTED DIRECT COSTS

Per 100 Units of Standard Product

(Based on Current C. S. C. C. Payroll)

| <u>DIRECT COST ITEM</u> | <u>I N I T I A L S T A N D A R D P R O D U C T S L I N E</u> | | | | | | | | | |
|---|--|------------------|-----------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|------------------|
| | Pupil's Stool | Pupil's Desk | Classroom Cupboard | Filing Cabinet | Teacher's Chair | Teacher's Table | Clothes Cabinet | Doors | Folding Chairs | Windows |
| I. DIRECT LABOUR | | | | | | | | | | |
| A. Skilled | 160.673 | 51.030 | 77.577 | 123.120 | 133.061 | 157.676 | 109.012 | 162.845 | 143.987 | 104.737 |
| B. Semi-Skilled | 146.822 | 38.050 | 108.004 | 142.038 | 143.434 | 130.431 | 133.024 | 150.821 | 114.319 | 96.553 |
| C. Unskilled | 34.850 | 8.529 | 10.837 | 4.800 | 12.950 | 29.203 | 11.624 | 16.591 | 82.196 | 10.802 |
| TOTAL DIRECT LABOUR COST | \$ 342.345 | \$ 97.609 | \$ 196.418 | \$ 269.958 | \$ 289.445 | \$ 317.810 | \$ 253.660 | \$ 350.527 | \$ 340.502 | \$212.092 |
| Per 100 Product Units | | | | | | | | | | |
| II. DIRECT MATERIALS | | | | | | | | | | |
| A. Lumber | 6,273.250 | 354.840 | 515.850 | 81.390 | 889.550 | 912.060 | 793.480 | 588.840 | 5,686.660 | 283.810 |
| B. Plywood | --- | 105.990 | 1,012.330 | 2,632.640 | 4,208.470 | --- | 922.380 | 7,127.460 | --- | 55.780 |
| C. Finishing/ Painting Materials | --- | 39.480 | 168.350 | 775.540 | 576.330 | 117.070 | 146.120 | 804.780 | --- | 84.330 |
| D. Hardware, Nails, Glass Glue, Wood- screws and others | 1,410.000 | 15.000 | 15.000 | 2,500.000 | 150.000 | 120.000 | 500.000 | 2,500.000 | 3,600.000 | 120.000 |
| TOTAL DIRECT MATERIAL COST | \$7,683.250 | \$515.310 | \$1,696.530 | \$5,989.570 | \$5,284.350 | \$1,149.130 | \$2,361.980 | \$11,021.080 | \$9,286.660 | \$543.920 |
| Per 100 Product Units | | | | | | | | | | |

T A B L E XIX

D E P R E C I A T I O N S C H E D U L E

C. S. C. C., 1986 - 1995

(x US\$1,000)

| Depreciable Asset | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| I. Buildings and Structures | 104 | 109 | 109 | 118 | 118 | 118 | 118 | 118 | 118 | 118 |
| II. Machinery and Equipment | 43 | 45 | 60 | 69 | 75 | 75 | 75 | 75 | 75 | 75 |
| III. Vehicles and Materials Handling Equipment | <u>34</u> | <u>35</u> | <u>35</u> | <u>47</u> | <u>18</u> | <u>17</u> | <u>17</u> | <u>5</u> | <u>---</u> | <u>---</u> |
| Annual Totals ----- | <u>181</u> | <u>189</u> | <u>204</u> | <u>234</u> | <u>211</u> | <u>210</u> | <u>210</u> | <u>198</u> | <u>193</u> | <u>193</u> |

Note : Actual Values were rounded off to nearest US\$1,000.00.

T A B L E XX

BASIC DATA FOR THE PREPARATION
OF THE DEPRECIATION SCHEDULE

| Depreciable Asset | Amount to be Depreciated | Depreciation Period | Annual Depreciation | Year Depreciation Starts |
|--|-----------------------------|------------------------|------------------------|--------------------------------|
| 1. BUILDINGS AND STRUCTURES : | | | | |
| a) Existing as of 30 June 1982* | US\$ 231,612 | 25 years | US\$ 9,265 | 1980 |
| b) At New Plant Site ** | 2,369,100 | 25 years | 94,765 | 1986 |
| c) Proposed Assembling Center No. 3 | 120,000 | 25 years | 4,800 | 1987 |
| d) Proposed Assembling Center No. 4 | 120,000 | 25 years | 4,800 | 1989 |
| e) Proposed Assembling Center No. 5 | 120,000 | 25 years | 4,800 | 1989 |
| 2. MACHINERY AND EQUIPMENT : | | | | |
| a) Existing as of 30 June 1982 | 87,207 | 10 years | 8,721 | 1978 |
| b) C-1 Phase, New Plant Site | 345,420 | 10 years | 34,542 | 1986 |
| c) C-2 Phase, New Plant Site | 13,470 | 10 years | 1,347 | 1987 |
| d) C-3 Phase, New Plant Site | 157,615 | 10 years | 15,761 | 1988 |
| e) D-1 Phase, New Plant Site | 82,510 | 10 years | 8,250 | 1989 |
| f) D-2 Phase, New Plant Site | 63,220 | 10 years | 6,320 | 1990 |
| 3. VEHICLES AND MATERIAL HANDLING EQUIPMENT : | | | | |
| a) Existing as of 30 June 1982 | 123,950 | 4 years | 30,985 | 1980 |
| b) C-1 Phase, New Plant Site | 135,630 | 4 years | 33,910 | 1986 |
| c) D-1 Phase, New Plant Site | 42,565 | 4 years | 10,640 | 1989 |
| d) D-2 Phase, New Plant Site | 18,100 | 4 years | 4,525 | 1990 |
| e) At Assembling Center No. 3 | 3,650 | 4 years | 915 | 1987 |
| f) At Assembling Center No. 4 | 3,650 | 4 years | 915 | 1989 |
| g) At Assembling Center No. 5 | 3,650 | 4 years | 915 | 1989 |

Note : a) *Excludes existing three incomplete buildings at New Plant Site.
 b) ** Includes existing three incomplete buildings at New Plant Site.
 c) Existing Depreciable Assets as of 30 June 1982 include those found in all member Workshop Units and materials stores in Mukalla City, Shihir and Ghail Bawazir.

T A B L E XXII

STATEMENTS OF ASSETS AND LIABILITIES

C. S. C. C., Mukalla, P. D. R. Y., 1980 - 1982

| <u>I t e m</u> | 1980 US \$ | 1981 US \$ | Jan. - June 1982 US \$ |
|-------------------------------------|----------------------------|----------------------------|------------------------------|
| I. <u>FIXED ASSETS :</u> | | | |
| Buildings and Structures | 174,860.06 | 218,591.84 | 218,591.84 |
| Machinery and Equipment | 250,102.04 | 254,180.76 | 254,247.81* |
| Vehicles and Material | | | |
| Handling Equipment | 91,676.38 | 125,661.81 | 123,953.35 |
| Tools and Equipments | 26,177.84 | 24,921.28 | 25,309.04 |
| Furniture | 38,224.49 | 45,125.36 | 45,125.36 |
| Additions to Buildings | 52,854.23 | 12,696.79 | 12,953.35 |
| Project under Implementation | 767,530.61 | 800,172.01 | 815,000.00 |
| Down Payment on Machinery | --- | 9,183.68 | --- |
| Total Fixed Assets ----- | <u>1,401,425.66</u> | <u>1,490,533.53</u> | <u>1,495,180.76</u> |
| II. <u>CURRENT ASSETS :</u> | | | |
| Inventories : | | | |
| Raw Materials | 1,308,128.28 | 1,633,594.75 | 1,183,413.99 |
| Materials-in-Process | 431,346.94 | 298,871.72 | 298,874.64 |
| Finished Goods | 95,253.64 | 111,728.86 | 111,728.86 |
| Materials in Transit | 461,422.74 | 109,819.24 | 305,731.78 |
| Trades Receivable | 631,349.86 | 876,311.95 | 869,332.36 |
| Amounts Refundable by Government | <u>49,440.23</u> | <u>49,440.24</u> | <u>49,440.23</u> |
| Total Current Assets --- | <u>2,976,941.69</u> | <u>3,079,766.76</u> | <u>2,818,521.86</u> |
| TOTAL ASSETS ----- | <u>4,378,367.35</u> | <u>4,570,300.29</u> | <u>4,313,702.62</u> |
| III. <u>LIABILITIES :</u> | | | |
| Capital (Cash) | 976.68 | 976.68 | 976.68 |
| Government Contribution | 804,664.72 | 804,664.72 | 804,664.72 |
| Accrued Payable | 1,036,075.80 | 1,208,492.71 | 1,195,387.75 |
| Accumulated Depreciation | 133,326.53 | 190,096.21 | 184,533.53 |
| Allowances for Bad Debts : | | | |
| Government | 41,725.95 | 41,725.95 | 41,725.95 |
| Customers | 1,690.96 | 1,690.96 | 1,690.96 |
| Other Allowances*** | 318,067.06 | 411,198.25 | 468,886.30 |

| I t e m | 1980 | 1981 | Jan. - June |
|--------------------------------|---------------------|---------------------|---------------------|
| | US \$ | US \$ | 1982 US \$ |
| Bank Loans | 721,603.50 | 933,090.38 | 846,551.02 |
| Trades Payable | 311,559.77 | 87,023.32 | 226,827.99 |
| Sales Deposits | 830,069.97 | 779,877.55 | 618,425.66 |
| Capital (In Kind) | 88,693.88 | 88,125.36 | 87,819.24 |
| Unpaid Salaries and Allowances | 6,763.85 | 7,247.81 | 717.20 |
| Refundable Payments (Sales) | <u>83,148.69</u> | <u>16,090.38</u> | <u>--- **</u> |
| TOTAL EQUITY AND LIABILITIES | <u>4,378,367.35</u> | <u>4,570,300.29</u> | <u>4,478,207.00</u> |

-----o0o-----

- Notes :
- a) Data furnished by the Accounting Department, C.S.C.C., Mukalla, P.D.R.Y.
 - b) Original data in YD converted to US\$ at YD0.343 = US\$1.00
 - c) *Does not include value of machinery ordered in 1981, now waiting for release by customs Office at Aden.
 - d) **Data available only at year end.
 - e) ***Contributions to government sponsored Funds for specific Social Programmes, held in trust by the National Bank of Yemen

- i - CSCC operations for the period 1982 to 1985 will remain at the same level as of 1981 as indicated in the statements of CSCC Assets and Liabilities for 1980 - 1982, Table XXII:
- ii - No new Fixed Assets will be acquired during the period 1982 - 1984 ;
- iii - As per CSCC policy, all net income from operations during the years 1983 to 1985, after deducting the scheduled loan servicing payments and other allowed financial commitments, will be plowed back into CSCC operations ;
- iv - "Accrued Payables" will remain at the current level (about 41% of "Cost of Goods Sold") for the period 1983 to 1986, and will be reduced thereafter to 17% of "Cost of Goods Sold", in order to improve the credit image of the Co-op ;
- v - The item "Additions to Buildings" carried as an asset in the 1980 to 1982 Statements, and which refers to expenses in the improvement of the three Workshop Units to be phased-out, will be written off by 1985.
- vi - The inventory levels will be maintained as follows :
 - Raw Materials and Supplies ----- 6 months supply
 - Materials- and Supplies-in-Transit ---- 6 months supply
 - Materials-in-Process ----- 1 month supply
 - Finished Goods ----- 1 month production
- vii - Trades Receivables will be kept at 45-days level ;
- viii - "Amounts to be Refunded by Government" will be liquidated by 1983 as expected by CSCC ;
- ix - The current "Customers' Bad Debt" of US\$1,690 will be written off by 1985 and a maximum level of US\$2,000 will be set from 1986 and thereafter ;
- x - "Trades Payable" will be maintained at 2 months level ;

- xi - "Sales Deposits" will be reduced to US\$500,000 by 1984 and to US\$200,000 by 1985, such that by 1986 a 50% sales deposit will be required on orders for Special Products only, with a corresponding delivery period of 45 days ;
- xii - All sales of Standard Products will be made on "Cash-on-Delivery" basis ;
- xiii - There will be no further additions to "Capital (In Kind)", as the recommended machinery and equipment complement will be sufficient to produce the projected sales volumes ;
- xiv - "Refundable Payments" will be allowed up to 1/4% of sales value on Special Products; while Standard Products will be sold on a "No Return-No Exchange" basis ; and
- xv - CSCC is not subject to any Government tax, by virtue of PDRY laws on Co-operatives.

It will be noted that the 1980 - 1982 CSCC Statements of Assets and Liabilities do not have an account for "Cash in Banks and on Hand". This was explained as in compliance to existing PDRY policies that Co-operatives are not Profit-oriented but are Service-oriented. It was explained further that any excess of Sales over "Cost of Goods Sold" is considered savings, and after deducting the cost of "Loans Servicing" and other specific financial obligations of the Co-op, the remainder is placed in certain Government sponsored funds for Social Programmes and are held in trust by the National Bank of PDRY. The CSCC contributions to these funds are indicated in the 1980 to 1982 Statements of Assets and Liabilities under the account "Other Allowances". The Co-op is allowed to use its contributions to the funds (subject to reimbursement) to finance its operations.

Inasmuch as the basic data needed to rework the Statements of Assets and Liabilities according to the UNIDO format were not available, and if made available there was not enough time to

rework the Statements, it was deemed expedient to more-or-less follow the CSCC format (as in Table XXII), with the inclusion of an account for "Cash in Banks and on Hand" under the "Current Assets" heading.

The resulting Projected Statements of Assets and Liabilities for the period 1984 to 1995 is given in Table XXIII, indicating an increase of net Worth from about US\$3,806,000 (YD1,305,000) in 1981 to approximately US\$25,893,000 (YD8,710,000) in 1995.

15.0 CASH FLOW PROJECTIONS

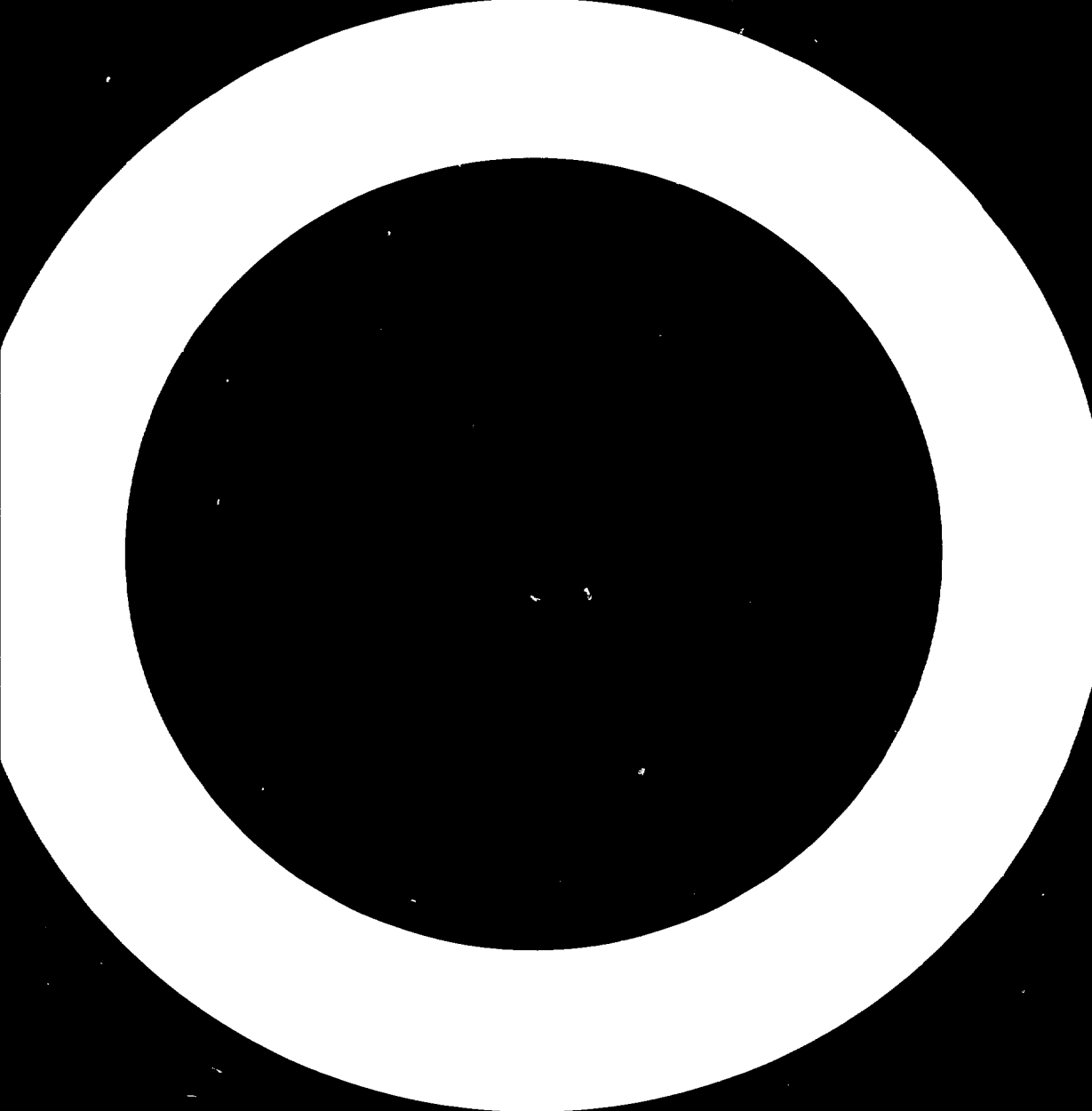
The corresponding annual Cash Flow for the period 1984 to 1995 assuming a cash position of US\$50,000 (YD17,150) at the beginning of 1984, (which is about the cash position at the end of each year previous to 1982) is given in Table XXIV. It should be noted that it was assumed that the total interest (US\$955,000) for the 3-year Grace Period of the Second Loan was collected in advance, so that only US\$1,320,000 of the US\$2,275,000 loan was drawn. It is indicated that the additional capital outlay of US\$748,400 (YD257,700) required to meet the expansion needs of the Co-op can be possibly funded from the cash proceeds during the same period.

16.0 OTHER FINANCIAL VIABILITY PARAMETERS

16.1 Break-Even Analysis

The calculated Break-Even Sales Volumes for each year of operations are as follows :

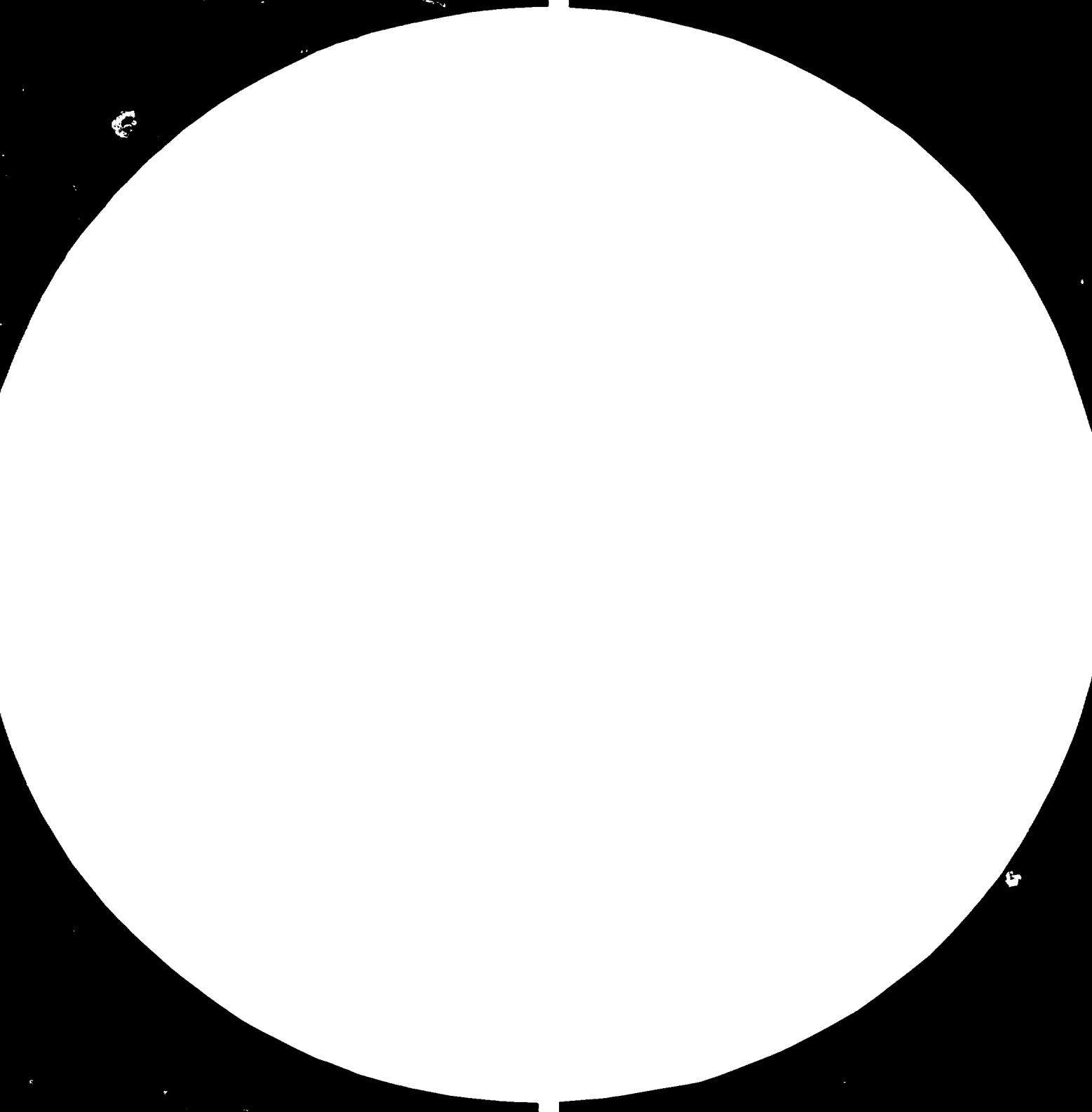
| Year | <u>Annual Sales Targets</u> | | <u>Break-Even Sales</u> | |
|------|-----------------------------|---|-------------------------|---|
| | US\$ (x 1,000) | Local Currency Equivalent (x 1,000) | US\$ (x 1,000) | Local Currency Equivalent (x 1,000) |
| 1986 | US\$ 5,250 | YD1,801 | US\$5,145 | YD1,765 |
| 1987 | 7,500 | 2,573 | 5,175 | 1,775 |
| 1988 | 10,500 | 3,602 | 7,705 | 2,643 |
| 1989 | 12,750 | 4,373 | 8,103 | 2,779 |
| 1990 | 15,000 | 5,145 | 9,379 | 3,217 |

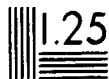




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Visual acuity is the ability to resolve detail. It is measured in terms of the minimum angle of resolution (MAR) of the eye. The MAR is the angle subtended by the two lines of the resolution test target. The MAR is the reciprocal of the spatial frequency in cycles per degree. The MAR is the reciprocal of the resolution in cycles per degree. The MAR is the reciprocal of the resolution in cycles per degree.

PROJECTED ANNUAL

| | 1984 | 1985 | 1986 |
|---|---------------------|---------------------|----------------------|
| I. <u>FIXED ASSETS :</u> | | | |
| Buildings and Structures | 219 | 1,875 | 1,995 |
| Machinery and Equipment | 272 | 617 | 631 |
| Vehicles and Material Handling Equipment | 124 | 260 | 264 |
| Tools and Equipments | 25 | 30 | 30 |
| Furniture | 45 | 45 | 45 |
| Additions to Buildings | 13 | --- | --- |
| Project Under Implementation | 815 | * | * |
| Total Fixed Assets | <u>1,513</u> | <u>2,827</u> | <u>2,965</u> |
| II. <u>CURRENT ASSETS :</u> | | | |
| Cash in Bank/on Hand | 102 | 580 | 2,175 |
| Inventories : | | | |
| Raw Materials | 1,184 | 1,361 | 1,973 |
| Materials-in-Process | 299 | 299 | 227 |
| Finished Goods | 112 | 112 | 377 |
| Materials in Transit | 306 | 1,361 | 1,973 |
| Other Current Assets | 869 | 869 | 869 |
| Total Current Assets | <u>2,872</u> | <u>4,582</u> | <u>7,594</u> |
| TOTAL ASSETS | <u>4,385</u> | <u>7,409</u> | <u>10,559</u> |
| III. <u>SHAREHOLDERS' EQUITY AND LIABILITIES :</u> | | | |
| Capital (Cash) | 1 | 1 | 1 |
| Government Contribution | 805 | 805 | 805 |
| Accrued Payables | 1,327 | 1,801 | 2,750 |

T A B L E XXIII

ANNUAL STATEMENTS OF ASSETS AND LIABILITIES

C. S. C. C., 1984 - 1995

(x US\$1,000)

| 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 2,235 | 2,235 | 2,235 | 2,235 | 2,235 | 2,235 | 2,235 | 2,235 | 2,235 |
| 789 | 871 | 934 | 934 | 934 | 934 | 934 | 934 | 934 |
| 264 | 314 | 332 | 332 | 332 | 332 | 332 | 332 | 332 |
| 30 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| * | * | * | * | * | * | * | * | * |
| <u>3,363</u> | <u>3,498</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> |
| 1,684 | 2,580 | 3,956 | 5,952 | 7,805 | 9,694 | 11,624 | 13,599 | 15,628 |
| 2,667 | 3,279 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 |
| 329 | 445 | 547 | 652 | 652 | 652 | 652 | 652 | 652 |
| 555 | 784 | 910 | 1,075 | 1,072 | 1,069 | 1,065 | 1,061 | 1,056 |
| 2,667 | 3,279 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 |
| 969 | 1,367 | 1,587 | 1,876 | 1,870 | 1,865 | 1,858 | 1,851 | 1,842 |
| <u>8,871</u> | <u>11,744</u> | <u>14,826</u> | <u>17,381</u> | <u>19,255</u> | <u>21,106</u> | <u>23,025</u> | <u>24,987</u> | <u>27,002</u> |
| <u>12,234</u> | <u>15,242</u> | <u>18,405</u> | <u>20,960</u> | <u>22,804</u> | <u>24,685</u> | <u>26,604</u> | <u>28,566</u> | <u>30,581</u> |

| | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 1 | i | 1 | 1 | i | 1 | 1 | 1 |
| 805 | 805 | 805 | 805 | 805 | 805 | 805 | 805 | 805 |
| 1,131 | 1,600 | 1,865 | 2,193 | 2,187 | 2,181 | 2,172 | 2,162 | 2,154 |

| | | | | |
|------------------------------|--------------|--------------|--------------|--------------|
| Project Under Implementation | 815 | * | * | * |
| Total Fixed Assets | <u>1,513</u> | <u>2,827</u> | <u>2,965</u> | <u>3,363</u> |

II. CURRENT ASSETS :

| | | | | |
|----------------------|--------------|--------------|---------------|---------------|
| Cash in Bank/on Hand | 102 | 580 | 2,175 | 1,684 |
| Inventories : | | | | |
| Raw Materials | 1,184 | 1,361 | 1,973 | 2,667 |
| Materials-in-Process | 299 | 299 | 227 | 329 |
| Finished Goods | 112 | 112 | 377 | 555 |
| Materials in Transit | 306 | 1,361 | 1,973 | 2,667 |
| Other Current Assets | <u>869</u> | <u>869</u> | <u>869</u> | <u>969</u> |
| Total Current Assets | <u>2,872</u> | <u>4,582</u> | <u>7,594</u> | <u>8,871</u> |
| | | | | |
| TOTAL ASSETS | <u>4,385</u> | <u>7,409</u> | <u>10,559</u> | <u>12,234</u> |

III. SHAREHOLDERS' EQUITY AND LIABILITIES :

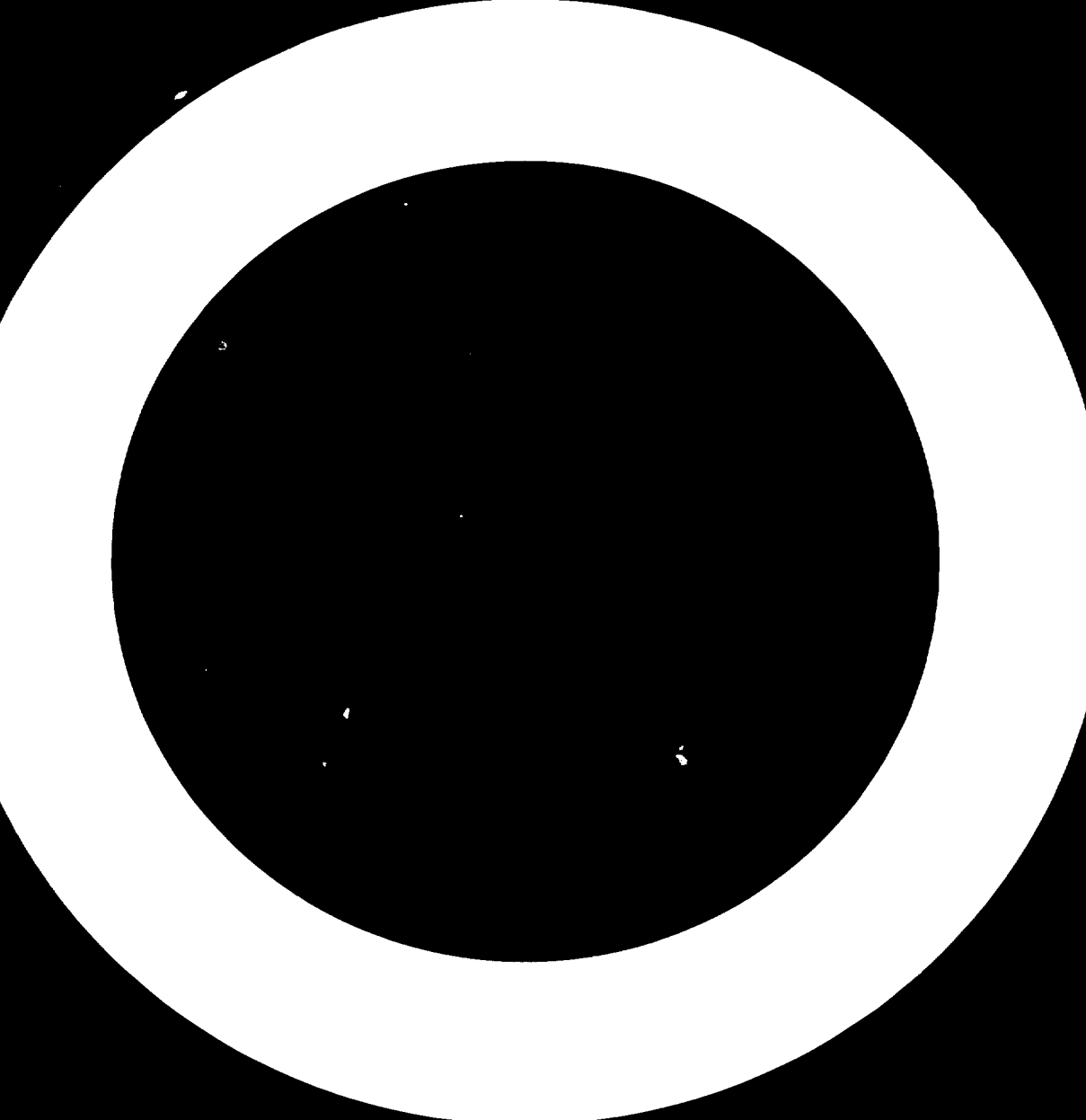
| | | | | |
|------------------------------------|--------------|--------------|---------------|---------------|
| Capital (Cash) | 1 | 1 | 1 | 1 |
| Government Contribution | 805 | 805 | 805 | 805 |
| Accrued Payables | 1,324 | 1,891 | 2,750 | 1,131 |
| Accumulated | | | | |
| Depreciation | 202 | 211 | 392 | 581 |
| Allowances for Bad Debts : | | | | |
| Government | 42 | --- | --- | --- |
| Customers | 2 | 2 | 2 | 2 |
| Other Allowances, | | | | |
| Accumulated ** | 812 | 1,390 | 3,783 | 6,379 |
| Bank Loans | 405 | 2,617 | 2,554 | 2,486 |
| Trades Payable | 187 | 187 | 287 | 658 |
| Sales Deposits | 500 | 200 | 66 | 92 |
| Capital (In Kind) | 88 | 88 | 88 | 88 |
| Unpaid Salaries and Allowances | 1 | 1 | 1 | 1 |
| Refundable Payments (Sales) | <u>16</u> | <u>16</u> | <u>10</u> | <u>10</u> |
| | | | | |
| TOTAL EQUITY AND LIABILITIES ----- | <u>4,385</u> | <u>7,409</u> | <u>10,559</u> | <u>12,234</u> |

Notes : * Distributed among Buildings

** See explanation of this item

| <u>*</u> | <u>*</u> | <u>*</u> | <u>*</u> | <u>*</u> | <u>*</u> | <u>*</u> | <u>*</u> |
|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <u>3,498</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> | <u>3,579</u> |
| 2,580 | 3,956 | 5,952 | 7,805 | 9,694 | 11,624 | 13,599 | 15,628 |
| 3,279 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 |
| 445 | 547 | 652 | 652 | 652 | 652 | 652 | 652 |
| 784 | 910 | 1,075 | 1,072 | 1,069 | 1,065 | 1,061 | 1,056 |
| 3,279 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 | 3,913 |
| <u>1,367</u> | <u>1,587</u> | <u>1,876</u> | <u>1,870</u> | <u>1,865</u> | <u>1,858</u> | <u>1,851</u> | <u>1,842</u> |
| <u>11,744</u> | <u>14,826</u> | <u>17,381</u> | <u>19,255</u> | <u>21,106</u> | <u>23,025</u> | <u>24,987</u> | <u>27,002</u> |
| <u>15,242</u> | <u>18,405</u> | <u>20,960</u> | <u>22,804</u> | <u>24,685</u> | <u>26,604</u> | <u>28,566</u> | <u>30,581</u> |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 805 | 805 | 805 | 805 | 805 | 805 | 805 | 805 |
| 1,600 | 1,865 | 2,193 | 2,187 | 2,181 | 2,172 | 2,163 | 2,154 |
| 785 | 1,019 | 1,230 | 1,440 | 1,650 | 1,845 | 2,041 | 2,234 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 8,688 | 11,387 | 13,457 | 15,324 | 17,321 | 19,386 | 21,538 | 23,799 |
| 2,246 | 1,980 | 1,684 | 1,429 | 1,139 | 807 | 430 | --- |
| 890 | 1,093 | 1,304 | 1,304 | 1,304 | 1,304 | 1,304 | 1,304 |
| 131 | 159 | 188 | 188 | 188 | 188 | 188 | 188 |
| 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| <u>5</u> | <u>5</u> | <u>5</u> | <u>5</u> | <u>5</u> | <u>5</u> | <u>5</u> | <u>5</u> |
| <u>15,242</u> | <u>18,405</u> | <u>20,960</u> | <u>22,804</u> | <u>24,685</u> | <u>26,604</u> | <u>28,566</u> | <u>30,581</u> |

and Structures and other fixed Capital items.
in Paragraph 14.0, page 45.



T A B L E XXIV
PROJECTED CASH FLOW, C. S. C. C., 1984 - 1995
(x US\$1,000)

| | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| A. PROJECTED CASH RECEIPTS : | | | | | | | | | | | | |
| Net Income After Tax | 175 | 175 | 723 | 844 | 1,090 | 1,777 | 2,100 | 2,134 | 2,170 | 2,222 | 2,274 | 2,327 |
| Proceeds from 2nd Loan | --- | 1,320 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Depreciation | 9 | 9 | 181 | 189 | 204 | 234 | 211 | 210 | 210 | 198 | 193 | 193 |
| Decrease in Other Current Assets | --- | --- | --- | --- | --- | --- | --- | 6 | 5 | 7 | 7 | 9 |
| Increase in Trades Payable | --- | --- | 100 | 371 | 232 | 203 | 211 | --- | --- | --- | --- | --- |
| Increase in Accrued Payables | 50 | 567 | 679 | --- | 469 | 265 | 328 | --- | --- | --- | --- | --- |
| T O T A L | 234 | 2,071 | 1,683 | 1,404 | 1,995 | 2,479 | 2,850 | 2,350 | 2,385 | 2,427 | 2,474 | 2,529 |
| Less : | | | | | | | | | | | | |
| B. PROJECTED CASH DISBURSEMENTS : | | | | | | | | | | | | |
| Pre-Operating Expenses | 75 | 75 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Payments on 1st Loan | 75 | 74 | 75 | 74 | 75 | 74 | 75 | --- | --- | --- | --- | --- |
| Payments on 2nd Loan | --- | --- | --- | --- | 490 | 491 | 490 | 491 | 490 | 491 | 490 | 491 |
| Increase in Other Current Assets | --- | --- | --- | 100 | 398 | 320 | 289 | --- | --- | --- | --- | --- |
| Decrease in Trades Payable | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Decrease in Accrued Payables | --- | --- | --- | 1,439 | --- | --- | --- | 6 | 6 | 6 | 9 | 9 |
| Purchases of Machinery and Equipment | --- | 346 | 13 | 158 | 83 | 63 | --- | --- | --- | --- | --- | --- |
| Construction Expenses, Buildings and Structures | --- | 700 | --- | 110 | --- | 220 | --- | --- | --- | --- | --- | --- |
| Other Construction and Installation Expenses | 40 | 398 | --- | 10 | --- | 20 | --- | --- | --- | --- | --- | --- |
| Purchases of Vehicles and Material Handling Equipment | --- | 136 | --- | 4 | 43 | 25 | --- | --- | --- | --- | --- | --- |
| T O T A L | 190 | 1,593 | 88 | 1,895 | 1,089 | 1,113 | 854 | 497 | 496 | 497 | 499 | 500 |
| INCREASE (DECREASE) IN CASH | 44 | 478 | 1,595 | (491) | 906 | 1,366 | 1,996 | 1,853 | 1,889 | 1,930 | 1,975 | 2,029 |
| Add : | | | | | | | | | | | | |
| Beginning Balance | 58 | 102 | 580 | 2,175 | 1,684 | 2,590 | 3,956 | 5,952 | 7,805 | 9,694 | 11,624 | 13,599 |
| ENDING BALANCE | 102 | 580 | 2,175 | 1,684 | 2,590 | 3,956 | 5,952 | 7,805 | 9,694 | 11,624 | 13,599 | 15,628 |

| Year | <u>Annual Sales Targets</u> | | <u>Break-Even Sales</u> | |
|------|-----------------------------|---|-------------------------|---|
| | US\$ (x 1,000) | Local Currency Equivalent (x 1,000) | (x 1,000) | Local Currency Equivalent (x 1,000) |
| 1991 | 15,000 | 5,145 | 9,288 | 3,186 |
| 1992 | 15,000 | 5,145 | 9,192 | 3,153 |
| 1993 | 15,000 | 5,145 | 9,052 | 3,105 |
| 1994 | 15,000 | 5,145 | 8,913 | 3,057 |
| 1995 | 15,000 | 5,145 | 8,771 | 3,008 |

It will be noted that at full plant capacity the Break-Even Sales is about 63% of the Total Sales Volume target.

16.2 Pay-Back Period

The Pay-Back Period is calculated as follows :

$$\text{Pay-Back Period} = \frac{(4,856 \times 10) \times 1,000}{(17,661 + 2,725 + 2,023) \times 1,000}$$

$$= \underline{\underline{2.17 \text{ years}}}$$

This Pay-Back Period is deemed acceptable for the type of Project and level of investment proposed in this study.

16.3 Internal Rate of Return

Based on the Projected Net Income Statements (Table XXI), and the estimated 1995 net worth of US\$25,893,000 the Internal Rate of Return for the 10-year period was computed at about 40%. This IRR is deemed very satisfactory for wood-working plant projects in developing countries.

16.4 Average Rate of Return on Investment

The Average Annual Rate of Return on Investments is

calculated as follows :

$$\text{ROI} = \frac{(17,661 + 2,677) \times 1,000}{10 \times 4,856 \times 1,000} \times 100\% = \underline{\underline{41.9\%}}$$

It is of interest to note that the calculated values for Internal Rate of Return and the Average Annual Rate of Return on Investment do not vary greatly from reciprocal of the calculated Pay-Back Period.

16.5 Sensitivity Analysis

Further tests to determine the ability of the Co-op to sustain the Projected Schedule of Operations and still meet its programmed financial obligations under abnormal economic conditions, is suggested.

The limited data and the time available to this Expert did not allow the calculation of useful and meaningful sensitivity parameters such as :

- i - The Degree of Operating Leverage ;
- ii - The Indifference Point ; and
- iii - The Degree of Financial Leverage.

It is however held that since the Project is officially sponsored by the Government of a centrally-planned economy and the Co-operative enjoys a virtual monopoly of the industry in the areas covered by its operations, necessary remedial measures could easily be formulated and expeditiously implemented when unforeseen abnormal economic conditions threaten the objectives of the Project.

17.0 PROJECT FINANCIAL AND ECONOMIC VIABILITY

Within the constraints, assumptions and considerations discussed in the foregoing paragraphs, the CSCC Consolidated Woodworks Plant Project is deemed technically feasible and financially viable. It is thus recommended for re-activation under the concepts and new plan of activities discussed in the previous paragraphs of this Report.

Appendix I
UNITED NATIONS



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

Project in the People's Democratic Republic of Yemen
Assistance to the Coastal Strip Carpentry
Co-operative in Mukalla

JOB DESCRIPTION

RP/PDY/82/003/11-01/31.7.A.

Post title Furniture Production Expert

Duration Three Months

Date required As soon as possible.

Duty station Mukalla, with travel to Aden.

Purpose of project To prepare a techno-economic study, including marketing aspects, for determining the future development plans, investment needs (if any), and training needs of the co-operative.

Duties The expert will be attached to the Coastal Strip Carpentry Co-operative in Mukalla

 He will be expected to assess the present situation at the Co-operative, and prepare a study which will cover the following topics:

- Markets and plant capacity;
- Raw material situation;
- Location and site;
- Project engineering;
- Organization;
- Manpower requirements;
- Training needs;
- Implementation scheduling;
- Requirements for technical assistance;
- Financial and economic evaluation.

In his report he will make recommendations for action to be taken by the Co-operative's management, as well as the local and Central Government authorities, and, identify the need for possible future technical assistance to ensure the proper establishment of the new integrated complex 25km. from Mukalla and coordination of all.../.
associated units.

Applications and communications regarding this Job Description should be sent to:

Project Personnel Recruitment Section, Industrial Operations Division
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. Box 300, Vienna, Austria

Qualifications Engineer or Wood Technologist with considerable experience in the operation and management of furniture and/or joinery plants. Experience in developing countries, training and marketing also desirable.

Language English. Knowledge of Arabic desirable.

Background information The Coastal Strip Carpentry Co-operative was started in Mukalla in December 1972 by 275 carpenters with their own equipment and facilities. The total value of equipment contributed was the equivalent of US\$88,694 (YD 30,422). There are four manufacturing units at Mukalla (about 500 km. east of Aden along the coastline), viz. one for boats and launches and three for doors, windows, roofs, household and office furniture such as tables, chairs, beds, sofas, etc. In addition, there is a unit at Ghail Bavazir (about 40km from Mukalla) and another at Shihir (about 65km from Mukalla) in the same line of manufacture under this Co-operative. Common services for all six units, eg. administration, accounts, etc. are centralized at Mukalla. The six units cater to the entire requirements of the Hadramout Governorate.

The production of boats and launches (which averaged 12 per annum with an average payload of 25 tons for fishing boats and 35 passengers for launches) ceased in 1980 because the requirements were met by imports. The production figures for 1980 for other items were as follows (in pieces):

| | |
|---------------------|-----------------------|
| Doors | 2,610 |
| Windows | 3,480 |
| Tables and Desks | 3,500 |
| Cupboards | 2,600 |
| Beds | 1,750 |
| Dressing Tables | 1,500 |
| Chairs and Sofas | 12,000 |
| Curtain Rails, Etc. | 24,000 (running feet) |

The total value of sales was US\$2,362,310 (YD 810,272).

The existing units are widespread, severely congested, ill-planned and improvised and do not lend themselves to increase in production as well as qualitative improvement. It is, therefore, proposed to establish an integrated, modern carpentry complex, about 25km from Mukalla on the main highway to the airport. Land has been acquired (a right-angled triangular plot, the two adjacent sides measuring 300M and 400M respectively) and three modern, spacious, well-ventilated, prefabricated buildings erected. The buildings measure 25m x 60m each and will house storage, assembly and workshop facilities. About 32 machines are proposed to be transferred here from the existing units, and a number of new machines are proposed to be imported.

The investment already committed is about US\$2.33 million (YD800,000).

In addition to the Co-operative at Mukalla, there is one at Seiyun, in the interior, about 400km from Mukalla, with two manufacturing units. There is also a Public Corporation for Carpentry and Boatbuilding at Aden with two manufacturing units for furniture and one for boatbuilding.

A review of the current status of the Mukalla manufacturing activities has revealed the imperative need for preparing as soon as possible a fully fledged techno-economic study including also the marketing aspects. The findings of such a study will dictate the direction which carpentry manufacture in the Mukalla area should take, and will determine the extent to which the new project should be implemented.

In August/September 1978, a short-term UNIDO expert (Desmond P. Cody) studied the activities of the Public Corporation for Carpentry and Boatbuilding at Aden under Project SI/PDY/77/804. He submitted a comprehensive report (DP/ID/SER.A/168) with over 50 recommendations covering product design, layout, raw materials, machinery specifications, production technology, appraisal of ongoing facilities, manning, training, organization, etc. As many of the problems are similar to those of the Mukalla units, this report contains useful additional background information on the level of development of this sector in Yemen.

A P P E N D I X II

OBSERVATIONS DURING THE VISIT TO
THE ADEN PUBLIC ENTERPRISE FOR CARPENTRY
(Formerly the PUBLIC CORPORATION
For CARPENTRY and BOAT BUILDING, ADEN)

24 August 1982

=====

Accompanied by Mr. Fuad Abdul Khalick, Supervising Officer for Co-operatives, Ministry of Industry, P.D.R.Y., a visit was made to the Aden Public Enterprise for Carpentry in Maala, Aden. A tour of the manufacturing facilities, raw materials and finished goods stores was guided by the General Manager of the Enterprise, Mr. Kassem Hasson Mohammad.

OBSERVATIONS :

The production facilities and techniques, the undesirable state of housekeeping, and the quality of furniture and joinery being produced by the Enterprise are exactly the same as was found by Mr. D. P. Cody, UNIDO Expert in his Technical Report (DP/ID/SER.A/168) of 15 September 1978.

However, it appears that the Enterprise has started implementing Mr. Cody's recommendations. Two new factory buildings have been erected, a number of new machines have been located according to the recommended lay-out, while others are still waiting to be located. Mr. Kassem stated that a few more pieces of equipment have been ordered and their arrival in Aden is expected soon.

COMMENTS :

Technical assistance in the implementation of Mr. Cody's recommendations are badly needed, together with the training of the factory personnel as recommended by Mr. Cody.

ACTION TAKEN :

Mr. S. K. Desai, Team Leader, UNIDO Industrial Advisory Group, P.D.R.Y. Ministry of Industry was informed of the need for technical assistance in the Enterprise's efforts to implement Mr. Cody's recommendations. The matter was subsequently discussed with the Assistant Deputy Minister of Industry (for Production) for appropriate action.

A P P E N D I X III

OBSERVATIONS DURING THE VISIT TO
MEMBER WORKSHOP UNITS OF
THE SEIHUN CARPENTRY CO-OPERATIVE
(7 to 10 SEPTEMBER, 1982)

In line with the request of the Ministry of Industry to look at the CSCC Project in the context of the PDRY furniture and joinery industry as a whole, a visit to the Seihun Carpentry Co-operative was conducted from 7 to 10 September, 1982. The General Manager and the Production Manager of the Co-operative, together with the District Supervisor of Co-operatives and Mr. Fuad of the Ministry of Industry, accompanied this Expert during the visits to the 4 workshop member units of the Co-operative.

After the visit to all the member workshop units and the central stores for sawwood and plywood, a conference was held with all the Unit Directors and Technical Directors of the Units, together with the Management Staff of the Co-operative in the morning of 9 September 1982. Limited consultations and advice were given by the Expert during the conference.

OBSERVATIONS :

1. The sawwood storing and handling practices in all the 4 units is not good. Exposure to the sun and haphazard piling of boards lead to degradates, splits, twisting, etc. (See Figures III-1 and III-2).
2. The production machinery lay-out in all the 4 units needs improvement to allow better and smooth flow of work-in-process.
3. Transfer of work-in-process from one work station to another is done by hand. Work is piled near the machines. (See Figs. III-3 to III-6).

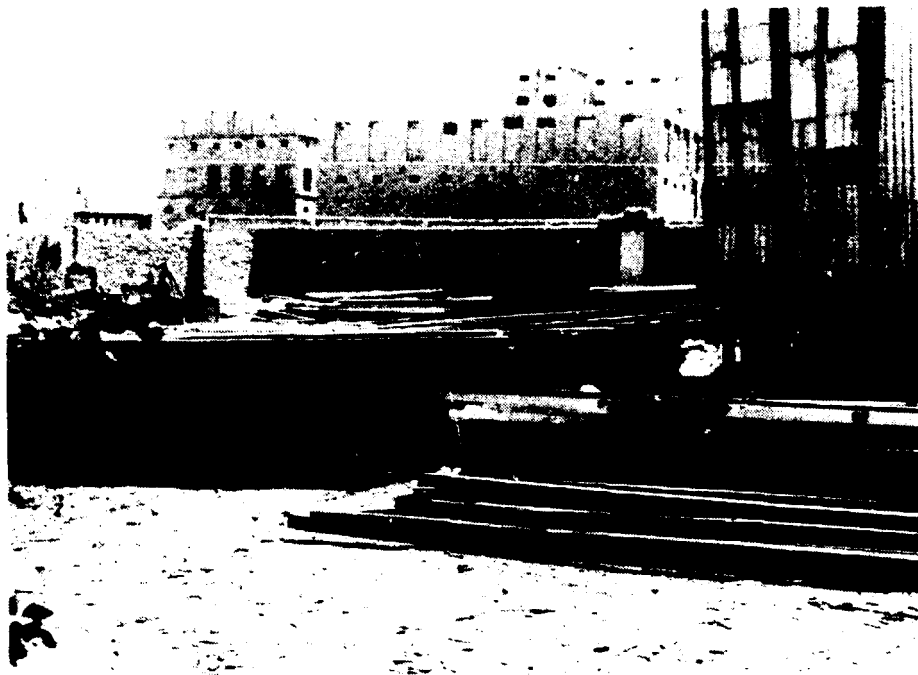


Figure III-1

Open-air "Dead-piling" of Lumber, a practice typical of all member units of the Seihun Carpentry Co-operative.



Figure III-2

Splits, cupping and other degrade manifestations caused by improper lumber storage in member Units of the Seihun Carpentry Co-operative.

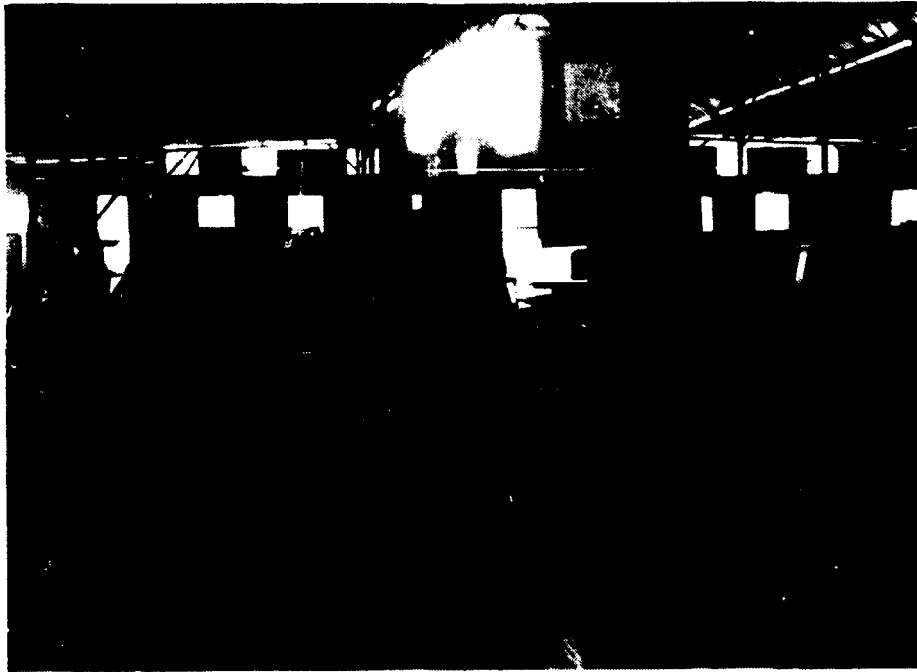


Figure III-3

Inside the machining section of a member Unit of the Seihun Carpentry Co-operative. Note the disorder typical of all member Units of the Co-operative.

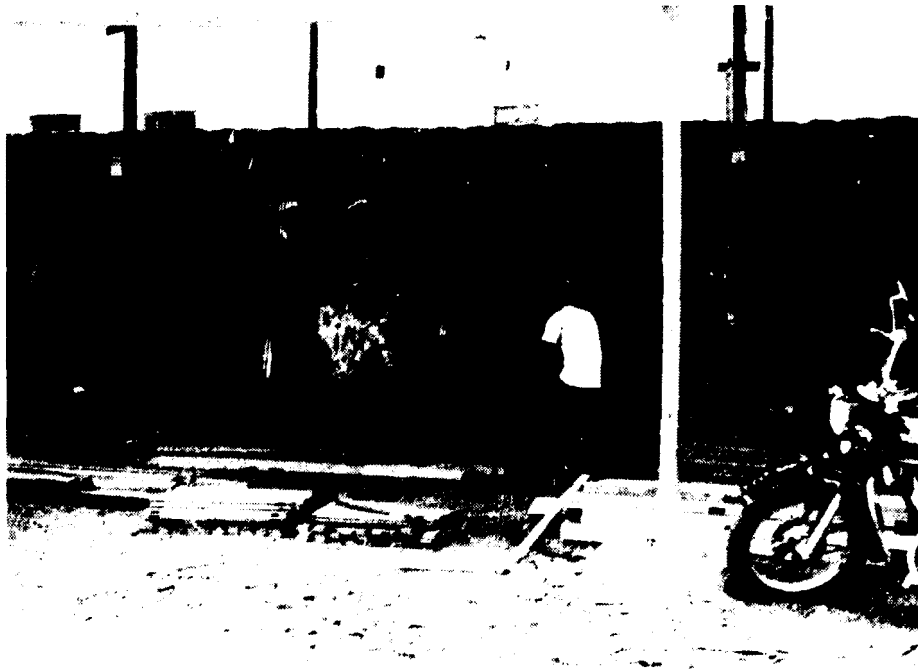


Figure III-4

Window assembly section at the Tarim Workshop Unit, Seihun Carpentry Co-operative.

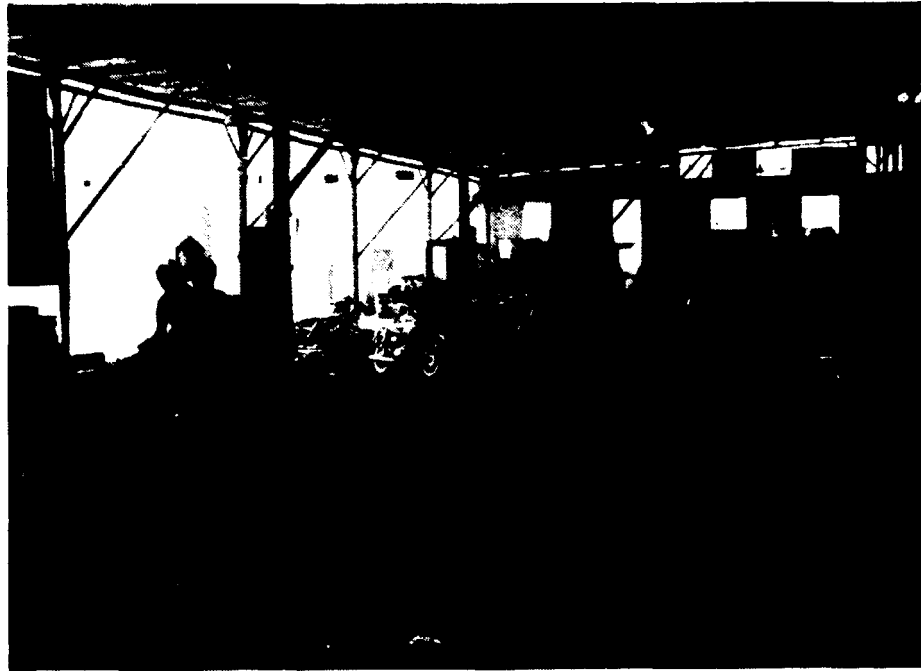


Figure III-5

There is about 2" thick layer of sawdust on the factory floor of this member Unit, Seihun Carpentry Co-operative.



Figure III-6

Another view of the assembling section, Tarim Workshop Unit, Seihun Carpentry Co-operative.

4. All the 4 units badly needs better house-keeping practices.
(See Figures III-3 to III-6).
5. Except for limited use in the Tarim Workshop Unit, jigs and fixtures are non-existent.
6. Among the four units, has acceptable level of cutting tool maintenance and thus, has better joinery than the other three units.
7. The production machinery are being used as tools, rather than as industrial machines, in all the 4 units.
8. All the 4 units do not have machine maintenance facilities. In the face of absence of spare parts, machinery are often laid idle for long periods of times.
9. There is no visible Q. C. activity in all the 4 units.
10. Finishing/coating of finished goods is not practiced.
11. Production abrasives are not used.
12. Neither is Adhesive Technology known.
13. Supervisors (Unit Directors) also function as workers and are paid by the piece. Some form of small allowances, in addition to workers' pay is given to supervisors. Hence, supervision in all 4 units is very inadequate.
14. In general, quality of workmanship is very low.
15. Use of product drawings and working drawings is totally unknown, components' dimensions are memorized by the Technical Director and given to workers as instructions. (This may be due to the fact that a great majority of the workers are illiterate.)

PROBLEMS AND COMPLAINTS :

1. Inadequate supply of raw materials, both in quality and quantity, prevents full utilization of machinery.
2. Lack of spare parts and maintenance tools prevent good and regular maintenance of machinery and cutting tools.
3. Poor working conditions, particularly high heat and uncollected saw-dust, result to low work efficiencies.
4. Except in equipment maintenance is carried out by whoever knows a little bit more about maintenance than the other workers.
5. There is a feeling and wish for better joinery designs and techniques, but there is no one available to provide assistance on this matter.

RECOMMENDATIONS :

A. For Immediate Action :

1. Set-up a maintenance shop, with basic equipment for each Unit.
2. Set up a central machine shop for the Co-operative equipment (lathes, shapers, etc.) to service the 4 units.
3. Set up central grinding facilities for TCT tools.
4. Set up training program for machinery and tools maintenance.

B. For Long Range Action :

1. Set-up a training programme and facilities for up-grading skills at a.l levels, including supervisory and managerial.
2. Set up training programmes for the following :
 - a. Adhesives Technology

- b. Abrasives Technology
 - c. Furniture and Joinery Design
 - d. Quality Control
 - e. Material Management
 - f. Production Control
 - g. Industrial Costing
3. Technical assistance in proper materials handling techniques and woodwaste disposal systems.
 4. Technical assistance in proper equipment selection and machinery lay-out.

THE SEIHUN CARPENTRY CO-OPERATIVE

The Seihun Carpentry Co-operative, with main offices in the City of Seihun, Hadhramout Governorate, about 200 km northeast of Mukalla, serves most of the furniture and construction woodworks requirements of the 120,000 inhabitants of the area. A few private carpentry shops, a number of which is owned and operated by some workers in the Co-operative's workshops, provide the balance of the furniture and construction woodworks needs of the area.

The Co-operative is composed of 4 workshop units. The Co-operative's Head office is responsible for the financial, materials procurement and distribution, sales and production planning functions for the 4 workshop units.

THE TARIM WORKSHOP UNIT :

Unit Director - Mr. ACHMED MOBARAK

This unit, located in the town of, produces primarily construction woodworks (doors and windows) and a smaller quantity of home furniture. The workshop is located on the outskirts of the town proper of Tarim, on a 2,400 sq.m. lot. The factory and office buildings have a total floor area of about 960 sq.m. The Unit employs a total of 68 workers, of whom 62 are production workers and 6 are administrative personnel. This Unit was established in 1975.

The Unit's equipment complement is composed of :

| <u>Description</u> | <u>No. of Units</u> |
|--|---------------------|
| Combination table saw, (200 mm sawblade Ø) and vertical spindle moulder, (150 mm cutterhead Ø) ----- | 1 |
| Combination Jointer, (500 mm work width capacity) and drill-mortizer, (16 mm maximum bit diameter) ----- | 2 |
| Planer-thicknesser, (600 mm work width capacity) single cutterhead, three knives - | 1 |
| Vertical spindle moulder, (cutter-head Ø 200 mm) ----- | 2 |
| Jointer, 500 mm work width capacity ----- | 1 |
| Bandsaw, 1020 mm pulley diameter, fixed table, 38 mm wide bandsaw blade ----- | 1 |
| Chain mortizer, 6.5 mm x 32 mm chainblade, hand-operated ----- | 1 |
| Jointer, 300 mm work width capacity ----- | 1 |
| Horizontal drill-mortizer, 6 mm bit capacity -- | 1 |
| Bandsaw blade filing machine, automatic feed, up to 50 mm sawblades capacity ----- | 1 |
| Bandsaw setting machine , automatic feed ----- | 1 |
| Bandsaw blade brazing machine, up to 50 mm blade width capacity ----- | 1 |
| Straight knife grinder, 600 mm blade length capacity, hand operated ----- | 1 |

THE SEIHUN WORKSHOP UNIT :

Unit Director -- ABDULLAH SALEM BASHEED

This Unit manufactures home furnitures only. It is located in the city of Seihun and was established in 1975. The shop is located on a 1,200 sq.m. lot, with a factory and office building having a total floor area of 500 sq.m. The Unit has 30 factory workers and 2 administrative personnel.

The equipment complement is composed of :

| <u>Description</u> | <u>No. of Units</u> |
|---|---------------------|
| Horizontal drill-mortizer, bit's maximum diameter 16 mm) ----- | 1 |
| Jointer, 450 mm work width capacity ----- | 1 |
| Bandsaw, pulley ϕ , 600 mm, 25 mm sawblade width ----- | 1 |
| Jointer, 300 mm work width capacity ----- | 1 |
| Combination table saw, blade ϕ 200 mm and vertical spindle moulder, cutterhead ϕ 150 mm with solid TCT grooving cutterheads) ----- | 1 |
| Horizontal drill/mortizer, maximum bit diameter 10 mm ----- | 1 |
| Cross-cut saw, sawblade ϕ 350 mm, moveable (forward/backward) saw head ----- | 1 |
| Planer, single cutterhead, 600 mm work width capacity, 3 knives ----- | 1 |
| Bandsaw blade filing machine, automatic feed, sawblades capacity up to 50 mm ----- | 1 |

| <u>Description</u> | <u>No. of Units</u> |
|--|---------------------|
| Bandsaw setting machine, automatic feed ----- | 1 |
| Bandsaw blade brazing machine, up to 50 mm blade width capacity ----- | 1 |
| Straight knife grinder, 600 mm blade length capacity, hand operated ----- | 1 |

AL-HAUTAH WORKSHOP UNIT :

Unit Director - JOMAAAN SALEM KHARAZ

This Unit is located in the town of Al-Hautah, about 20 kms. from Seihun. The workshop, housed in a shed with 500 sq.m. floor area is on a 1,200 sq.m. lot. The Unit was also established in 1975. Only doors and windows are produced by this Unit. 20 production workers and 2 administrative personnel are employed by this Unit.

The equipment complement is composed of :

| <u>Description</u> | <u>No. of Units</u> |
|--|---------------------|
| Combination horizontal drill/mortizer (maximum bit \emptyset 14 mm) and jointer (450 mm work width capacity -----) | 1 |
| Bandsaw, 900 mm pulley diameter, 25 mm bandsaw blade width ----- | 1 |
| Combination vertical spindle moulder cutterhead \emptyset 150 mm and table saw, sawblade diameter 250 mm) ----- | 1 |
| Planer-thicknesser, single cutterhead, work width capacity 450 mm, 2-knives ----- | 1 |
| Bandsaw blade filing machine, automatic feed, sawblades capacity up to 50 mm ----- | 1 |
| Bandsaw setting machine, automatic feed ----- | 1 |

| <u>Description</u> | <u>No. of Units</u> |
|---|---------------------|
| Bandsaw blade brazing machine, blade width capacity up to 50 mm ----- | 1 |
| Straight knife grinder, blade length capacity 600 mm, hand operated ----- | 1 |

SHIBAM WORKSHOP UNIT :

Unit Director - MAHFOOD ZOBEIR

This Unit is located in the town of Shibam, about 30 kms from Seihun. Only doors and windows are produced by the Unit. The Unit employs 23 shop workers and 2 administrative personnel. The workshop has a floor area of 280 sq.m. constructed on a lot of about 640 sq.m. The Unit was established in 1975.

The equipment complement is composed of :

| <u>Description</u> | <u>No. of Units</u> |
|---|---------------------|
| Combination Jinter (450 mm work width capacity) and horizontal drill/mortizer max. ϕ 24 mm. ----- | 1 |
| Combination planer work width capacity 600 mm single cutterhead, 3-knives) and horizontal drill/mortizer, (max. bit ϕ 12 mm) ----- | 1 |
| Horizontal drill/mortizer, (bit ϕ 19 mm)----- | 1 |
| Combination table saw (saw blade ϕ 250 mm) and vertical spindle moulder cutterblade ϕ 150 mm with sliding table-- | 1 |
| Horizontal drill/mortizer, maximum bit diameter 16 mm----- | 1 |

| <u>Description</u> | <u>No. of Units</u> |
|--|---------------------|
| Bandsaw, (pulley Ø 750 mm sawblade width 25 mm) ----- | 1 |
| Table saw, sawblade diameter 250 mm ----- | 1 |
| Bandsaw blade filing machine, automatic feed, capacity up to 50 mm sawblades ----- | 1 |
| Bandsaw setting machine, automatic feed ----- | 1 |
| Bandsaw blade brazing machine, blade width capacity up to 50 mm ----- | 1 |
| Straight knife grinder, blade length ca- pacity 600 mm, hand operated ----- | 1 |

A P P E N D I X IV
OBSERVATIONS DURING THE VISIT TO
MEMBER WORKSHOP UNITS OF THE
COASTAL STRIP CARPENTRY CO-OPERATIVE

The Coastal Strip Carpentry Co-operative, founded in 1973 by 150 members, has grown to the present membership of 350 and annual sales of more than YD1,000,000. The Co-op's Head Office is located at Mukalla Avenue, Mukalla City, Hadramout Governorate. At present the Co-op has five member workshop units (3 in Mukalla City and one each in Ghail Bawazir and Shihir). The Co-op's central raw materials storage depot is in Baabood, Mukalla City. Three storehouses for finished goods are located in three different buildings in the City. A storehouse for machinery spare parts, paint materials, hand tools, screws and nails and other production supplies is located in a building about four blocks from the main offices and next to a shop where minor repair jobs are done on the Co-op's machinery. Another storage room for imported furniture and joinery hardware and fittings is located on the ground floor of the building housing the Co-op's main offices.

A total of nine weeks was spent in observing operations in the Co-op facilities and member workshop units. On-the-spot consultation was given during visits to the five member workshop units. A set of production "GO, NO-GO" gauges and an assembling jig for component parts of louvred windows were designed and fabricated for the 26th September Unit (see Figs. IV-1 to IV-3). A portable machine for upsetting the ends of louvre slats was also fabricated from discarded hardware boxes and scrap wood and plywood, for the 26th September Unit (see Figs. IV-4). Production jigs and fixtures were designed and fabricated for the Radfan Unit. An improved shop lay-out was designed for the Bajaber Unit. Better methods of stock-piling lumber, plywood, crated glass sheets and formica sheets were discussed with the officer-in-charge of the Baabood raw materials depot. To illustrate what can be done with the huge piles of wood and plywood off-cuts, a dresser stool was designed and fabricated using scrap materials (see Figs. IV-1 and IV-5). Mr. Awadh Saleh Alakbari, an English teacher at the Al-Jamaheer Unity School, received some training on the basic concepts of Product Engineering and Technical Drafting, while serving as Interpreter for this Expert.



Figure IV-1

Production Gauges and Assembling Jig for Louvred Windows, designed and fabricated for the 26th September Workshop Unit, Coastal Strip Carpentry Co-operative.



Figure IV-2

Mr. Khomoor, Technical Director, 26th September Unit, CSCC, demonstrates the use of Production Gauges and the Assembly Jig for Louvred Windows during the general conference and seminar of all key officers CSCC member Units.



Figure IV-3

A closer view of the production gauges made of Gauge 18 galvanized iron sheets with plywood stiffeners, 26th September Workshop Unit, CSCC



Figure IV-4

"Even the fabric upholstery and the synthetic foam material of the Dresser Stool came from the scrap pile!" explains Mr. Bin Jabear, Unit Director, Radfan Workshop Unit, CSCC. Note : At the upper left side of the picture is a louvre slat upsetting machine, made of a portable belt sanding machine, scrap wood and plywood, 26th September Workshop Unit, CSCC.



Figure IV-5

Key officials of CSCC and member Units discussing the merits of the Dresser Stool made from SCRAP materials, Radfan Workshop Unit, CSCC.

Finally, a conference with the principal officers of the Co-op and member workshop units was held on 14 October 1982 to discuss operating problems and explore possible solutions to the problems.

THE BAABOO RAW MATERIAL STORAGE DEPOT

The depot is located on a 5-hectare lot adjacent to the 26th September Workshop Unit in Baabood.

Sawnwood, plywood, formica, glass sheets and mild steel bars are stored in bins inside the storage shed. Sawnwood and crates of glass sheets are stocked in the open-air, while plywood, formica and mild steel bars are stored in a shed with a floor area of approximately 200 square meters.

Sawnwood is "dead-piled" haphazardly on the ground (see Figs. IV-6 to IV-9), sometimes with skids and mostly without skids. The high temperature during the day, and the more than 15 centigrade degrees temperature drop at night (more during the winter part of the year) create internal stresses within the sawnwood (see Figs. IV-10 to IV-14), resulting to twisting, splitting, bowing and cupping of the boards. Thus sawnwood recover rates at the workshops are very low.



Figure IV-6

Thick boards haphazardly piled at the CSCC Materials Central Depot, Baabood, Mukalla City.



Figure IV-7

"BOWING" of thin boards resulting from improper and inadequate use of skids at the CSCC Materials Central Depot, Baabood, Mukalla City.



Figure IV-8

Another case of haphazard "dead-piling" of sawnwood boards at the CSCC Materials Central Depot, Baabood, Mukalla City.



Figure IV-9

Even 2" x 4" and 3" x 3" boards exhibit "bowing" due to improper piling, CSCC Materials Central Depot, Baabood, Mukalla City.



Figure IV-10

Note severe twisting of top boards due to prolonged exposure to the elements, CSCC Materials Central Depot, Baabood, Mukalla City.



Figure IV-11

"Multiple Bowing", "Cupping" and "Twisting" were found in this pile of 4/4" boards at the CSCC Materials Central Depot, Baabood, Mukalla City



Figure IV-12

"Splits" and other forms of degrade have developed in these batch of **Austrian thick pine**, boards as a result of continued exposure to the elements, CSCC Materials Central Depot, Baabood, Mukalla City.



Figure IV-13

Another case of severe splitting on thick pine boards, CSCC Materials Central Depot, Baabood, Mukalla City.



Figure IV-14

Note "Twisting" and "Bowing" of the top boards in this bundle due to prolonged exposure to the elements, CSCC Materials Central Depot, Baabood, Mukalla City.

Crates of glass sheets (see Fig. IV-15) waiting for transfer to the new factory site at Al-Jol Mashah are also haphazardly piled in the open air. Again, as a result of the high temperature during the day and the big temperature drop at night, internal stresses develop within the glass sheets so that undesirable wastage occurs when the sheets are cut to desired sizes.

Formica, plywood and mild steel bars stored inside the shed are in better condition for use than the lumber and glass sheets stored in the open-air. However, handling being purely manual, damage to the materials frequently occur during the transfer of the material from the storage bins to the workshop units.

The Seihun Carpentry Co-operative also draws its raw material needs from this depot.

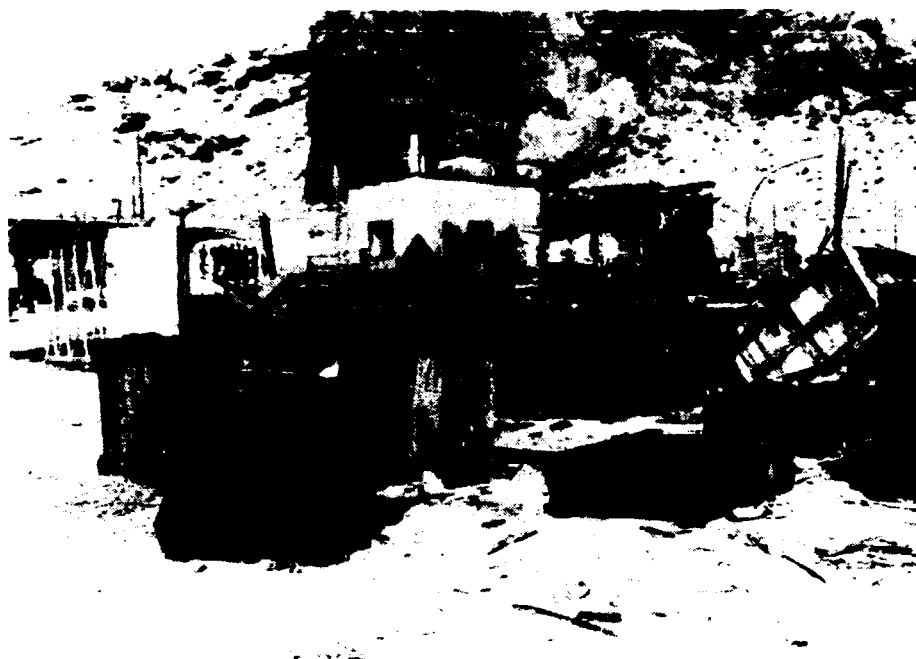


Figure IV-15

Crates of glass sheets (for windows) piled in the open-air, CSCC central stores for raw materials, Baabood, Mukalla City.

THE CENTRAL WAREHOUSE FOR PRODUCTION SUPPLIES AND HAND TOOLS

This is another "mess" as far as the accepted practice of warehousing is concerned. Cans of paint materials are piled near stores of combustible materials. Items in the storage bins are not properly identified, thus making it a pain-staking endeavor to look for needed items. Kegs of nails are piled on the ground in various locations within the storehouse.

This confused situation has led to the utter uselessness of the stock cards which are not kept up-to-date. In fact, member workshop units would not know the availability of a needed item unless a representative of the Unit goes around the storehouse and search for the item. The stock cards do not indicate the location of the stored item.

There is an urgent need to improve the organization and stocking system in the storehouse!

THE CENTRAL MACHINE REPAIR SHOP

The shop, located next door to the central warehouse for production supplies and hand tools, is manned by a mechanic and an electrician under the supervision of a Section Head.

Due to lack of basic machines and tools for machinery maintenance and repair jobs, the shop could undertake only simple repair jobs. About 60% of the shop floor area is used to store broken-down machinery (about 39 units, excluding another 21 located in the Shihir and Ghail Bawazir workshops). Most of these machines were cannibalized to provide spare parts for other machines and have been in storage for a number of years. It is the Expert's opinion that about 90% of these machines should be "junked" and sold as scrap metal.

It is surprising to note that the Co-op has not fully availed itself of the facilities available at the Government Central Machine Shop and the Trade School machine shop which are adequately equipped for precision machining and metalworking jobs.

The Co-op's central machine repair shop badly needs good organization and housekeeping, trained technicians and up-dating of repair facilities!

THE FINISHED GOODS STORES

The finished goods produced by the Bajaber and Radfan Workshop Units are stored in three separate locations near the Head Offices of the Co-op.

Since there is no display room for the Co-op's products, customers are brought to one or all of the three stores to allow them to select the furniture item they wish to buy. The three stores are usually closed and are opened only to customers who ask to see the Co-op's products. All the three stores have poor lighting which do not contribute at all in bringing out the good points about the Co-op's products. The finished products are stored directly on the ground. Some of these goods are even piled one on top of the other.

Here again, better handling and storage procedures are badly needed!

THE SHIHIR WORKSHOP UNIT :

(4 September 1982)

Unit Director - KHAMEES SAAD MUBARAAK

Administrative Director - ABDUL-RAHMAN AL-SABAAN

The Shihir Workshop Unit serves the furniture and construction woodworks needs of composed of Shihir and four other towns, having a total population of about 40,000 people. Shihir town itself, approximately 65 kms. east of Mukalla has a population of about 25,000 people.

The workshop is located on the outskirts of Shihir town, on a lot of about 10,000 sq. m. with a factory building of approximately 1,000 sq. m. The Unit was established in 1974 by several shop owners. The manufacturing operations were moved to the present location in 1979.

The Unit operates under the Coastal Strip Carpentry Co-operative. The major product lines are home furniture and construction woodworks. Furniture products are principally laminated with Formica (printed in several designs) which is popular on the local market.

The work force has a total of 74 people of whom 64 are factory labourers while the rest are administrative personnel.

The existing equipment complement is composed of :

| <u>Description</u> | <u>No. of Units</u> |
|---|---------------------|
| Vertical bandsaw, pulleys, ϕ 750 mm with 50 mm wide sawblades ----- | 2 |
| Jointer, work width capacity 600 mm, 3-blade cutterhead hand-fed ----- | 1 |
| Horizontal drill/mortizer, bit ϕ , 12.5 mm hand-operated ----- | 1 |
| Combination circular table saw and vertical spindle moulder ----- | 1 |

| <u>Description</u> | <u>No. of Units</u> |
|---|---------------------|
| Single-head planer-thicknesser, 3-knife top cutterhead, work width capacity 600 mm ----- | 1 |
| Chain mortizer, chain blade 6.5 mm x 32 mm, hand-operated ----- | 1 |
| Twin-blade slot mortizer, auto-fed, bit capacity, 9 mm manual start-stop (not yet in operation) ----- | 1 |
| Vertical spindle moulders, 150 mm cutterhead (under repair) ----- | 1 |
| Jointer, work width capacity 350 mm, 3-blade cutterhead, hand-fed ----- | 1 |
| Bandsaw blade filing machine, automatic feed, sawblades capacity up to 50 mm ----- | 1 |
| Bandsaw setting machine, automatic feed ----- | 1 |
| Bandsaw blade brazing machine, up to 50 mm blade width capacity ----- | 1 |
| Straight knife grinder, blade length 600 mm, hand operated ----- | 1 |

Production Operations :

Although limited serial production is practiced in the production of some components for doors, windows and cabinet drawers, the low level of machining precision attained still requires hand-tooled repair of component parts at the assembling section. Hand-fitting is generally done during assembling operations for household furniture. There is very minimal finish coating done on the assembled products. Varnish (Indian Copal) dissolved in mineral spirits, applied on top of inert-pigment coloring material, is the only coating system practiced and is used mainly on the edges and underparts of some furniture items. Drawer interiors are not coated at all; likewise with wardrobe interiors.

Inadequate cutting tool maintenance, and free-hand cutting on the machines (without use of jigs and fixtures) lead to unsatisfactory joints and tear-out on the machined edges.

"Over-design" of furniture and door components (i.e., use of wood sizes larger than structurally required) result to wastage of the imported sawn-timber. Precision cutting to attain desirable fitting of part is almost impossible as the sawn-timber being used is not properly seasoned. This also contributes to "poor machined edges".

In general, the machines are being used as tools and not as industrial equipment, so that outputs thus obtained are low.

The use of abrasives in surface preparation is totally absent. Surfacing on thin edges is done by hand-planing.

No concern is given to universality of components and fidelity of machining and construction from one batch to another of the same furniture or joinery product so that component parts of the same type of furniture or woodworks product are not interchangeable.

Technical Assistance Required :

All phases of woodworking operations need improvement.

Quality control, material management, abrasives and adhesives technology need to be introduced.

The practice of "good housekeeping" is badly needed.

THE GHAIL BAWAZIR WORKSHOP UNIT : (5 September 1982)

Unit Director - ABDULLAH AWAD BA-DORAIS

The Ghail Bawazir Workshop Unit serves the furniture and construction woodworks needs of the Ghail Bawazir District (approximately 40 kms. north-east of Mukalla) composed of Ghail Bawazir and 5 other towns. The Unit also serves part of Shihir District's requirements. The total population served (excluding Shihir) is about 18,000 (about 10,000 in Ghail Bawazir and 8,000 for the other towns).

The workshop is located on outskirts of Ghail Bawazir, on a lot of about 10,450 sq.m. and a factory floor area of 930 sq.m. This Co-operative Unit was established by several family workshops in 1973. Manufacturing operations were merged and transferred to the present location in 1976.

The Unit operates under the Coastal Strip Carpentry Co-operative. The major product lines are home furniture and construction woodworks. A total of 68 people are employed by the Unit, of whom 62 are factory workers and 6 are administrative employees. The factory workers have an average of about 10 years experience in furniture production, with some having about 20 years experience in the business.

The equipment complement is composed of :

| <u>Description</u> | <u>No. of Units</u> |
|--|---------------------|
| Bandsaw, pulley diameter 900 mm, 28 mm wide blade, fixed table ----- | 1 |
| Bandsaw, pulley diameter 915 mm, 50 mm wide blade, fixed table ----- | 1 |
| Louvre slotting machine, automatic feed, bits 9 mm ----- | 1 |
| Chain mortizer, chain 6.5 mm x 25 mm blade, hand operated ----- | 1 |
| Combination thicknesser planer (single head, work width capacity 400 mm and vertical spindle moulder diameter ----- | 1 |
| Horizontal drill/mortizer, bit \emptyset 12 mm ----- | 1 |
| Vertical spindle moulder, cutterhead \emptyset 150 mm (with TCT solid cutterhead)----- | 1 |
| Jointer, work width 400 mm, 3-blade cutterhead ----- | 1 |

| <u>Description</u> | <u>No. of Units</u> |
|---|---------------------|
| Straight knife grinder, blade length capacity 600 mm, hand operated ----- | 1 |
| Planer, overhead cutter, 2-knives, work width capacity 400 mm ----- | 1 |
| Bandsaw blade filing machine, automatic feed, saw blade capacity up to 50 mm ----- | 1 |
| Bandsaw setting machine, automatic feed ----- | 1 |
| Bandsaw blade brazing machine, blade width capacity up to 50 mm ----- | 1 |

Production Operations :

Production operations in this Unit are exactly similar as those at the Shihir Unit, although at a slightly lower volume.

Thus, production problems both in nature and magnitude are similar to those encountered by the Shihir Unit.

THE 26th SEPTEMBER WORKSHOP UNIT :

(2 & 11 September ; 2 to 7 October 1982)

Unit Director - MOHAMMED AHMED AL-MOHAFEED

Technical Director - AHMED ALI-KHOMOR

This Unit is located in Baabood, about 6 kms. west of Mukalla City proper, on the road to Fuwa. The factory building has a floor area of 1,500 sq. m., on a lot of 16,000 sq. m. The Unit employs 53 factory workers and 3 administrative personnel. Only joinery and other builders' woodworks products (doors, windows, jambs, etc.) are manufactured in this Unit.

This Unit is one the three workshop units proposed to be transferred to the new factory site in Al-Jol Mashah.

The Unit's equipment complement, its present state of repair and the recommended final disposition is given in Table VI-A.

T A B L E IV-A

EXISTING MACHINERY AND EQUIPMENT LIST

LOCATION : 26th September Workshop Unit

AS OF : October 1982

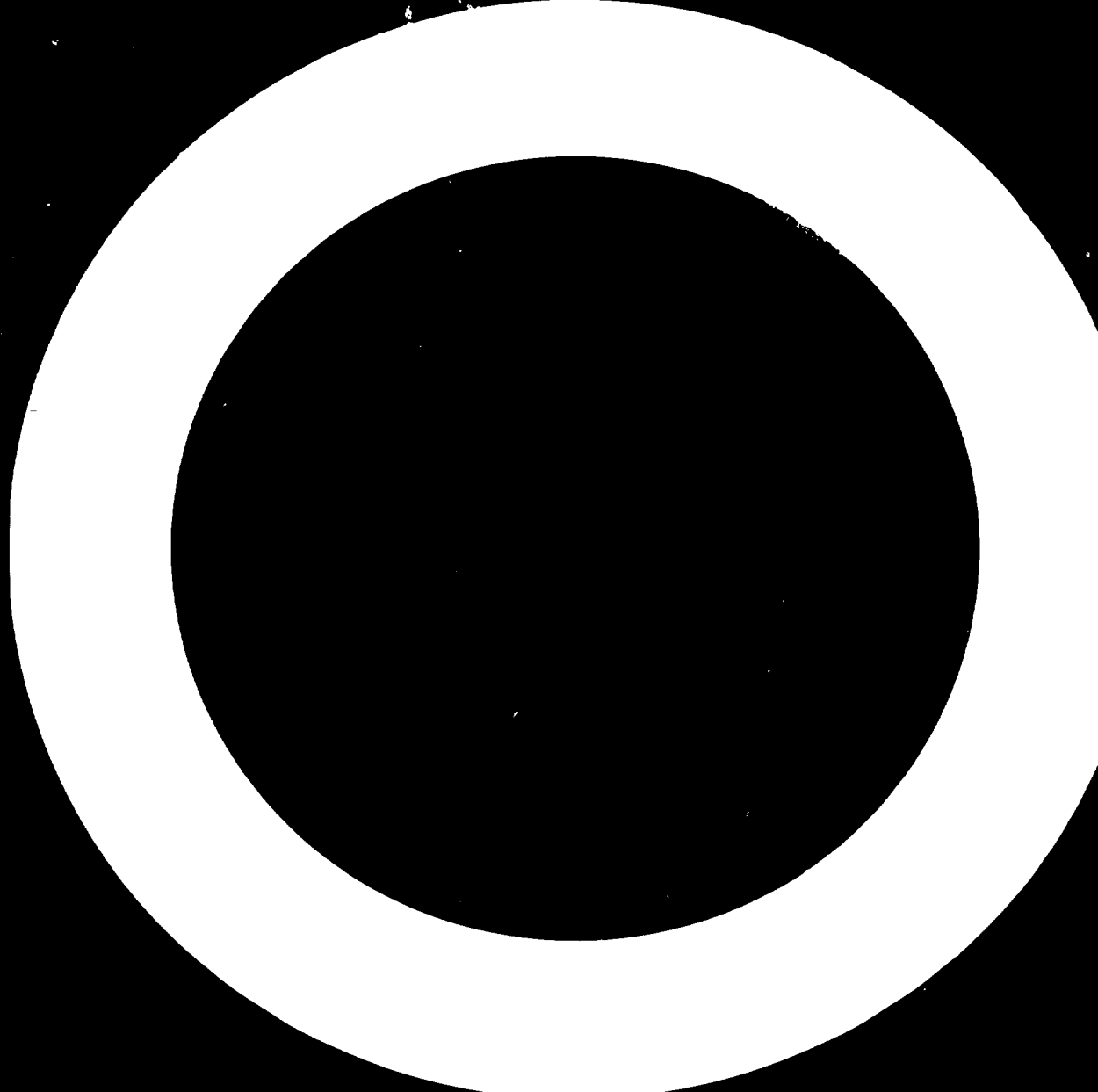
SECTION 1

| No. of Units | Equipment/Tool/Machine Description or Specifications | Year Acquired & Source | Electric Motors KW/ HP V-HZ-PH | Function | Remarks | Disposition Under New Project Plans |
|----------------------------------|--|----------------------------|--------------------------------|---------------------------------|---|--|
| A. <u>PRODUCTION MACHINERY :</u> | | | | | | |
| 1 | Bandsaw, 36" Pulley Ø, 1-1/2" sawblade width, 35" x 48" Tilting Table | 1962 Italy | 8Hp, 380 V 3Ø, 50Hz | Rip-sawing | Operational, needs pulley rim re-facing and 2V-belts | Transfer to assembling center after pulley re-facing & general re-conditioning |
| 1 | Jointer, 20" maximum work width, hand fed | 1977 Bauerle Germany | 7Hp, 440V 3Ø, 60Hz | Jointing and One-Side Planing | Operational, 4-blade cutterhead, but only 2 blades being used | Transfer to assembling center |
| 1 | Bandsaw, 36" Pulley Ø, 1" wide sawblade fixed table | 1957 Centaurus Italy | 7.5Hp, 415V 3Ø, 50Hz | Resawing and Tenoning | Operational, needs pulley rim re-facing and 2V-belts | Transfer to assembling center after pulley re-facing and general reconditioning |
| 1 | Planer-thickener, 2-knife cutterhead 500 mm work width | 1959 Unknown | 7.5Hp, 440V 3Ø, 50Hz | Surfacing Thicknessing | Operational, needs exhaust hood for shavings | Transfer to assembling center after pulley re-facing and general re-conditioning |
| 1 | Combination Jointer 20" maximum work width, 3-knives cutterhead; and planer-surfacer | 1962 SPA Italy | 7.5Hp, 440V 3Ø, 50Hz | Jointing and One-side Surfacing | Table Lifting Motor not running, planer part not Operational | Transfer to assembling center after pulley re-facing and general re-conditioning |
| 1 | Planer-thicknesser, 25" work width capacity, 4-blades cutterhead | 1977 Bauerle Germany | 10Hp, 440V 3Ø, 50Hz | Planing and thicknessing | Only 2 blades are being used fully operational | Transfer to new factory at |

SECTION 2

| | | | | | | |
|----|---|----------------------|---------------------------------|---------------------------------------|--|---|
| | width, 3-knives cutterhead; and planer-surfacer | 1966 SPA Italy | 10Hp, 440V 3Ø, 50Hz | Jointing and One-side Surfacing | part not Operational | after pulley re-facing and general re-conditioning |
| 1 | Planer-thicknesser, 25" work width capacity, 4-blades cutterhead | 1977 Bauerle Germany | 10Hp, 440V 3Ø, 50Hz | Planing and thicknessing | Only 2 blades are being used fully operational | Transfer to new factory at |
| 1 | Louvre slotting machine, up to 1/4" router bits, semi-automatic | 1960 CPI Italy | 4Hp, 380V 50/60 Hz | Routing Slots on Louve Stiles | Router bits improvised from tappet valve stem of car engine, operational | Transfer to assembling center after general re-conditioning |
| 1 | Horizontal drill/mortizer, 3/4" bit maximum diameter, manual | 1977 Okoma | 3Hp, 440V 3Ø, 50Hz | Mortizing and Boring | Bits not properly ground, Operational | Transfer to assembling center after general re-conditioning |
| 1 | Chain mortizer, 10 x 50 mm maximum chain size | 1977 Festo Italy | 2.2 KW, 220V 440V, 3Ø 60Hz | Mortizing | Operational, needs repair of control switch | Transfer to assembling center after general re-conditioning |
| 1 | Bandsaw, 800 mm wheel diameter 1-1/2" sawblade, fixed table | 1977 Bauerle Germany | 5.5 KW, 440V, 3Ø 50Hz | Resawing and Tenoning | Operational - good condition | Transfer to new factory at Al-Jol Mashah |
| 1 | Vertical spindle moulder, 70 x 120 mm maximum cutterhead Ø 3000-9000RPM | 1962 SPA Italy | 5Hp, 440V 3Ø, 50Hz | Shaping | Operational, has only 1 x 50 mm Ø cutterhead needs other sizes | Transfer to assembling center after general re-conditioning |
| 1 | Combination tilting arbor saw (45° maximum tilt); vertical spindle moulder, 120 mm cutterhead Ø, 2800-12,000 RPM, and radial arm canted saw, 2840 RPM | 1977 Bauerle Germany | 440V, 3Ø 50Hz, 1.1 KW, 10Hp 3Hp | Grooving, Shaping, Mitering, Trimming | Operational, but canted saw not converted to power supply | Transfer to new factory at Al-Jol Mashah |
| 1 | Horizontal drill/mortizer, 1/2" maximum bit Ø | 1962 BPM Italy | 3Hp, 440V 3Ø, 50Hz | Drilling and Mortizing | Wrong bit prevents effective use in mortizing | Transfer to assembling center after general re-conditioning |
| B. | TOOL MAINTENANCE EQUIPMENT : | | | | | |

| | | | | | | |
|--|---|-----------------------------|-------------------------------|---------------------------|---|---|
| | arbor saw (45° maximum tilt); vertical spindle moulder, 120 mm cutterhead Ø, 2800-12,000 RPM, and radial arm canted saw, 2840 RPM | Germany | 10HP, 10KW, 10HP 3HP | Mitering, Trimming | power supply | Mashah |
| 1 | Horizontal drill/mortizer, 1/2" maximum bit Ø | 1962 BPM Italy | 3HP, 440V 3Ø, 50Hz | Drilling and Mortizing | Wrong bit prevents effective use in mortizing | Transfer to assembling center after general re-conditioning |
| B. TOOL MAINTENANCE EQUIPMENT : | | | | | | |
| 1 | Bench grinder, single, 4"Ø wheel | Unknown | 1HP, 220V 50Hz | | Operational, with guide and guard | Transfer to new factory at Al-Jol Mashah |
| 1 | Bandsaw blade brazing machine, 50 mm blade maximum width | 1978 Ideal W. Germany | 20 Amps. 380V, 50/60 Hz | | Operational | Transfer to new factory at Al-Jol Mashah |
| 1 | Sawfiler/setter, up to 2" wide blades capacity | 1978 Volmer Germany | 1.06KW 220V, 1Ø 50Hz | | Operational | Transfer to new factory at Al-Jol Mashah |
| 1 | Straight knife grinder, 2 x 6" Ø stones, 2" wide x 20" long blades, 2900 RPM | 1978 Panhans Germany | 400W, 380V 3Ø, 50Hz | | Operational | Transfer to assembling center after general re-conditioning |
| <p>Note : One unit brand new Bauerle automatic straight knife grinder, 1200 mm knife length capacity, now at the central repair shop awaiting installation at the 26th September Workshop Unit, is recommended to be installed at the new factory site in Al-Jol Mashah.</p> | | | | | | |



Production Operations :

Limited serial production is practiced by this Unit. However, the level of precision in machining component parts is very low, so that excessive hand-fitting activities still have to be done at the assembling section.

Flow of work-in-process is greatly hampered by improper machinery lay-out and accumulation of sawdust, shavings, chips and sawing off-cuts in the work areas around the machine (see Figs. IV-16 to IV-20).

Work-in-process is moved by hand from one work station to another and is made more difficult and time-consuming by the clutter of woodwastes on the factory floor.

At least 50% of the factory workers are illiterate. Thus, production and quality control systems could hardly be introduced. Parts dimensions are relayed to the workers orally by the factory foreman or through the machine set-up man. This results in poor precision and faulty joinery.



Figure IV-16

A view of the Assembling Section, 26th September Unit, note the pile of work-in-process clogging the areas around the work benches.



Figure IV-17

Piles of lumber off-cuts choke the machining area at the 26th September Workshop Unit, CSCC.

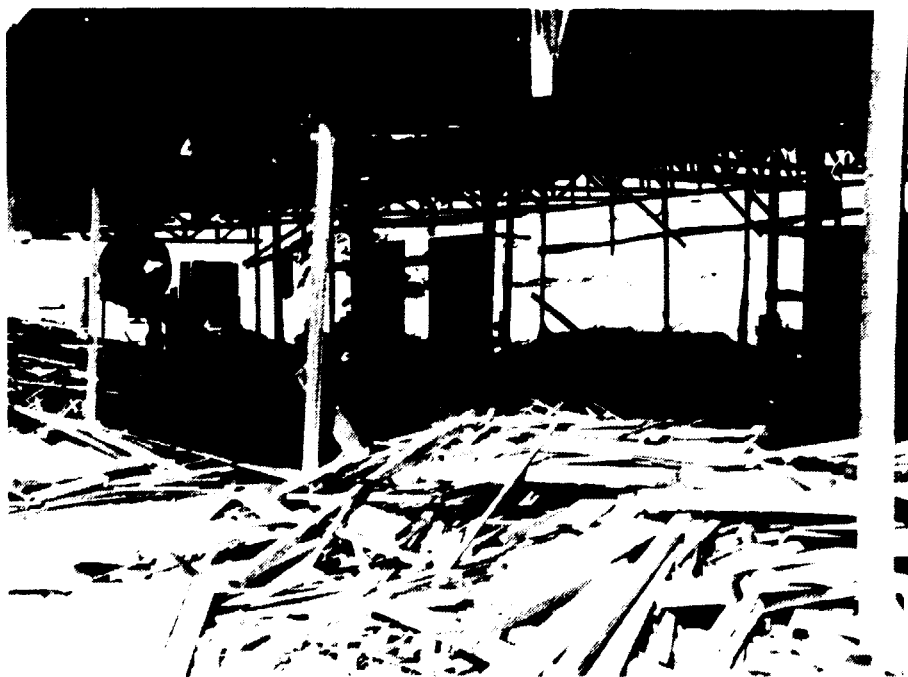


Figure IV-18

Movement of "in-process" goods around the Bandsaw area have become difficult due to the piles of off-cuts, 26th September Workshop Unit, CSCC.



Figure IV-19

Door Assembling at the 26th September Workshop Unit,
CSCC, Mukalla City.



Figure IV-20

File of off-cuts accumulated through the years. These
could have been converted into marketable goods! 26th
September Workshop Unit, CSCC.

THE RADFAN WORKSHOP UNIT :

(4 & 12 September ; 7 to 10 October 1982)

Unit Director - MUBARAK SALMEEN BIN TALIB
Technical Director (Machinery) - MUHAMMED ABDULLA BIN JABEAR
Technical Director (Production Control) - SALIM OMER BAGOHOOM

This Unit is located on Mukalla Avenue, Mukalla City proper. An open-air storage area (500 sq. m.) for sawnwood and plywood separates the two production buildings (each of which has also 500 sq. m. floor area). The Unit has 26 production workers and 2 administrative personnel. School furniture, living room furniture and furnishings of wood are produced by this Unit. A limited volume of upholstered furniture is also produced by the Unit.

This Unit is also one of the three units proposed to be transferred to the new factory site at Al-Jol Mashah.

The Unit's equipment complement, its present status of repair and the recommended final disposition is given in Table IV-B.

Production Operations :

All major machining operations are done in the western production

area, while hand-fitting, assembling, painting and upholstering operations are done in the eastern production area.

As in all other Workshop Units visited, smooth flow of work-in-process is prevented by the accumulation of sawdust, shavings and sawing off-cuts on the factory floor around the machines. Transfer of work-in-process from one work station to another is done by hand and is made difficult by the piles of woodwaste around the machines.

There is minimal use of crude machining jigs and fixtures. Thus, machining precision is unsatisfactory and furniture component parts still have to be repaired by hand to make them fit together.

T A B L E IV-B

EXISTING MACHINERY AND EQUIPMENT LIST

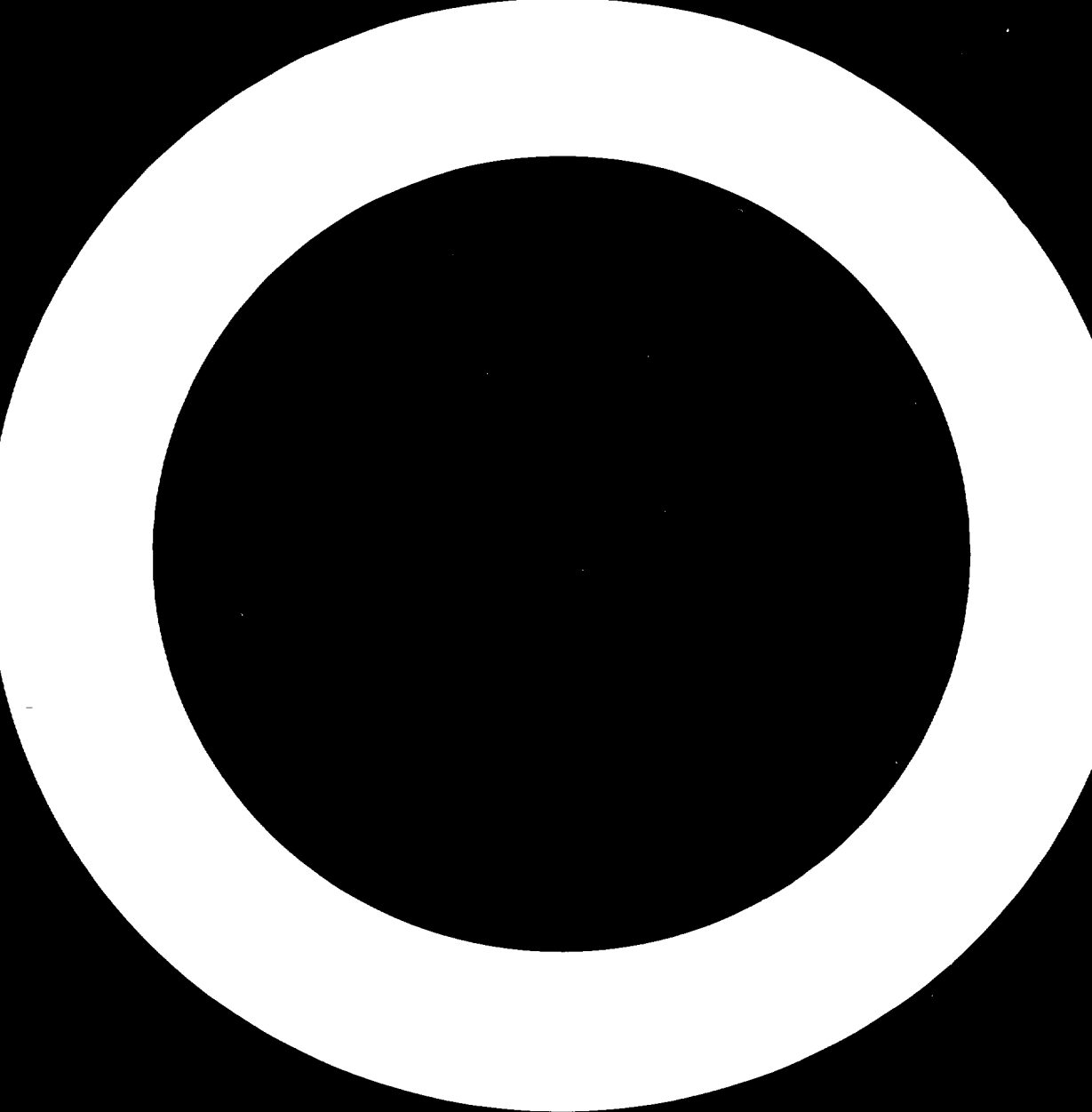
LOCATION : Radfan Workshop Unit, Mukalla Avenue, Mukalla City

AS OF : 9 October 1982

SECTION 1

| No. of Units | Equipment/Tool/Machine Description or Specifications | Year Acquired & Source | Electric Motors KW/ HP V-HZ-PH | Function | Remarks | Disposition Under New Project Plans |
|----------------------------------|---|----------------------------|-------------------------------------|---|--|---|
| A. PRODUCTION MACHINERY : | | | | | | |
| 2 | Combination: Vertical spindle moulder, 6"Ø x 4" maximum head capacity; tilting arbor saw (+45°/-30° tilt), 10"Ø sawblade Planer/jointer, 400 mm. work width capacity, 2-knives; and horizontal drill/mortizer, 1/2" maximum bit Ø, movable work table; manually operated. | 1952 TMA Italy | | Shaping, Jointing planing, mitering, trimming mortizing - one operation at a time | Both operational, but the saw is not being used in one unit and the shape is not being used in the other unit. Reason - burnt motor. | Transfer to assembling center after general re-conditioning |
| 1 | Bandsaw, 1-1/2" sawblade, 900 mm pulley diameter, fixed table | 1952 Alavesas Spain | 7.15Hp, 220/440 V 60Hz, 3Ø | Tenoning, re-sawing, cutting-off | Operational pulleys need re-facing | Transfer to assembling center after general re-conditioning |
| 1 | Combination vertical spindle moulder and canted saw | 1978 Bauerle Germany | 3Hp/10Hp 1.1KW, 440V 3Ø, 50Hz | Grooving, shaping mitering, trimming | Operational canted saw seldom used | Transfer to new factory at Al-Jol Mashah |
| 1 | Horizontal drill/mortizer, 3/4" maximum bit Ø, movable work table, hand operated | 1978 Okoma Germany | 2 Hp, 440V 50Hz, 3Ø | Drilling and mortizing | Operational - good condition | Transfer to assembling center after general re-conditioning |

| | | | | | | |
|--|--|----------------------|--|--|--|---|
| | blade, 150 mm pulley, diameter, fixed table | Alarcas Spain | 220/440 v 60Hz, 3Ø | sawing, cutting-off | need re-facing | assembling center after general re-conditioning |
| 1 | Combination vertical spindle moulder and canted saw | 1978 Bauerle Germany | 3Hp/10Hp 1.1kW, 440V 3Ø, 50Hz | Grooving, shaping mitering, trimming | Operational canted saw seldom used | Transfer to new factory at Al-Jol Mashah |
| 1 | Horizontal drill/mortizer, 3/4" maximum bit Ø, movable work table, hand operated | 1978 Okoma Germany | 2 Hp, 440V 50Hz, 3Ø | Drilling and mortizing | Operational - good condition | Transfer to assembling center after general re-conditioning |
| B. TOOL MAINTENANCE EQUIPMENT : | | | | | | |
| 1 | Bandsaw blade (up to 2" width) and circular sawblade (up to 15"Ø) grinder | 1952 Merz Germany | Grinder : 184W, 230/440V, 1Ø-50Hz; feed 60W, 230/440V, 1Ø-50Hz | Sharpening bandsaw and circular saw-blades | Operational - needs bushing spacer for circular saw mounting shaft | Transfer to assembling center after general re-conditioning |
| 1 | Bandsaw blade brazing machine | 1978 Panhans Germany | 20 Amps., 380V, 50/60 Hz | | Operational - good condition | Transfer to assembling center after general re-conditioning |
| 1 | Straight knife grinder | 1978 Panhans Germany | 400W, 38V 3Ø, 50Hz | | Operational - good condition | Transfer to assembling center after general re-conditioning |



Painting materials are brushed on the product, without any regard for proper drying times, compatibility of the material system, nor use of proper abrasives for surface preparation prior to painting operations.

Upholstery techniques are primitive and is based mainly on the use of coil springs and synthetic foam material.

There is no quality control at all.

Product quality is very low, compared to similar products in other developing countries (the Philippines, Indonesia, Malaysia and India).

THE BAJABER WORKSHOP UNIT :

(5, 13 & 22 September ; 12, 13 & 16 October 1982)

Unit Director - ALI ACHMED BASHIR
Technical Director - SALLEH KARAMA BAIASHOT

This Unit is located on Bajaber Street, Mukalla City, a few blocks from the CSCC head offices on Mukalla Avenue. The factory building with a floor area of 320 sq. m., fully occupies the land on which it is built. The Unit has 23 factory workers and 2 administrative personnel. Bedroom and living room furniture and furnishings are produced by this Unit.

This Unit is also proposed to be transferred to the new factory site at Al-Jol Mashah.

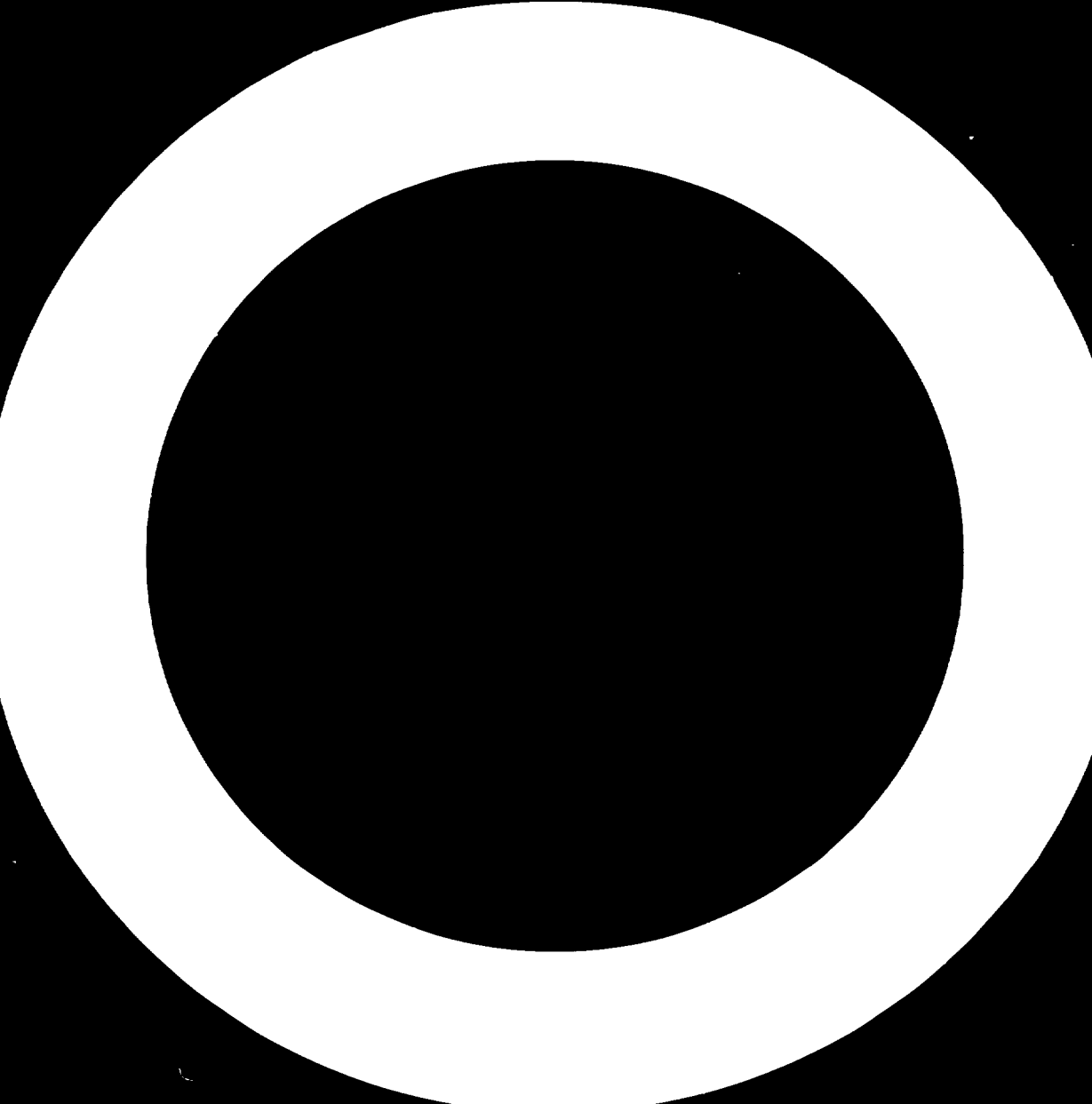
The Unit's equipment complement, its present state of repair and the recommended final disposition is given in Table IV-C.

Production Operations :

Manufacturing activities are primarily hand-tool operations, supported by the three pieces of basic woodworking machinery. Smooth flow of work-in-process is greatly impeded by poor factory lay-out accumulation of woodwastes on the factory floor, and poorly organized work-stations.

Plywood and lumber inventories are piled on the City streets adjacent to the Workshop Unit. Damage to the materials in storage is excessive.

Improvement measures in the Unit's operations can be introduced only after a thorough re-organization of the factory lay-out is done.



T A B L E X

EXISTING MACHINERY AND EQUIPMENT LIST

LOCATION : Bajaber Workshop Unit, Bajaber St., Mukalla City

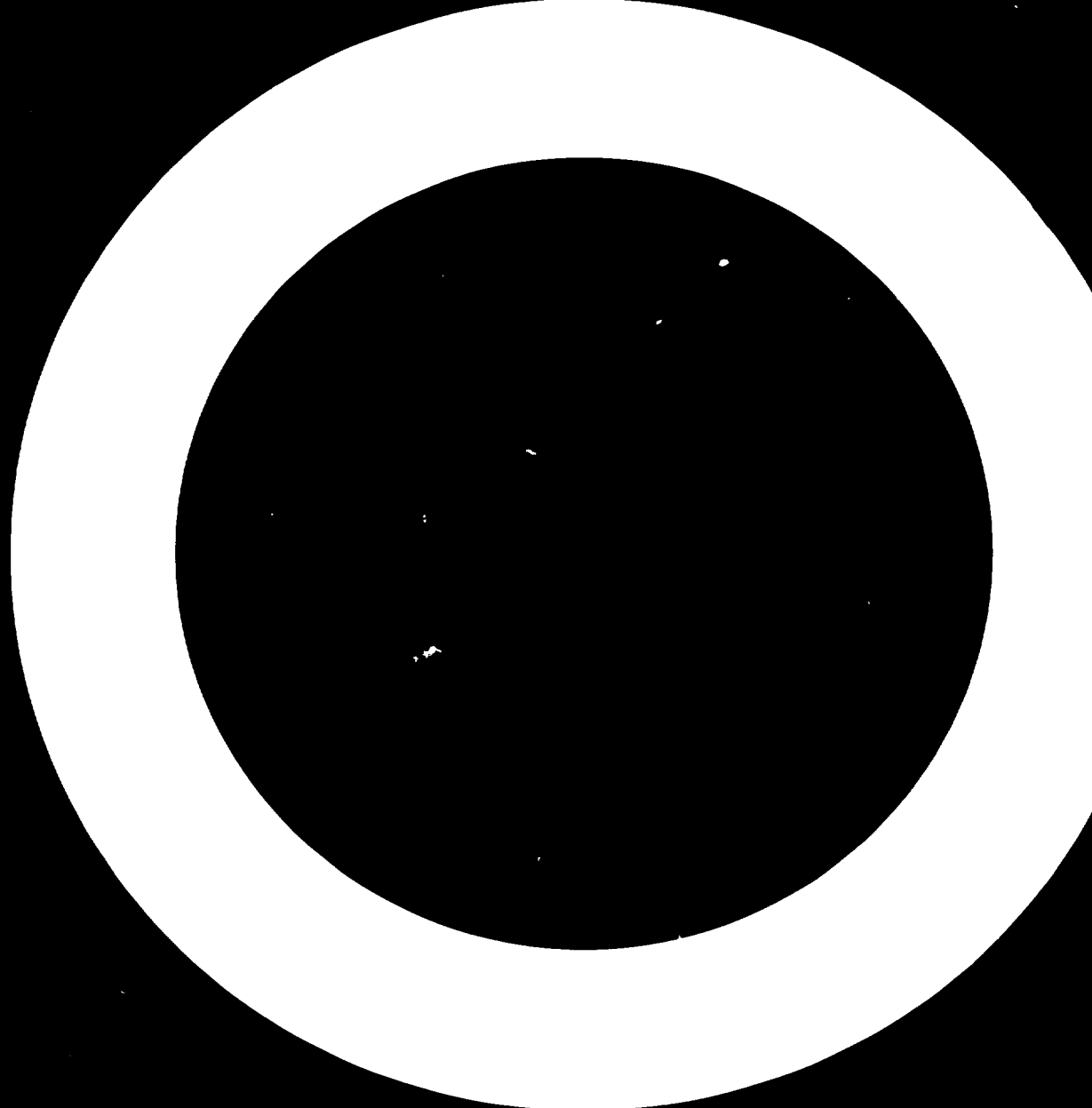
AS OF : 12 October 1982

SECTION 1

| No. of Units | Equipment/Tool/Machine Description or Specifications | Year Acquired & Source | Electric Motors KW/ HP V-HZ-PH | Function | Remarks | Disposition Under New Project Plans |
|--|---|------------------------|-----------------------------------|--|--|--|
| A. <u>PRODUCTION MACHINERY :</u> | | | | | | |
| 1 | Bandsaw, 800 mm pulley, 30 mm maximum sawblade width 760 mm x 980 mm. fixed table | 1967 Italy | 4KW, 380V 50Hz, 3Ø 1400 RPM | Resawing, trimming, etc. | Pulley needs re-facing third motor replacement, operational | Transfer to assembling center after pulley rim re-facing and general re-conditioning |
| 1 | Combination: shaper 6"Ø cutterhead; table saw 12"Ø circular blade ; planer/joint r, 400 mm x 3-knives cutterhead | 1967 BPM Italy | | Surfacing, Jointing shaping and mitering | Planer/jointer only Operational Unit, anti-kick-back fence needs additional cams/ | Transfer to assembling center after general re-conditioning |
| 1 | Combination : planer jointer - 400 mm x 3-knives cutterhead shaper - 6"Ø x 4" cutterhead ; tilting arbor saw, (+45°/-30°tilt), 10"Ø sawblade; horizontal drill/mortizer 1/2" Ø bit maximum capacity, movable table; manually operated | 1952 IMA Italy | | Shaping, jointing, planing, mitering, drilling mortizing, one operation at a time | All units operational except shaper, which needs spare parts | Transfer to assembling center after general re-conditioning |
| B. <u>TOOL MAINTENANCE EQUIPMENT :</u> | | | | | | |

| | | | |
|--|--|------------------------------------|-------------------------------------|
| 1 | Combination : planer jointer - 400 mm x 3-knives cutterhead shaper - 6"Ø x 4" cutterhead ; tilting arbor saw, (+45°/-30°tilt), 10"Ø saw-blade; horizontal drill/mortizer 1/2" Ø bit maximum capacity, movable table; manually operated | 1952 IMA Italy | |
| B. <u>TOOL MAINTENANCE EQUIPMENT</u> : | | | |
| 1 | Straight knife grinder, 2 x 6" Ø grinding stones, 2" x 20" knife length capacity | 1978 Panhans West Germany | 220/380V 400W, 50Hz 3Ø |
| 1 | Bandsaw blade brazing machine 50 mm maximum blade width capacity | 1978 Ideal Germany | 20Amps. 380V 50/60Hz, 1Ø |
| 1 | Bandsaw blade filing and setting machine up to 2" wide saw-blades capacity | 1962 Volmer West | 0.27 Hp, 220/440V 3Ø, 50/60Hz |

| | | |
|--|---|--|
| <p>Shaping, jointing, planing, mitering, drilling mortizing, one operation at a time</p> | <p>All units operational except shaper, which needs spare parts</p> | <p>Transfer to assembling center after general re-conditioning</p> |
| <p>Sharpening, planer and shaper knives</p> | <p>Needs grinding stone dresser, operational</p> | <p>Transfer to assembling center after general re-conditioning</p> |
| <p>Splicing bandsaw blades</p> | <p>Operational</p> | <p>Transfer to assembling center after general re-conditioning</p> |
| <p>Bandsaw blade filing and setting</p> | <p>Operational</p> | <p>Transfer to assembling center after general re-conditioning</p> |



THE C. S. C. C. HEAD OFFICE :

(23, 25 & 30 September ; 17 & 18 October 1982)

Centralized materials procurement, storage and distribution, financing, sales and pricing, and production planning functions are exercised by the Co-op's Head Office, in addition to the normal administrative functions of a corporate organization.

There is hardly any promotional activity of the Co-op's products as it enjoys a virtual monopoly in the area it serves.

The C. S. C. C. also supplies plywood, Formica, sawnwood and mild steel bars to the Seihun Carpentry Co-operative.

A P P E N D I X V

THE P.D.R.Y. NATIONAL AND LOWER SCHOOLS
POPULATION GROWTH, AND SCHOOL FURNITURE NEEDS,
FOR 1986 - 1995

=====

The growth of the national population from the year 1973 to the end of this century, Table 14/II, Statistical Yearbook, 1980, shows an average annual increase of 2.59%. The Yearbook also gives the following growth rates and average percentage of the national population for the lower schools population during the period 1973 - 1978 :

=====

| School Level | Average Annual Growth Rate | Average % of the National Population |
|-------------------|----------------------------|--------------------------------------|
| Unified Level | 0.36%/year | 14.12% |
| Secondary | 25.00%/year | 0.60% |
| All Level Schools | 7.48%/year | 14.72% |

=====

Data on the actual enrollment in the lower schools during the schoolyears 1979 - 1980 to 1981 - 1982, adjusted to include commercial, agricultural and technical schools, gave approximately the same growth rate and average ratio of the lower schools population to the national population. Application of these figures to the projected national population for the period 1986 - 1995 gave the lower schools population for the same period as shown in the following table :

LOWER SCHOOLS POPULATION (x 1,000)

P. D. R. Y.

| Year | <u>UNIFIED LEVEL</u> | | | <u>SECONDARY SCHOOLS</u> | | <u>T O T A L S</u> | |
|----------|---------------------------------|----------------------|--------------------------|--------------------------|--------------------------|----------------------|--------------------------|
| | Total P.D.R.Y. Population | School Population | % P.D.R.Y. Population | School Population | % P.D.R.Y. Population | School Population | % P.D.R.Y. Population |
| 1976-77 | 1718 | 249 | 14.49 | 12 | 0.70 | 261 | 15.19 |
| 1977-78 | 1762 | 264 | 14.98 | 14 | 0.79 | 278 | 15.78 |
| 1978-79 | 1808 | 276 | 15.26 | 16 | 0.86 | 292 | 16.15 |
| 1979-80* | 1855 | 290 | 15.63 | 18 | 0.97 | 308 | 16.60 |
| 1980-81* | 1903 | 304 | 15.97 | 26 | 1.36 | 330 | 17.34 |
| 1981-82* | 1953 | 318 | 16.28 | 27 | 1.38 | 345 | 17.66 |
| 1986-87 | 2220 | 391 | 17.61 | 29 | 1.32 | 420 | 18.91 |
| 1987-88 | 2278 | 405 | 17.77 | 31 | 1.36 | 434 | 19.06 |
| 1988-89 | 2337 | 416 | 17.80 | 33 | 1.40 | 449 | 19.20 |
| 1989-90 | 2398 | 430 | 17.93 | 34 | 1.43 | 464 | 19.35 |
| 1990-91 | 2460 | 444 | 18.04 | 36 | 1.46 | 480 | 19.50 |
| 1991-92 | 2524 | 458 | 18.14 | 38 | 1.49 | 496 | 19.65 |
| 1992-93 | 2590 | 473 | 18.26 | 40 | 1.53 | 513 | 19.80 |
| 1993-94 | 2657 | 489 | 18.40 | 41 | 1.56 | 530 | 19.94 |
| 1994-95 | 2726 | 504 | 18.48 | 44 | 1.60 | 548 | 20.09 |
| 1995-96 | 2797 | 520 | 18.59 | 46 | 1.63 | 566 | 20.24 |

- Note :
1. Basic data obtained from 1980 Statistical Yearbook for schoolyears 1976-77 to 1978-79 showed Unified Level Schools population as Primary and Secondary Schools populations
 2. *Basic data for schoolyears 1979-80 to 1981-82 supplied by the Ministry of Education, P.D.R.Y., have been adjusted to include commercial, technical and agricultural schools populations.
 3. Data for schoolyears 1986-87 to 1995-96 are extrapolations for the Project Operations Period.

An average annual population increase of about 16,000 pupils is indicated. Based on an average 40 pupils per class, the annual basic classroom furniture requirement for the lower schools is as follows :

| Classroom Furniture Items | No. of Units Per Classroom | Total Annual Requirements |
|---------------------------|----------------------------|---------------------------|
| Pupil's Desk | 40 | 16,000 |
| Pupil's Chair (or Stool) | 40 | 16,000 |
| Teacher's Table | 1 | 400 |
| Teacher's Chair | 1 | 400 |
| Classroom Cupboard | 1 | 400 |

Visits to classrooms and interviews with school authorities indicated the following annual replacement requirements for broken/damaged school furniture :

| Classroom Furniture Items | Estimated % of Annual School Requirements | No. of Units Required Annually |
|---------------------------|---|--------------------------------|
| Pupil's Desk | 2% | 9,720 Units |
| Pupil's Chair (or Stool) | 4% | 19,400 Units |
| Teacher's Table | 1/4% | 305 Units |
| Teacher's Chair | 1/2% | 610 Units |
| Classroom Cupboard | 1/2% | 610 Units |

Note : The last column includes replacements for the current quantity of damaged school furniture, programmed to be completely replaced by the year 1995, in addition to the number of units expected to be broken/damaged from 1983 and on.

Thus, the annual market volume for basic classroom furniture items for the lower schools of PDRY is :

| Classroom Furniture Items | No. of Units Per Year |
|------------------------------|-----------------------|
| Pupil's Desk | 25,720 Units |
| Pupil's Chair (or Stool) | 35,440 Units |
| Teacher's Table | 705 Units |
| Teacher's Chair | 1,010 Units |
| Classroom Cupboard | 1,010 Units |

Based on 90% attainable factory efficiency the following production targets are indicated :

| Classroom Furniture Items | No. of Units Per Year |
|------------------------------|-----------------------|
| Pupil's Desk | 28,600 Units |
| Pupil's Chair (or Stool) | 39,400 Units |
| Teacher's Table | 790 Units |
| Teacher's Chair | 1,130 Units |
| Classroom Cupboard | 1,130 Units |

A summary of the results of this study is given in the following table :

ANNUAL REQUIREMENTS AND INDICATED PRODUCTION TARGETS
FOR BASIC CLASSROOM FURNITURE,
P.D.R.Y. LOWER SCHOOLS,
1986 - 1995

=====

| <u>Classroom Furniture Items</u> | <u>No. of Units Needed for Annual School Population Growth</u> | <u>No. of Units Needed to Replace Current and Expected Damaged Furniture</u> | <u>Total Units Required</u> | <u>Indicated Production Targets Based on 90% Attainable Efficiency</u> |
|--------------------------------------|--|--|---------------------------------|--|
| Pupil's Desk | 16,000 | 9,720 | 25,720 | 28,600 |
| Pupil's Chair (or Stool) | 16,000 | 19,440 | 35,440 | 39,400 |
| Teacher's Table | 400 | 305 | 705 | 790 |
| Teacher's Chair | 400 | 610 | 1,010 | 1,130 |
| Classroom Cupboard | 400 | 610 | 1,010 | 1,130 |

=====

Sources : Tables 9/II, 14/II; 3, 4, 5, 7, 9/II, Statistical
Yearbook 1980, UN-ECWA/PDRY - Ministry of Planning
C.S.O., Volume No. I.

A P P E N D I X VI

SCHOOL FURNITURE REQUIREMENTS
FOR THE IV, V AND VI GOVERNORATES
P.D.R.Y., 1986 - 1995

Table 9/II, Statistical Yearbook 1980, gives the estimated annual distribution of population in the six Governorates of the Republic for the period 1973 - 1983. The following is an extrapolation of the distribution of population in the IV, V and VI Governorates for the period 1985 - 1995 :

| Year | National | IV Gov. | V Gov. | VI Gov. |
|------|----------|---------|--------|---------|
| 1981 | 1953 | 199 | 603 | 75 |
| 1982 | 2004 | 204 | 619 | 77 |
| 1983 | 2056 | 209 | 635 | 79 |
| 1985 | 2164 | 219 | 667 | 83 |
| 1995 | 2797 | 269 | 827 | 103 |

Based on the ratios of population in each of the three Governorates to the PDRY national population, and using the projections on the lower schools population given in Appendix V , the estimated lower school populations in the three Governorates for 1985 - 1995 is as follows :

| Year | PDRY Sch. Pop. | IV Gov. Sch. Pop. | V Gov. Sch. Pop. | VI Gov. Sch. Pop. |
|------|----------------------|-------------------------|------------------------|-------------------------|
| 1981 | 319 | 33 | 99 | 12 |
| 1985 | 365 | 37 | 113 | 14 |
| 1995 | 519 | 53 | 160 | 20 |

Using an average class size of 40 pupils, the estimated number of classrooms for the three Governorates is as follows :

| Year | IV Gov. | V Gov. | VI Gov. |
|------|---------|--------|---------|
| 1981 | 825 | 2,475 | 300 |
| 1985 | 925 | 2,825 | 350 |
| 1995 | 1,325 | 4,000 | 500 |

and the corresponding estimated annual increases in student population and number of classrooms is as follows :

| | Pupils | Classrooms |
|-------------------------|--------|------------|
| V Governorate Only | 4,700 | 118 |
| IV, V & VI Governorates | 6,900 | 173 |

The estimated annual furniture requirements due to school population increase (three lower levels) in the three Governorates are as follows :

| Classroom Furniture Items | For V Gov. Only | For IV, V & VI Gov. |
|---------------------------|-----------------|---------------------|
| Pupil's Desk | 4,700 Units | 6,900 Units |
| Pupil's Chair (or Stool) | 4,700 Units | 6,900 Units |
| Teacher's Table | 118 Units | 173 Units |
| Teacher's Chair | 118 Units | 173 Units |
| Classroom Cupboard | 118 Units | 173 Units |

Applying the estimated allowances for school furniture damaged annually as used in Appendix V, the total annual furniture requirements for the IV, V and VI Governorates are as follows :

| Classroom Furniture Items | F o r V Gov. Only | F o r IV, V & VI Gov. |
|------------------------------|----------------------|--------------------------|
| Pupil's Desk | 7,430 Units | 10,870 Units |
| Pupil's Chair (or Stool) | 10,160 Units | 14,840 Units |
| Teacher's Table | 127 Units | 186 Units |
| Teacher's Chair | 136 Units | 199 Units |
| Classroom Cupboard | 136 Units | 199 Units |

Since the CSCC enjoys a virtual monopoly of the furniture industry in the areas it is recommended to serve, the indicated annual production targets, based on 90% attainable factory efficiency, are as follows :

| Classroom Furniture Items | F o r V Gov. Only | F o r IV, V & VI Gov. |
|------------------------------|----------------------|--------------------------|
| Pupil's Desk | 8,260 Units | 12,080 Units |
| Pupil's Chair (or Stool) | 11,290 Units | 16,090 Units |
| Teacher's Table | 150 Units | 210 Units |
| Teacher's Chair | 160 Units | 230 Units |
| Classroom Cupboard | 160 Units | 230 Units |

Sources : Appendix V; Tables 9/II, 7/IV, 8/IV, 9/IV, 10/IV, 11/IV, 13/IV, 14/IV and 15/IV, Statistical Yearbook 1980, UN-ECWA/PDRY - Ministry of Planning, C.S.O., Volume No. I.

A P P E N D I X VII

MARKET POTENTIAL FOR DOORS AND WINDOWS

IV, V AND VI GOVERNORATES

P.D.R.Y., 1986 - 1995

The number of households and persons per household in PDRY and the IV, V and VI Governorates according to the 1973 population census are :

| <u>A r e a</u> | <u>No. of Households</u> | <u>Average No. of Persons Per Household</u> |
|----------------|--------------------------|---|
| P.D.R.Y. | 286,313 | 5.55 persons/household |
| IV Governorate | 27,004 | 6.00 persons/household |
| V Governorate | 86,982 | 5.65 persons/household |
| VI Governorate | 13,442 | 4.53 persons/household |

Based on the population growth projections in Appendices V and VI, the number of households in the areas under considerations is as follows :

| <u>Year</u> | <u>P.D.R.Y.</u> | <u>IV Gov.</u> | <u>V Gov.</u> | <u>VI Gov.</u> |
|-------------|-----------------|----------------|---------------|----------------|
| 1973 | 286,490 | 27,004 | 86,982 | 13,442 |
| 1981 | 351,171 | 33,167 | 106,726 | 16,556 |
| 1985 | 389,910 | 36,833 | 118,230 | 18,322 |
| 1995 | 503,946 | 47,500 | 152,920 | 23,620 |

and the corresponding average annual increase in the number of households are as follows :

| Period | P.D.R.Y. | IV Gov. | V Gov. | VI Gov. |
|-------------|----------|---------|--------|---------|
| 1973 - 1981 | 8,085 | 770 | 2,468 | 389 |
| 1981 - 1985 | 9,685 | 917 | 2,876 | 442 |
| 1985 - 1995 | 11,405 | 1,067 | 3,469 | 530 |

Visits to typical PDRY households, Government housing projects, and interviews with individuals who own their homes indicate the following door and window installations in a PDRY household :

- A. MAIN ENTRY DOOR : 1 or 2 Wings, raised
 panel type ----- 1 Unit

- B. LIVING ROOM :
 Inner Windows : 4 sections or 3 sections,
 embossed glass panes on inner windows;
 and matching louvred windows on the
 outside ----- 2 Units

 Doors to Bedroom : Flush or raised
 panel type doors, single wing ----- 2 Units

- C. BED ROOMS (2) :
 Windows, 2 or 3 sections, same design as
 B above ----- 4 Units

- D. DINING ROOM/KITCHEN :
 Windows, same design as C above ----- 2 Units
 Back Door, flush type ----- 1 Unit

- E. SUMMARY OF TYPICAL HOUSEHOLD REQUIREMENTS
 Windows ----- 8 Units
 Doors ----- 4 Units

The projected requirements for doors and windows for IV, V and VI Governorates using the following assumptions are given in the following tabulation :

- A. Assume only 40% of households require windows and doors of the above types, per interviews with officials of the CSCC and Ministry of Planning.
- B. Consider window and door types requiring most machining operations as model for production targets projections.
- C. Assume an additional 5% of doors and windows required to replace old and broken doors and windows.

| | <u>IV Governorate</u> | | <u>V Governorate</u> | | <u>VI Governorate</u> | |
|---|-----------------------|--------------|----------------------|---------------|-----------------------|--------------|
| | Doors | Windows | Doors | Windows | Doors | Windows |
| Needed Annually due to population increase | 1,707 | 3,414 | 5,560 | 11,120 | 848 | 1,696 |
| Needed Annually for Replacement of Broken Doors and Windows | <u>85</u> | <u>170</u> | <u>278</u> | <u>556</u> | <u>42</u> | <u>84</u> |
| Totals ----- | <u>1,792</u> | <u>3,584</u> | <u>5,838</u> | <u>11,676</u> | <u>890</u> | <u>1,780</u> |

The indicated annual production targets based on 90% attainable factory efficiency are :

| | <u>Initial Stage</u> | <u>At Full Operations</u> |
|---------|----------------------|---------------------------|
| Doors | 6,500 Units | 9,500 Units |
| Windows | 13,000 Units | 19,000 Units |

- Sources :
- 1) Tables 5/II and 6/II, Statistical Yearbook 1980,
 - 2) Study No. I, and
 - 3) Data on Typical P.D.R.Y. Flats obtained from visits to government owned apartment buildings, and interviews with Co-operative employees residing in government housing projects.

A P P E N D I X VIII

ESTIMATED ANNUAL MARKET VOLUMES
AND PRODUCTION TARGETS FOR CONSTRUCTION
WOODWORKS, HOME AND
OFFICE FURNITURE AND FURNISHINGS,
IV, V AND VI GOVERNORATES, P.D.R.Y.
1986 - 1995

At a meeting with officials of the CSCC, specific models and designs of home and office furniture/furnishings and joinery products were selected from the more than 150 items in the CSCC product lines. The selection was primarily based on quantity produced and the product's contribution to the aggregate annual income of CSCC. The following products were selected to be included in the initial list of CSCC Standard Products Line :

- A. Clothes Cabinet (wardrobe), two doors, clothes hanger rack and one shelf on the left side and 4 shelves, with locked drawer on bottom middle shelf at the right side, outside formica faced, inside raw plywood face.
- B. Folding Chairs, wooden slats, varnish (dyed) finish.
- C. Filing Cabinet, 4 drawers with locks, 445 x 625 x 1330 mm.
- D. Doors, two wings, raised panels, complete with Jamb Assembly.
- E. Windows, 4 wings, glass panes on the inside windows and louvred windows on the outside complete with window sills or mounting frame.

The sales volumes of the selected products are :

| Products | Annual Volumes (Units) | | | Ave. |
|----------------------------|------------------------|-------|-------|------|
| | 1980 | 1981 | 1982* | |
| Clothes Cabinet (Wardrobe) | 2,600 | 1,298 | 1,470 | 1790 |
| Chairs, Wooden** | 12,000 | 3,104 | 1,652 | 5585 |
| Filing Cabinet, Office | Not Available | 153 | 680 | 417 |
| Doors w/Jamb Assembly | 2,610 | 3,369 | 3,568 | 3182 |
| Windows w/Sill Assembly | 3,480 | 6,726 | 7,720 | 5975 |

Note : (*) Data for year 1982 extrapolated from data for period January to June 1982.

(**) Principally school furniture-pupil's chair.

The estimated market volumes of the selected items are calculated as follows :

A. HOME FURNITURE :

- From Appendix VII the estimated average annual increase in number of households for the period 1985 - 1995 :

| A r e a | Annual Increase | 40% of Annual Increase |
|----------------|-----------------|------------------------|
| P. D. R. Y. | 11,405 | 4,562 |
| IV Governorate | 1,067 | 427 |
| V Governorate | 3,469 | 1,388 |
| VI Governorate | 530 | 212 |

The number of households which can afford to buy furniture on the basis of annual income level, as indicated in Tables 2/IX, 2/X (applied to IV, V and VI Governorates), Statistical Yearbook 1980, is around 40% of total number of households. Thus, the potential market target in each of the three Governorates is as given in the last column above.

2. In the typical PDRY household used as the basis in Appendix VII there are normally 2 clothes cabinets for family household. However, additional units of each piece of furniture may be found in households housing two or more families which is a very common situation in the IV, V and VI Governorates. For purposes of this study, therefore, it is assumed that the typical PDRY household will have :

3 units ----- clothes cabinets

among its complement of home furnishings, as the number of flats occupied by two or more families has become significant, although the actual number is not known.

3. Thus, the following market volumes may be considered as conservative for the period 1985 - 1995 :

| | IV Gov. | V Gov. | VI Gov. | Total |
|-----------------|---------|--------|---------|-------|
| Clothes Cabinet | 1,281 | 4,164 | 636 | 6,081 |

B. CHAIRS, SCHOOL FURNITURE :

The demand and recommended target volumes for this furniture item as used in schools is discussed in Appendix VI. This however, is the same type of chair popularly used in family homes. Thus, the following number of units of chair should be added to the market potential listed in Appendix VI:

| | IV Gov. | V Gov. | VI Gov. | Total |
|---------------------------------|---------|--------|---------|-------|
| Folding Chairs, for home use | 1,708 | 5,552 | 848 | 8,108 |

C. FILING CABINET, OFFICE :

1. The market demand for this item is directly related to

the increase in number of business establishments (commercial, industrial, banking, etc.) and government offices. Table 1/VIII, Statistical Yearbook 1980, Volume No. I, showed an increase of 497 in the number of industrial establishments during the nine year period 1969 - 1977 (inclusive), or an increase of about 66 establishments per year in all sectors (public, mixed, private and co-operative), in PDRY. No data is available on the number of establishments in the other sectors, nor is there any data available on the distribution of these establishments in the various Governorates in PDRY. Nonetheless, there should be increasing demand for filing cabinets, office type, as the development of the country's economy progresses.

2. In view of the unavailability of data which may be used as basis for a realistic sales target for office filing cabinets, an arbitrary level of 500 units a year is set initially, subject to revision as the situation requires up to a maximum of 700 units/year.

D. DOORS AND WINDOWS :

The market potential and recommended production targets for these items are discussed in Appendix VII.

The average annual market and production targets for the CSCC project are summarized as follows :

| Product Item | Estimated Annual Market Volume | | Recommended Annual Production Target Based on 90% Factory Efficiency | |
|-----------------------------|-----------------------------------|---------------------------------|---|---------------------------------|
| | Initial (Units) | At Full Operation (Units) | Initial (Units) | At Full Operation (Units) |
| Clothes Cabinet | 4,200 | 6,100 | 4,700 | 6,800 |
| Folding Chairs, Home Use | 5,600 | 8,200 | 6,300 | 9,200 |
| Office Filing Cabinet | 500 | 700 | 600 | 800 |
| Doors w/Jamb Assembly | See Appendix VII | | See Appendix VII | |
| Windows w/Sill Assembly | See Appendix VII | | See Appendix VII | |

A P P E N D I X IX

OPERATIONS LIST

(CSCC Consolidated Woodworks Plant, Mukalla)

DEPARTMENT : MACHINING

DEPARTMENT NO. : 1

| <u>Operation No.</u> | <u>Description/Name of Operation</u> | <u>Remarks</u> |
|----------------------|--------------------------------------|----------------|
| 1-001 | Cutting to Rough Length/Width | |
| 1-002 | Surface Planing, One Face | |
| 1-003 | Surface Planing, Two Faces | |
| 1-004 | Surface Planing, Four Faces | |
| 1-005 | Planer-Matching | |
| 1-006 | Ripping, Single Pass | |
| 1-007 | Multi-Ripping | |
| 1-008 | Cutting To Final Length/Width | |
| 1-009 | Edge Shaping | |
| 1-010 | Drilling, Single Hole | |
| 1-011 | Multi-Hole Drilling | |
| 1-012 | Dowel Milling | |
| 1-013 | Dowel Cutting and Chamfering | |
| 1-014 | Routing Edges | |
| 1-015 | Routing Cut-outs | |
| 1-016 | Routing/Shaping Rabbets | |
| 1-017 | Routing Hinge Seats | |
| 1-018 | Turning on Simple Lathe | |
| 1-019 | Turning on Automatic Lathe | |
| 1-020 | Mortizing on Chain Mortizer | |
| 1-021 | Mortizing on Router | |
| 1-022 | Mortizing on Drill/Chisel Mortizer | |
| 1-023/a | Tenoning, Single End | |

| Operation No. | Description/Name of Operation | Remarks |
|---------------|--|---------|
| 1-023/b | Tenoning, Double End | |
| 1-023/c | Tenoning Special Shape | |
| 1-024 | Grooving with Saw | |
| 1-025 | Grooving with Router | |
| 1-026 | Grooving with Dado | |
| 1-027 | Edge Profiling with Dado | |
| 1-028 | Dove-Tailing with Router | |
| 1-029 | Dove-Tailing with Dove-Tailing Machine | |
| 1-030 | Machine Sanding Plain Edge | |
| 1-031 | Edge Profile Sanding | |
| 1-032 | Stroke Sanding, Single Belt | |
| 1-033 | Stroke Sanding, Double Belt | |
| 1-034 | Single Surface-Sanding Wide Belt Sander | |
| 1-035 | Double Surface-Sanding, Wide Belt Sander | |
| 1-036 | Sanding Cut-outs Edges | |
| 1-037 | Hand-Sanding | |
| 1-997 | Machine Set-up | |
| 1-998 | Machine Cleaning | |
| 1-999 | Area Cleaning | |

DEPARTMENT : PANEL PRODUCTION

DEPARTMENT NO. : 2

| Operation No. | Description/Name of Operation | Remarks |
|---------------|---------------------------------------|---------|
| 2-001 | Edge Gluing Core-Stock, Manual | |
| 2-002 | Edge Gluing Core-Stock, Core Composer | |
| 2-003 | Panel Sawing to Rough Sizes | |
| 2-004 | Thickness Planing | |

| Operation No. | Description/Name of Operation | Remarks |
|---------------|--|---------|
| 2-005 | Veneer Laying | |
| 2-006 | Cold Pressing Panels | |
| 2-007 | Hot Pressing Panels | |
| 2-008/a | Panel Cutting to Rough Size | |
| 2-008/b | Panel Trimming to Final Size | |
| 2-009 | Single Edge Banding with Veneer | |
| 2-010 | Double Edge Banding with Veneer | |
| 2-011 | Trimming Excess Veneer | |
| 2-012 | Combination Edge Banding, Excess Veneer Trimming and Edge Breaking-Single Edge | |
| 2-013 | Combination Edge Banding, Excess Veneer Trimming and Edge Breaking-Double Edge | |
| 2-996 | Panel Repair | |
| 2-997 | Panel Machine Set-up | |
| 2-998 | Panel Machine Cleaning | |
| 2-999 | Area Cleaning | |

DEPARTMENT : ASSEMBLING

DEPARTMENT NO. : 3

| Operation No. | Description/Name Of Operation | Remarks |
|---------------|-------------------------------|---------|
| 3-001 | Assembling Sub-Assemblies | |
| 3-002 | Assembling Complete Product | |
| 3-996 | Repair Work | |
| 3-997 | Assembling Machine Set-up | |
| 3-998 | Assembling Machine Cleaning | |
| 3-999 | Area Cleaning | |

DEPARTMENT : FINISHING

DEPARTMENT NO. : 4

| <u>Operation No.</u> | <u>Description/Name of Operation</u> | <u>Remarks</u> |
|----------------------|---|----------------|
| 4-001 | Hand Staining | |
| 4-002 | Spray Staining | |
| 4-003 | Spraying Wash Coat | |
| 4-004 | Sanding Wash Coat | |
| 4-005 | Applying Wood Filler | |
| 4-006 | Spraying Sanding Sealer | |
| 4-007 | Applying Sanding Sealer on Curtain Coating Machine | |
| 4-008 | Hand Sanding Sealer Coat | |
| 4-009 | Machine Sanding Sealer Coat | |
| 4-010 | Spraying First Top Coat | |
| 4-011 | Applying First Top Coat on Curtain Coating Machine | |
| 4-012 | Spraying Second Top Coat | |
| 4-013 | Applying Second Top Coat on Curtain Coating Machine | |
| 4-014 | Spraying Third Top Coat | |
| 4-015 | Applying Third Top Coat on Curtain Coating Machine | |
| 4-016 | Roller Coating | |
| 4-017 | Machine Rubbing | |
| 4-018 | Hand Polishing | |
| 4-019 | Machine Polishing | |
| 4-020 | Applying Decorative Appliques | |
| 4-996 | Repair and Touch-up | |
| 4-997 | Finishing Machine Set-up | |
| 4-998 | Finishing Machine Cleaning | |
| 4-999 | Area Cleaning | |

DEPARTMENT : PACKING

DEPARTMENT NO. : 5

| <u>Operation No.</u> | <u>Description/Name of Operation</u> | <u>Remarks</u> |
|----------------------|--------------------------------------|----------------|
| 5-001 | Wrapping Product Components | |
| 5-002 | Bundling Wrapped Components | |
| 5-003 | Assembling Carton Boxes | |
| 5-004 | Packing in Carton Boxes | |
| 5-011 | Assembling Wooden Crates | |
| 5-012 | Packing in Wooden Crates | |
| 5-021 | Hand Marking boxes/ Crates | |
| 5-997 | Packing/Crating Machine Set-up | |
| 5-998 | Packing/Crating Machine Cleaning | |
| 5-999 | Area Cleaning | |

APPENDIX X

WORKING DRAWINGS OF THE RANGE OF PRODUCTS FOR THE COASTAL STRIP
COOPERATIVE COMPANY

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| | | |
|------|--|-----|
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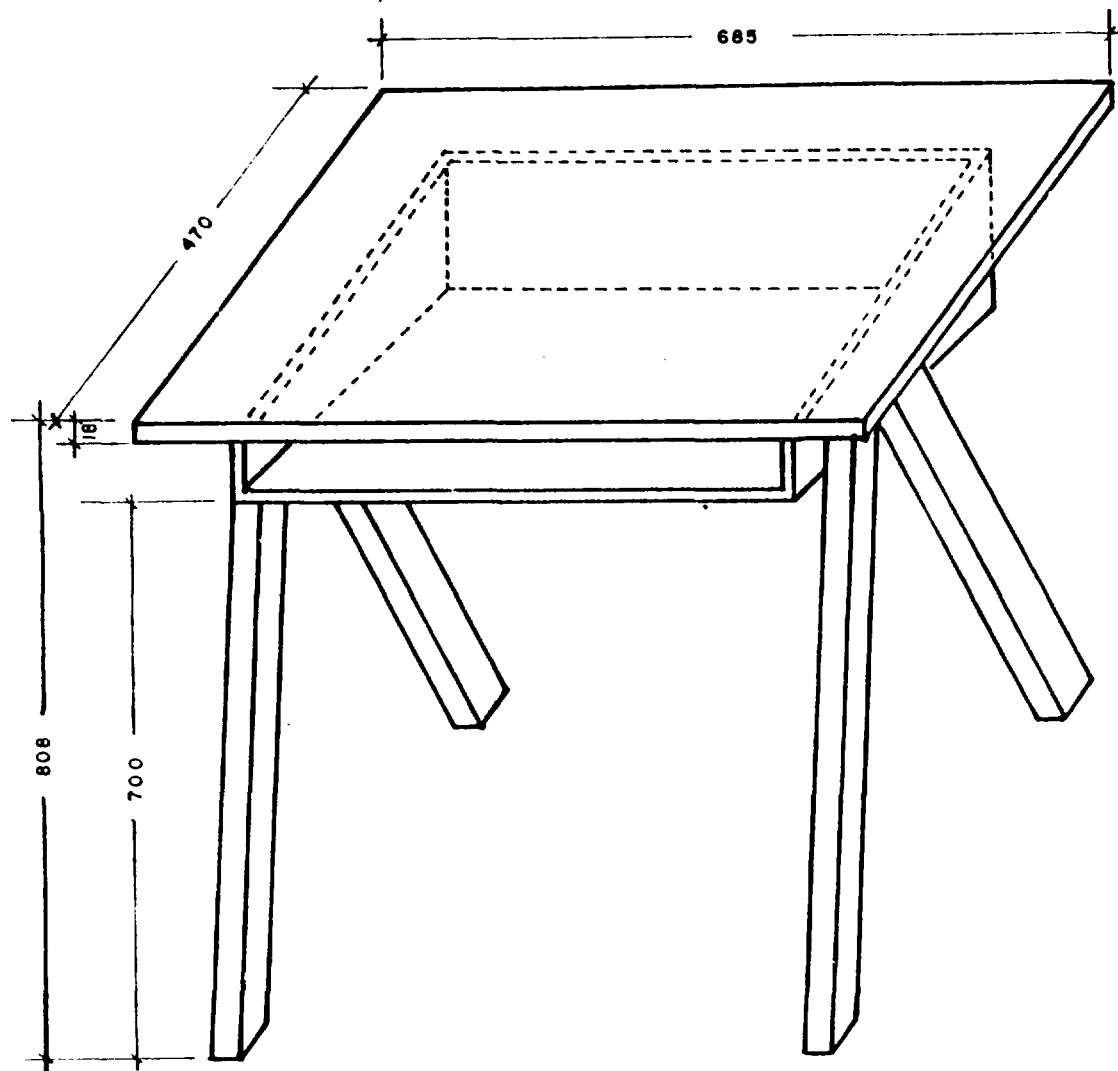


FIGURE X-1

Product : Pupil's Desk
Product No. : ME--SFC - 1, CSCC/Rev.
Scale : Not to Scale

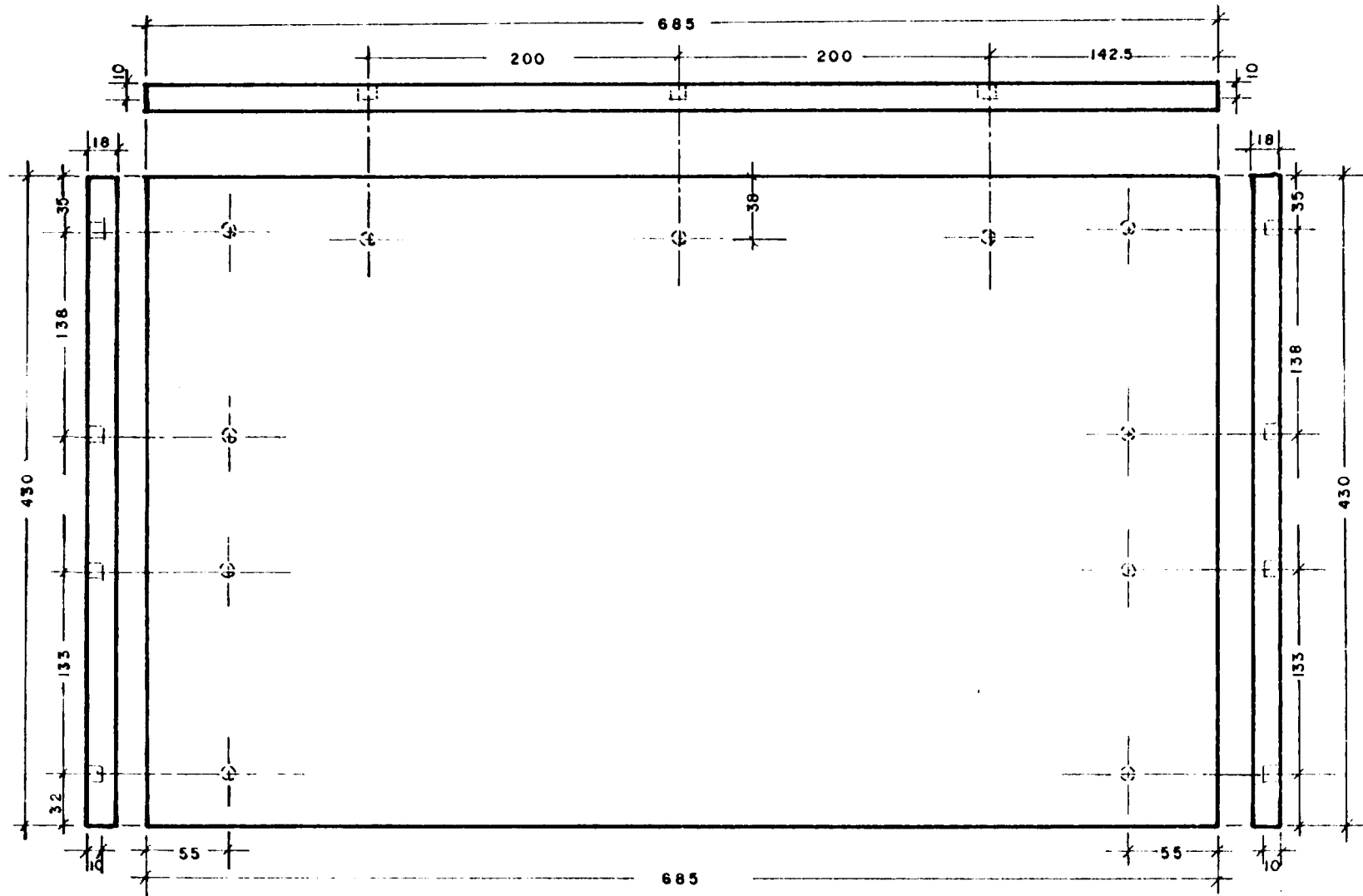


FIGURE X-2

Part No. : PD - 1

Part Name : DESK TOP

Qty. Per Unit Product : One (1) piece

Product : Pupil's Desk

Product No. : ME - SFC - 1, CSCC/Rev.

Scale : 1 : 40

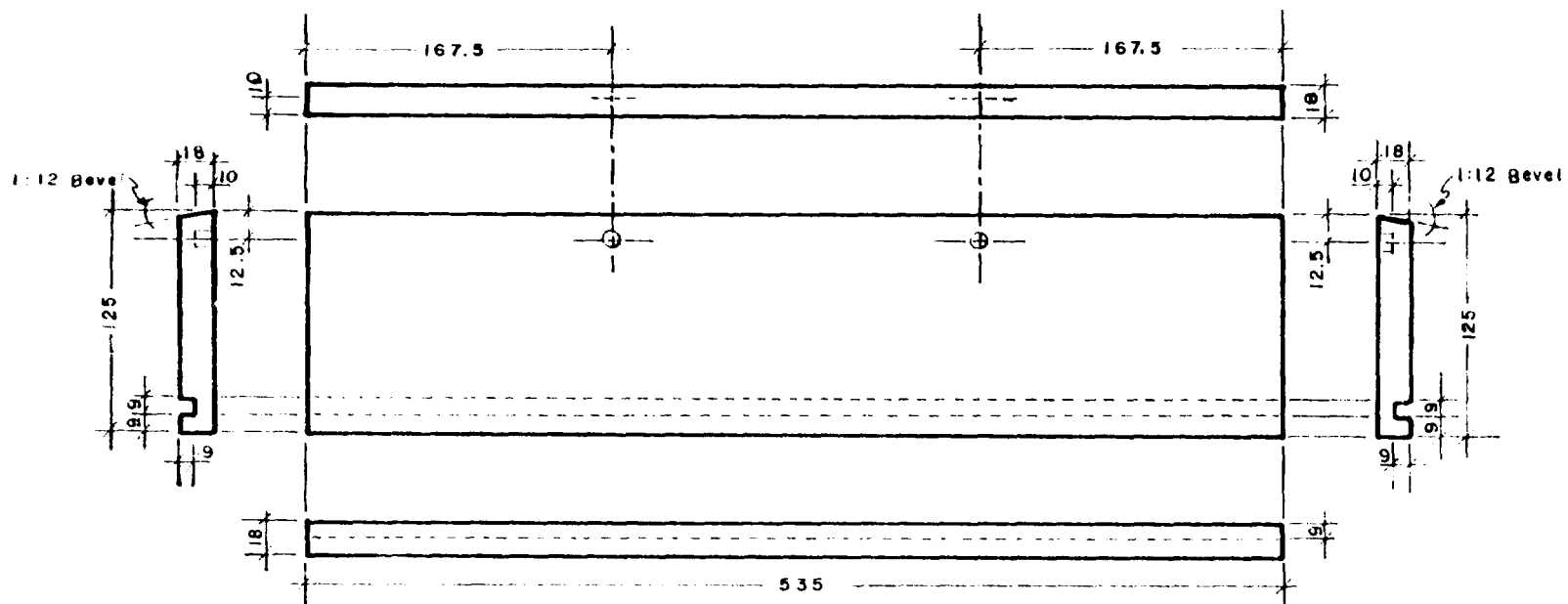


FIGURE X-3

Part No. : PD - 2
 Part Name : SHELF FRONT PANEL
 Qty. Per Unit Product : One (1) piece

Product : , Pupil's Desk
 Product No. : ME - SFC - 1, CSCC/Rev.
 Scale : 1 : 40

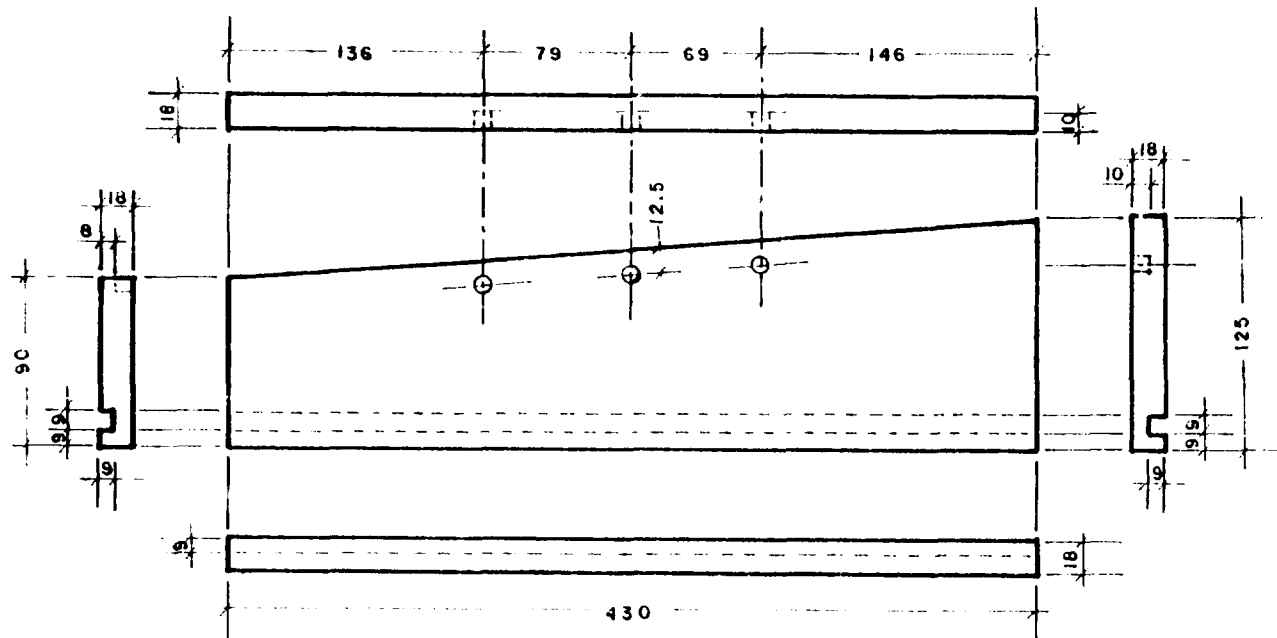


FIGURE X-4

Part No. : PD - 3
 Part Name : SHELF SIDE PANEL, LEFT
 Qty. Per Unit Product : 1 pc. L. & 1 pc. R

Product : Pupil's Desk
 Product No. : ME - SFC - 1, CSCC/Rev.
 Scale : 1 : 40

Note : Shelf Side Panel, Right, Part No. PD-4, is mirror image
 of Shelf Side Panel, Left, Part No. PD - 3.

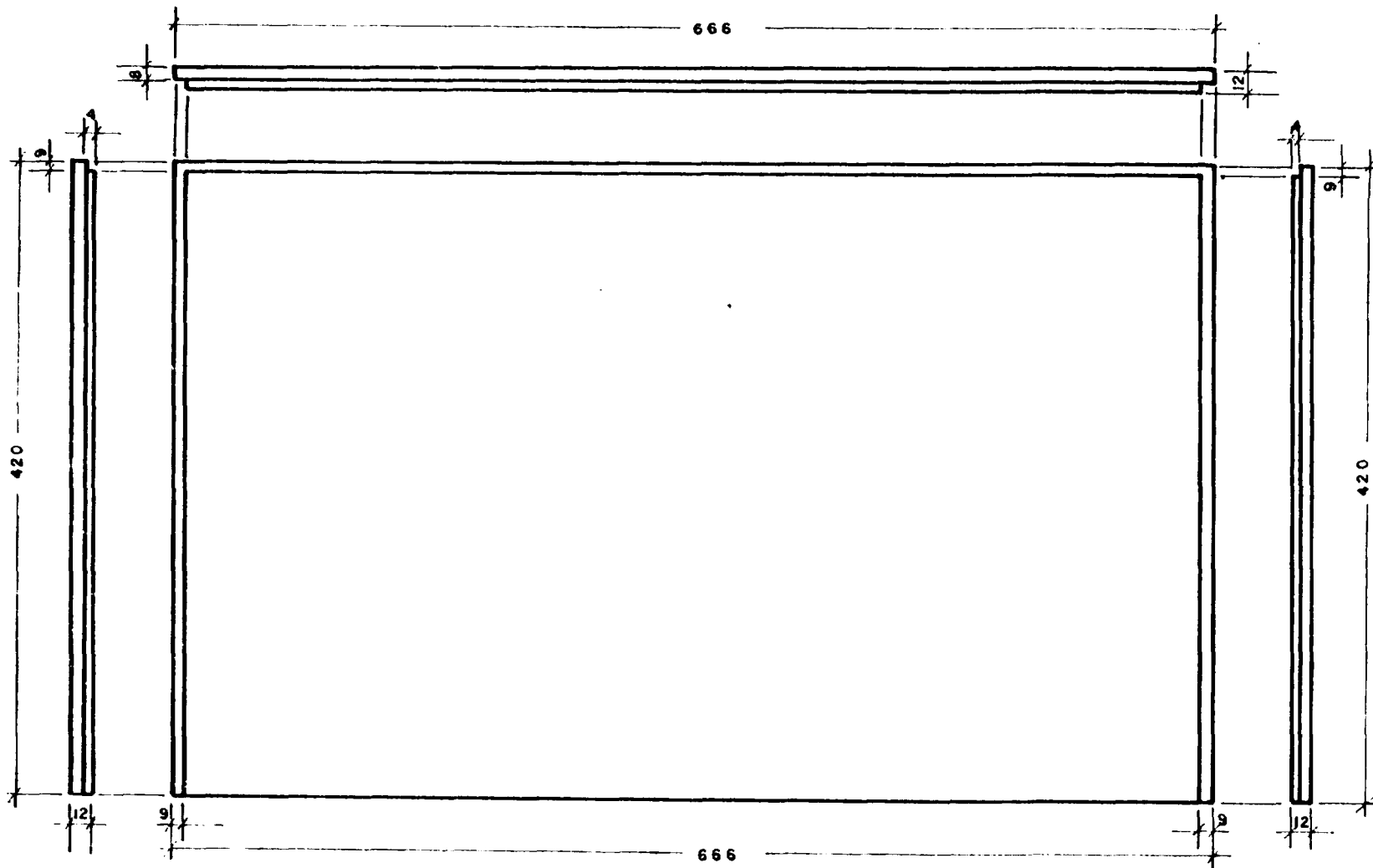


FIGURE X-5

Part No. : PD - 5
 Part Name : SHELF BOTTOM PANEL
 Qty. Per Unit Product : One (1) piece

Product : Pupil's Desk
 Product No. : ME - SFC-1, CSCC/Rev.
 Scale : 1 : 40

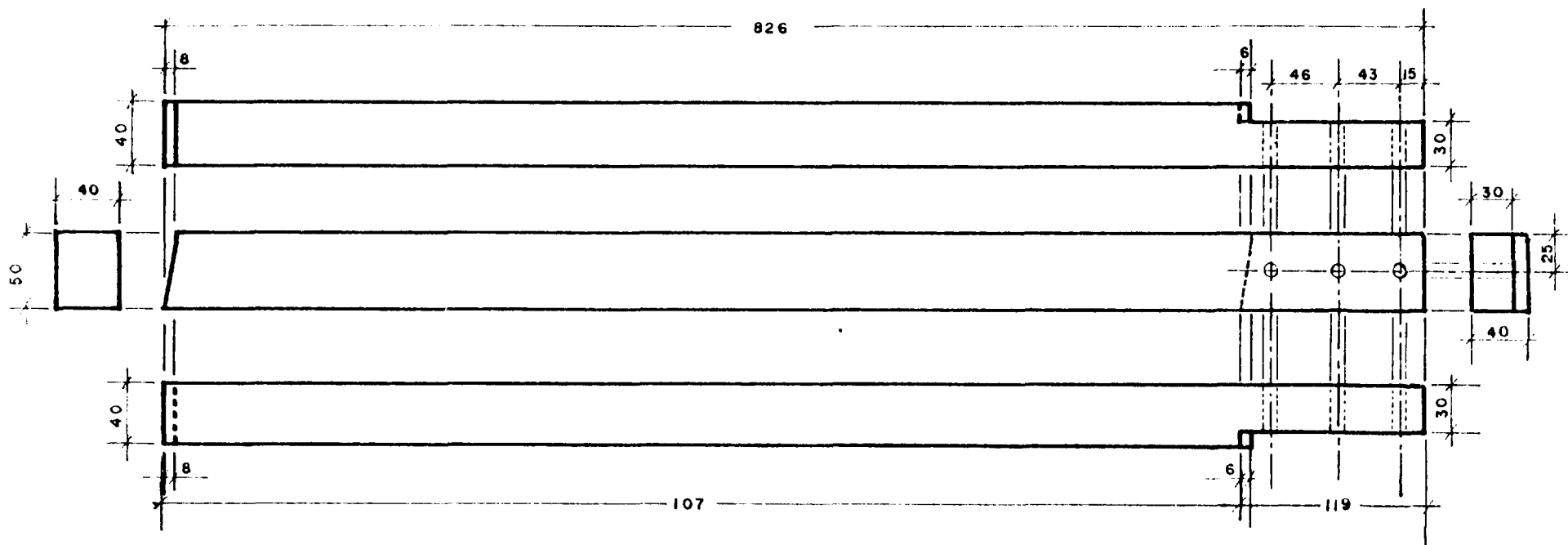


FIGURE X-6

Part No. : PD - 6
 Part Name : FRONT LEG, LEFT
 Qty. Per Unit Product : One (1) piece

Product : Pupil's Desk
 Product No. : ME - SFC - 1, CSCC/Rev.
 Scale : 1 : 40

Note: Front Leg, Right, Part No. PD - 7 is mirror image of
 Front Leg, Left, Part No. PD - 6.

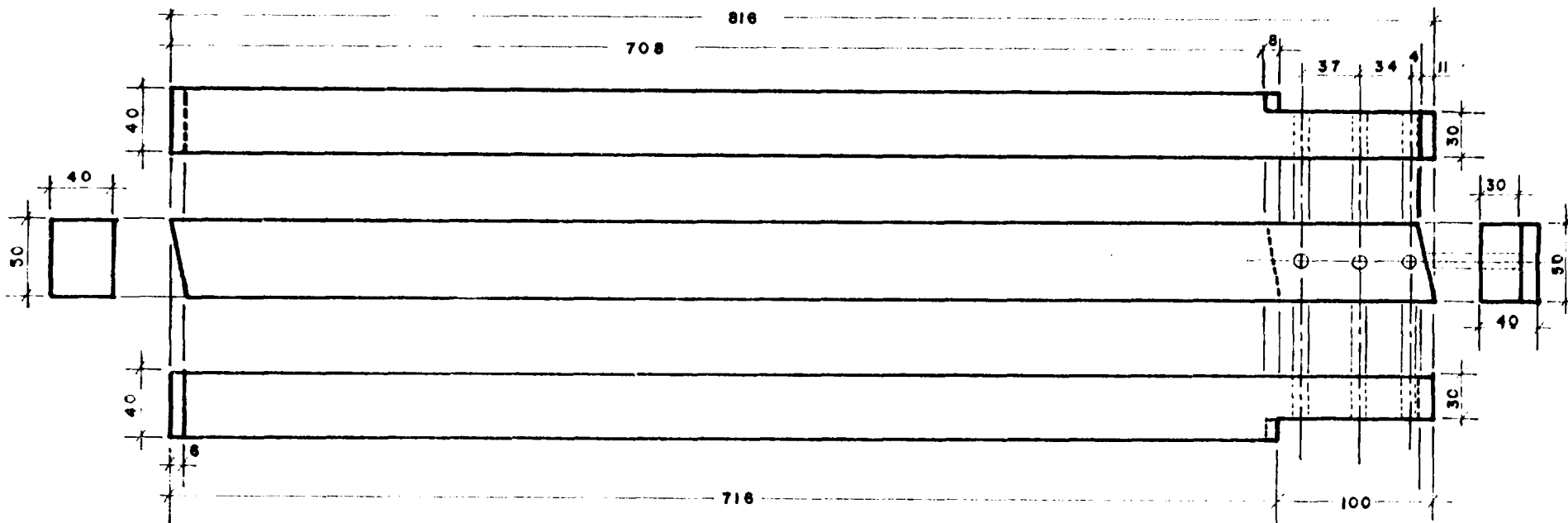


FIGURE X-7

Part No. : PD - 8
 Part Name : REAR LEG, LEFT
 Qty. Per Unit Product : 1 pc., L & 1 pc., R

Product : Pupil's Desk
 Product No. : ME - SFC - 1, CSCC/Rev.
 Scale : 1 : 40

Note : Rear Leg, Right, Part No. PD-9 is mirror image of
 Rear Leg, Left, Part No. PD-8.

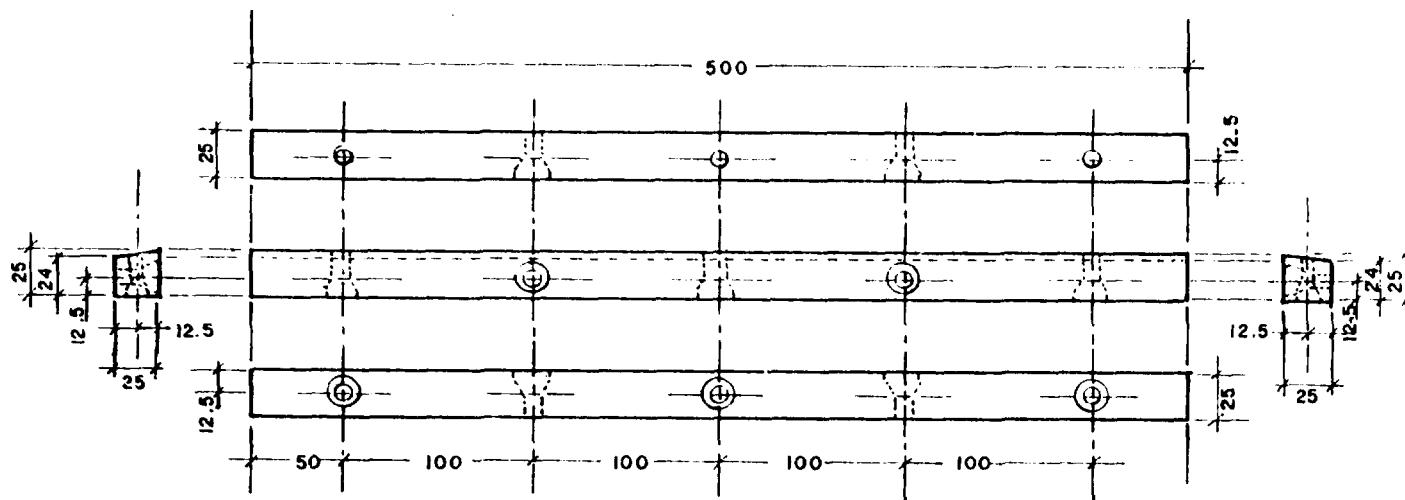


FIGURE X-8

Part No. : PD - 10
 Part Name : SUPPORT FILLET, FRONT
 Qty. Per Unit Product : One (1) piece

Product : Pupil's Desk
 Product No. : ME - SFC - 1, CSCC/Rev.
 Scale : 1 : 40

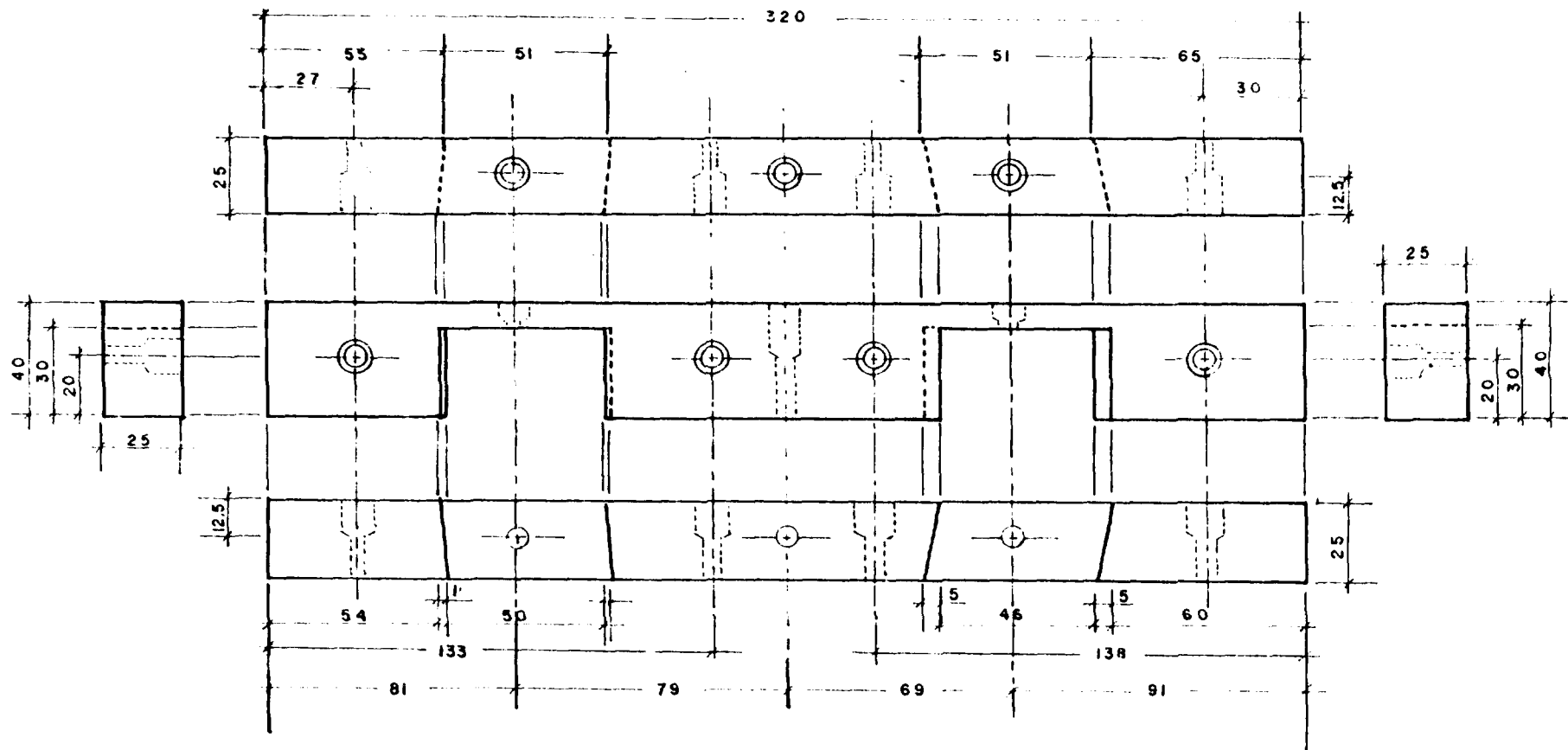


FIGURE X-9

Part No. : PD - 11
 Part Name : SIDE SUPPORT FILLET, LEFT
 Qty. Per Unit Product : 1 pc., L & 1 pc., R

Product : Pupil's Desk
 Product No. : ME - SFC - 1, CSCC/Rev.
 Scale : 1 : 20

- Note : a) Side Support Fillet, Right, Part No. PD-12 is mirror image of Side Support Fillet, Left, Part No. PD-11.
 b) Depth of countersink hole to be determined by size of available woodscrews.

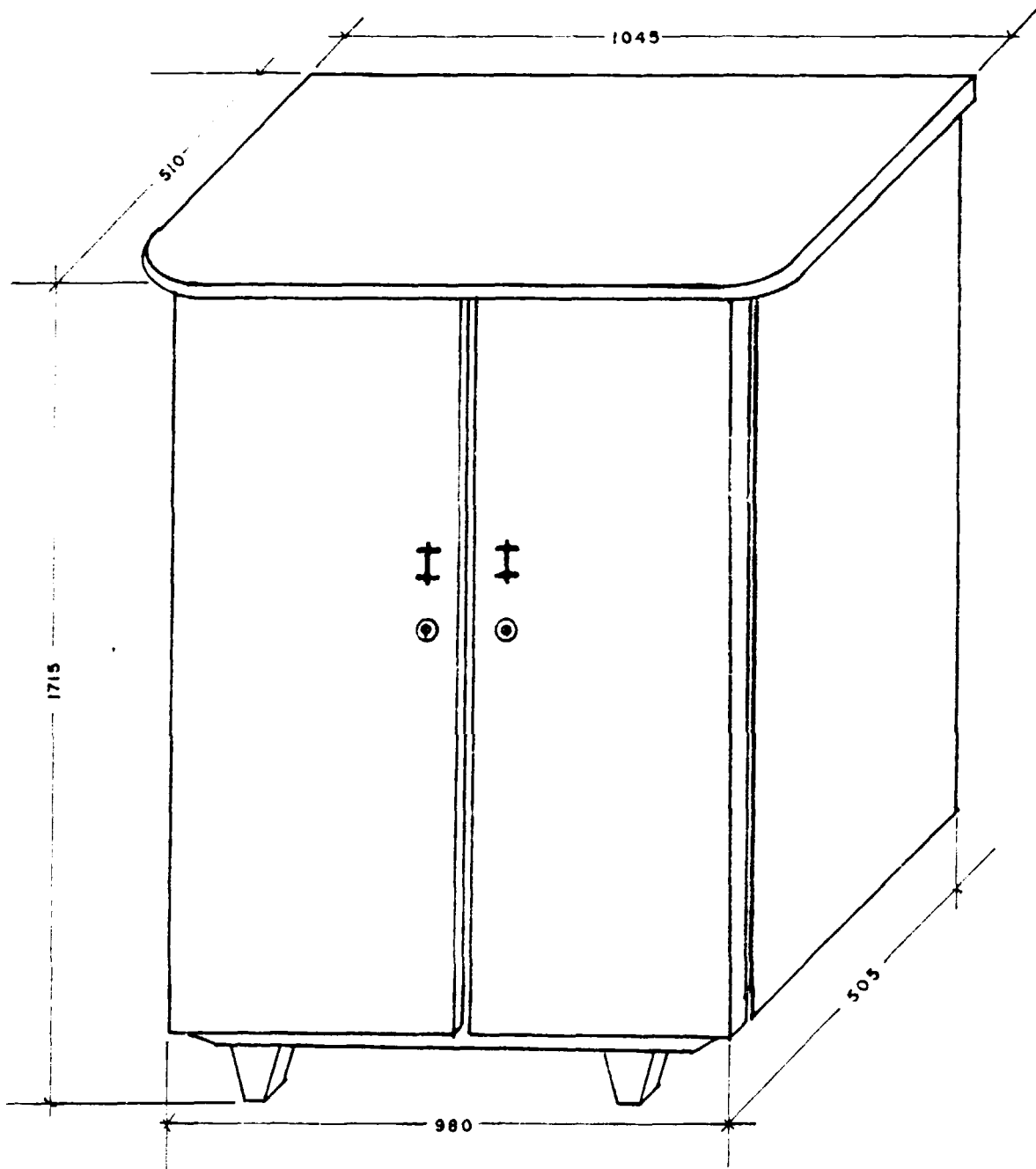


FIGURE X-10

CLOTHES CABINET

Product No. CSCC - HFH - 1, Rev.

(Not to Scale)

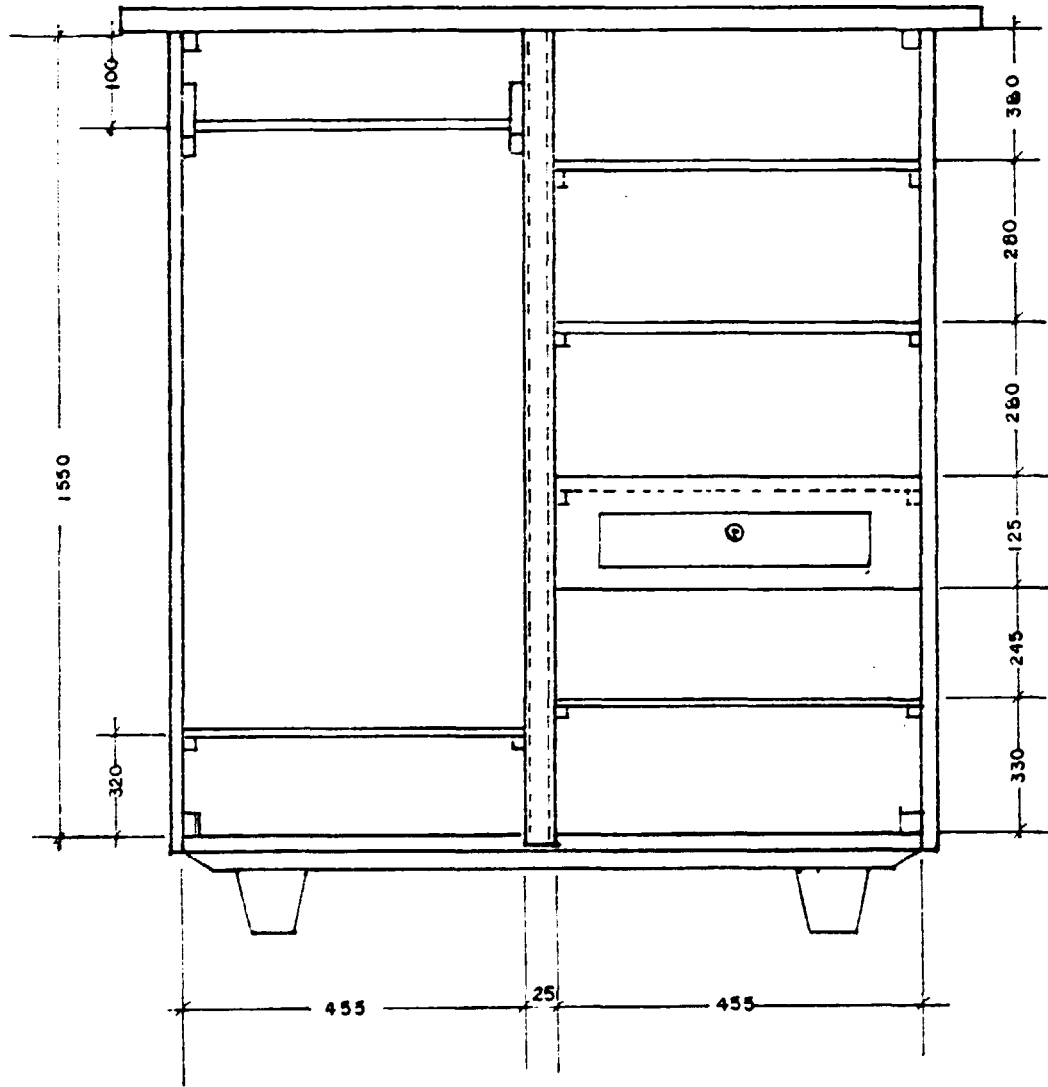


FIGURE X-11

INSIDE VIEW OF CLOTHES CABINET
Product No. CSCC - HFH - 1, Rev.
(Not to Scale)

- Note : a) All woodscrew pilot holes are 10 mm deep.
 b) All dowel holes are 4 mm \emptyset x 8 mm deep.

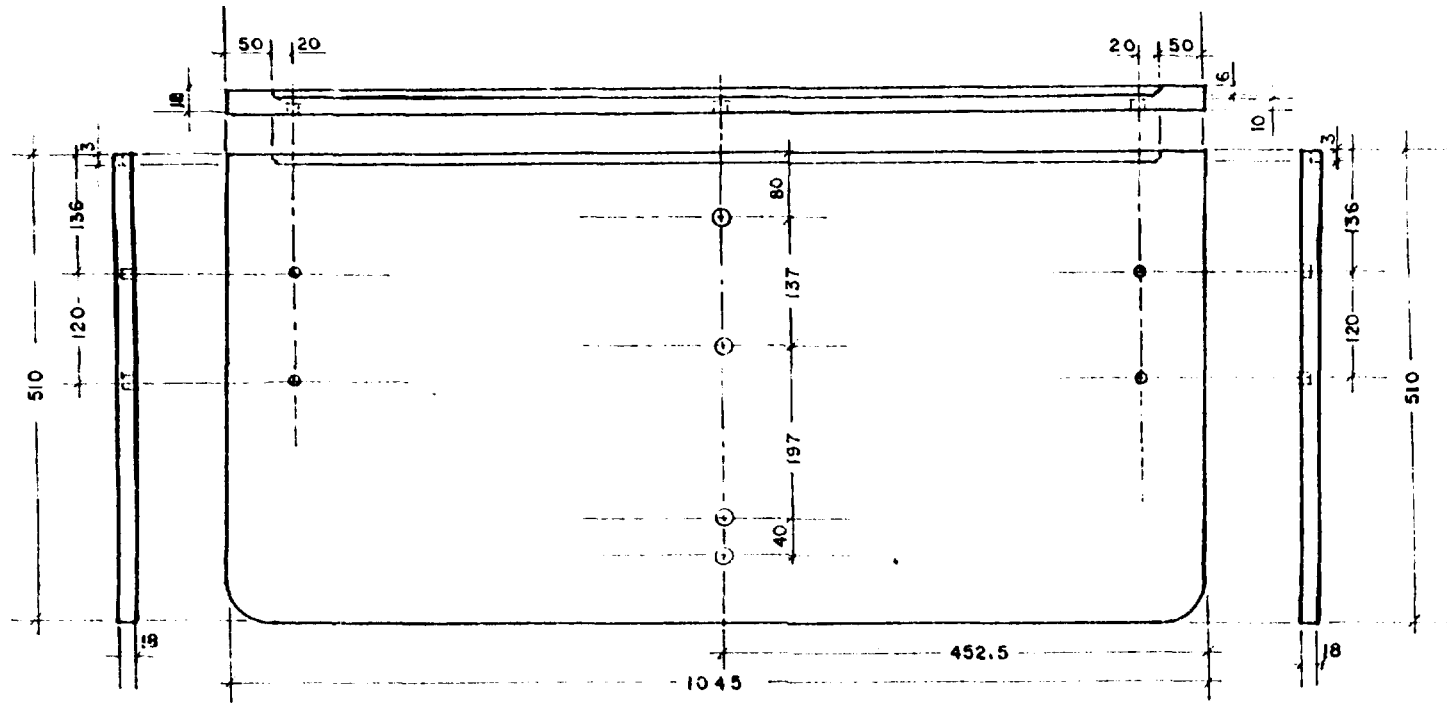


FIGURE X-12

Part No. : HFH - 1
 Part Name : CABINET TOP
 Qty. Per Unit Product : One (1) piece

Product : Clothes Cabinet
 Product No. : CSCC - HFH - 1, Rev.
 Scale : 1 : 80

Note : All woodscrew pilot holes 10 mm deep.

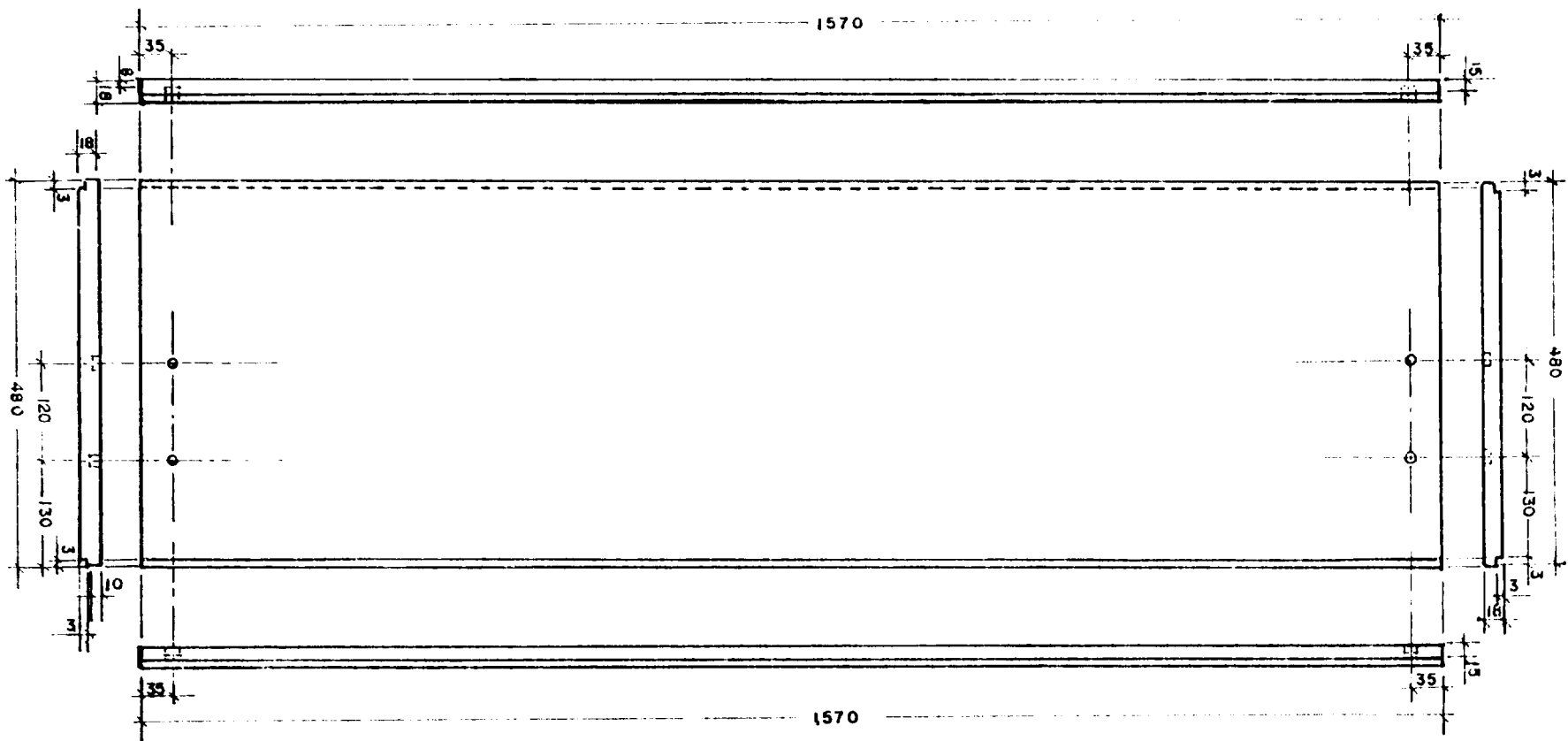


FIGURE X-13

Part No. : HFH - 2
Part Name : CABINET SIDE PANEL, LEFT
Qty. Per Unit Product : One (1) piece

Product : Clothes Cabinet
Product No. : CSCC - HFH - 1, Rev.
Scale : 1 : 80

Note : All woodscrew pilot holes 10 mm deep.

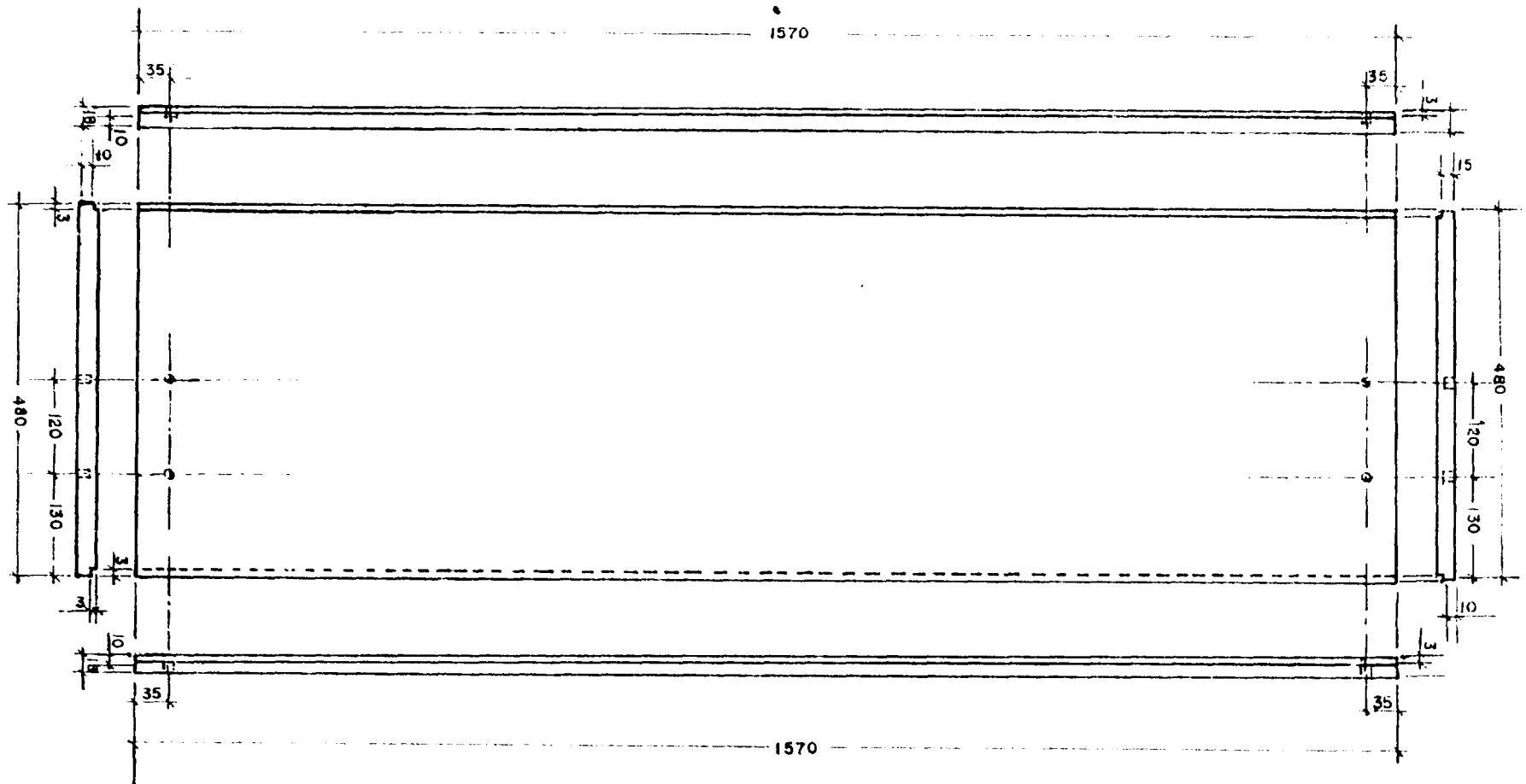
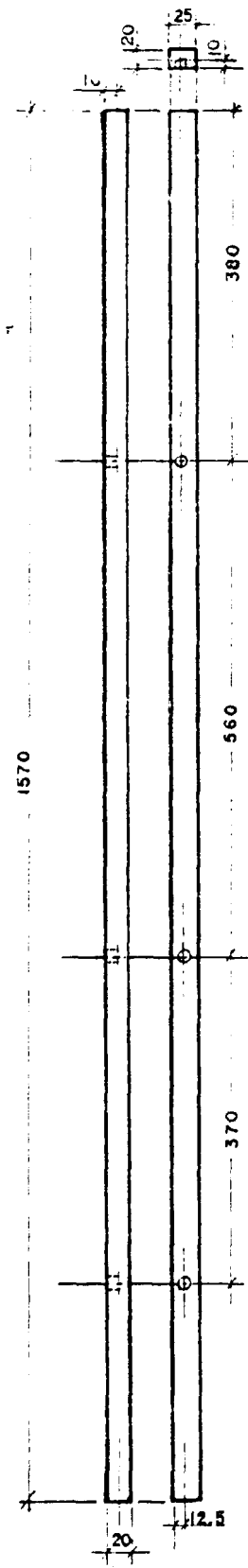


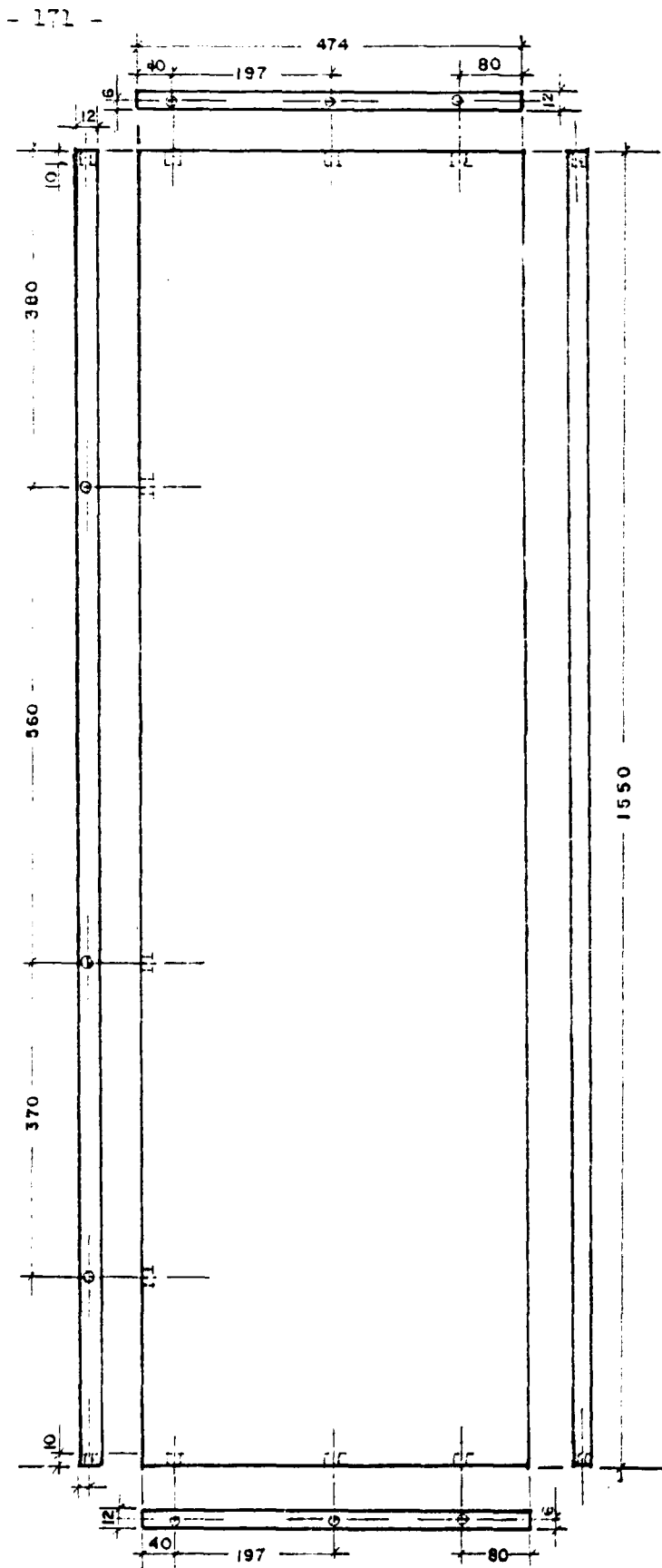
FIGURE X-14

Part No. : HFH - 3
Part Name : CABINET SIDE PANEL, RIGHT
Qty. Per Unit Product : One (1) piece

Product : Clothes Cabinet
Product No. : CSCC - HFH - 1, Rev.
Scale : 1 : 80



PARTITION LIPPING
Part No. HFH-5



CABINET PARTITION PANEL
Part No. HFH-4

FIGURE X-15

| | | | |
|-------------------------|--------------------------------|---------------|-------------------------|
| Part No. : | <u>HFH - A</u> | Product : | <u>Clothes Cabinet</u> |
| Part Name : | <u>CABINET PARTITION ASSY.</u> | Product No. : | <u>CSCC-HFH-1, Rev.</u> |
| Qty. Per Unit Product : | <u>1 set</u> | Scale : | <u>1 : 80</u> |

- Note : a) Cabinet Door, Right, Part No. HFH-7 is mirror image
of Cabinet Door, Left, Part No. HFH-6.
- b) Locate Door Lock and Handle after final decision on
choice of Hardware.

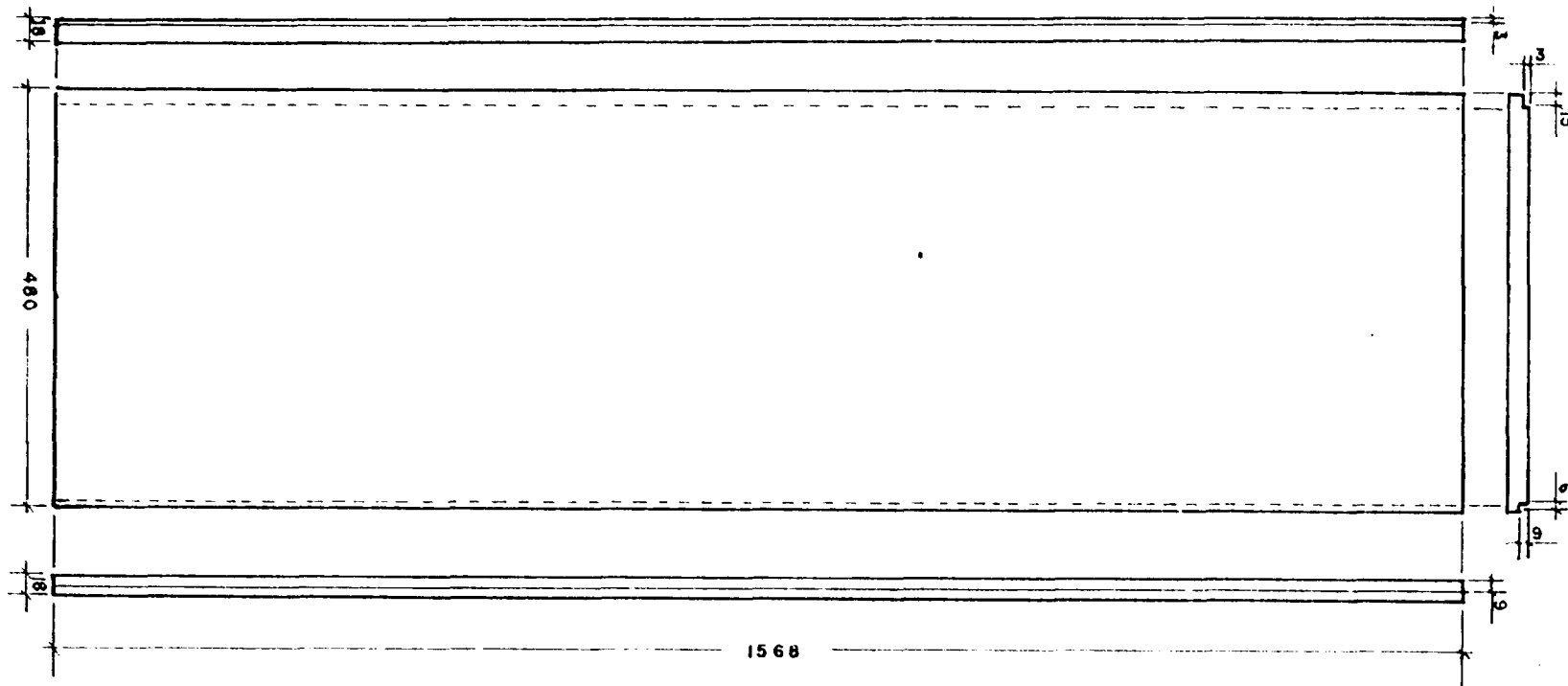


FIGURE X-16

Part No. : HFH - 6

Part Name : CABINET DOOR, LEFT

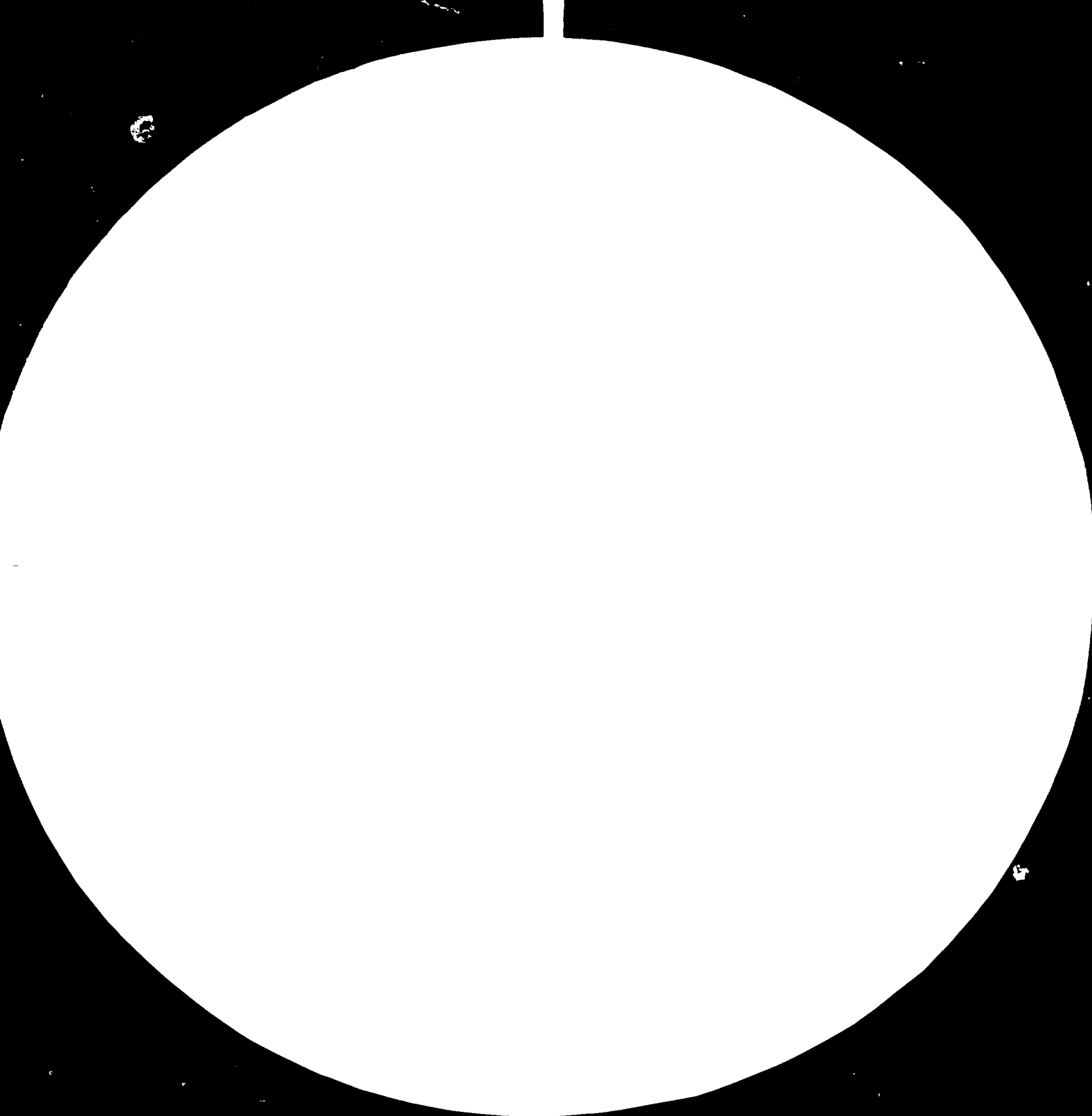
Qty. Per Unit Product : 1 pc., L & 1 pc., R

Product : Clothes Cabinet

Product No. : CSCC - HFH - 1, Rev.

Scale : 1 : 80







2.8



3.2



4.0



5.0



4.5

5.6

6.3

8.0

8.0

10.0

10.0

12.5

12.5

16.0

16.0

20.0

Cut from 9 mm Plywood, Commercial Grade
9 mm x 380 x 461

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FIGURE X-17

Part No. : HFH - 8
Part Name : CABINET SHELVINGS
Qty. Per Unit Product : Five (5) pieces

Product : Clothes Cabinet
Product No. : CSCC - HFH - 1, Rev.
Scale : -----

Cut from 3 mm Plywood, Commercial Grade
3 mm x 945 x 1575

FIGURE X-18

Part No. : HFH - 23
Part Name : CABINET BACK PANEL
Qty. Per Unit Product : One (1) piece

Product : Clothes Cabinet
Product No. : CSCC - HFH - 1, Rev.
Scale : -----

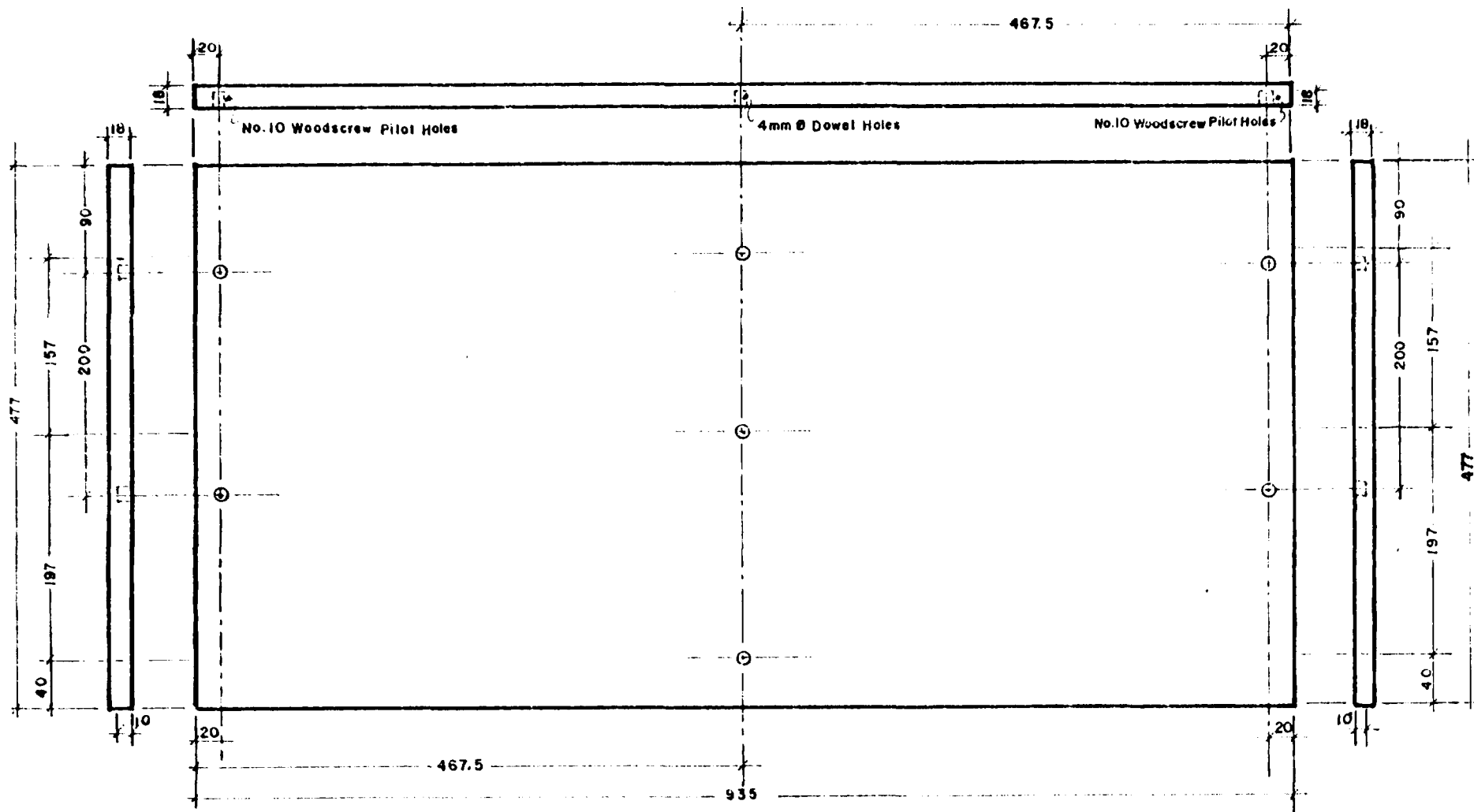


FIGURE X-19

Part No. : HFH - 9
 Part Name : CABINET BOTTOM PANEL
 Qty. Per Unit Product : One (1) piece

Product : Clothes Cabinet
 Product No. : CSCC - HFH - 1, Rev.
 Scale : 1 : 50

FIGURE X-20

Part No. : HFH - 10 Product : Clothes Cabinet
Part Name : SHELF SUPPORT FILLETS Product No. : CSCC-HFH-1, Rev.
Qty. Per Unit Product : 10 pieces Scale : -----

Cut from 18 mm Plywood Trimmings
18 mm x 18 x 360

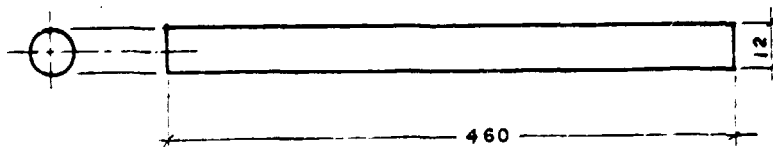


FIGURE X-21

Part No. : HFH - 11 Product : Clothes Cabinet
Part Name : CLOTHES HANGER RACK Product No. : CSCC-HFH-1, Rev.
Qty. Per Unit Product : 1 piece Scale : Not to Scale

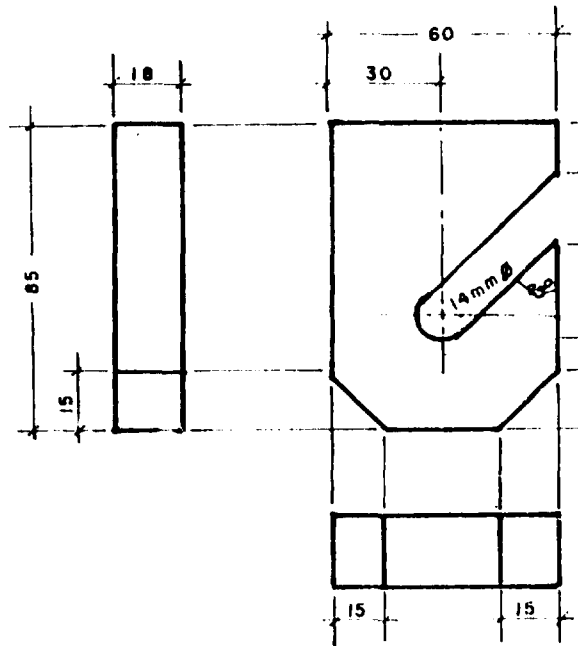
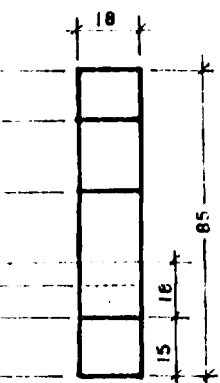


FIGURE X-22

Part No. : HFH -12
 Part Name : RACK SUPPORT BRACKET
 Qty. Per Unit Product : Two (2) pieces



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Product : Clothes Cabinet
Product No. : CSCC - HFH - 1, Rev.
Scale : 1 : 20

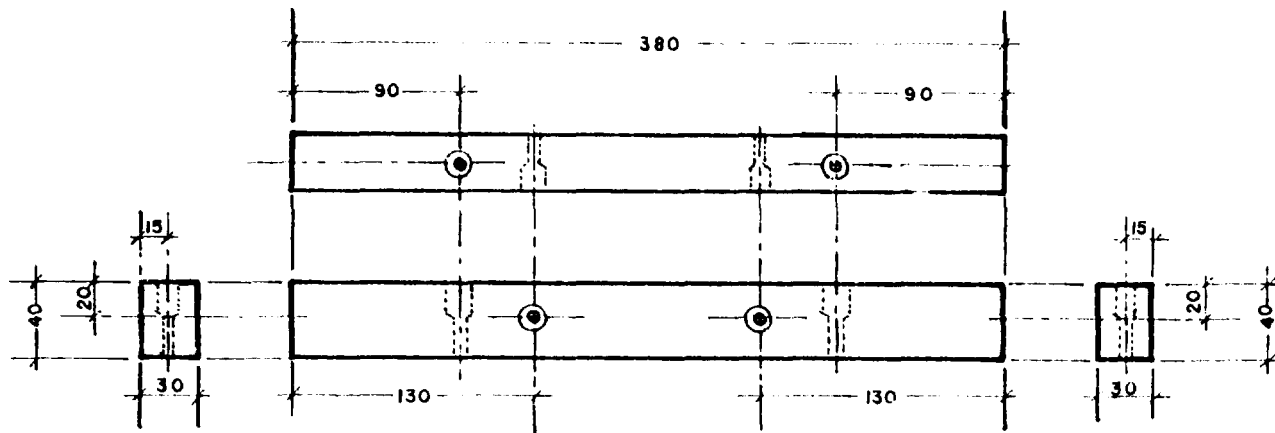


FIGURE X-23

Part No. : HFH - 13

Part Name : CORNER FILLETS, TOP/BOTTOM

Qty. Per Unit Product : Four (4) pieces

Product : Clothes Cabinet

Product No. : CSCC - HFH - 1, Rev.

Scale : 1 : 40

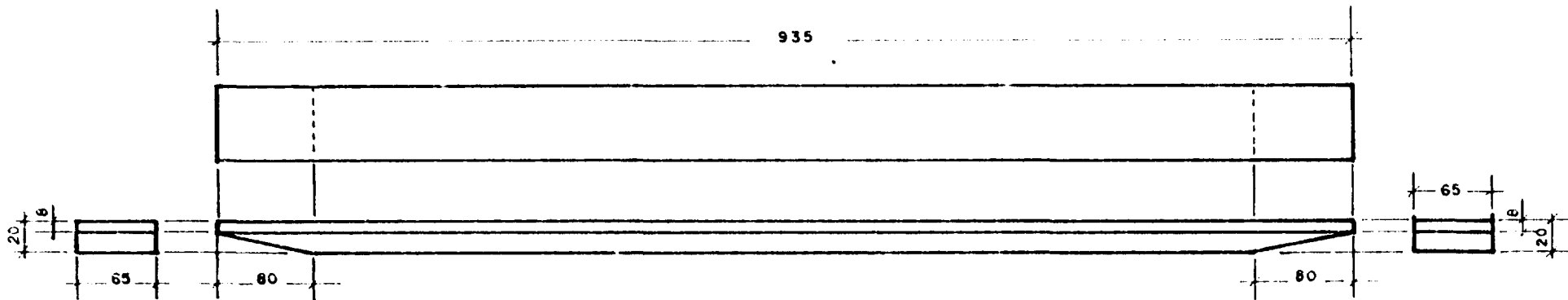


FIGURE X-24

Part No. : HFH - 14
 Part Name : LEG SUPPORT BRACES, FRONT/BACK
 Qty. Per Unit Product : Two (2) pieces

Product : Clothes Cabinet
 Product No. : CSCC - HFH - 1, Rev.
 Scale : 1 : 50

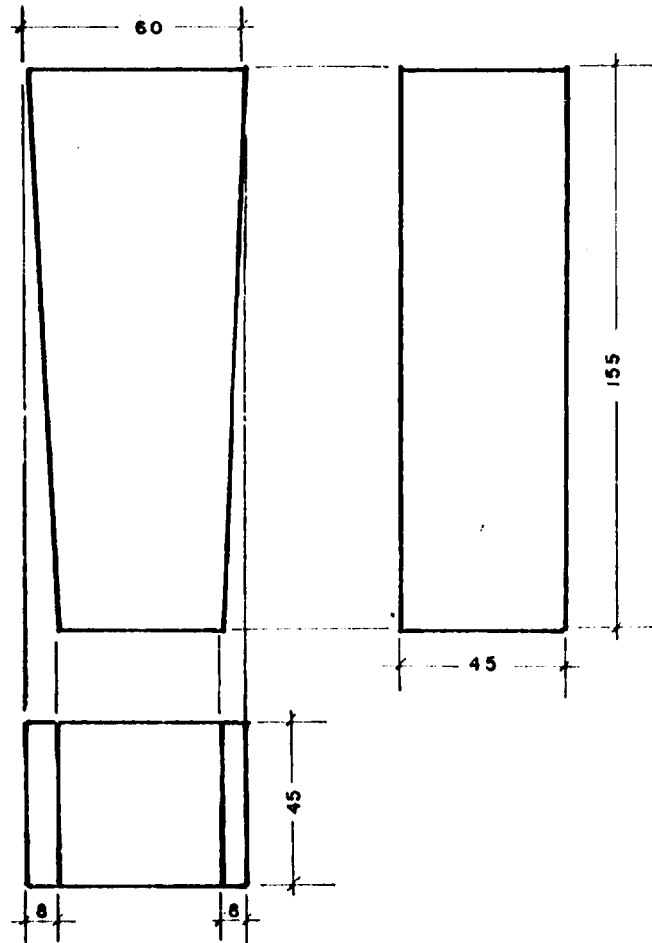


FIGURE X-25

Part No. : HFH - 15
 Part Name : CABINET LEGS
 Qty. Per Unit Product : Four (4) pieces

Product : Clothes Cabinet
 Product No. : CSCC - HFH - 1, Rev.
 Scale : 1 : 20

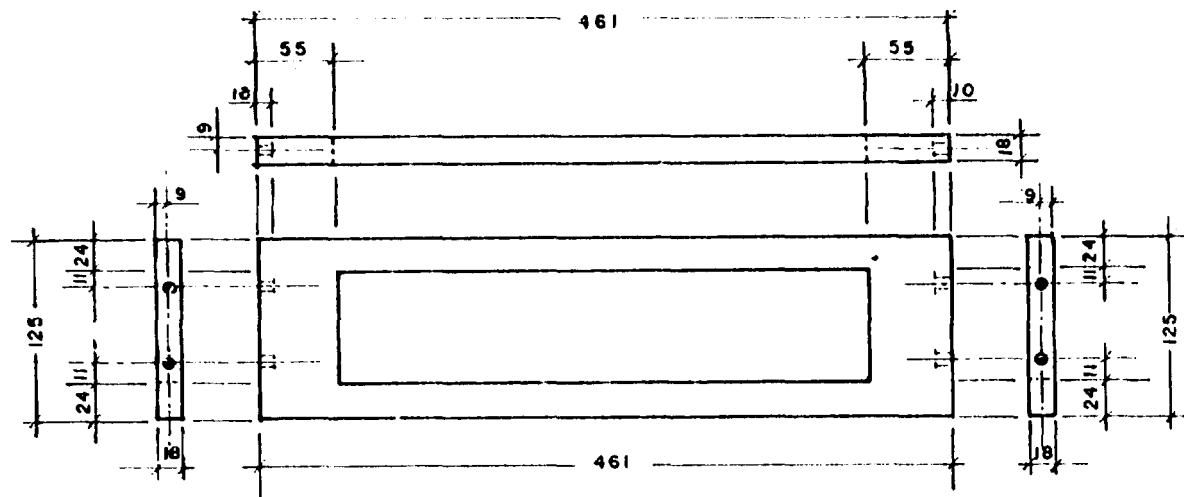


FIGURE X-26

Part No. : HFH - 16
 Part Name : DRAWER SUPPORT FRONT RAIL
 Qty. Per Unit Product : One (1) piece

Product : Clothes Cabinet
 Product No. : CSCC - HFH - 1, Rev.
 Scale : 1 : 50

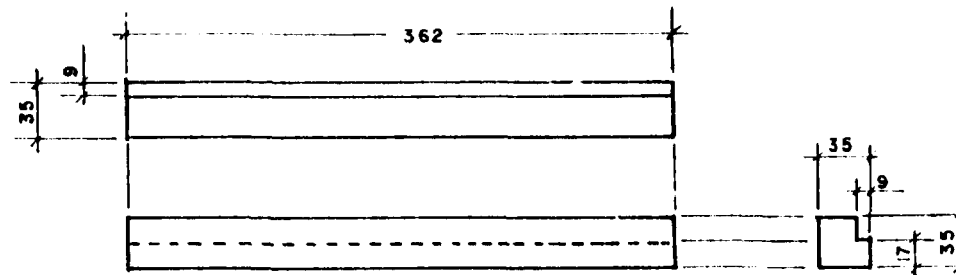


FIGURE X-27

Part No. : HFH - 17
 Part Name : DRAWER GUIDE RAILS, L & R
 Qty. Per Unit Product : Two (2) pieces

Product : Clothes Cabinet
 Product No. : CSCC - HFH - 1, Rev.
 Scale : 1 : 50

Cut from 18 mm Plywood, Commercial Grade,
18 mm x 30 x 351

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FIGURE X-28

Part No. : HFH - 12
Part Name : DRAWER GUIDE CROSS RAIL & STOPPER
Qty. Per Unit Product : Two (2) pieces

Product : Clothes Cabinet
Product No. : CSCC - HFH - 1, Rev.
Scale : ---

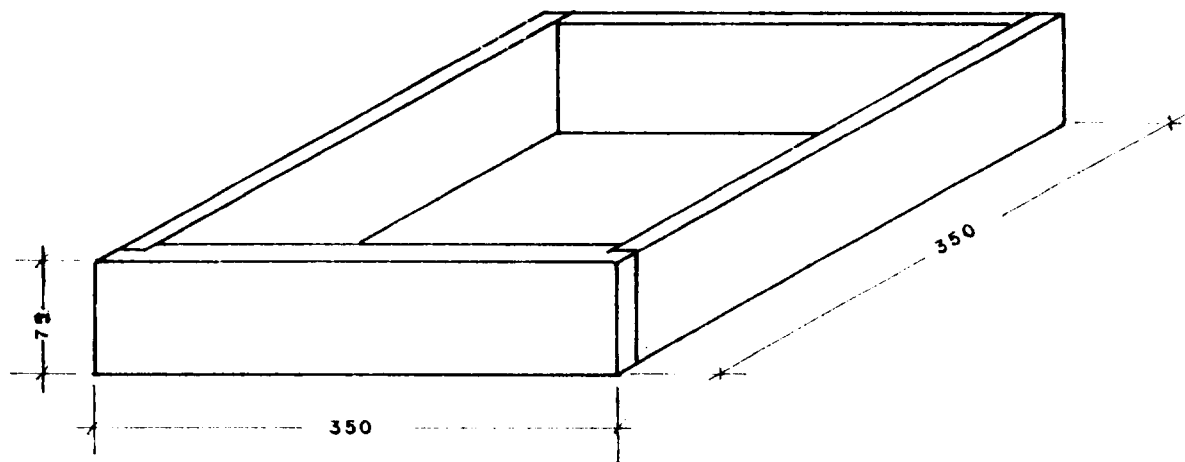


FIGURE X-29

Part No. : HFH - C

Part Name : DRAWER

Qty. Per Unit Product : One (1) Set

Product : Clothes Cabinet

Product No. : CSCC - HFH - 1, Rev.

Scale : 1 : 50

Note : Drawer Pull and Lock to be located after final decision on choice of hardware.

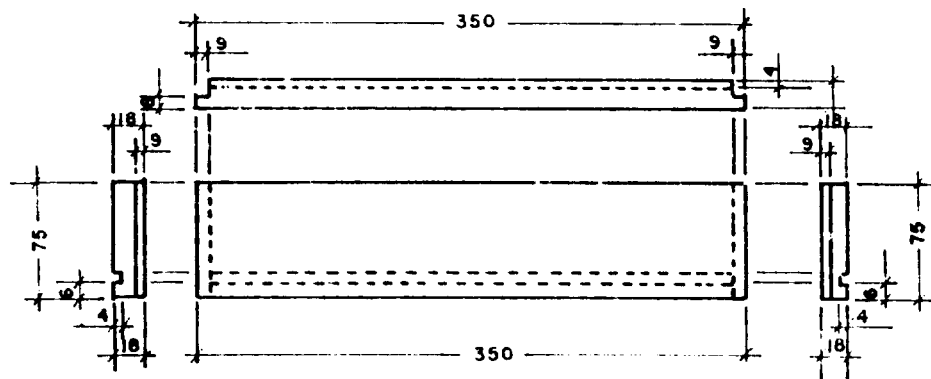


FIGURE X-30

Part No. : HFH - 19
 Part Name : DRAWER FRONT
 Qty. Per Unit Product : One (1) piece

Product : Clothes Cabinet
 Product No. : CSCC - HFH -1, Rev.
 Scale : 1 : 50

- Note :
- a) Cut from 18 mm Plywood, Commercial Grade.
 - b) Locate Drawer Handle and Lock after final decision.
 - c) Groove for Drawer Bottom, 4 mm x 4 mm.

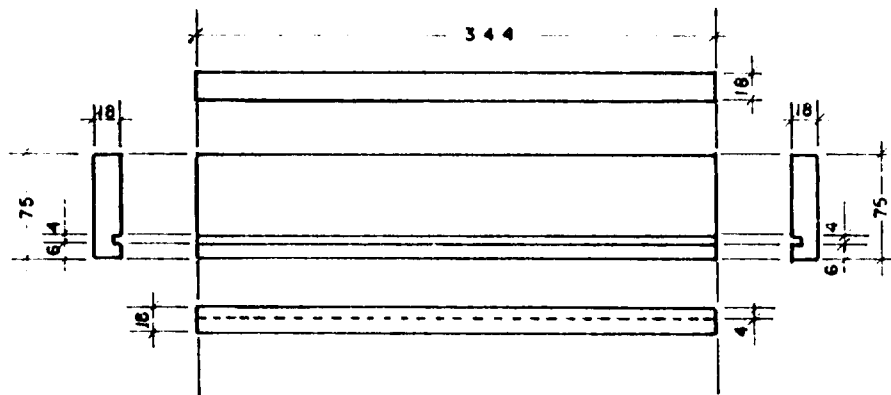


FIGURE X-31

Part No. : HFH - 20
 Part Name : DRAWER SIDES, LEFT & RIGHT
 Qty. Per Unit Product : Two (2) pieces

Product : Clothes Cabinet
 Product No. : CSCC - HFH - 1, Rev.
 Scale : 1 : 50

Note : Groove for Drawer Bottom --- 4 mm x 4 mm

Cut 18 x 65 x 332
Commercial Grade Plywood

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FIGURE X-32

Part No. : HFH - 21
Part Name : DRAWER BACK
Qty. Per Unit Product : One (1) piece

Product : Clothes Cabinet
Product No. : CSCC - HFH - 1, Rev.
Scale : -----

Cut 4 mm x 340 x 335
Commercial Grade Plywood

FIGURE X-33

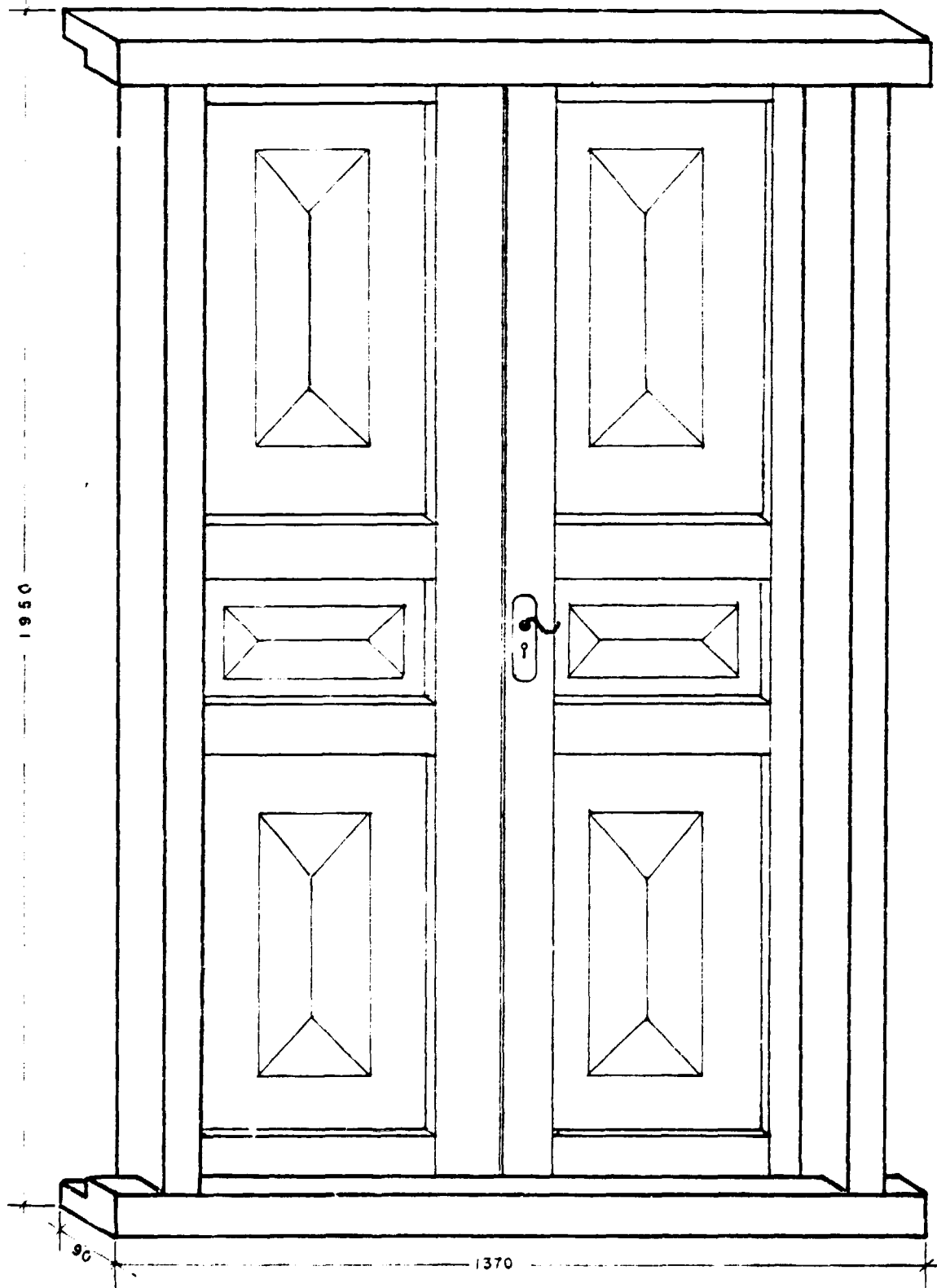
Part No. : HFH - 22
Part Name : DRAWER BOTTOM
Qty. Per Unit Product : One piece

Product : Clothes Cabinet
Product No. : CSCC - HFH - 1, Rev.
Scale : -----

FIGURE X-34

RAISED PANEL DOORS WITH JAMB ASSEMBLY

Product No. CSCC - CWI - 1, Rev.



Scale : 1 : 100

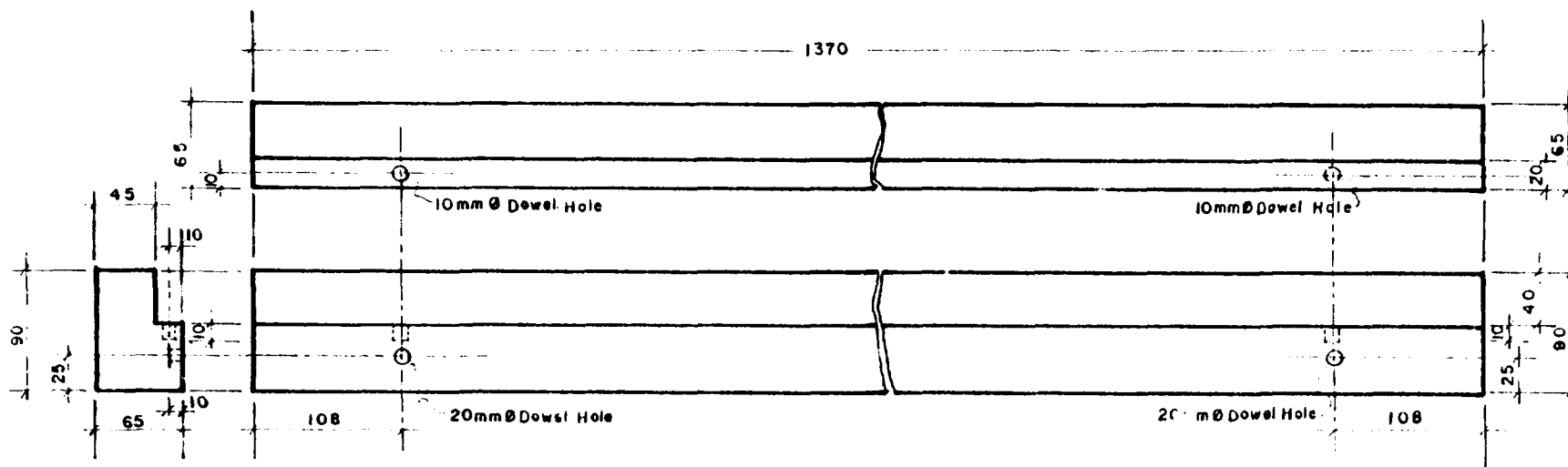


FIGURE X-35

Part No. : CWI - 1
 Part Name : TOP/BOTTOM RAIL, Door Jamb Assy.
 Qty. Per Unit Product : Two (2) pieces

Product : Raised Panel Doors
 Product No. : CSCC - CWI - 1, Rev.
 Scale : 1 : 50

- Note :
- a) Outer Stile, Door, Right, Part No. CWI - 4 is mirror image of Outer Stile, Door, Left, Part No. CWI-3.
 - b) Dowel Holes are 15mm \emptyset x 20mm deep for Middle Braces and 20mm \emptyset x 15mm for Top and Bottom Braces.
 - c) Grooves for Raised Panels are 6mm wide.
 - d) Hinge Seats to be located after final decision on choice of DOOR HINGES.

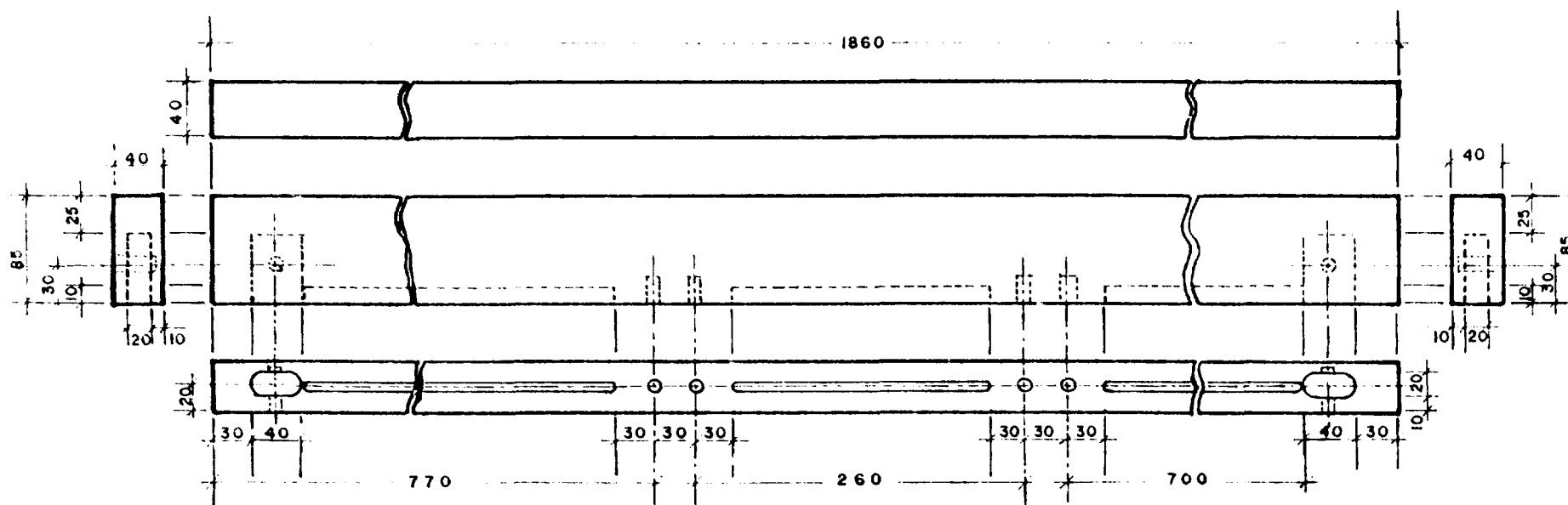


FIGURE X-37

Part No. : CWI - 3
 Part Name : OUTER STILE, Door, LEFT
 Qty. Per Unit Product : 1 pc., L & 1 pc., R

Product : Raised Panel Doors
 Product No. : CSCC - CWI - 1, Rev.
 Scale : 1 : 50

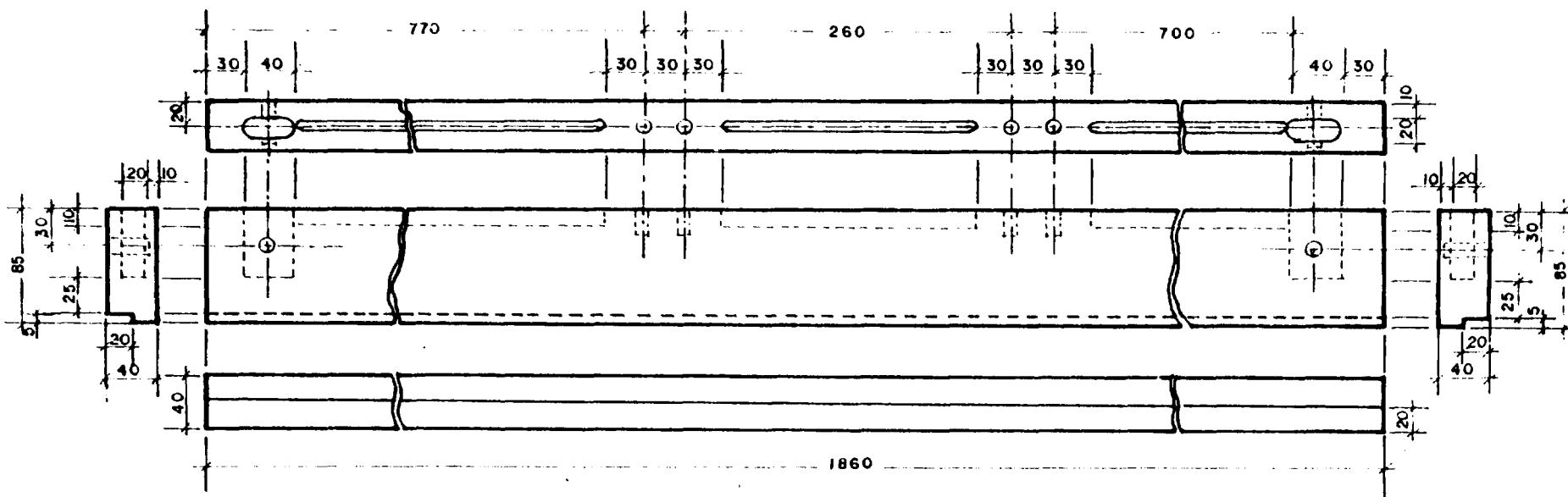


FIGURE X-38

| | | | |
|-------------------------|--------------------------------|---------------|-----------------------------|
| Part No. : | <u>CWI - 5</u> | Product : | <u>Raised Panel Doors</u> |
| Part Name : | <u>INNER STILE, DOOR, LEFT</u> | Product No. : | <u>CSCC - CWI - 1, Rev.</u> |
| Qty. Per Unit Product : | <u>1 pc., L & 1 pc., R</u> | Scale : | <u>1 : 50</u> |

- Note :
- a) Inner Stile Door, Right, Part No. CWI-6 is mirror image of Inner Stile, Door, Left, Part No. CWI-5.
 - b) Dowel Holes as in Figure 42.
 - c) Grooves for Raised Panels are 6 mm wide.
 - d) Locate Holes for Door Lock after final decision on choice of Lock Set.

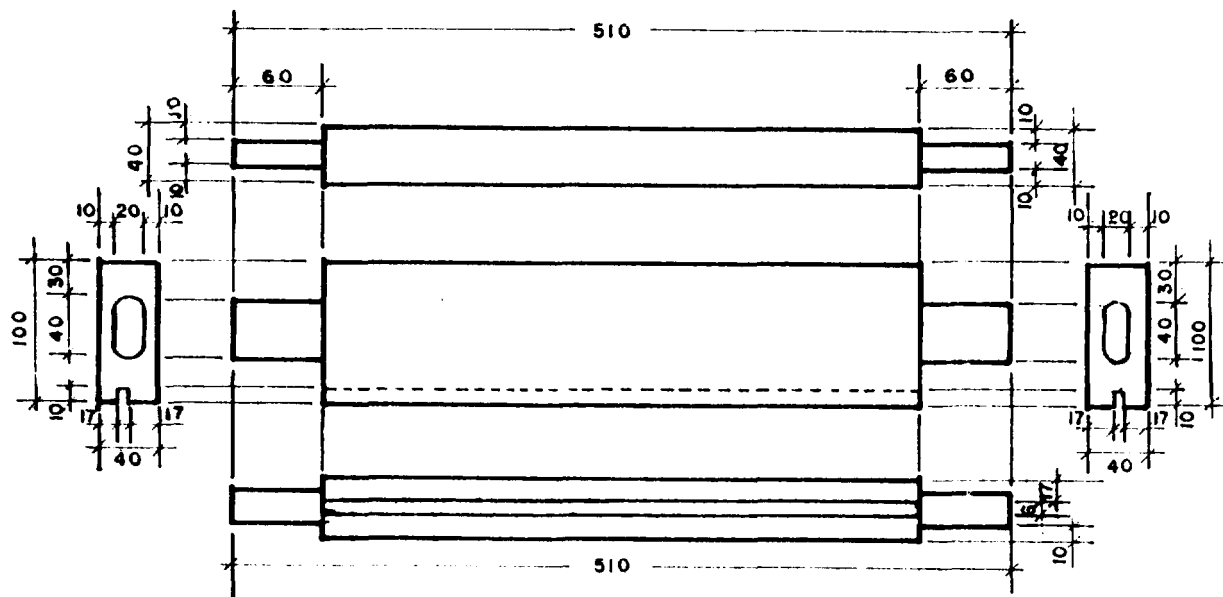


FIGURE X-39

Part No. : CWI - 7 & 8
 Part Name : TOP/BOTTOM BRACES
 Qty. Per Unit Product : Two (2) pieces

Product : Raised Panel Doors
 Product No. : CSCC - CWI - 1, Rev.
 Scale : 1 : 50

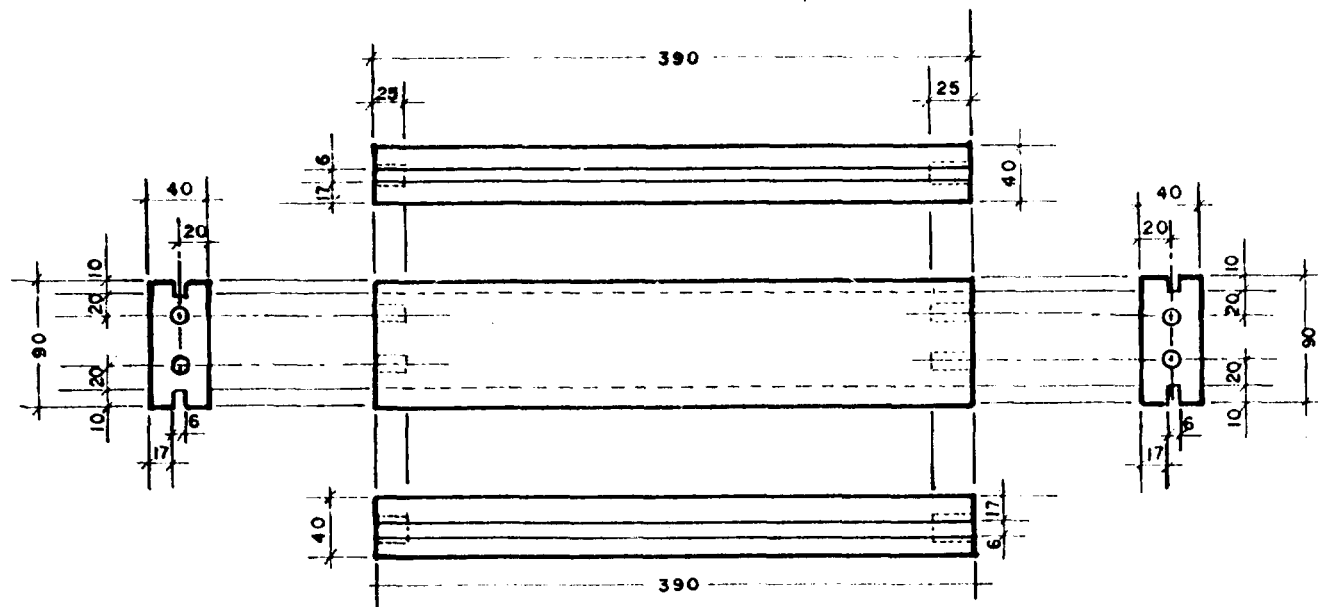


FIGURE X-40

Part No. : CWI - 9 & 10
 Part Name : MIDDLE BRACES
 Qty. Per Unit Product : Two (2) pieces

Product : Raised Panel Doors
 Product No. : CSCC - CWI - 1, Rev.
 Scale : 1 : 50

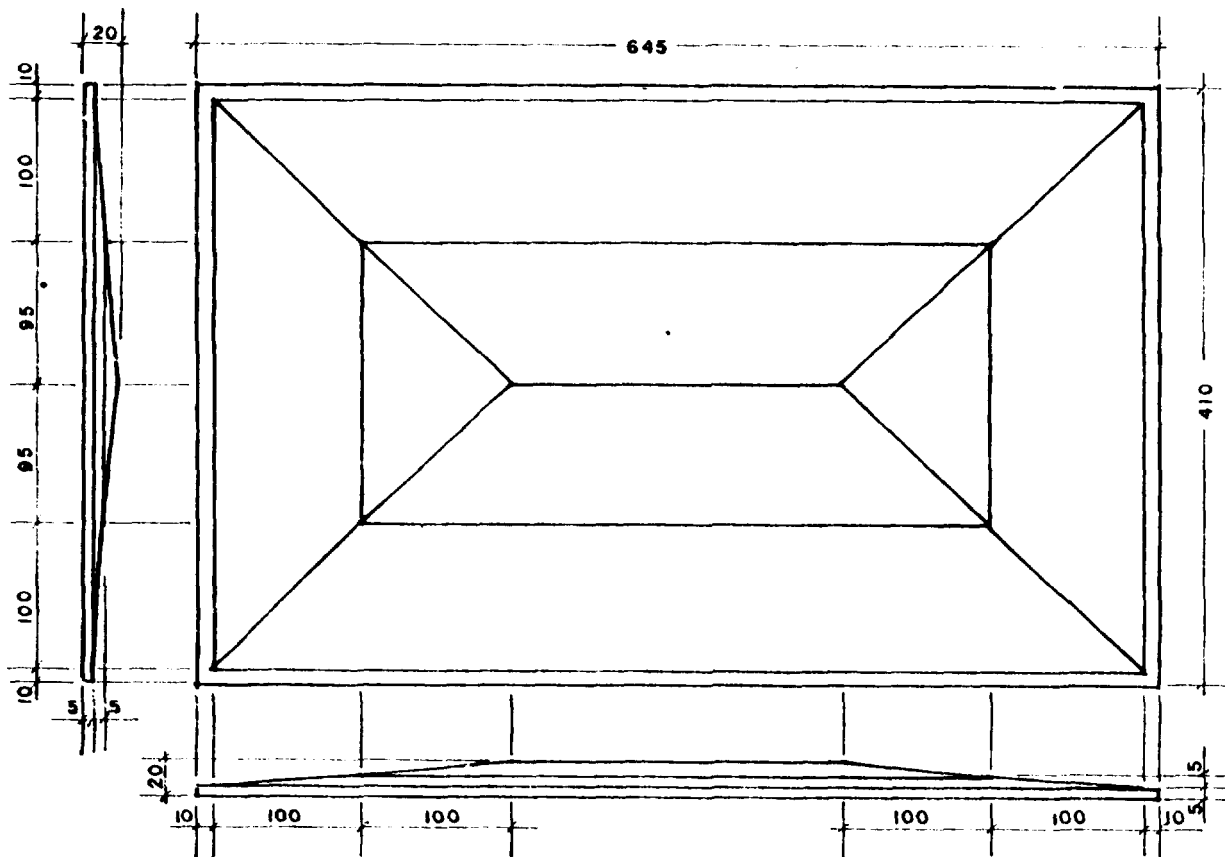


FIGURE X-41

Part No. : CWI - 11
 Part Name : UPPER/LOWER RAISED PANEL
 Qty. Per Unit Product : Four (4) pieces

Product : Raised Panel Doors
 Product No. : CSCC - CWI - 1, Rev.
 Scale : 1 : 50

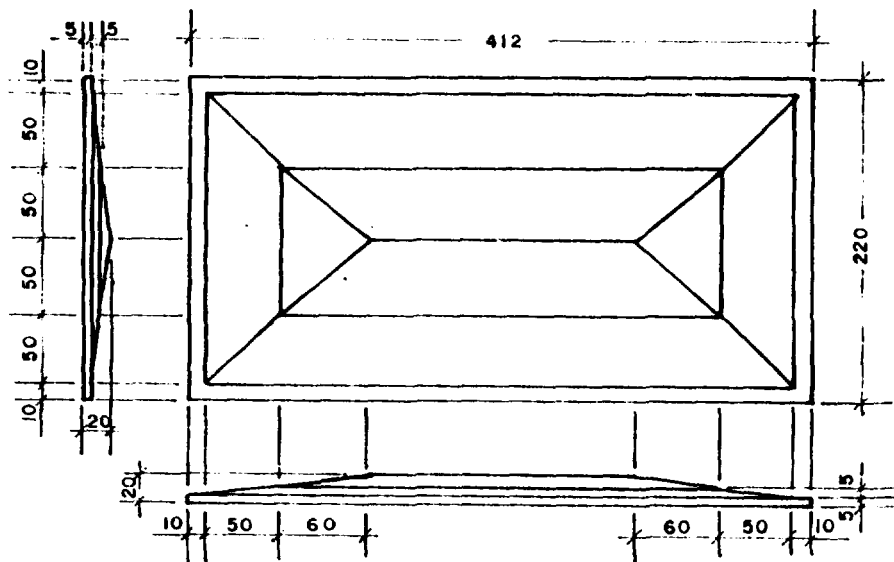


FIGURE X-42

Part No. : CWI - 12
 Part Name : MIDDLE RAISED PANELS
 Qty. Per Unit Product : Two (2) pieces

Product : Raised Panel Doors
 Product No. : CSCC - CWI - 1, Rev.
 Scale : 1 : 40

A P P E N D I X XI

MANPOWER COMPLEMENT *

CONSOLIDATED WOODWORKS PLANT, C. S. C. C.,

Al-Jol Mashah, Mukalla City

| Department and Job Title | Initial Stage | Final Stage |
|--|---------------|-------------|
| Plant Manager | 1 | 1 |
| Assistant Plant Manager | 1 | 1 |
| Secretarial Pool | 2 | 3 |
| Production Division Head | 1 | 1 |
| Shift Supervisors | 1 | 3 |
| Foremen, Machining and Sanding Departments | 3 | 9 |
| Highly Skilled Workers | 4 | 10 |
| Skilled Workers | 23 | 46 |
| Semi-Skilled Workers | 42 | 84 |
| Unskilled Workers | 15 | 30 |
| Foremen, Assembling Department | 1 | 3 |
| Skilled Workers | 1 | 3 |
| Semi-Skilled Workers | 3 | 8 |
| Unskilled Workers | 3 | 8 |
| Foremen, Finishing Department | 1 | 3 |
| Highly Skilled Workers | 15 | 30 |
| Skilled Workers | 3 | 6 |
| Semi-Skilled Workers | 10 | 20 |
| Unskilled Workers | 5 | 10 |

* Excludes Manpower Complement in Assembly Centers.

| Department and Job Title | Initial Stage | Final Stage |
|---|---------------|-------------|
| Foremen, Special Products Department | 1 | 1 |
| Highly Skilled Workers | 1 | 2 |
| Skilled Workers | 2 | 4 |
| Semi-Skilled Workers | 4 | 8 |
| Unskilled Workers | 4 | 8 |
| Foremen, Packing and Crating Department | 1 | 2 |
| Semi-Skilled Workers | 3 | 6 |
| Unskilled Workers | 3 | 6 |
| Engineering Services Division Head | 1 | 1 |
| Shift Heads | 1 | 3 |
| Mechanics | 2 | 6 |
| Electricians | 1 | 3 |
| Millwrights | 2 | 6 |
| Helpers | 2 | 6 |
| Buildings and Grounds Maintenance Section | | |
| Carpenters/Masons/Tinsmith | 2 | 2 |
| Janitors | 3 | 4 |
| Gardeners | 2 | 2 |
| Machine Shop Section | | |
| Machinists | 1 | 2 |
| Welders | 1 | 2 |
| Helpers | 2 | 3 |

| Department and Job Title | Initial Stage | Final Stage |
|--------------------------------------|---------------|-------------|
| Accounting Division Head | 1 | 1 |
| Payroll Clerk | 1 | 2 |
| Cashier | 1 | 1 |
| Cost Clerk | 2 | 4 |
| Materials Management Division Head | 1 | 1 |
| Foremen, Lumber Yard | 1 | 2 |
| Yardmen | 6 | 12 |
| Forklift Operators | 1 | 2 |
| Raw Materials Warehouse Stock Clerk | 1 | 2 |
| Helpers | 1 | 2 |
| Finished Goods Warehouse Stock Clerk | 1 | 2 |
| Helpers | 1 | 2 |
| Purchasing Officer | 1 | 1 |
| Imports Clerk | 1 | 1 |
| Local Purchases Clerk | 1 | 1 |
| Product Design and Engineering Head | 1 | 1 |
| Draftsmen | 1 | 2 |
| Artist/Illustrator | 1 | 1 |
| Documentation Clerk | 1 | 1 |
| Vehicle Drivers | 8 | 12 |
| Security Guards | 3 | 9 |

| Department and Job Title | Initial Stage | Final Stage |
|---|-------------------------|-------------------------|
| Quality Control Department Head (Will also be Production Control Head) | 1 | 1 |
| Raw Materials Q. C. Inspector | 4 | 2 |
| In-Process Q. C. Inspector | 4 | 10 |
| Finished Goods Q. C. Inspector | 1 | 3 |
| Q. C. Testing Laboratory Technician | 1 | 3 |
| Clerk | <u>1</u> | <u>1</u> |
| Grand Totals ----- | <u>216 Men</u> ***** | <u>437 Men</u> ***** |

Note : *Excludes manpower complement in Assembling Centers.

A P P E N D I X XII

JOB DESCRIPTIONS
UNIDO TECHNICAL ASSISTANCE STAFF

I. PROJECT STAGE A - PREPARATORY PERIOD

A. WOODWORKING MACHINERY MAINTENANCE AND REPAIR EXPERT

DURATION ----- 18 months

DUTIES :

1. To select and train qualified personnel of CSCC in the techniques of proper, timely and adequate machinery maintenance ;
2. To evaluate the existing machinery maintenance facilities of CSCC and submit a detailed program on immediate and long-term measures to up-date the facilities to meet the requirements of the proposed consolidation and expansion Project at the new plant in Al-Jol Mashah, Mukalla City ;
3. To evaluate the existing machine shop services provided by the Government Central Machine shop and the Central Training Institute (Trade School), Mukalla City, and submit recommendations on the possibilities and measures of CSCC availing of the services of either or both the machine shops ;
4. To evaluate the current inventory of woodworking machinery for repair at the CSCC machinery repair shop and submit recommendations for immediate and long-term measures on the disposition of the machinery for repair ; and

5. To evaluate the current inventory of machinery spare parts at the CSCC central stores and submit recommendations on immediate measures to be taken by CSCC in order to make the present stocking methods more responsive to the needs of CSCC manufacturing operations, qualitatively and quantitatively.

QUALIFICATIONS :

Mechanical and/or Electrical Engineer having broad experience in machine shop, machinery maintenance and repair practices in furniture and joinery plants. Experience in developing countries is most desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

B. WOODWORKING TOOL MAINTENANCE EXPERT

DURATION ----- 12 months

DUTIES :

1. To select and train qualified CSCC personnel in the proper, timely, and adequate maintenance of sawblades, knives, bits and other cutting tools for woodworking operations ;
2. To evaluate the existing tool maintenance facilities of CSCC and submit a detailed program for immediate and long-range measures with a view to making the CSCC tool maintenance services more responsive to the needs of its current and projected manufacturing operations ;
3. To select and train qualified CSCC personnel in the design, fabrication and proper use of

production jigs and fixtures; design, fabrication and proper use of metal gauges in woodworks manufacturing operations and the proper set up of machinery for basic woodworking operations ; and

4. To prepare and implement a program for the development of a Tungsten-Carbide-Tipped tool maintenance system to service the present and anticipated needs of CSCC under the proposed consolidation and expansion Project.

QUALIFICATIONS :

Woodworks millwright with broad experience in the wooden furniture and joinery products industry. Experience in developing countries is very desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

C. FURNITURE DESIGNER

DURATION ----- 3 months

DUTIES :

1. To select and train qualified CSCC personnel in furniture design appropriate to the needs and likes of the PDRY population ; and
2. To review the current design of all furniture and joinery products of CSCC, assist in the selection of product types and models to be initially included in the Standard Product Line, and supervise the re-design of the selected models to suit serial production purposes.

QUALIFICATIONS :

Furniture designer with ample experience in the design of wooden furniture suitable for limited serial production. Familiarity with products design of joinery is also desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

D. PRODUCT ENGINEERING EXPERT

DURATION ----- 9 months

DUTIES :

1. To train qualified CSCC personnel in the basic techniques of Product Engineering ;
2. To supervise the preparation of Working Drawings, Operations Sequence Sheets, Product Parts Lists for the product models to be included in the initial Standard Products Line ;
3. To assist CSCC in determining the most economic dimensions and specifications of raw materials, and the minimum economic batch sizes for each of the products included in the initial Standard Products Line ; and
4. To supervise the preparation of a Production Schedule for the selected products and establish a set of procedures for periodic up-dating of the schedule.

QUALIFICATIONS :

Wood Technologist or Engineer with broad experience in the production, value analysis, product design standards and raw materials specifications of furniture and joinery products. Experience in

developing countries most desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

E. PRODUCTION MANAGEMENT AND COSTING EXPERT

DURATION ----- 12 months

DUTIES :

1. To train qualified CSCC personnel in modern management and supervisory techniques (including the use of production control and quality control in the efficient management of a furniture and joinery factory); Personnel Management techniques and Personnel Training programs oriented to motivate and provide incentives for sustained high output levels under a Piece Rate Pay System ;
2. To train qualified CSCC personnel in the basic techniques of cost accounting as applied to the multi-product manufacturing operations of CSCC ; and
3. To assist CSCC in the design and installation of an improved Management Information System appropriate to the needs of the proposed consolidation and expansion Project.

QUALIFICATIONS :

Industrial Management Expert with broad experience in the management of multi-product manufacturing systems. Experience in developing countries is also desired.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

II. PROJECT STAGE B - PRE-OPERATING PERIOD

A. PROJECT MANAGER

DURATION ----- 36 months

DUTIES :

1. To provide technical assistance in the final preparation of the site plan, and the design of : buildings, auxiliary structures, production jigs and fixtures, machinery lay-out, production gauges, work benches, material handling and storage equipment and fixtures, selection of machinery and equipment and for the new CSCC plant at Al-Jol Mashah, Mukalla City ;
2. To provide Technical Advice on the recruitment of key personnel for the new plant ;
3. To direct, administer and control the activities implementing plans approved by pertinent authorities for the CSCC consolidation and expansion Project ;
4. To draw up and direct the implementation of plans for the transfer of machinery, tools and equipment and materials inventories of the three member Workshop Units to the new factory site at Al-Jol Mashah ;
5. To provide technical assistance in the review of existing materials and supplies inventories and their adjustment to desired levels under the new plans of operations ; and

6. To direct and supervise the trial run of all production units at the new CSCC woodworks plant.

QUALIFICATIONS :

Production Engineer or Consultant having broad experience in the establishment and management of furniture and/or woodworks factories. Experience in developing countries is most desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

B. INDUSTRIAL ENGINEER

DURATION ----- 12 months

DUTIES :

1. To assist the Project Manager in the finalization of plans for the installation of an appropriate project management information and the corresponding controls systems ; and
2. To assist the Project Manager in the design and installation of the following production systems :
 - a) Quality Control,
 - b) Production Control,
 - c) Materials Management, and
 - d) Such other aspects of Industrial Engineering, as required by Project Implementation Plans, Pre-Operating Period.

QUALIFICATIONS :

Industrial Engineer with broad experience in the operations of furniture and joinery plants in developing countries.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help

C. WOODWORKS PLANT ENGINEER

DURATION ----- 18 months

DUTIES :

1. To assist the project manager in the implementation of plans on the mechanical, electrical and construction aspects of the Project ;
2. To supervise the final design, fabrication and installation of auxiliary plant facilities ;
3. To supervise the installation of all machinery and equipment ;
4. To train qualified CSCC personnel in the operations and maintenance of auxiliary plant facilities ; and
5. To assist the Project Manager in the conduct of the trial run of all operating units of the new CSCC factory.

QUALIFICATIONS :

Mechanical and/or Electrical Engineer with broad experience in the erection and operations of furniture and joinery factories. Experience in developing countries is most desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

D . PROJECT CONSULTANTS

DURATION ----- 6 months

DUTIES AND QUALIFICATIONS :

(To be specified by the Project Manager, as required by the exigencies of Project implementation activities).

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

III. INITIAL AND FINAL STAGES, OPERATING PERIOD

A. PROJECT MANAGER

DURATION ----- 60 months

DUTIES :

1. To plan, direct, administer and control the operations of the new CSCC woodworks plant at Al-Jol Mashah, Mukalla City, in accordance to the objectives and operating schemes set in the approved Project Plan of Activities ;
2. With the aid of the UNIDO Staff assigned to the Project, supervise the implementation of the training program for key plant personnel ;
3. To provide technical advice to CSCC Management on matters relative to manufacturing and marketing operations of the Co-op; and
4. To select and train an understudy from among the available qualified CSCC personnel.

QUALIFICATIONS :

Wood Technologist or Engineer with broad experience in the management of furniture and joinery plant operations. Experience in training personnel in developing countries is most desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

B. PRODUCTION ENGINEER

DURATION ----- 60 months

DUTIES :

1. To assist the Project Manager in the implementation of Plans for the Operations Period of the Project ; and
2. To train an understudy from among qualified CSCC personnel.

QUALIFICATIONS :

Engineer with broad experience in the production operations of furniture and joinery products. Experience in training personnel in developing countries is most desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

C. TOOL AND MACHINERY MAINTENANCE SPECIALIST

DURATION ----- 60 months

DUTIES :

1. To assist the Project Manager in the implementation of Plans for the Operations Period of the Project ; and
2. To train an understudy from among qualified CSCC personnel.

QUALIFICATIONS :

Engineer with broad experience in the maintenance and repair of machinery and equipment and the maintenance of cutting tools in furniture and joinery plants. Experience in training personnel in developing countries is most desirable.

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

D. PROJECT CONSULTANTS

DURATION ----- 18 months, total

DUTIES AND QUALIFICATIONS :

(To be specified by the Project Manager, as required by the exigencies of Project implementation activities.)

LANGUAGE REQUIREMENT :

English. Knowledge of Arabic will be of great help.

A P P E N D I X XIII

OPERATIONS SEQUENCE SHEETS
AND PRODUCT PARTS LIST

PUPIL'S DESK

ME - SFC - 1, (CSCC, Rev.)

OPERATIONS SEQUENCE SHEET

Part Description : TOP SUPPORT FILLET, Front Part No. : PD - 10 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : SFC - A
 Material Input Specifications : Use Ripping and Trimming Offals; 30 mm Boards (and Thicker Boards), Redwood
 Rough Dimensions : 30 x 30 x 510 Finished Dimensions : 25 x 25 x 500 Estimated Material Recovery : %

Department: Machining Department

Page 2 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S US | 80 | 40 | 1.250 | Radial Arm Saw | |
| 1-006/a | Rip to Rough Width | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-006/b | Rip to Rough Thickness | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-004 | Surface 4-Sides | 1 | S US | 150 | 75 | 0.667 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-011/a | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drill Set-up | Use Countersink Bit |
| 1-011/b | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drill Set-up | Use Countersink Bit |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ---- | Use Flat Backed Sanding Block and No. 320 Grit Sandpaper. |
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OPERATIONS SEQUENCE SHEET

Part Description : TOP SUPPORT FILLET, Left Side Part No. : PD - 11 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : SFC - A
 Material Input Specifications : Use Rippling and Trimming Offals, 30 mm and thicker Boards, Redwood
 Rough Dimensions : 30 x 45 x 330 Finished Dimensions : 25 x 40 x 320 Estimated Material Recovery : 7%

Department : Machining Department

Page 3 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|-----------------------------|--|
| 1-001 | Cut to Rough Length | 1 1 | S US | 80 | 40 | 1.250 | Radial Arm Saw | |
| 1-006/a | Rip to Rough Width | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-006/b | Rip to Rough Thickness | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-004 | Surface 4-Sides | 1 1 | S US | 180 | 90 | 0.556 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-026 | Grooving with Dado | 1 | SS | 50 | 50 | 2.000 | Cross-cut Saw Table Type | Use Dado Blades |
| 1-011/a | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drill Set-up | Use Countersink Bits |
| 1-011/b | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drill Set-up | Use countersink Bits |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ---- | Use Flat Backed Sanding Block and No. 320 Grit Sandpaper |
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OPERATIONS SEQUENCE SHEET

Part Description : TOP SUPPORT FILLET, Right Side Part No. : PD - 12 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : SFC - A
 Material Input Specifications : Use Ripping and Trimming Offals, 30 mm and thicker Boards, Redwood
 Rough Dimensions : 30 x 45 x 330 Finished Dimensions : 25 x 40 x 320 Estimated Material Recovery : %

Department : Machining Department Page 4 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|-------------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|-----------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S US | 80 | 40 | 1.250 | Radial Arm Saw | |
| 1-006/a | Rip to Rough Width | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-006/b | Rip to Rough Thickness | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-004 | Surface 4-Sides | 1 | S US | 180 | 90 | 0.556 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-026 | Grooving with Dado | 1 | SS | 50 | 50 | 2.000 | Cross-cut Saw Table Type | Use Dado Blades |
| 1-011/a | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drill Set-up | Use Countersink Bits |
| 1-011/b | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drill Set-up | Use Countersink Bits |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | --- | Use Flat Backed Sanding Blocked and No. 320 Grit Sandpaper. |
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OPERATIONS SEQUENCE SHEET

Part Description : DESK TOP ASSEMBLY Part No. : SFC - A No. of Parts/Unit Product : 1 set
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : SFC - A
 Material Input Specifications : One piece, Part PD-1 & 1 pc. each Parts PD-10, PD-11 & PD-12 from Machining Department
 Rough Dimensions : _____ Finished Dimensions : _____ Estimated Material Recovery : _____%

Department: Assembling Page 5 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|---|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------|---|
| 3-001 | Assemble Top Support Fillets to Desk Top | 1 | SS | 40 | 40 | 2.500 | Ratchet Type Screw-Driver | Use No. 7 x 35 mm flat-head, slotted wood-screws; PVA Glue and Assembling Jig |
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OPERATIONS SEQUENCE SHEET

Part Description : DESK TOP ASSEMBLY Part No. : SFC - A No. of Parts/Unit Product : 1 set
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : SFC - A

Material Input Specifications : Part No. SFC - A, sanded, from Assembling Department
 Rough Dimensions : _____ Finished Dimensions : 18 x 430 x 685 Estimated Material Recovery : _____%

Department : Finishing Department

Page 6 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-002 | Spray Stain | 1 | S | 50 | 50 | 2.000 | Spray Gun | Use NGR Woodstain, Spray Top Face & Edges Only |
| 4-003 | Spray Wash Coat | 1 | S | 80 | 50 | 1.250 | Spray Gun | Use 50-50 mixture Clear Sanding Sealer & Lacquer Thinner |
| 4-004 | Sand Wash Coat | 1 | SS | 100 | 100 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-005 | Apply Woodfiller | 4 | SS | 60 | 15 | 1.667 | Filling Line | Air-dry overnight |
| 4-006/a | Spray Sanding Sealer | 1 | S | 65 | 65 | 1.538 | Spray Gun | Spray Bottom Face Only |
| 4-006/b | Spray Sanding Sealer | 1 | S | 60 | 60 | 1.667 | Spray Gun | Spray Top Face and Edges |
| 4-008 | Sand Sealer Coat | 1 | SS | 85 | 85 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-010/a | Spray First Top Coat | 1 | S | 65 | 65 | 1.538 | Spray Gun | Spray Clear Nitrocellulose Tupe Lacquer on bottom Face Only |
| 4-010/b | Spray First Top Coat | 1 | S | 60 | 60 | 1.667 | Spray Gun | Spray Top Face and Edges |
| 4-012/b | Spray 2nd Top Coat | 1 | S | 60 | 60 | 1.667 | Spray Gun | Spray Top Face and Edges |
| 4-996 | Repair and Touch-up | 1 | S | 30 | 30 | | | |
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OPERATIONS SEQUENCE SHEET

Part Description : FRONT PANEL Part No. : PD - 2 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME - SFC-1, (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 18 x 140 x 537 Finished Dimensions : 18 x 135 x 535 Estimated Material Recovery : %

Department: Machining Department

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|--|
| 2-001/a | Cut to Rough Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut saw, table type | 6 pieces from part of balance from PD-1 sheet |
| 2-001/b | Cut to Rough Width | 1 | SS | 100 | 100 | 1.000 | Cross-cut saw, table type | 2 pieces in 1 board |
| 1-025 | Grooving | 1 | SS | 100 | 100 | 1.000 | Heavy Duty Router | Use 9 mm Ø DF Router Bit |
| 1-009 | Shape Slope on Top Edge | 1 | SS | 100 | 100 | 1.000 | Vertical Spindle Moulder | |
| 1-011 | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drills- Set-up | |
| 1-030 | Sand 3 Edges | 1 | SS | 60 | 60 | 1.667 | Oscillating Edge Belt Sander | Use No. 280 Grit Sanding Belt |
| 1-033 | Stroke Sanding | 1 | S | 60 | 60 | 1.667 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | --- | Use Flat Backed sanding Block and No. 320 Grit Sandpaper |
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OPERATIONS SEQUENCE SHEET

Part Description : FRONT PANEL Part No. : PD - 2 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : Part No. PD-2, sanded, from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 18 x 135 x 535 Estimated Material Recovery : _____%

Department: Finishing Department

Page 9 of 26 Pages

| OPEN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-002 | Spray Stain | 1 | S | 120 | 120 | 0.833 | Spray Gun | Use NGR Woodstain, Spray Top Face and ends only |
| 4-003 | Spray Wash Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Use 50-50 mixture clear Sanding Sealer and Lacquer Thinner, Spray Top Face and ends only |
| 4-004 | Sand Wash Coat | 1 | SS | 150 | 150 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-005 | Apply Woodfiller | 4 | SS | 80 | 20 | 1.250 | Filling Line | Fill Top and Ends only. Air-dry Overnight |
| 4-006/a | Spray Sanding Sealer | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Bottom Face only |
| 4-006/b | Spray Sanding Sealer | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Top Face and Ends Only |
| 4-008 | Sand Sealer Coat | 1 | SS | 130 | 130 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-010/a | Spray First Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Bottom Face Only |
| 4-010/b | Spray First Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Top Face and ends Only |
| 4-012/b | Spray 2nd Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Top Face and Ends Only |
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OPERATIONS SEQUENCE SHEET

Part Description : FRONT PANEL Part No. : PD - 2 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFG-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : Part No. PD-2, finished, from Finishing Department
 Rough Dimensions : _____ Finished Dimensions : 18 x 135 x 535 Estimated Material Recovery : _____%

Department: Packing and Crating Page 10 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 5-001 | Wrapping | 1 | SS | 150 | 150 | | | Use approved wrapping material and technique |
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OPERATIONS SEQUENCE SHEET

Part Description : SIDE PANEL, Right Part No. : PD - 4 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1, (CSCC Rev.) Sub-Assembly : _____
 Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Available Locally
 Rough Dimensions : 18 x 255 x 432 Finished Dimensions : 18 x 125 x 430 Estimated Material Recovery : %
 Department : Machining Department Page 12 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 2-001/a | Cut to Rough Length | 1 | S US | 160 | 80 | 0.633 | Vertical Panel Saw | 5 pcs. from 1 sheet. Use balance for other furniture parts. |
| 2-001/b | Cut to Rough Width | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw, table type | 4 pieces in 1 board |
| 1-025 | Grooving | 1 | SS | 120 | 120 | 0.833 | Heavy Duty Router | |
| 1-008 | Cut to Final Width | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw, Table type | 2 pieces in 1 board |
| 1-011/a | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/c | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-031 | Edge Sanding | 1 | SS | 120 | 120 | 0.833 | Oscillating Edge Belt Sander | Use No. 280 Grit Sanding Belt |
| 1-033 | Stroke Sanding | 1 | S | 60 | 60 | 1.667 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | --- | Use Flat Backed Sanding Block and No. 320 Grit Sandpaper |
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OPERATIONS SEQUENCE SHEET

Part Description : SIDE PANEL, Left/Right Part No. : PD-3/PD-4 No. of Parts/Unit Product : 2 pcs.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCG-Rev.) Sub-Assembly : _____

Material Input Specifications : Part PD-3/PD-4, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 18 x 125 x 430 Estimated Material Recovery : 7

Department : Finishing Department Page 13 of 26 Pages

| OPPN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-002 | Spray Stain | 1 | S | 120 | 120 | 0.833 | Spray Gun | Use NGR Woodstain, Spray Top Face and ends only |
| 4-003 | Spray Wash Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Use 50-50 mixture clear Sanding Sealer and Lacquer Thinner, Spray Top Face and ends only |
| 4-004 | Sand Wash Coat | 1 | SS | 150 | 150 | | | Use No. 280 Grit Stearate Sandpaper with Flat Backed Sanding Block |
| 4-005 | Apply Woodfiller | 4 | SS | 80 | 20 | 1.250 | Filling Line | Fill Top and Ends only. Air-dry overnight |
| 4-006/a | Spray Sanding Sealer | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Bottom Face Only |
| 4-006/b | Spray Sanding Sealer | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Top Face and Ends only |
| 4-008 | Sand Sealer Coat | 1 | SS | 130 | 130 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-010/a | Spray First Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Bottom Face only |
| 4-010/b | Spray First Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Top Face and Ends only |
| 4-012/b | Spray 2nd Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Top Face and Ends Only |
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OPERATIONS SEQUENCE SHEET

Part Description : SIDE PANEL, Left/Right Part No. : PD-3/PD-4 No. of Parts/Unit Product : 2 pcs.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____

Material Input Specifications : Part PD-3/PD-4, finished from Finishing Department

Rough Dimensions : _____ Finished Dimensions : 18 x 125 x 430 Estimated Material Recovery : %

Department : Packing and Crating

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|-------------|-----------------------------|---------------|-----------------|--------------------|---------------------------|--|--------------|------------------------|
| 5-001 | Wrapping | 1 | SS | 150 | 150 | | | Use approved wrapping |
| | | | | | | | | material and technique |
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OPERATIONS SEQUENCE SHEET

Part Description : SHELF BOTTOM Part No. : PD - 5 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1, (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : 12 x 1220 x 2440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 12 x 420 x 666 Finished Dimensions : 12 x 420 x 666 Estimated Material Recovery : %

Department: Machining Department Page 15 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|-----------------------------|---|
| 2-002/a | Cut to Final Length | 1 | S US | 160 | 80 | 0.633 | Vertical Panel Saw | 3 pcs. in 1 sheet |
| 2-002/b | Cut to Final Width | 1 | SS | 100 | 100 | 1.000 | Cross-cut saw Table type | 2 pcs. in 1 board |
| 1-016 | Rabbeting 3 Edges | 1 | SS | 60 | 60 | 1.667 | Heavy Duty Router | Use 9 mm Ø DF Router Bit |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | | ----- | Use Flat Backed Sanding Block and No. 320 Grit Sandpaper. |
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OPERATIONS SEQUENCE SHEET

Part Description : SHELF BOTTOM Part No. : PD - 5 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : Part PD-5, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 12 x 420 x 666 Estimated Material Recovery : %

Department : Finishing Department Page 16 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-002 | Spray Stain on Back Edge | 1 | S | 200 | 200 | 0.500 | Spray Gun | Use NGR Woodstain. Spray 20 pcs. at a time |
| 4-006/a | Spray Sanding Sealer | 1 | S | 150 | 150 | 0.667 | Spray Gun | Use Clear Sanding Sealer Spray Bottom Face only |
| 4-006/b | Spray Sanding Sealer | 1 | S | 150 | 150 | 0.667 | Spray Gun | Spray Top Face and Back Edge |
| 4-008 | Sand Sealer Coat | 1 | SS | 80 | 80 | | | Use No. 280 Grit Stearate Sandpaper w/Flat backed Sanding Block |
| 4-010/a | Spray Top Coat | 1 | S | 150 | 150 | 0.667 | Spray Gun | Spray Bottom Face only |
| 4-010/b | Spray Top Coat | 1 | s | 150 | 150 | 0.667 | Spray Gun | Spray Top Face and Back Edge |
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OPERATIONS SEQUENCE SHEET

Part Description : SHELF BOTTOM Part No. : PD - 5 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material input Specifications : Part PD-5, finished from Finishing Department
 Rough Dimensions : _____ Finished Dimensions : 12 x 420 x 660 Estimated Material Recovery : ___%

Department: Packing/Crating Page 17 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 5-001 | Wrapping | 1 | SS | 160 | 160 | | | Use approved wrapping material and technique |
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OPERATIONS SEQUENCE SHEET

Part Description : FRONT LEG, Left Part No. : PD - 6 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1, (CSCC-REV.) Sub-Assembly :

Material Input Specifications : 50 x 120 x 4270 Red Wood (Meranti, Lauan, etc.) Air Dried to Local EMC
 Rough Dimensions : 50 x 55 x 840 Finished Dimensions : 40 x 50 x 826 Estimated Material Recovery : %

Department: Machining Department

Page 18 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|--|
| 1-001/ | Cut to Rough Length | 1 1 | S US | 150 | 75 | 0.667 | Radial Arm Saw | 5 pcs. in 1 board |
| 1-006 | Rip to Rough Width | 1 1 | S US | 120 | 60 | 0.833 | Straight Line Edger | 2 pcs. in 1 board |
| 1-004 | Surface Four Sides | 1 1 | S US | 100 | 50 | 1.000 | 4-Side Planer | |
| 1-008/a | Cant Saw 1 End | 1 | SS | 80 | 80 | 1.250 | Cross-cut Saw, Table type | |
| 1-008/b | Trim Other End | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw, Table type | |
| 1-023/a | Tenon one End | 1 | S | 150 | 150 | 0.667 | Single End Tenoner | |
| 1-011 | Drill Holes for Woodscrews | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | Use countersink drill bit |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ---- | Use Flat Backed Sanding Block and No. 320 Grit Sandpaper |
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OPERATIONS SEQUENCE SHEET

Part Description : FRONT LEG, Right Part No. : PD - 7 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : 50 x 120 x 4270 Red Wood (Meranti, Lauan, etc.) Air Dried to Local EMC
 Rough Dimensions : 50 x 55 x 840 Finished Dimensions : 40 x 50 x 826 Estimated Material Recovery : %

Department : Machining Department

Page 19 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------|--|
| 1-001 | Cut to Rough Length | 1 | S | 150 | 75 | 0.667 | Radial Arm Saw | 5 pcs. in 1 board |
| 1-006 | Rip to Rough Width | 1 | US | 120 | 60 | 0.833 | Straight Line Edger | 2 pcs. in 1 board |
| 1-004 | Surface Four Sides | 1 | S | 100 | 50 | 1.000 | 4-Side Planer | |
| 1-008/a | Cant Saw 1 End | 1 | SS | 80 | 80 | 1.250 | Cross-cut Saw, Table type | |
| 1-008/b | Trim Other End | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw, Table type | |
| 1-023/a | Tenon One End | 1 | S | 150 | 150 | 0.667 | Single End Tenoner | |
| 1-011 | Drill Holes for Woodscrews | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | Use countersink drill bit |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ---- | Use Flat Backed Sanding Block and No. 320 Grit Sandpaper |
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OPERATIONS SEQUENCE SHEET

Part Description : FRONT LEG, Left/Right Part No. : PD-6/PD-7 No. of Parts/Unit Product : 2 pcs.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : Parts PD-6/PD-7, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 40 x 50 x 826 Estimated Material Recovery : %
 Department : Finishing Department Page 20 of 26 Pages

| OPER No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-002 | Spray Stain | 1 | S | 120 | 120 | 0.833 | Spray Gun | Use Spraying Fixture for Legs. Use NGR Woodstain |
| 4-003 | Spray Wash Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Use 50-50 mixture clear Sanding Sealer and Lacquer Thinner. |
| 4-004 | Sand Wash Coat | 1 | SS | 200 | 200 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-005 | Apply Woodfiller | 4 | SS | 100 | 25 | 1.000 | Filling Line | Air-dry Overnight |
| 4-006 | Spray Sanding Sealer | 1 | SS | 80 | 80 | 1.250 | Spray Gun | Spray Four Faces |
| 4-008 | Sand Sealer Coat | 1 | S | 120 | 120 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-010 | Spray First Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Four Faces |
| 4-012 | Spray 2nd Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Four Faces |
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- 233 -

OPERATIONS SEQUENCE SHEET

Part Description : FRONT LEG, Left/Right Part No. : PD-6/PD-7 No. of Parts/Unit Product : 2 pcs.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : Parts PD-6/PD-7, finished from Finishing Department
 Rough Dimensions : _____ Finished Dimensions : 40 x 50 x 826 Estimated Material Recovery : 2
 Department : Packing/Crating Page 21 of 26 Pages

| OPPN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 5-001 | Wrapping | 1 | SS | 200 | 200 | | | Use approved wrapping material and technique |
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OPERATIONS SEQUENCE SHEET

Part Description : REAR LEG, Left Part No. : PD - 8 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFG-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : 50 x 120 x 4270 Red Wood (Meranti, Lauan, etc.) Air-Dried to Local EMC
 Rough Dimensions : 50 x 55 x 825 Finished Dimensions : 40 x 50 x 816 Estimated Material Recovery : _____%

Department: Machining Department

Page 22 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------------|--|
| 1-001 | Cut to Rough Length | 1 | S US | 150 | 75 | 0.667 | Radial Arm Saw | 5 pcs. in one board |
| 1-006 | Rip to Rough Width | 1 | S US | 120 | 60 | 0.833 | Straight Line Edger | 2 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 | S US | 100 | 50 | 1.000 | 4-Side Planer | |
| 1-008/a | Cant Saw one End | 1 | SS | 80 | 80 | 1.250 | Cross-cut Saw Table type | |
| 1-008/b | Cant Saw One End | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table type | |
| 1-023/a | Tenon One End | 1 | SS | 150 | 150 | 0.667 | Single End Tenoner | |
| 1-011 | Drill Holes for Woodscrews | 1 | SS | 100 | 100 | 1.000 | Electric Drills Arrangement | Use countersink Drill Bits |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ----- | Use Flat Backed Sanding Block and No. 320 Grit Sandpaper |
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OPERATIONS SEQUENCE SHEET

Part Description : REAR LEG, Right Part No. : PD - 9 No. of Parts/Unit Product : 1 pc.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : 50 x 120 x 4270 Red Wood (Meranti, Lauan, etc.) Air-Dried to Local EMC
 Rough Dimension : 50 x 55 x 825 Finished Dimensions : 40 x 50 x 816 Estimated Material Recovery : %

Department : Machining Department

Page 23 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------------|--|
| 1-001 | Cut to Rough Length | 1 1 | S US | 150 | 75 | 0,667 | Radial Arm Saw | 5 pcs. in one board |
| 1-006 | Rip to Rough Width | 1 1 | S US | 120 | 60 | 0.833 | Straight Line Edger | 2 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 1 | S US | 100 | 50 | 1,000 | 4-Side Planer | |
| 1-008/a | Cant Saw One End | 1 | SS | 80 | 80 | 1,250 | Cross-cut Saw Table type | |
| 1-008/b | Cant Saw One End | 1 | SS | 100 | 100 | 1,000 | Cross-cut Saw Table Type | |
| 1-023/a | Tenon One End | 1 | SS | 150 | 150 | 0.667 | Single End Tenoner | |
| 1-011 | Drill Holes for Woodscrews | 1 | SS | 100 | 100 | 1,000 | Electric Drills Arrangement | Use countersink Drill Bits |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | --- | Use Flat Backed Sanding Block and No. 320 Grit Sandpaper |
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OPERATIONS SEQUENCE SHEET

Part Description : REAR LEG, Left/Right Part No. : PD-8/PD-9 No. of Parts/Unit Product : 2 pcs.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : Parts PD-8/PD-9, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 40 x 50 x 816 Estimated Material Recovery : _____%

Department : Finishing Department

Page 24 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-002 | Spray Stain | 1 | S | 120 | 120 | 0.833 | Spray Gun | Use Spraying Fixture for Legs. Use NGR Woodstain |
| 4-003 | Spray Wash Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Use 50-50 mixture clear Sanding Sealer and Lacquer Thinner. |
| 4-004 | Sand Wash Coat | 1 | S | 200 | 200 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-005 | Apply Woodfiller | 4 | SS | 100 | 25 | 1.000 | Filling Line | Air-dry Overnight |
| 4-006 | Spray Sanding Sealer | 1 | SS | 80 | 80 | 1.250 | Spray Gun | Spray Four Faces |
| 4-008 | Sand Sealer Coat | 1 | S | 120 | 120 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-010 | Spray First Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Four Faces |
| 4-012 | Spray 2nd Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray Four Faces |
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OPERATIONS SEQUENCE SHEET

Part Description : REAR LEG, Left/Right Part No. : PD-8/PD-9 No. of Parts/Unit Product : 2 pcs.
 Product : Pupil's Desk Product No. : ME-SFC-1 (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : Parts PD-8/PD-9, finished from Finishing Department
 Rough Dimensions : _____ Finished Dimensions : 40 x 50 x 816 Estimated Material Recovery : _____ %

Department: Packing/Crating

Page 25 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 5-001 | Wrapping | 1 | SS | 200 | 200 | | | Use approved wrapping material and technique. |
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OPERATIONS SEQUENCE SHEET

Part Description : _____ Part No. : _____ No. of Parts/Unit Product : _____
 Product : Pupil's Desk Product No. : ME-SFC-I (CSCC-Rev.) Sub-Assembly : _____
 Material Input Specifications : 10 Complete Sets of Component Parts from Wrapping Section
 Rough Dimensions : _____ Finished Dimensions : _____ Estimated Material Recovery : _____%

Department : Packing/Crating

Page 26 of 26 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|---|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------------|--|
| 5-012 | Packing in Wooden Crates, the following | | | | | | | |
| | 10 pcs. Sub-Assembly. No. SFC-A | | | | | | | |
| | 10 pcs. Part No. PD-2 | | | | | | | |
| | 10 pcs. Part No. PD-3 | | | | | | | |
| | 10 pcs. Part No. PD-4 | | | | | | | |
| | 10 pcs. Part No. PD-5 | | | | | | | |
| | 10 pcs. Part No. PD-6 | | | | | | | |
| | 10 pcs. Part No. PD-7 | | | | | | | |
| | 10 pcs. Part No. PD-8 | | | | | | | |
| | 10 pcs. Part No. PD-9 | 2 | SS | 60 | 30 | | Steel Strap Sealer/ Crimper | Use approved packing system for 10 complete sets of Pupil's Desk |
| | 1 bag containing 10 sets of woodscrews and nails (Refer to Product Parts List in the following pages) | | | | | | | |

PRODUCT PARTS LIST

Name of Product : Pupil's Desk
 Customer : Ministry of Education, P.D.R.Y.
 Requirement : _____ units per year

Product No. : ME - SFC - 1 (CSCC-Rev.)
 Ref: Drawings Nos. : SFC - 1 thru SFC - 14
 Page : 1 of 2 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks |
|--------------|----------|----------------------|-------------------|-----|-----|-----------------------|---|
| | | | T | W | L | | |
| SFC - A | PD - 1 | Desk Top | 18 | 430 | 685 | 1 | 18 mm Plywood, pre-drilled for Wood-screws |
| | PD - 2 | Front Panel | 18 | 125 | 535 | 1 | 18mm Plywood, grooved, canted on top edge, pre-drilled for woodscrews |
| | PD - 3 | Side Panel, Left | 18 | 125 | 430 | 1 | 18mm Plywood, grooved, canted on top edge, pre-drilled for woodscrews |
| | PD - 4 | Side Panel, Right | 18 | 125 | 430 | 1 | 18mm Plywood, grooved, canted on top edge, pre-drilled for woodscrews |
| | PD - 5 | Shelf Bottom | 12 | 420 | 666 | 1 | 12mm Plywood, Rabbetted |
| | PD - 6 | Front Leg, Left | 40 | 50 | 826 | 1 | Solid Wood, Tenoned and pre-drilled for woodscrews |
| | PD - 7 | Front Leg, Right | 40 | 50 | 826 | 1 | Solid Wood, Tenoned and pre-drilled for woodscrews |
| | PD - 8 | Rear Leg, Left | 40 | 50 | 816 | 1 | Solid Wood, Tenoned and pre-drilled for woodscrews |
| | PD - 9 | Rear Leg, Right | 40 | 50 | 816 | 1 | Solid Wood, Tenoned and pre-drilled for woodscrews |

PRODUCT PARTS LIST

Name of Product : Pupil's Desk
 Customer : Ministry of Education, P.D.R.Y.
 Requirement : _____ units per year

Product No. : ME - SFC - 1 (CSCC-Rev.)
 Ref: Drawings Nos. : SFC - 1 thru SFC - 14
 Page : 2 of 2 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks |
|--------------|----------|---------------------------------|-------------------|----|------|-----------------------|--|
| | | | T | W | L | | |
| SFC - A | PD - 10 | Top Support Fillet, Front | 25 | 25 | 500 | 1 | Shaped, Tenoned and Pre-drilled for woodscrews, |
| SFC - A | PD - 11 | Top Support Fillet, Left Side | 25 | 40 | 320 | 1 | Solid Wood, Trench Grooved, pre-drilled for Woodscrews |
| SFC - A | PD - 12 | Top Support Fillet, Right Side | 25 | 40 | 320 | 1 | Solid Wood, Trench Grooved, pre-drilled for Woodscrews |
| SFC - A | | Slotted Flathead Woodscrews, #8 | | | 30mm | 19 | Left & Right Support Fillets to Desk Top and side Panels, Left and Right |
| SFC - A | | Slotted Flathead Woodscrews, #8 | | | 50mm | 6 | Legs to Side Panels, Left and Right |
| | | C.W. Nails, #2 | | | 12mm | 9 | Front and side Panels Edges through Shelf Bottom inside Grooves |
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A P P E N D I X XIV

OPERATIONS SEQUENCE SHEETS

AND PRODUCT PARTS LIST

CLOTHES CABINET (WARDROBE)

CSCC - HFH - 1 (Rev.)

OPERATIONS SEQUENCE SHEET

Part Description : CABINET TOP Part No. : HFH - 1 No. of Parts/Unit Product : 1 pc.

Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____

Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Available Locally

Rough Dimensions : 18 x 515 x 1047 Finished Dimensions : 18 x 510 x 1045 Estimated Material Recovery : %

Department : Machining Department Page 1 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 2-001/a | Cut to Rough Length | 1 | S US | 150 | 75 | 0.667 | Vertical Panel Saw | 2 pcs. in one sheet |
| 2-001/b | Cut Rough Width | 1 | S US | 100 | 50 | 1.000 | Vertical Panel Saw | 2 pcs. in one board |
| 1-016 | Rabbit for Cabinet Back | 1 | SS | 80 | 80 | 1.250 | Heavy Duty Router | Use Special Shaping Jig to Round off Front Corners |
| 1-009 | Shape Edges | 1 | SS | 30 | 30 | 3.333 | Vertical Spindle Moulder | |
| 1-011/a | Drill Holes for Dowels | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/c | Drill Holes for Dowels | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-030 | Edge Sanding | 1 | SS | 100 | 100 | 1.000 | Oscillating Edge Belt Sander | Use No. 320 Grit Sanding Belt |
| 1-033 | Stroke Sanding | 1 | S | 80 | 80 | 1.250 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block |
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1015

OPERATION SEQUENCE SHEET

Part Description : CABINET TOP

Part No. : HFH - 1

No. of Part Unit Produced : 1 pc.

Product : Clothes Cabinet

Product No. : CSCC-HFH-1 (Rev.)

Sub-Assembly :

Material Input Specifications : Part HFH-1, sanded, from Machining Department

Rough Dimensions : _____ Finished Dimensions : 18 x 510 x 1045

Estimated Material : _____

Department : Finishing Department

Page 2 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|-----------------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-006/a | Spray First Coat Primer Surfacer | 1 | S | 60 | 60 | 1.667 | Spray Gun | Spray Bottom Face and Rear Edge |
| 4-006/b | Spray First Coat Primer Surfacer | 1 | S | 50 | 50 | 2.000 | Spray Gun | Spray Top Face, Front Edge & Left/Right Edges |
| 4-006/c | Spray Second Coat Primer Surfacer | 1 | S | 50 | 50 | 2.000 | Spray Gun | Spray Top Face, Front Edge & Left/Right Edges |
| 4-008 | Sand Primer Coat | 1 | SS | 40 | 40 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-010/a | Spray First Top Coat | 1 | S | 60 | 60 | 1.667 | Spray Gun | Use Quick Dry Enamel; Spray Bottom Face & Rear Edge |
| 4-010/b | Spray First Top Coat | 1 | S | 50 | 50 | 2.000 | Spray Gun | Use Quick Dry Enamel; Spray Top Face, Front Edge and Left and Right Edges |
| 4-012 | Spray 2nd Top Coat | 1 | S | 50 | 50 | 2.000 | Spray Gun | Use Quick Dry Enamel ; Spray Top Face, Front Edge and Left and Right Edges |
| 4-015 | Spray 3rd Top Coat | 1 | S | 50 | 50 | 2.000 | Spray Gun | Use Quick Dry Enamel ; Spray Top Face, Front Edge and Left and Right Edges |
| 4-996 | Repair and Touch-up | 1 | S | 30 | 30 | | | |
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1-214

OPERATIONS SEQUENCE SHEET

Part Description : CABINET SIDE, Left Part No. : HFH - 2 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1, (Rev.) Sub-Assembly : _____

Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 18 x 485 x 1570 Finished Dimensions : 18 x 480 x 1570 Estimated Material Recovery : _____%

Department : Machining Department

Page 4 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------|---|
| 2-001/a | Cut to Length | 1 | S | 160 | 80 | 0.6250 | Vertical Panel Saw | 1 pc. in one sheet |
| 2-001/b | Cut to Rough Width | 1 | S | 100 | 50 | 1.000 | Vertical Panel Saw | 2 pcs. in one board |
| 1-017 | Rout Hinge Seat | 1 | SS | 80 | 80 | 1.250 | Heavy Duty Router | |
| 1-016 | Rabbet Back Edge | 1 | SS | 80 | 80 | 1.250 | Heavy Duty Router | |
| 1-011/a | Drill Holes for Woodscrews | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Woodscrews | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | |
| 1-033 | Stroke Sanding | 1 | S | 60 | 60 | 1.667 | Double Belt Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block |
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- 24 -

OPERATIONS SEQUENCE SHEET

Part Description : CABINET SIDE, Right Part No. : HFH - 3 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCG-HFH-1 (Rev.) Sub-Assembly : _____

Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 18 x 485 x 1570 Finished Dimensions : 18 x 480 x 1570 Estimated Material Recovery : %

Department: Machining Department Page 5 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------|---|
| 2-001/a | Cut to Length | 1 | S | 160 | 80 | 0.6250 | Vertical Panel Saw | 1 pc. in one sheet |
| 2-001/b | Cut to Rough Width | 1 | S | 100 | 50 | 1.000 | Vertical Panel Saw | 2 pcs. in one board |
| 1-017 | Rout Hinge Seat | 1 | SS | 80 | 80 | 1.250 | Heavy Duty Router | |
| 1-016 | Rabbit Back Edge | 1 | SS | 80 | 80 | 1.250 | Heavy Duty Router | |
| 1-011/a | Drill Holes for Woodscrews | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Woodscrews | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | |
| 1-033 | Stroke Sanding | 1 | S | 60 | 60 | 1.667 | Double Belt Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block |
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- 247 -

OPERATION REFERENCE SHEET

Part Description : CABINET SIDE, Left or Right Part No. : HFH-2 or HFH-3 No. of Parts Unit Product : 1 pair
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-assembly : _____
 Material Input Specifications : Part HFH-2 or HFH-3, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 18 x 480 x 1570 Estimated Material Recovery : _____

Department : Finishing Department

Page 6 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-006/a | Spray First Coat Primer Surfacer | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Inner Face and Back Edge |
| 4-006/b | Spray First Coat Primer Surfacer | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Outer Face and Front Edge |
| 4-006/c | Spray Second Coat Primer Surfacer | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Outer Face and Front Edge |
| 4-008 | Sand Primer Coat | 1 | SS | 30 | 30 | | | Use #280 Grit Stearate Sandpaper. w/Flat Backed Sanding Block |
| 4-010/a | Spray First Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Use Quick Dry Enamel; Spray on Inner Face and Back Edge |
| 4-010/b | Spray First Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Use Quick Dry Enamel; Spray on Outer Face and Front Edge |
| 4-012 | Spray Second Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Use Quick Dry Enamel; Spray on Outer Face and Front Edge |
| 4-015 | Spray Third Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Use Quick Dry Enamel; Spray on Outer Face and Front Edge |
| 4-996 | Repair and Touch-up | 1 | S | 25 | 25 | | | |
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- 218 -

OPERATIONS SEQUENCE SHEET

Part Description : CABINET PARTITION Part No. : HFH - 4 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____

Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 18 x 474 x 1550 Finished Dimensions : 18 x 474 x 1550 Estimated Material Recovery : %

Department : Machining Department Page 8 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------|---|
| 2-008/a | Cut to Length | 1 | S | | | | | |
| | | 1 | US | 160 | 80 | 0.625 | Vertical Panel Saw | One piece in one Sheet |
| 2-008/b | Cut to Width | 1 | S | | | | | |
| | | 1 | US | 100 | 50 | 1.000 | Vertical Panel Saw | Two pieces in one board |
| 1-011/a | Drill Holes for Dowels | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | |
| 1-011/c | Drill Holes for Dowels | 1 | SS | 100 | 100 | 1.000 | Electric Drills Set-up | |
| 1-033 | Stroke Sanding | 1 | S | 60 | 60 | 1.667 | Double Belt Stroke Sander | Use No. 320 and 280 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 80 | 80 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block |
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- 250 -

OPERATORS SEQUENCE SHEET

Part Description : CABINET PARTITION w/LIPPING Part No. : HFH - A No. of Parts Unit Product : 1
 Product : Clothes Cabinet Product No. : CSCC - HFH - 1 (Rev. Sub-Assembl HFH - A

Material Input Specifications : Part HFH-A, finished from Finishing Department
 Rough Dimensions : _____ Finished Dimensions : 25 x 494 x 1570 Estimated Material Recovery : _____

Department: Packing/Crating

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|---------------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 5-001 | Wrapping, with : | 1 | SS | 6 | 6 | | | Use approved wrapping material and technique |
| | 1 pc. Cabinet Bottom Panel ; | | | | | | | |
| | 5 pcs. shelvings ; | | | | | | | |
| | 10 pcs. Shelf support Fillets ; | | | | | | | |
| | 2 pcs. Leg Support Braces ; | | | | | | | |
| | 4 pcs. Corner Fillets and | | | | | | | |
| | 2 Lengths Hinges | | | | | | | |
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- 256 -

OPERATIONS SEQUENCE SHEET

Part Description : Cabinet DOOR, Left Part No. : HFH - 6 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____
 Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 18 x 485 x 1568 Finished Dimensions : 18 x 480 x 1568 Estimated Material Recovery : %

Department: Machining Department Page 13 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | R E M A R K S |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------|---|
| 2-008 | Cut to Length | 1 | S | 100 | 50 | 1.000 | Vertical Panel Saw | One pc. in one sheet |
| 2-001 | Cut to Rough Width | 1 | S | 80 | 40 | 1.250 | Vertical Panel Saw | Two pcs. in one board |
| 1-016 | Rabbet One Edge | 1 | SS | 60 | 60 | 1.667 | Heavy Duty Router | |
| 1-017 | Rout Hinge Seat | 1 | SS | 100 | 100 | 1.000 | Heavy Duty Router | |
| 1-033 | Stroke Sanding | 1 | SS | 50 | 50 | 2.000 | Double Belt Stroke Sander | Use No. 320 and 280 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block |
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1-033-1

OPERATIONS SEQUENCE SHEET

Part Description : CABINET DOOR, Right Part No. : HFH - 7 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____
 Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 18 x 485 x 1568 Finished Dimensions : 18 x 480 x 1568 Estimated Material Recovery : ?

Department: Machining Department

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------|--|
| 2-008 | Cut to Length | 1 | S | 100 | 50 | 1.000 | Vertical Panel Saw | One pc. in one sheet |
| 2-001 | Cut to Rough Width | 1 | S | 80 | 40 | 1.250 | Vertical Panel Saw | Two pcs. in one board |
| 1-016 | Rabbit One Edge | 1 | SS | 60 | 60 | 1.667 | Heavy Duty Router | |
| 1-017 | Rout Hinge Seat | 1 | SS | 100 | 100 | 1.000 | Heavy Duty Router | |
| 1-033 | Stroke Sanding | 1 | SS | 50 | 50 | 2.000 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | ----- | | Use 320 Grit Sand-paper on Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : CABINET DOOR, Left or Right Part No. : HFH-6 or HFH-7 No. of Parts Unit Produced : 1 pair
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly :

Material Input Specifications : Parts HFH-6 or HFH-7, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 18 x 480 x 1568 Estimated Material Recovery : _____

Department : Finishing Department Page 15 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|-----------------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-006/a | Spray First Coat Primer Surfacer | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Inner Face and Two Adjacent Edges |
| 4-006/b | Spray Second Coat Primer Surfacer | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Inner Face and Two Adjacent Edges |
| 4-006/c | Spray First Coat Primer Surfacer | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Outer Face and Two adjacent Edges |
| 4-006/d | Spray Second Coat Primer Surfacer | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Outer Face and Two Adjacent Edges |
| 4-008 | Sand Primer Coat | 1 | SS | 30 | 30 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-010/a | Spray First Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Quick Dry Enamel on Inner Face and 2 Adjacent edges |
| 4-012/a | Spray Second Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Quick Dry Enamel on Inner Face and 2 Adjacent Edges |
| 4-010/b | Spray First Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Quick Dry Enamel on Outer Face and the other 2 adjacent Edges |
| 4-012/b | Spray Second Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Quick Dry Enamel on Outer Face and the other 2 adjacent edges |
| 4-015 | Spray Third Top Coat | 1 | S | 40 | 40 | 2.500 | Spray Gun | Spray Quick Dry Enamel on Outer Face and the other 2 adjacent edges |
| 4-996 | Repair and Touch-up | 1 | S | 20 | 20 | | | |

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OPERATIONS SEQUENCE SHEET

Part Description : SHELVINGS Part No. : HFH - 8 No. of Parts/Unit Product : 5 pcs.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____
 Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Available Locally
 Rough Dimensions : 18 x 380 x 461 Finished Dimensions : 18 x 380 x 461 Estimated Material Recovery : %

Department : Machining Department

Page 17 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------|---|
| 2-008/a | Cut to Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | Use balance of sheets used for HFH2/3 and HFH4 |
| 2-008/b | Cut to Width | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | Use balance of sheets used for HFH2/3 and HFH4 |
| 1-033 | Stroke Sanding | 1 | S | 100 | 100 | 1.000 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | ----- | ----- | Use 320 Grit Sandpaper on Flat Backed Sanding Block |
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- 150 -

OPERATION SOURCE SHEET

Part Description: SHELVINGS Part No.: HFH - 8 Quantity: 5
 Product: Clothes Cabinet Product No.: CSCC-HFH-1 (Rev.)

Material Input Specifications: Part HFH-8, sanded, from Machining Department
 Rough Dimensions: _____ Finished Dimensions: 18 x 380 x 461

Department: Finishing Page: 18 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-006/a | Spray First Sanding Sealer Coat | 1 | S | 150 | 150 | 0.667 | Spray Gun | Spray Bottom Face and Front Edge |
| 4-006/b | Spray Second Sanding Sealer Coat | 1 | S | 150 | 150 | 0.667 | Spray Gun | Spray Bottom Face and Front Edge |
| 4-006/c | Spray First Sanding Sealer Coat | 1 | S | 150 | 150 | 0.667 | Spray Gun | Spray Top Face only |
| 4-006/d | Spray Second Sanding Sealer Coat | 1 | S | 150 | 150 | 0.667 | Spray Gun | Spray Top Face Only |
| 4-008 | Sand Sealer Coat | 1 | SS | 100 | 100 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : BOTTOM PANEL Part No. : HFH - 9 No. of Parts/Unit Product : 1 pc.

Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____

Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available

Rough Dimensions : 18 x 477 x 935 Finished Dimensions : 18 x 477 x 935 Estimated Material Recovery : _____ %

Department : Machining Department

Page 19 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------|--|
| 2-001/a | Cut to Length | 1 | S | 150 | 75 | 0.667 | Vertical Panel Saw | 2 pcs. in one sheet |
| 2-001/b | Cut to Width | 1 | S | 100 | 50 | 1.000 | Vertical Panel Saw | 2 pcs. in one board |
| 1-011/a | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-033 | Stroke Sanding | 1 | S | 80 | 80 | 1.250 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts Top Face Only |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ----- | Use 320 Grit Sandpaper on Flat Backed Sanding Block |
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OPERATION FLOW SHEET

Part Description: BOTTOM PANEL Part No.: HFH - 9 Quantity: 1

Product: Clothes Cabinet Product No.: CSCC-HFH-1 (Rev.)

Material Input Specifications: Part HFH-9, sanded from Machining Department

Rough Dimensions: _____ Finished Dimensions: _____ Estimated Material Requirements: _____

Department: Finishing Date: 20 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 160 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-006/a | Spray First Coat Sanding Sealer | 1 | S | 100 | 100 | 1.000 | Spray Gun | Spray Bottom Surface and 2 Adjacent Edges |
| 4-006/b | Spray First Coat Sanding Sealer | 1 | S | 100 | 100 | 1.000 | Spray Gun | Spray Top Surface and Two adjacent Edges |
| 4-006/c | Spray Second Coat Sanding Sealer | 1 | S | 100 | 100 | 1.000 | Spray Gun | Spray Top Surface and Two Adjacent Edges |
| 4-008 | Sand Sealer Coat | 1 | SS | 75 | 75 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : SHELF SUPPORT FILLETS Part No. : HFH - 10 No. of Parts/Unit Product : 10 pcs.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____

Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available

Rough Dimensions : 18 x 18 x 360 Finished Dimensions : 18 x 18 x 360 Estimated Material Recovery : _____%

Department : Machining Department

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 2-008/a | Cut to Length | 1 | SS | 120 | 120 | 0.833 | Cross- cut Saw Table Type | Use balance of sheets used for HFH - 1 and HFH -6/7 |
| 2-008/b | Cut to Width | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | ----- | ----- | Use 320 Grit Sandpaper w/Flat Backed Sanding Block |
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OPERATION SEQUENCE SHEET

Part Description: **SHELF SUPPORT FILLETS** Part No. **HFH - 10** Quantity: **10**
 Product: **Clothes Cabinet** Product No. **CSCC-HFH-1 (Rev.)**

Material Input Specifications: **Part HFH - 10, sanded from Machining Department**
 Rough Dimensions: _____ Finished Dimensions: **18 x 18 x 360** Estimated Material Recovery: _____

Department: **Finishing** Page **22** of **47** pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-006/a | Spray 1st Sealer Coat | 1 | S | 200 | 200 | 0.500 | Spray Gun | Spray clear sanding sealer on 3 adjacent exposed edges, |
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OPERATIONS SEQUENCE SHEET

Part Description : CLOTHES HANGER RACK Part No. : HFH - 11 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly :

Material Input Specifications : Use Ripping and Trimming Offals from 15 mm or thicker Boards, Red Wood
 Rough Dimensions : 15 x 15 x 460 Finished Dimensions : 120 x 460 Estimated Material Recovery : 2

Department : Machining Department Page 23 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------|--|
| 1-008 | Cut to Length | 1 | SS | 150 | 150 | 0.667 | Cross-cut Saw Table Type | |
| 1-001/a | Rip to Rough Width | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-001/b | Rip to Rough Thickness | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-012 | Round-Off on Dowel Machine | 1 | SS | 80 | 80 | 1.250 | Dowel Making Machine | |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ----- | Use 320 Girt Sand-paper on Flat Backed Sanding Block |
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FINISHING DEPARTMENT SHEET

Part Description: Clothes Hanger Rack Part No.: HFH - 11 Quantity: 1
 Product: Clothes Cabinet Product No.: CSCC-HFH-1, (Rev.) Date: _____

Material Input Specifications: Part HFH - 11, sanded from Machining Department
 Rough Dimensions: _____ Finished Dimension: 120 x 460 Estimated Material Requirements: _____

Department: Finishing Page 24 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-006/a | Spray First Sealer Coat | 1 | S | 180 | 180 | 0.556 | Spray Gun | Use special spraying fixture |
| 4-006/b | Spray 2nd Sealer Coat | 1 | S | 180 | 180 | 0.556 | Spray Gun | Use special spraying fixture |
| 4-008 | Sand Sealer Coat | 1 | S | 120 | 120 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
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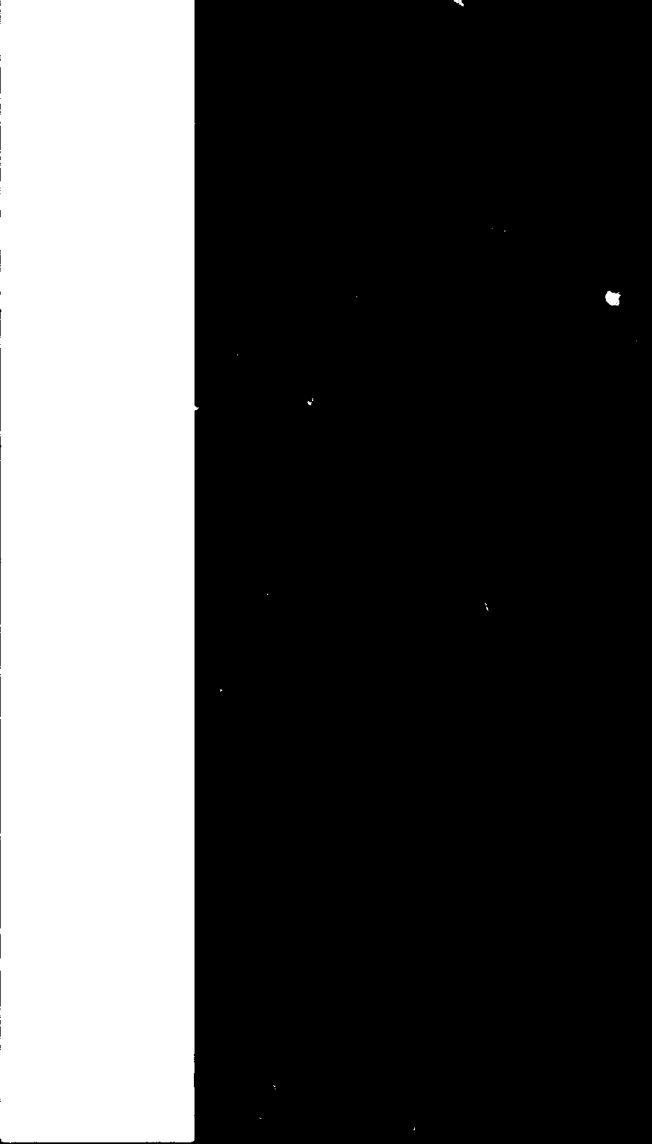
OPERATIONS SEQUENCE SHEET

Part Description : RACK SUPPORT, Left/Right Part No. : HFH - 12 No. of Parts/Unit Product : 2 pcs.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____

Material Input Specifications : 18 x 1220 x 1440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 18 x 60 x 85 Finished Dimensions : 18 x 60 x 85 Estimated Material Recovery : %

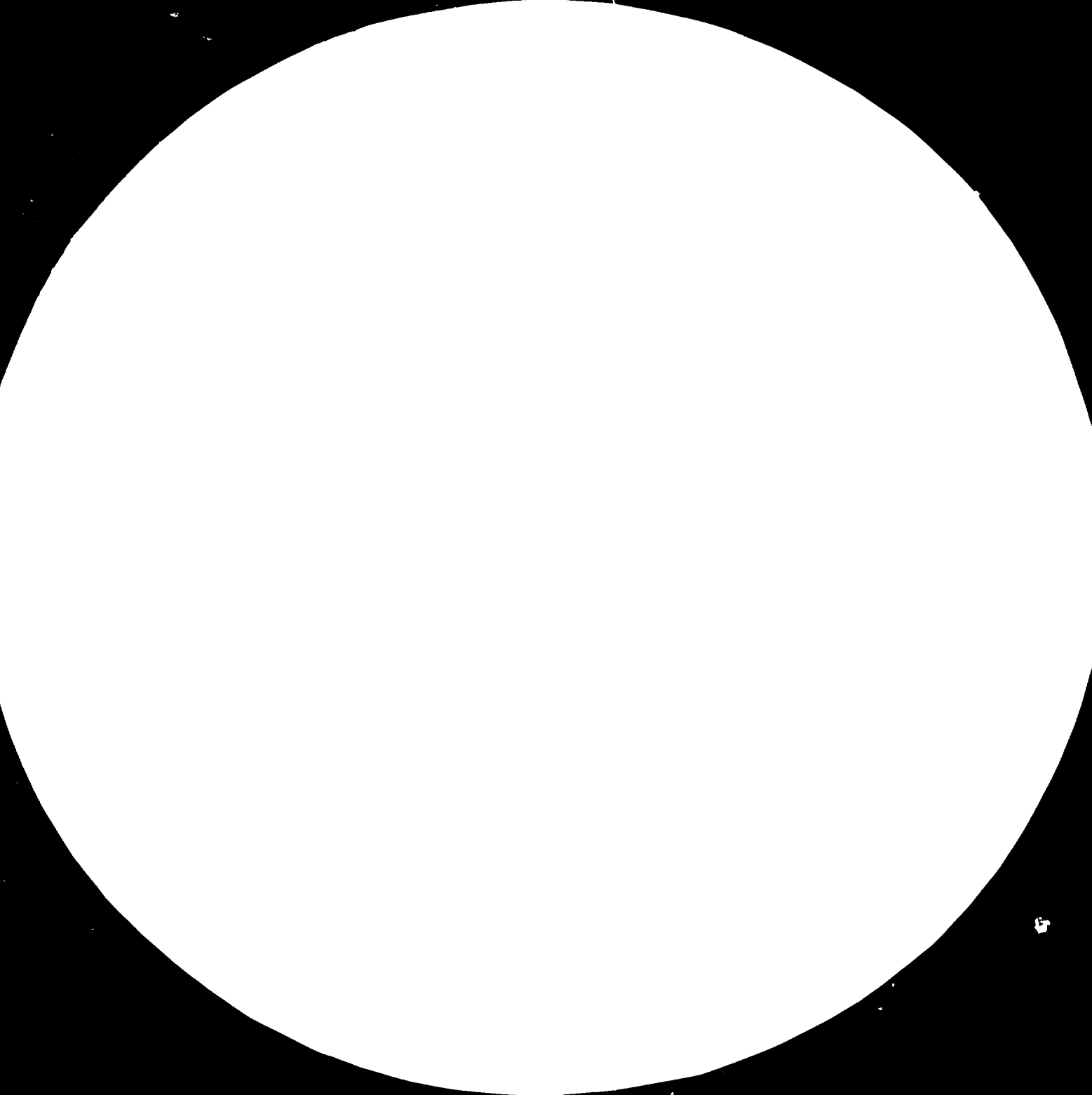
Department: Machining Department Page 25 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|-----------------------------|--|
| 2-008/a | Cut to Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | Use balance of sheet used for HFH-2/3 and HFH- 8 |
| 2-008/a | Cut to Width | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 2-008/b | Cant Saw, 2 Corners | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-015 | Routing Cut-out for Rack | 1 | S | 100 | 100 | 1.000 | Heavy Duty Router | |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | | ----- | Use 320 Grit Sand-paper on Flat Backed Sanding Block |
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Resolution test charts are available from the National Bureau of Standards, Gaithersburg, MD 20899. For more information, contact the author at the address above.

OPERATION SEQUENCE SHEET

Part Description: Rack Support Bracket, Left & Right Part No. HFH-12, L & R Product No. 2
 Product: Clothes Cabinet Product No. CSCC-HFH-1 (Rev.)

Material Input Specifications: Part HFH-12, L/R, sanded from Machining Department
 Rough Dimensions: _____ Finished Dimensions: 18 x 60 x 85 Estimated Material Inventory: _____

Department: Finishing Page 26 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-006/a | Spray 1st Sealer Coat | 1 | S | 200 | 200 | 0.500 | Spray Gun | Use special spraying fixture, spray top face and edges |
| 4-006/b | Spray 2nd Sealer Coat | 1 | S | 200 | 200 | 0.500 | Spray Gun | Use Special Spraying fixture, spray top face and edges |
| 4-008 | Sand Sealer Coat | 1 | SS | 180 | 180 | | | Use No. 280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : CORNER FILLETS, Top and Bottom Part No. : HFH - 13 No. of Parts/Unit Product : 4 pcs.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____
 Material Input Specifications : Use Rippling and Trimming Offals from 38 mm or Thicker Boards, Red Wood
 Rough Dimensions : 38 x 45 x 380 Finished Dimensions : 30 x 40 x 380 Estimated Material Recovery : %

Department : Machining Department

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------|---|
| 1-008 | Cut to Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-006/a | Rip to Rough Width | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-006/b | Rip to Rough Thickness | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-002 | Surface One Face | 1 | S US | 80 | 40 | 1.250 | Planer Thicknesser | |
| 1-002 | Surface One Face | 1 | S US | 80 | 40 | 1.250 | Planer Thicknesser | |
| 1-011/a | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | Use Countersink Drill Bits |
| 1-011/b | Drill Holes for Woodscrews | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | Use Countersink Drill Bits |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | | ----- | Use 320 Grit Sandpaper On Flat Backed Sanding Block |
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- 269 -

OPERATIONS SEQUENCE SHEET

Part Description : LEG SUPPORT BRACES Part No. : HFH - 14 No. of Parts/Unit Product : 2 pcs.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____
 Material Input Specifications : 25 x 150 x 4300 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 25 x 70 x 935 Finished Dimensions : 20 x 65 x 935 Estimated Material Recovery : %

Department : Machining Department Page 29 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------------|---|
| 1-008 | Cut to Length | 1 1 | S US | 120 | 60 | 0.833 | Radial Arm Saw | 4 pcs. in one board |
| 1-004 | Rip to Rough Width | 1 | S US | 100 | 50 | 1.000 | Straight Line Edger | 2 pcs. in one board |
| 1-002/a | Surface One Edge | 1 1 | S US | 80 | 40 | 1.250 | Planer Thicknesser | |
| 1-002/b | Surface One Edge | 1 1 | S US | 80 | 40 | 1.250 | Planer Thicknesser | |
| 1-002/c | Surface One Face | 1 1 | S US | 80 | 40 | 1.250 | Planer Thicknesser | |
| 1-009/a | Taper Saw One End | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | |
| 1-009/b | Taper Saw One End | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | |
| 1-030 | Cant Edge Sanding | 1 | SS | 80 | 80 | 1.250 | Oscillating Edge Belt Sander | Use No. 320 Grit Sanding Belt |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | ---- | ---- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block |
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OPERATION SEQUENCE SHEET

Part Description : Leg Support Braces Part No. : HFH - 14 No. of parts/Unit Produced : 2
 Product : Clothes Cabinet Product No. : CSCC - HFH - 1 (Rev.)
 Material Input Specifications : Part HFH - 14, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 20 x 65 x 935 Estimated Material Recovery : _____
 Department : Finishing Page 30 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--------------------------|
| 4-006/a | Spray 1st Coat Primer | | | | | | | Spray all four faces and |
| | Surfacer | 1 | S | 160 | 160 | 0.625 | Spray Gun | two ends. |
| 4-006/b | Spray Second Coat | | | | | | | |
| | Primer Surfacer | 1 | S | 160 | 160 | 0.625 | Spray Gun | Spray all 4 faces and |
| | | | | | | | | two ends |
| 4-008 | Sand Primer Coat | 1 | SS | 120 | 120 | | | Use #280 Grit Stearate |
| | | | | | | | | Sandpaper w/Flat Backed |
| | | | | | | | | Sanding Block |
| 4-010 | Spray First Top Coat | 1 | S | 180 | 180 | 0.556 | Spray Gun | Spray Quick Dry Enamel |
| | | | | | | | | on Bottom Face, Front |
| | | | | | | | | Edge and two ends only |
| 4-012 | Spray Second Top Coat | 1 | S | 180 | 180 | 0.556 | Spray Gun | Spray Quick Dry Enamel |
| | | | | | | | | on Bottom Face, Front |
| | | | | | | | | Edge and Two ends only |

- CTC -

OPERATIONS SEQUENCE SHEET

Part Description : CABINET LEGS Part No. : HFH - 15 No. of Parts/Unit Product : 4 pcs.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : _____
 Material Input Specifications : Use Ripping and Trimming Offals from 50 mm and thicker boards
 Rough Dimensions : 50 x 65 x RL Finished Dimensions : 45 x 60 x 155 Estimated Material Recovery : %

Department : Machining Department Page 31 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------------|---|
| 1-002/a | Rip to Rough Width | 1 | S US | 80 | 40 | 1.250 | Straight Line Edger | |
| 1-002/b | Rip to Rough Thickness | 1 | SS | 80 | 80 | 1.250 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-004 | Surface 4-sides | 1 | S US | 80 | 80 | 1.250 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | |
| 1-009/a | Taper Saw One Edge | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | |
| 1-009/b | Taper Saw One Edge | 1 | SS | 60 | 60 | 1.667 | Cross-cut Saw Table Type | |
| 1-030 | Edge Sanding | 1 | SS | 100 | 100 | 1.000 | Oscillating Edge Belt Sander | Use No. 320 Grit Sanding Belt |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | ---- | ----- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block |
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OPERATORS SEQUENCE SHEET

Part Description : CABINET LEGS Part No. : HFH - 15 4
 Product : Clothes Cabinet Product No. : CSCC - HFH - 1 (Rev.)
 Material Input Specifications : Part HFH - 15, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 45 x 60 x 155
 Department : Finishing Page 32 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-006/a | Spray First Coat | | | | | | | Use special spraying |
| | Primer Surfacer | 1 | S | 200 | 200 | 0.500 | Spray Gun | fixture, spray 4 faces only |
| 4-006/b | Spray First Coat | | | | | | | |
| | Primer Surfacer | 1 | S | 200 | 200 | 0.500 | Spray Gun | Use special spraying fixture Spray four faces only |
| 4-008 | Sand Primer Coat | 1 | SS | 150 | 150 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
| 4-010 | Spray First Top Coat | 1 | S | 200 | 200 | 0.500 | Spray Gun | Spray Quick Dry Enamel on four faces only. |
| 4-012 | Spray Second Top Coat | 1 | S | 200 | 200 | 0.500 | Spray Gun | Spray Quick Dry Enamel on four faces only. |
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OPERATIONS SEQUENCE SHEET

Part Description : DRAWER SUPPORT FRONT RAIL Part No. : HFH - 16 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : HFH - B
 Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Locally Available
 Rough Dimensions : 18 x 127 x 461 Finished Dimensions : 18 x 125 x 461 Estimated Material Recovery : %

Department: Machining Department

Page 33 of 47 Pages

| OPRI No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 2-008/a | Cut to Length | 1 | SS | 80 | 80 | 1.250 | Cross-cut Saw Table Type | Use balance of sheet used for Bottom Panel |
| 2-008/b | Cut to Rough Width | 1 | SS | 80 | 80 | 1.250 | Cross-cut Saw Table Type | |
| 1-011/a | Drill Holes for Dowel | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowel | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/c | Drill Holes for Dowel | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-015 | Rout Cut-Out | 1 | S | 50 | 50 | 2.000 | Heavy Duty Router | Use 1/8"Ø DF Router Bit |
| 1-030 | Edge Sanding | 1 | SS | 120 | 120 | 0.833 | Oscillating Edge Belt Sander | Use No. 320 Grit Sanding Belt, Sand Bottom Edge Only |
| 1-033 | Stroke Sanding | 1 | S | 80 | 80 | 1.250 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts Sand Front Face Only |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | ----- | ----- | Use 320 Grit Sandpaper on Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : DRAWER GUIDE RAILS, Left & Right Part No. : HFH - 17 No. of Parts/Unit Product : 2 pcs.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : HFH - B
 Material Input Specifications : Use Ripping and Trimming Offalls from 38 mm or Thicker Boards
 Rough Dimensions : 38 x 38 x Random Length Finished Dimensions : 35 x 35 x 362 Estimated Material Recovery : %

Department : Machining Department

Page 35 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | NO. OF MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------|--|
| 1-006/a | Rip to Rough Width | 1 | SS | 80 | 80 | 1.250 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-006/b | Rip to Rough Thickness | 1 | SS | 80 | 80 | 1.250 | Cross-cut Saw Table Type | Use Rip Saw Blade |
| 1-008 | Cut to Final Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-016 | Rabbetting | 1 | SS | 80 | 80 | 1.250 | Heavy Duty Router | Use 9mm Ø DF Router Bit |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | | ----- | Use No. 320 Grit Sand-Paper on Flat Backed Sanding Block |
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OPERATION SEQUENCE SHEET

Part Description: DRAWER GUIDE RAILS, L & R Part No.: HFH - 17 Product Part Part Product: 2
 Product: Clothes Cabinet Product No.: CSCC - HFH - 1 (Rev.) Part No.: HFH - B
 Material Input Specifications: Part HFH - 17, sanded, from Machining Department
 Rough Dimensions: _____ Finished Dimensions: 35 x 35 x 362 Estimated Material: _____

Department: Finishing Page 36 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-006 | Spray Sealer Coat | 1 | S | 220 | 220 | 0.455 | Spray Gun | Use Special Spraying Fixture. Spray all edges. |
| 4-008 | Sand Sealer Coat | 1 | SS | 150 | 150 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : DRAWER GUIDE CROSS RAIL/Stopper Part No. : HFH - 18 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : HFH - B
 Material Input Specifications : Use 18 mm Plywood Offals
 Rough Dimensions : 18 x 30 x 351 Finished Dimensions : 18 x 30 x 351 Estimated Material Recovery : %
 Department : Machining Department Page 37 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------|--|
| 2-008/a | Cut to Width | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | Use balance of sheet used for HFH-2/3 & HFH-8 |
| 2-008/b | Cut to Length | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | | ----- | Use No. 320 Grit Sand - paper on Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : DRAWER GUIDE CROSS RAIL/STOPPER Part No. : HFH - 18 No. of Parts Unit Product : 1
 Product : Clothes Cabinet Product No. : CSCC - HFH -1 (Rev.) Sub-assembly : HFH - B
 Material Input Specifications : Part HFH - 18, sanded from Machining Department
 Rough Dimensions : _____ Finished Dimensions : 18 x 30 x 351 Estimated Material Recovery : _____
 Department : Finishing Page 38 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 4-006 | Spray Sealer Coat | 1 | S | 250 | 250 | 0.400 | Spray Gun | Use Special Spraying Fixutre. Spray four faces. |
| 4-008 | Sand Sealer Coat | 1 | SS | 200 | 200 | | | Use #280 Girt Stearate Sandpaper w/Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : DRAWER FRONT Part No. : HFH - 19 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : HFH - C

Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Available Locally
 Rough Dimensions : _____ Finished Dimensions : _____ Estimated Material Recovery : _____ %

Department : _____

Page 39 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|----------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|--|
| 2-008/a | Cut to Rough Length | 1 | SS | 150 | 150 | 0.667 | Cross-cut Saw Table Type | Use balance of sheet used for Classroom Cupboard Top Panel |
| 2-008/b | Cut to Rough Width | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | |
| 1-016 | Rabbet Two Sides | 1 | SS | 100 | 100 | 1.000 | Vertical Spindle Moulder | |
| 1-024 | Groove Back Surface | 1 | SS | 120 | 120 | 0.833 | Cross-cut Saw Table Type | Use Grooving Sawblade |
| 1-011 | Drill Holes for Woodscrews | 1 | SS | 120 | 120 | 0.833 | Electri Drills Set-up | |
| 1-030 | Edge Sanding | 1 | SS | 100 | 100 | 1.000 | Oscillating Edge Belt Sander | Use No. 320 Grit Sanding Belt Top and Bottom edges Only |
| 1-037 | Hand Sanding | 1 | SS | 150 | 150 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : DRAWER SIDES, Left and Right Part No. : HFH - 20 No. of Parts/Unit Product : 2 pcs.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : HFH - C
 Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Available Locally
 Rough Dimensions : 18 x 80 x 344 Finished Dimensions : 18 x 75 x 344 Estimated Material Recovery : %

Department : Machining Department

Page 40 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------------|---|
| 2-008/a | Cut to Length | 1 | SS | 150 | 150 | 0.667 | Cross-cut Saw Table Type | Use balance of sheet used for HFH-4 & 8 |
| 2-008/b | Cut to Rough Width | 1 | SS | 120 | 120 | 0.833 | Cross-Cut Saw Table Type | |
| 1-024 | Grooving | 1 | SS | 150 | 150 | 0.667 | Cross-cut Saw Table Type | |
| 1-030 | Edge Sanding | 1 | SS | 120 | 120 | 0.833 | Oscillating Edge Belt Sander | Use No. 320 Grit Sanding Belt; Sand Top Edge Only |
| 1-033 | Stroke Sanding | 1 | S | 80 | 80 | 1.250 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ----- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : DRAWER BACK Part No. : HFH- 21 No. of Parts/Unit Product : 1 pc.
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : HFH - C
 Material Input Specifications : 18 x 1220 x 2440 Commercial Grade Plywood Available Locally
 Rough Dimensions : 18 x 66 x 332 Finished Dimensions : 18 x 65 x 332 Estimated Material Recovery : %

Department : Machining Department Page 41 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|-----------------------------|---|
| 2-008/a | Cut to Length | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | Use balance of sheet used for HFH-1 |
| 2-008/a | Cut to Width | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ---- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block |
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OPERATIONS PRELUCE SHEET

Part Description : DRAWER ASSEMBLY Part No. : HFH - C No. of Parts/Unit Product : 1
 Product : Clothes Cabinet Product No. : CSCC - HFH - 1 (Rev.) Sub-Assembly : HFH - C
 Material Input Specifications : 1 pc. each HFH - 19, HFH-21 and HFH-22; 2 pcs. HFH-20, all sanded from Machining Dept.
 Rough Dimensions : _____ Finished Dimensions : 75 x 350 x 350 Estimated Material Re. : _____
 Department : Assembling Page 43 of 47 Pages

| OPRS No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|-----------------------|
| 3-001 | Assemble Cabinet | | | | | | | Use Drawer Assembling |
| | Drawer | 1 | SS | 20 | 20 | | | Jig |
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- 55 -

OPERATION SEQUENCE SHEET

Part Description : DRAWER ASSEMBLY Part No. : HFH - C No. of Parts/Sheet : 1
 Product : Clothes Cabinet Product No. : CSCC-HFH-1 (Rev.) Sub-Assembly : HFH - C
 Material Input Specifications : Sub-assembly No. HFH - C sanded from Assembling Department
 Rough Dimensions : _____ Finished Dimensions : 75 x 350 x 350 Estimated Material Loss : _____
 Department : Finishing Page 44 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 4-006/a | Spray 1st Coat Sealer | 1 | S | 80 | 80 | 1.250 | Spray Gun | Spray on all surfaces |
| 4-006/b | Spray 2nd Coat Sealer | 1 | S | 80 | 80 | 1.250 | Spray Gun | Spray on all surfaces |
| 4-008 | Sand Sealer Coat | 1 | SS | 40 | 40 | | | Use #280 Grit Stearate Sandpaper w/Flat Backed Sanding Block; Sand all surfaces. |
| 4-010 | Spray one Top Coat | 1 | S | 120 | 120 | 0.833 | Spray Gun | Spray on Front Face Top and Side Edges only |
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OPERATIONS SEQUENCE SHEET

Part Description : DRAWER ASSEMBLY Part No. : HFH - C No. of Parts/Op. : Product 1
 Product : Clothes Clothes Product No. : CSCC-HFH - 1 (Rev.) Sub-assembly : HFH - C
 Material Input Specifications : Sub-assembly No. HFH - C finished from Finishing Department
 Rough Dimensions : _____ Finished Dimensions : 75 x 350 x 350 Estimated Material : _____

Department : Packing/Crating Page 45 of 47 pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|--|
| 5-001 | Wrapping Drawer with | | | | | | | |
| | the following parts : | | | | | | | |
| | 1 pc. HFH - 11 ; | | | | | | | |
| | 2 pcs. HFH - 12 ; | | | | | | | |
| | 4 pcs. HFH - 15 ; | | | | | | | |
| | 1 pc. HFH - 16 ; | | | | | | | |
| | 1 pc. HFH = 17 ; | | | | | | | |
| | 1 pc. HFH - 18 | 1 | SS | 30 | 30 | | | Use approved wrapping material and technique |
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OPERATIONS SEQUENCE SHEET

Part Description : _____ Part No. : _____ No. of Parts/Unit Product : _____
 Product : Clothes Cabinet Product No. : CSCC - HFH -1 (Rev.) Sub-Assembly : _____

Material Input Specifications : _____
 Rough Dimensions : _____ Finished Dimensions : 460 x 1045 x 1715 Estimated Material Recovery : _____

Department : Packing/Crating Page 46 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---------|
| 5-012 | Pack the following parts | | | | | | | |
| | in one Wooden Crate : | | | | | | | |
| | 1 pc. - HFH - 1 | | | | | | | |
| | 1 pair - HFH-2 & 3, L&R | | | | | | | |
| | 1 wrapped bundle | | | | | | | |
| | containing : | | | | | | | |
| | 1 pc. - HFH - A | | | | | | | |
| | 5 pcs. - HFH - 8 | | | | | | | |
| | 1 pc. - HFH - 9 | | | | | | | |
| | 10 pcs. HFH - 10 | | | | | | | |
| | 4 pcs. HFH - 13 | | | | | | | |
| | 2 pcs. HFH - 14 and | | | | | | | |
| | 2 pcs. Hinges | | | | | | | |
| | 1 Wrapped bundle | | | | | | | |
| | containing : | | | | | | | |
| | 1 pc. HFH - C | | | | | | | |
| | 4 pcs. HFH - 15 | | | | | | | |
| | 1 pc. HFH - 16 | | | | | | | |

OPERATIONS SEQUENCE SHEET

Part Description : _____ Part No. : _____ No. of Parts/Unit Produced : _____
 Product : Clothes Cabinet Product No. : CSCC - HFH - 1 (Rev.) Sub-Assembly : _____

Material Input Specifications : _____
 Rough Dimensions : _____ Finished Dimensions : 460 x 1045 x 1715 Estimated Material Recovery : _____

Department : Packing/Crating

Page 47 of 47 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|---|------------|--------------|-----------------|---------------------|-----------------------------------|-----------------------------------|-------------------------------------|
| | 2 pcs. HFH - 17 | | | | | | | |
| | 1 pc. HFH - 18 | | | | | | | |
| | 1 pair HFH - 6 and HFH - 7 | | | | | | | |
| | 1 bag containing 1 complete set of dowels hardware, woodscrews and nails. | | | | | | | |
| | (See Product Parts List, on next page) | 2 | SS | 6 | 3 | | Strapping Tape Sealer and Crimper | Use approved packing/crating system |
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PRODUCT PARTS LIST

Name of Product : Clothes Cabinet (Wardrobe)
 Customer : General Public
 Requirement : _____ units per year

Product No. : CSCC - HFH - 1 (Rev.)
 Ref: Drawings Nos. : HFH - 1 thru HFH - 18
 Page : 1 of 4 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks |
|--------------|----------|--------------------------|-------------------|-----|------|-----------------------|---|
| | | | T | W | L | | |
| | HFH - 1 | Cabinet Top | 18 | 510 | 1045 | 1 | 18mm Plywood, Bored for dowels and pre-drilled for wood-screws |
| | HFH - 2 | Cabinet Side, Left | 18 | 480 | 1570 | 1 | Rabbetted, bored for dowels and pre-drilled for woodscrews, 18mm plywood |
| | HFH - 3 | Cabinet Side, Right | 18 | 480 | 1570 | 1 | Rabbetted, bored for dowels and pre-drilled for woodscrews, 18 mm plywood |
| HFH - A | HFH - 4 | Cabinet Partition | 18 | 474 | 1550 | 1 | Rabbetted, bored for dowels and pre-drilled for woodscrews, 18 mm plywood |
| HFH - A | HFH - 5 | Cabinet Patition Lipping | 20 | 25 | 1550 | 1 | Solid wood, bored for dowels |
| | HFH - 6 | Cabinet Door, Left | 18 | 480 | 1568 | 1 | 18mm Plywood, rabbetted and pre-drilled for woodscrews and lock hole |
| | HFH - 7 | Cabinet Door, Right | 18 | 480 | 1568 | 1 | 18mm Plywood, rabbetted and pre-drilled for woodscrews and lock hole |
| | HFH - 8 | Cabinet Shelvings | 9 | 380 | 461 | 5 | 9 mm Plywood, square trimmed edges |
| | HFH - 9 | Cabinet Bottom Panel | 20 | 477 | 935 | 1 | 20mm Plywood, bored for dowels and pre-drilled for woodscrews |
| | HFH - 10 | Shelf Support Fillets | 9 | 15 | 360 | 10 | Solid wood, nailed and glued to sides & partition |
| | HFH - 11 | Clothes Hanger Rack | 12 | 12 | 460 | 1 | Rounded Solid Wood |

PRODUCT PARTS LIST

Name of Product : Clothes Cabinet (Wardrobe)
 Customer : General Public
 Requirement : _____ units per year

Product No. : CSCC - HFH - 1 (Rev.)
 Ref: Drawings Nos. : HFH - 1 thru HFH - 18
 Page : 2 of 4 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks |
|--------------|----------|-------------------------------------|-------------------|-----|------|-----------------------|---|
| | | | T | W | L | | |
| | HFH - 12 | Rack Support Brackets, Left/Right | 9 | 60 | 85 | 2 | 9 mm plywood, routed to shape |
| | HFH - 13 | Corner Fillets, Top and Bottom | 30 | 40 | 380 | 4 | Solid wood, pre-drilled/countersink for woodscrews |
| | HFH - 14 | Leg Support Braces | 20 | 65 | 935 | 2 | Solid Wood, Red |
| | HFH - 15 | Cabinet Legs | 45 | 60 | 155 | 4 | Solid Wood, Red |
| HFH - B | | DRAWER SUPPORT ASSEMBLY | 125 | 362 | 461 | 1 | |
| HFH - B | HFH - 16 | Drawer Support Front Rail | 18 | 125 | 461 | 1 | 18 mm plywood, bored for dowels |
| HFH - B | HFH - 17 | Drawer Guide Rails, L & R | 35 | 35 | 362 | 2 | Solid wood, drilled dowels, nailed and glued for cross-rail |
| HFH - B | HFH - 18 | Drawer Guide Cross-Rail and Stopper | 18 | 30 | 351 | 2 | Solid wood, nailed & glued to HFH - 17 |
| HFH - C | | DRAWER ASSEMBLY | 75 | 350 | 350 | 1 | |
| HFH - C | HFH - 19 | Drawer Front | 18 | 75 | 350 | 1 | Rabbetted and pre-drilled for wood-screws, grooved for bottom |
| HFH - C | HFH - 20 | Drawer Sides, Left and Right | 18 | 75 | 344 | 2 | Grooved for bottom, nailed and glued to front and back |
| HFH - C | HFH - 21 | Drawer Back | 18 | 65 | 332 | 1 | Nailed and Glued to Sides |
| HFH - C | HFH - 22 | Drawer Bottom | 3 | 340 | 335 | 1 | Nailed and Glued to Back |
| | HFH - 23 | Cabinet Back Panel | 3 | 945 | 1575 | 1 | Nailed to Cabinet Top Sides and Bottom |

PRODUCT PARTS LIST

Name of Product : Clothes Cabinet (Wardrobe)
 Customer : General Public
 Requirement : _____ units per year

Product No. : CSCC - HFH - 1 (Rev.)
 Ref: Drawings Nos. : HFH - 1 thru HFH - 18
 Page : 3 of 4 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks |
|--------------|----------|-----------------------------------|-------------------|---|----|-----------------------|---|
| | | | T | W | L | | |
| | | Wooden Dowels, 4mm Ø | | | 15 | 6 | Partition Panel to Cabinet Top & Bottom |
| | | Wooden Dowels, 4mm Ø | | | 20 | 4 | Drawer Guide Rails to Drawer Support Front Rail |
| | | Wooden Dowels, 6mm Ø | | | 20 | 3 | Partition Lipping to Partition Panel |
| | | Wooden Dowels, 6mm Ø | | | 20 | 4 | Drawer Support Front Rail to Cabinet Partition and Right Side |
| | | Woodscrews, Flathead, Slotted #10 | | | 45 | 16 | Side Panels to Cabinet Top & Bottom w/Corner Fillets |
| | | Nails, Finishing #2 | | | 19 | 18 | Cabinet Back to Sides, Top and Bottom |
| | | Nails, Finishing #3 | | | 25 | 8 | Clothes Rack Support to Cabinet Sides |
| | | Nails, Finishing #4 | | | 25 | 30 | Shelf Support Fillets to Partition Panel and Right Side Panel |
| | | Nails, Finishing #4 | | | 35 | 7 | Drawer Guide Cross-Rail to Drawer Guide Rails and Cabinet Back |
| | | Nails, Finishing #6 | | | 35 | 14 | Drawer Sides to Drawer Front and Back, Drawer Bottom to Drawer Back |

PRODUCT PARTS LIST

Name of Product : Clothes Cabinet (Wardrobe)
 Customer : General Public
 Requirement : _____ units per year

Product No. : CSCC - HFH - 1 (Rev.)
 Ref: Drawings Nos. : HFH - 1 thru HFH - 18
 Page : 4 of 4 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks | |
|--------------|----------|---|-------------------|------|------|-----------------------|---|--|
| | | | T | W | L | | | |
| | | Nails, C. W., #7 | | | 30 | 12 | Leg Support Braces to Cabinet Bottom | |
| | | Nails, C. W., #8 | | | 35 | 12 | Legs to Leg Support Braces | |
| | | Nails, C. W., #10 | | | 30 | 8 | Leg Support Braces to Cabinet Bottom | |
| | | Nails, Finishing #4 | | | 25 | 3 | Drawer Support Front Rail to 3rd Shelf | |
| | | HARDWARE FOR THE COMPLETE PRODUCT ASSY. | | | | | | |
| | | Hinges, Piano Type w/screws | | 12mm | 1570 | 2 sets | Doors to Cabinet Sides | |
| | | Lock with screws | | | | 1 set | Left Cabinet Door to Right Cabinet Door | |
| | | Drawer Handle | 10 | 12 | 80 | 1 pcs. | Drawer Pull | |
| | | Drawer Lock with Screws | | | | 1 set | Cabinet Drawer | |
| | | Door Handle, w/screws | | 15 | 100 | 1 set | Door Pull, L & R | |
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A P P E N D I X X V

OPERATIONS SEQUENCE SHEETS

AND PRODUCT PARTS LIST

RAISED PANEL DOORS, 2-WINGS WITH JAMB ASSEMBLY

CSCC - CWI - 1 (Rev.)

OPERATIONS SEQUENCE SHEET

Part Description : TOP/BOTTOM RAIL, DOOR JAMB ASSY. Part No. : CWI - 1 No. of Parts/Unit Product : 2 pcs.
 Product : Door, Raised Panels 2- Wings Product No. : CSCC - CWI-1 (Rev.) Sub-Assembly : CWI - A
 Material Input Specifications : 76 x 100 x 6000 Red Wood, Air Dried to Local EMC
 Rough Dimensions : 76 x 100 x 1370 Finished Dimensions : 65 x 90 x 1370 Estimated Material Recovery : %

Department : Machining Department

Page 1 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------|---|
| 1-008 | Cut to Length | 1 | S US | 50 | 25 | 2.000 | Radial Arm Saw | 4 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 | S US | 60 | 30 | 1.667 | 4-Side Planer | |
| 1-016 | Rabbet One Edge | 1 | SS US | 40 | 20 | 2.000 | Vertical Spindle Moulder | |
| 1-011/a | Drill Holes for Dowel | 1 | SS | 60 | 60 | 1.667 | Electric Drills Set-Up | |
| 1-011/b | Drill Holes for Dowel | 1 | SS | 60 | 60 | 1.667 | Electric Drills Set-Up | |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block |
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OPERATIONS SEQUENCE SHEET

Part Description : DOOR JAMB STILE, Left/Right Part No. : CWI - 2 No. of Parts/Unit Product : 2 pcs.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC - CWI - 1 (Rev.) Sub-Assembly : CWI - A
 Material Input Specifications : 76 x 100 x 6000 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 76 x 100 x 1900 Finished Dimensions : 65 x 90 x 1900 Estimated Material Recovery : %

Department : Machining Department Page 2 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------|--|
| 1-008 | Cut to Length | 1 1 | S US | 50 | 25 | 2,000 | Radial Arm Saw | 3 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 1 | S US | 40 | 20 | 2,500 | 4-Side Planer | |
| 1-016 | Rabbet One Edge | 1 1 | SS US | 40 | 20 | 2,500 | Vertical Spindle Moulder | |
| 1-017/a | Rout for Hinge Seats | 1 1 | S US | 40 | 20 | 2,500 | Portable Router | Use Hinge Seat Routing Jig |
| 1-017/b | Rout for Hinge Seats | 1 1 | S US | 40 | 20 | 2,500 | Portable Router | Use Hinge Seat Routing Jig |
| 1-017/c | Rout for Hinge Seats | 1 1 | S US | 40 | 20 | 2,500 | Portable Router | Use Hinge Seat Routing Jig |
| 1-011/a | Drill Holes for Dowels | 1 | SS | 60 | 60 | 1,667 | Electric Drill Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS | 60 | 60 | 1,667 | Electric Drill Set-up | |
| 1-037 | Hand Sanding | 1 | SS | 60 | 60 | | ---- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block, Square corners of Hinge Seats |
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OPERATIONS SEQUENCE SHEET

Part Description : OUTER STILES, DOOR, Left Part No. : CWI - 3 No. of Parts/Unit Product : 1 pc.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B
 Material Input Specifications : 50 x 100 x 6000 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 50 x 100 x 1900 Finished Dimensions : 40 x 85 x 1860 Estimated Material Recovery : 7

Department : Machining Department

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| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|---------------------------|--|
| 1-001 | Cut to Rough Length | 1 | S | 50 | 25 | 2.000 | Radial Arm Saw | 3 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 | S | 40 | 20 | 2.500 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 60 | 30 | 1.667 | Cross-cut Saw Table Type | Use Table Extension Fixture |
| 1-011/a | Drill Holes for Dowels | 1 | SS | 60 | 30 | 1.667 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | US | 60 | 30 | 1.667 | Electric Drills Set-up | |
| 1-021/a | Mortize One End | 1 | SS | 60 | 30 | 1.667 | Heavy Duty Router | |
| 1-021/b | Mortize One End | 1 | US | 60 | 30 | 1.667 | Heavy Duty Router | |
| 1-024 | Grooving | 1 | SS | 40 | 20 | 2.500 | Cross-cut Saw Table Type | |
| 1-017/a | Rout Hinge Seat | 1 | S | 60 | 60 | 1.667 | Portable Router | Use 1/8"Ø DF Router Bit |
| 1-017/b | Rout Hinge Seat | 1 | US | 60 | 60 | 1.667 | Portable Router | Use 1/8"Ø DF Router Bit |
| 1-017/c | Rout Hinge Seat | 1 | S | 60 | 60 | 1.667 | Portable Router | Use 1/8"Ø DF Router Bit |
| 1-033 | Stroke Sanding | 1 | US | 40 | 20 | 2.500 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 60 | 60 | | ---- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block and Surface Hinge Seat Corners |

OPERATIONS SEQUENCE SHEET

Part Description : OUTER STILES, DOOR, Right Part No. : CWI - 4 No. of Parts/Unit Product : 1 pc.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B
 Material Input Specifications : 50 x 100 x 6000 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 50 x 100 x 1900 Finished Dimensions : 40 x 85 x 1860 Estimated Material Recovery : %

Department: Machining Department

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| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|--|
| 1-001 | Cut to Rough Length | 1 | S US | 50 | 25 | 2.000 | Radial Arm Saw | 3 pieces in one board |
| 1-004 | Surface 4-Sides | 1 | S US | 40 | 20 | 2.500 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS US | 60 | 30 | 1.667 | Cross-cut Saw Table Type | Use Table Extension Fixture |
| 1-011/a | Drill Holes for Dowels | 1 | SS US | 60 | 30 | 1.667 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS US | 60 | 30 | 1.667 | Electric Drills Set-up | |
| 1-021/a | Mortize One End | 1 | SS US | 60 | 30 | 1.667 | Heavy Duty Router | |
| 1-021/b | Mortize One End | 1 | SS US | 60 | 30 | 1.667 | Heavy Duty Router | |
| 1-024 | Grooving | 1 | SS US | 40 | 20 | 2.500 | Cross-cut Saw Table Type | |
| 1-017/a | Rout Hinge Seat | 1 | S US | 60 | 60 | 1.667 | Portable Router | Use 1/8"Ø DF Router Bit |
| 1-017/b | Rout Hinge Seat | 1 | S US | 60 | 60 | 1.667 | Portable Router | Use 1/8"Ø DF Router Bit |
| 1-017/c | Rout Hinge Seat | 1 | S US | 60 | 60 | 1.667 | Portable Router | Use 1/8"Ø DF Router Bit |
| 1-033 | Stroke Sanding | 1 | S US | 40 | 20 | 2.500 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 60 | 60 | | ---- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block and Surface Hinge Seat Corners |
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OPERATIONS SEQUENCE SHEET

Part Description : INNER STILE, DOOR, Left Part No. : CWI - 5 No. of Parts/Unit Product : 1 pc.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B

Material Input Specifications : 50 x 100 x 6000 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 50 x 100 x 1980 Finished Dimensions : 40 x 90 x 1860 Estimated Material Recovery : %

Department : Machining Department Page 6 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S US | 50 | 25 | 2.000 | Radial Arm Saw | 3 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 | S US | 40 | 20 | 2.500 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS US | 60 | 30 | 1.667 | Cross-cut Saw Table Type | Use Table Extension Fixture |
| 1-011/a | Drill Holes for Dowels | 1 | SS US | 60 | 30 | 1.667 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS US | 60 | 30 | 1.667 | Electric Drills Set-up | |
| 1-021/a | Mortize One End | 1 | SS US | 60 | 30 | 1.667 | Heavy Duty Router | |
| 1-021/b | Mortize One End | 1 | SS US | 60 | 30 | 1.667 | Heavy Duty Router | |
| 1-024 | Grooving | 1 | SS US | 40 | 20 | 2.500 | Cross-cut Saw Table Type | |
| 1-016 | Rabbeting | 1 | SS US | 40 | 20 | 2.500 | Vertical Spindle Moulder | |
| 1-033 | Stroke Sanding | 1 | S US | 40 | 20 | 2.500 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 60 | 60 | | ---- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block and Surface Hinge Seat Corner |
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OPERATIONS SEQUENCE SHEET

Part Description : INNER STILE, DOOR, Right Part No. : CWI - 6 No. of Parts/Unit Product : 1 pc.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-I (Rev.) Sub-Assembly : CWI - B
 Material Input Specifications : 50 x 100 x 6000 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 50 x 100 x 1980 Finished Dimensions : 40 x 90 x 1860 Estimated Material Recovery : %

Department : Machining Department

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| OPR! No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|-------------|-----------------------------|---------------|-----------------|--------------------|---------------------------|--|------------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S US | 50 | 25 | 2.000 | Radial Arm Saw | 3 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 | S US | 40 | 20 | 2.500 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS US | 60 | 30 | 1.667 | Cross-cut Saw Table Type | Use Table Extension Fixture |
| 1-011/a | Drill Holes for Dowels | 1 | SS US | 60 | 30 | 1.667 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS US | 60 | 30 | 1.667 | Electric Drills Set-up | |
| 1-021/a | Mortize One End | 1 | SS US | 60 | 30 | 1.667 | Heavy Duty Router | |
| 1-021/b | Mortize One End | 1 | SS US | 60 | 30 | 1.667 | Heavy Duty Router | |
| 1-024 | Grooving | 1 | SS US | 40 | 20 | 2.500 | Cross-cut Saw Table Type | |
| 1-016 | Rabbeting | 1 | SS US | 40 | 20 | 2.500 | Vertical Spindle Moulder | |
| 1-033 | Stroke Sanding | 1 | S US | 40 | 20 | 2.500 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 60 | 60 | | ---- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block and Surface Hinge Seat Corner |
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OPERATIONS SEQUENCE SHEET

Part Description : TOP BRACE, Door Part No. : CWI - 7 No. of Parts/Unit Product : 2 pcs.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B
 Material Input Specifications : 50 x 120 x 6000 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 50 x 120 x 520 Finished Dimensions : 40 x 100 x 510 Estimated Material Recovery : %

Department : _____

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| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S US | 50 | 25 | 2.500 | Radial Arm Saw | 11 pieces in one board |
| 1-004 | Surface 4-Sides | 1 | S US | 80 | 40 | 1.250 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | |
| 1-024 | Grooving | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | |
| 1-023/b | Tenon Both Ends | 1 | S | 100 | 100 | 1.000 | Oval Double End Tenoner | |
| 1-033 | Stroke Sanding | 1 | S | 80 | 80 | 1.250 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ---- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block and Surface Hinge Seat Corner |
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OPERATIONS SEQUENCE SHEET

Part Description : BOTTOM BRACE, Door Part No. : CWI - 8 No. of Parts/Unit Product : 2 pcs.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B
 Material Input Specifications : 50 x 120 x 6000 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 50 x 120 x 520 Finished Dimensions : 40 x 100 x 510 Estimated Material Recovery : %

Department : Machining Department Page 9 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 1-001 | Cut to Rough Length | 1 1 | S US | 50 | 25 | 2.500 | Radial Arm Saw | 11 pieces in one board |
| 1-004 | Surface 4-Sides | 1 1 | S US | 80 | 40 | 1.250 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | |
| 1-024 | Grooving | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | |
| 1-023/b | Tenon Both Ends | 1 | S | 100 | 100 | 1.000 | Oval Double End Tenoner | |
| 1-033 | Stroke Sanding | 1 | S | 80 | 80 | 1.250 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ---- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block and Surface Hinge Seat Corner |
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OPERATIONS SEQUENCE SHEET

Part Description : MIDDLE BRACE, Upper, Door Part No. : CWI - 9 No. of Parts/Unit Product : 2 pcs.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B
 Material Input Specifications : 50 x 120 x 6000 Red Wood Air-Dried to Local EMC
 Rough Dimensions : 50 x 120 x 400 Finished Dimensions : 40 x 100 x 390 Estimated Material Recovery : %

Department: Machining Department

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| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S US | 50 | 25 | 2.000 | Radial Arm Saw | 14 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 | S US | 80 | 40 | 1.250 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 100 | 100 | 1.000 | Cross-Cut Saw Table Type | |
| 1-024/a | Groove One End | 1 | SS | 100 | 100 | 1.000 | Cross-Cut Saw Table Type | Use Grooving Sawblade |
| 1-024/b | Groove One End | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | Use Grooving Sawblade |
| 1-011/a | Drill Holes for Dowels | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-033 | Stroke Sanding | 1 | S | 80 | 80 | 1.250 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ----- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block and Surface Hinge Seat Corner |
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OPERATIONS SEQUENCE SHEET

Part Description : MIDDLE BRACE, Lower, Door Part No. : CWI - 10 No. of Parts/Unit Product : 2 pcs.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B

Material Input Specifications : 50 x 120 x 6000 Red Wood, Air-Dried to Local EMC
 Rough Dimensions : 50 x 120 x 400 Finished Dimensions : 40 x 100 x 390 Estimated Material Recovery : %

Department : Machining Department Page 11 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|------------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S US | 50 | 25 | 2.000 | Radial Arm Saw | 14 pcs. in one board |
| 1-004 | Surface 4-Sides | 1 | S US | 80 | 40 | 1.250 | 4-Side Planer | |
| 1-008 | Cut to Final Length | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | |
| 1-024/a | Groove One End | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | Use Grooving Sawblade |
| 1-024/b | Groove One End | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | Use Grooving Sawblade |
| 1-011/a | Drill Holes for Dowels | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-011/b | Drill Holes for Dowels | 1 | SS | 80 | 80 | 1.250 | Electric Drills Set-up | |
| 1-033 | Stroke Sanding | 1 | S | 80 | 80 | 1.250 | Double Belt Stroke Sander | Use No. 280 and 320 Grit Sanding Belts |
| 1-037 | Hand Sanding | 1 | SS | 120 | 120 | | ---- | Use No. 320 Grit Sand- paper on Flat Backed Sanding Block and Surface Hinge Seat Corner |
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- 305 -

OPERATIONS SEQUENCE SHEET

Part Description : UPPER/LOWER RAISED PANELS, Door Part No. : CWI - 11 No. of Parts/Unit Product : 4 pcs.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B

Material Input Specifications : 25 x 150 x 6000 White Wood, Air-Dried to Local EMC
 Rough Dimensions : 22 x 430 x 660 Finished Dimensions : 20 x 410 x 645 Estimated Material Recovery : %
 (Edge-Glued)

Department : Machining Department Page 12 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--|------------|--------------|-----------------|---------------------|-----------------------------------|-----------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S US | 150 | 75 | 0.667 | Radial Arm Saw | 9 peices in one board |
| 1-006/a | Ripping | 1 | S US | 100 | 50 | 1.000 | Straight Line Edge | Clean Rip one Edge for Gluing surface - 145 mm wide |
| 1-006/b | Ripping | 1 | S US | 100 | 50 | 1.000 | Straight Line Edge | Clean Rip One Edge for Gluing Surface - 145 mm wide |
| 1-003 | Surface 2 Faces | 1 | S US | 100 | 50 | 1.000 | 4-Side Planer | Skip Planing and Jointing |
| 2-001 | Edge Gluing | 1 | SS | 50 | 50 | 2.000 | Clamping Fixture | 3 pcs. in one board Use White Glue |
| | Note : Keep in Clamp for 24 Hours; release pressure and normalize for another 24 Hours before machining. | | | | | | | |
| 1-008 | Cut to Final Length | 1 | SS | 100 | 100 | 1.000 | Cross-cut Saw Table Type | |
| 1-016 | Rabbit 4 Edges | 1 | SS | 40 | 20 | 2.500 | Vertical Spindle Moulder | |
| 1-002/a | Box Plane 1 Face | 1 | S US | 80 | 40 | 1.250 | Planer-Thicknesser | Use knife-ground to desire profile |
| 1-002/b | Box Plane One Face | 1 | S US | 80 | 40 | 1.250 | Planer-Thicknesser | Use knife-ground to desire profile |
| 1-002/c | Box Plane One Face | 1 | S US | 80 | 40 | 1.250 | Planer-Thicknesser | Use knife-ground to desire profile |
| 1-002/d | Box Plane One Face | 1 | S US | 80 | 40 | 1.250 | Planer-Thicknesser | Use knife-ground to desire profile |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block and Surface Hinge Seat Corner |

OPERATIONS SEQUENCE SHEET

Part Description : MIDDLE RAISED PANELS, Door Part No. : CWI - 12 No. of Parts/Unit Product : 2 pcs.
 Product : Doors, Raised Panels, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B

Material Input Specifications : 25 x 120 x 6000 White Wood, Air-Dried to Local EMC
 Rough Dimensions : 22 x 240 x 430 Finished Dimensions : 20 x 220 x 412 Estimated Material Recovery : %
 (Edge-Glued)

Department : Machining Department

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| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--|------------|--------------|-----------------|---------------------|-----------------------------------|--------------------------|---|
| 1-001 | Cut to Rough Length | 1 | S | 160 | 80 | 0,667 | Radial Arm Saw | 9 pcs. in one board |
| 1-006 | Ripping | 1 | S | 120 | 60 | 0,825 | Straight Line Edger | Clean Rip One Edge 145 mm wide |
| 1-003 | Surface Two Faces | 1 | S | 120 | 60 | 0,825 | Planer-Thicknesser | Skip Planing on one Face only |
| 2-001 | Edge Gluing | 1 | SS | 80 | 80 | 1,250 | Clamping Fixture | Two pieces in one board |
| | Note : Keep in Clamp for 24 Hours; release pressure and normalize for another 24 Hours before machining. | | | | | | | |
| 1-008 | Cut to Final Length | 1 | SS | 100 | 100 | 1,000 | Cross-cut Saw Table Type | |
| 1-016 | Rabbit Four Edges | 1 | SS | 40 | 20 | 2,500 | Vertical Spindle Moulder | |
| 1-002/a | Box Plane One Face | 1 | S | 80 | 40 | 1,250 | Planer-Thicknesser | Use knife-ground to desire profile |
| 1-002/b | Box Plane One Face | 1 | S | 80 | 40 | 1,250 | Planer-Thicknesser | Use knife-ground to desire profile |
| 1-002/c | Box Plane One Face | 1 | S | 80 | 40 | 1,250 | Planer-Thicknesser | Use knife-ground to desire profile |
| 1-002/d | Box Plane One Face | 1 | S | 80 | 40 | 1,250 | Planer-Thicknesser | Use knife-ground to desire profile |
| 1-037 | Hand Sanding | 1 | SS | 100 | 100 | | ----- | Use No. 320 Grit Sandpaper on Flat Backed Sanding Block and Surface Hinge Seat Corner |

OPERATIONS SEQUENCE SHEET

Part Description : DOOR WING, Right Part No. : CWI-B, Right No. of Parts/Unit Product : 1 set
 Product : Doors, Raised Panel, 2-Wings Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : CWI - B
 Material Input Specifications : 1 pc. each CWI-4, CWI-6, CWI-7, CWI-8, CWI-9, CWI-10 & CWI-12 and 2 pcs. CWI-11
 Rough Dimensions : _____ Finished Dimensions : 40 x 565 x 1860 Estimated Material Recovery : _____%

Department: Assembling Page 15 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|---|
| 3-001 | Assembling Complete | | | | | | | |
| | Door Wing | 2 | 1 1 | S SS | 6 | 3 | | Use Door Assembling Jig, Install Door Lock |
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OPERATIONS SEQUENCE SHEET

Part Description : _____ Part No. : _____ No. of Parts/Unit Product : _____
 Product : Raised Panel Doors, 2-Wings w/Jamb Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : _____
 Material Input Specifications : Assembly 1 Set CWI-A and 1 pair CWI-B (Left & Right) from Assembling Department
 Rough Dimensions : _____ Finished Dimensions : 90 x 1370 x 1950 Estimated Material Recovery : _____

Department: Assembling

Page 16 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-Hour | Machine Hours / 100 Unit Products | MACHINE USED | REMARKS |
|----------|--------------------------|------------|--------------|-----------------|---------------------|-----------------------------------|--------------|----------------------------|
| 3-002 | Assembling Doors to | | | | | | | |
| | Jamb Assembly | 2 | 1 S 1 SS | 10 | 5 | | | Use 8 pcs. 40 x 100 Hinges |
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OPERATIONS SEQUENCE SHEET

Part Description : _____ Part No. : _____ No. of Parts/Unit Product : 1 pc.
 Product : Raised Panel Doors, 2-Wings w/Jamb Product No. : CSCC-CWI-1 (Rev.) Sub-Assembly : _____
 Material Input Specifications : Assembly CSCC - CWI-1 (Rev.) from Assembling Department
 Rough Dimensions : _____ Finished Dimensions : 200 x 1390 x 1980 Estimated Material Recovery : _____

Department: Packing/Crating Page 17 of 17 Pages

| OPRN No. | DESCRIPTION OF OPERATION | No. of MEN | LABOUR GRADE | OUTPUT PER HOUR | OUTPUT Per Man-hour | Machine Hours / 100 Unit Products | MACHINE USED | R E M A R K S |
|-------------|---|---------------|-----------------|--------------------|---------------------------|--|--------------|----------------------------------|
| 5-012 | Packing In Wooden Crates | 2 | SS | 40 | 20 | | | Use approved packing |
| | (See Product Parts List on next pages) | | | | | | | system for 2 units per crate. |
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PRODUCT PARTS LIST

Name of Product : Door, Raised Panels, 2-Wings
 Customer : Ministry of Housing & General Public
 Requirement : _____ units per year

Product No. : CSCC - CWI - 1, Rev.
 Ref: Drawings Nos. : CWI - 1 thru CWI - 11
 Page : 1 of 3 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks |
|--------------|----------|--------------------------------------|-------------------|------|------|-----------------------|--|
| | | | T | W | L | | |
| CWI - A | | DOOR JAMB ASSEMBLY | 90 | 1370 | 1950 | 1 | |
| CWI - A | CWI - 1 | Top/Bottom Rail, Door Jamb Assembly | 65 | 90 | 1370 | 2 | 76 mm Red Wood, hard, drilled for dowels |
| CWI - A | CWI - 2 | Left/Right Stile, Door Jamb Assembly | 65 | 90 | 1900 | 2 | 76 mm Red Wood, hard, drilled for dowels |
| CWI - B | | DOOR WING ASSEMBLY | 40 | 565 | 1860 | 1 pair | |
| CWI - B | CWI - 3 | Outer Stile, Door, Left | 40 | 85 | 1860 | 1 | 50 mm Red Wood, medium hard, routed for hinge seats, grooved for panels and drilled for dowels |
| CWI - B | CWI - 4 | Outer Stile, Door, Right | 40 | 85 | 1860 | 1 | 50 mm Red Wood, medium hard, routed for hinge seats, grooved for panels and drilled for dowels |
| CWI - B | CWI - 5 | Inner Stile, Door, Left | 40 | 90 | 1860 | 1 | 50 mm Red Wood, medium hard, grooved for panels, rabbetted and drilled for dowels |
| CWI - B | CWI - 6 | Inner Stile, Door, Left | 40 | 90 | 1860 | 1 | 50 mm Red Wood, medium hard, grooved for panels, rabbetted & drilled for dowels |
| CWI - B | CWI - 7 | Top Brace, Door | 40 | 100 | 510 | 2 | 50 mm Red Wood, medium hard, grooved for panels, rabbetted & drilled for dowels |

PRODUCT PARTS LIST

Name of Product : Door, Raised Panels, 2-Wings
 Customer : Minsitry of Housing & General Public
 Requirement : _____ units per year

Product No. : CSCC - CWI - 1, Rev.
 Ref: Drawings Nos. : CWI - 1 thru CWI - 11
 Page : 2 of 3 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks |
|--------------|----------|----------------------------------|-------------------|-----|------|-----------------------|---|
| | | | T | W | L | | |
| CWI - B | CWI - 8 | Bottom Brace, Door | 40 | 100 | 510 | 2 | 50 mm Red Wood, medium hard, grooved for panels, rabbetted & drilled for dowels |
| CWI - B | CWI - 9 | Middle Brace, Upper, Door | 40 | 90 | 390 | 2 | 50 mm Red Wood, medium hard, grooved for panels, rabbetted & drilled for dowels |
| CWI - B | CWI -10 | Middle Brace, Lower, Door | 40 | 90 | 390 | 2 | 50 mm Red Wood, medium hard, grooved for panels, rabbetted & drilled for dowels |
| CWI - B | CWI -11 | Upper/Lower, Raised Panels, Door | 20 | 410 | 645 | 4 | Edge glued white wood, profiled as designed |
| CWI - B | CWI - 12 | Middle Raised Panles, Door | 20 | 220 | 412 | 2 | Edge glued white wood, profiled as designed |
| CWI - A | | Wooden Dowel, 20 mm Ø | | | 30mm | 4 pcs. | Use hardwood, Jamb top/ bottom rail to Jamb Stiles |
| CWI - A | | Wooden Dowel, 10 mm Ø | | | 55mm | 4 pcs. | Use hardwood, Jamb top/ bottom rail to Jamb Stiles |
| CWI - B | | Wooden Dowel, 15 mm Ø | | | 45mm | 16 pcs. | Use hardwood, middle braces to door stiles r & l |
| | | Wooden Dowel, 20 mm Ø | | | 35mm | 8 pcs. | Use hardwood, top/ bottom braces to door stiles, R & L |
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PRODUCT PARTS LIST

Name of Product : Door, Raised Panels, 2-Wings
 Customer : Ministry of Housing & General Public
 Requirement : _____ units per year

Product No. : CSCC - CWI - 1, Rev.
 Ref: Drawings Nos. : CWI - 1 thru CWI - 11
 Page : 3 of 3 pages

| Sub-Assy No. | Part No. | Name of Product Part | Sanded Dimensions | | | Qty. Per Unit Product | Remarks |
|--------------|----------|--|-------------------|----|-----|-----------------------|---|
| | | | T | W | L | | |
| | | HARDWARE FOR THE COMPLETE PRODUCT ASSY. | | | | | |
| | | Door Lock Set with screws | | | | 1 set | |
| | | Door Hinge, with matching woodscrews | | 45 | 100 | 8 sets | CWI - A Sub-Assembly to CWI-B Sub-Assembly |
| | | Barrel Bolt with screws | | | 150 | 2 sets | Doors to Jamb Rails |
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A P P E N D I X XVI

DETAILED SCHEDULE OF ACTIVITIES

(Refer to Figure 9 PROJECT TIMETABLE)

| Period of Activity (in number of months) from 30 Sept. 1983) | | A c t i v i t i e s |
|--|---------------------|--|
| Starting Month No. | Ending Month No. | |
| A. <u>PREPARATORY PERIOD</u> - <u>24 Months</u> | | |
| 1 | 12 | --- Final review, up-dating and approval of Project implementation plans |
| 1 | 18 | --- Training Program for Machinery Maintenance and Repair, including the use of existing machine shop facilities in Mukalla to fabricate simple machinery spare parts needed by the Project |
| 7 | 18 | --- Training Program for Cutting Tools Maintenance; Design, fabrication and proper use of production jigs and fixtures; Design, fabrication and proper use of metal gauges in wood-working operations; and proper machine set-up for basic woodworking operations |
| 13 | 15 | --- Training Program for Product Design, including review of all product types and models, selection of one model of each product type as basis for Standard Product Line and their re-design for serial production purposes. |
| 13 | 24 | --- Training Program in Modern Management and Supervisory Techniques; including Production Control and Quality Control Systems as tools of industrial management; appropriate management information system for CSCC; basic accounting and costing systems for multi-product manufacturing operations; Personnel Management Techniques and Personnel Training Programmes -- motivation and incentives for sustained high output levels; Salary and Wage Administration on the basis of Job Evaluation and Analysis as applied to Piece Rate Pay Systems and local legislations |

| Starting Month No. | Ending Month No. |
|-----------------------|---------------------|
|-----------------------|---------------------|

| | | |
|----|----|--|
| 16 | 24 | --- Training Program for Product Engineering, including Preparation of working drawings and operations sequence sheets for selected models in the Standard Product Line, determination of most economic size and specifications of raw materials and minimum economic batch sizes for each Standard Product and Preparation of Production Schedule |
|----|----|--|

B. PRE-OPERATING PERIOD, PROJECT

IMPLEMENTATION - 36 Months

| | | |
|----|----|--|
| 13 | 14 | --- Completion of Site Development |
| 13 | 14 | --- Review of equipment and machinery requirements |
| 13 | 18 | --- Modifications of existing buildings according to new plans, including connecting ramps |
| 13 | 24 | --- Erection of additional buildings and structures according to new plans |
| 13 | 18 | --- Installation of electric power supply system |
| 13 | 18 | --- Deep-well drilling and installation of water pump and water supply system |
| 16 | 24 | --- Evaluation of tenders and final selection and ordering of machinery and equipment |
| 19 | 24 | --- Final review of working drawings for selected standard products |
| 19 | 24 | --- Installation of compressed air system |
| 25 | 31 | --- Design and fabrication of metal gauges for selected standard products |
| 25 | 31 | --- Design and Fabrication of Production Jigs and Fixtures |
| 28 | 34 | --- Arrival of imported equipment and machinery |
| 31 | 36 | --- Design and fabrication of work benches, production trucks and dollies; and stationary racks and storage bins |

| Starting Month No. | Ending Month No. | |
|--|---------------------|---|
| 31 | 36 | --- Installation of imported equipment and machinery, and individual test run |
| 37 | 40 | --- Transfer of Co-operative's inventory of raw materials and supplies to new factory |
| 40 | 41 | --- Transfer of machinery from 3 member units' workshops to new factory site; immediate installation and test run; |
| 40 | 42 | --- Review of existing inventories of raw materials and supplies, their adjustment to desired levels under new plans of operations, and their purchase or importation |
| 42 | 48 | --- trial run all production units |
| C. <u>INITIAL OPERATING STAGE</u> - <u>36 Months</u> | | |
| 49 | 60 | --- Familiarization and Learning Phase, C-1 Phase, Figure 6 |
| 61 | 72 | --- Skills Development and Up-Grading Phase, C-2 Phase, Figure 6 |
| 73 | 84 | --- Expansion Program Preparation Phase, C-3 Phase, Figure 6 |
| D. <u>FINAL OPERATING STAGE</u> - <u>24 Months</u> | | |
| 85 | 96 | --- First Expanded Operation Phase, D-1 Phase, Figure 6 |
| 86 | 108 | --- Second Expanded Operation Phase, D-2 Phase, Figure 6 |
| 109 and on | | E. <u>REGULAR AND SUSTAINED FULL OPERATIONS</u> Phase E, Figure 6 |

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