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REPUBLIC OF MALAWI

Technical report: Assistance to ADMARC Cannery*

Prepared for the Government of the Republic of Malawi
by the United Nations Industrial Development Organization
acting as executing agency for the United Nations Development Programme

Based on the work of G. Taylor, Consultant in the processing,
preservation and canning of fruits, vegetables and juices

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* This document has not been edited.

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EXPLANATORY NOTES.

ADMARC.....Agricultural Development & Marketing Corporation

pH.....Measure of the acidity or alkalinity of a material

QA.....Quality Assurance

Double Seam.....To attach an end to a can body by a method in which five thicknesses of plate (metal) are interlocked or folded & pressed firmly together. A joint formed by interlocking the edges of both end & body of a can.

Side Seam.....The method used to join the metal forming the body of the can. Originally this was formed similar to Double Seams and soldered also it could be overlapped and soldered. In latter times, the use of solder which may come into contact with food has been discouraged. The present system is to make the joint by the use of continuous welding techniques.

Lacquer.....A paint like composition usually baked onto the plate (metal) before it is fabricated into a can body or end. On the inner surface its purpose is to protect either the container or the product. On the outer surface its purpose is to prevent corrosion.

CMB Packaging The new corporate name for Metal Box, can manufacturers.

ABSTRACT

Project Reference : DP/MLW/88/018/11-55.

The purpose of the project was to undertake a diagnostic study of the problems of ADMARC Canning Company, Mulanje and offer recommendations and assistance towards it's re-habilitation and improvement of performance. The initial study took place between March 4th and May 6th in Mulanje, Blantyre & England.

The Company has been starved of working capital for the last four years and investment in new plant has been minimal for considerably longer.. The owners ADMARC, have been attempting to divest themselves of the Company for some time & a group of local entrepreneurs have recently signed articles of agreement for the purchase. The Company has also lacked adequate technical management for the last 6 years.

The main recommendations are :-

- a) Good technical management be recruited and installed as soon as possible.
- b) A concentrated sales programme, rather than the present 'order taking' system, be instituted.
- c) A planned programme of capital investment be undertaken to replace existing plant in order to improve production efficiency, raw material yield, labour utilisation and profitability.
- d) In house & external training programmes be instituted for Production, Quality Assurance & Maintenance staff at Supervisory level to improve their technical competence.

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I. INTRODUCTION.

This report was initiated by the visit of the UNIDO Project Identification Mission and possible Trust Fund Assistance to Malawi, undertaken in May 1990.

A consultant in Food Process Engineering, Mr Glyn Taylor from England was contracted to undertake the necessary work and this report forms the initial part of that study. (Job description given as Annex 1).

ADMARC Canning Company is a wholly owned subsidiary of ADMARC, a parastatal organization responsible for agricultural development and agricultural commodity sales & exports in & from Malawi. It was set up in 1969 as a joint venture between ADMARC and a C.F.STEVENS CANNING CO. LTD., and was originally located at Luchenza, some 20km on the Blantyre side of Mulanje. In 1972, ADMARC took over the entire shareholding of the Company and moved the operation to it's present location 18km South of Mulanje town in 1973. The present site was originally a tea processing factory but due to re-organizations / aquisitions it became redundant and was sold to ADMARC.

The original objectives of the Company were to encourage the growing of fruits and vegetables, particularly pineapples, by the local farmers and the conversion of these by the Company, into canned preserved products such as pineapple rings and pieces plus vegetables & jars from the various produce available in the area. At the time of the aquisition by ADMARC an expatriate manager, Mr Bunney, was recruited, and asked to give his design recommendations for the new factory. It is understood that these were prepared

but extensively modified to the present operation in view of the then, high capital cost and the relatively experimental nature of the project. The present factory is based upon a highly labour intensive operation intended to take advantage of local raw material supplies. In this way production could be rapidly changed to suit any variable inputs inherent with this type of supply situation. During the tenure of Mr Rumneys' office from 1972 to 1984, the pineapple crop was developed to the level of handling some 1,500 Tonnes of fruit as well as about 600 Tonnes of tomato per year, however, there was never any effort made to change the basic character of the operation from its essentially manual base and little or no capital investment was made other than minor machinery purchases and some replacements.

After Mr Rumney retired in 1984 another Zimbabwean expatriate, Mr Tebb was appointed and he held the post until 1987. Since that time the management of the Company has been the responsibility of a Mr Mfune until 1990 who, as General Manager, only attended on about two days per week and since then by Mr Munthali, the Chief Accountant, who has been in an acting capacity since.

It would appear that up to 1984 a substantial export market was operated by the Company, mostly with Zimbabwe. This seems to have been largely due to the efforts of Mr Rumney as a result of personal visits and contacts in that country. Since 1984 this market has dried, caused possibly by Mr Rumneys' retirement and a reported decision by ADMARC to transfer all responsibility for sales to its Head Office. Since then the sales have been transferred back to the factory. However, the profitability of

the Company has worsened to such an extent that total indebtedness is now around Kwacha 4,500,000. These debts have encouraged ADMARC to make every effort to divest themselves of the operation and have also resulted in a starving of working capital to the Company. The effects of this are apparent in the extremely low level of empty can stocks, which have been imported from South Africa or Zimbabwe and the dangerously low level of spare parts for equipment. The only recent capital investment made has been the purchase of a wood fired boiler to replace the original diesel fueled units, the latter fuel becoming prohibitively expensive. Even though the new boiler was originally made in 1925 it has proved eminently successful, fuel costs being substantially cut on a like for like basis.

The initial study took place from March 4th to May 6th 1981 in Mulanje, Blantyre and England. The objectives of the study were to undertake an overall analytical study of the activities of ADMARC Canning Company and to offer recommendations and advice towards the re-habilitation of the Company. In this respect it is felt that these objectives have been attained in the recommendations which have been made and the advice offered. Certain changes have been instituted immediately at the factory to improve the overall quality control. A programme of planned and phased investment is put forward for consideration to improve long term performance & profitability. In addition recommendations are made which it is felt will immediately benefit the performance of the Company in its present form, improving cash flow and profitability and thus forming the basis for the future proposed phased investment programme. It is suggested that serious consideration be given to

assistance with this investment, on most favoured terms by the UNDP and UNIDO through their associate investment advisory activities in view of the long term development potential to the rural infra structure, employment and economics as well as the import substitution inherent in this type of activity.

II: PRESENT OPERATIONS.

A: Production

The present method of production is essentially a manual operation and all movement of materials to and in the process is carried out by hand. In essentials the factory is divided into two zones: the Northern end being the 'JAM' section and the Southern end being the 'FRUIT & VEGETABLE' portion. Raw materials to supply the two operations are each delivered to their respective ends of the factory where the necessary preparation and processing takes place. It would seem that in the two sections, though largely independent of one another, operations are never carried out simultaneously. All transfers of cans, crates, syrups, prepared raw material and finished cans are carried out by hand; manually and using barrows and hand trucks. There is no logical process flow which can be discerned and codified. The only means of mechanically moving material is the hoist for loading & unloading crates of filled cans into the processing retorts and even this has to be hauled along by hand. Reference to the drawing entered as Annex 2 shows the layout and location of equipment in the existing factory.

At the Southern end of the factory there is a 'GINNECA' type pineapple sizing and coring machine capable of handling 60 fruits per minute. In this machine the pineapples are cut to a pre-determined diameter and the centre core removed. Waste is conveyed sideways and to the rear discharging into a bin for later disposal. The sized pineapples are then taken by hand to the slicing machines which again are fed manually. The sliced

sized product is inspected and any blemished or damaged pieces removed. The whole rings are packed into cans, syrup or juice added and then taken by hand to the exhaust boxes for air to be removed and after exhausting lifted and fed to the seamers by hand for final closing. The blemished pieces and broken pieces may be used, after sorting, for packing as cubes or crushed; or alternatively may be squeezed in the hand press to express juice for subsequent filling into the can with fruit instead of syrup. There are about 40 stainless steel tables approximately 7 feet by 3 feet which are moveable and are used as intermediate staging points in the handling process. The same essential methods are used if other fruits and vegetables are to be processed; the only difference being that the 'GINECCA' is not used. Fruit and vegetables are brought into the factory in wooden tote bins, sorted, washed, inspected cut/sliced/chopped et al and then packed into cans on a volumetric basis. The filled cans have brine, syrup or juice added and then pass through the exhaust box as before and are seamed and pasteurised (at 100 degrees Celsius) or sterilized (at 115 degrees Celsius) depending upon whether they are 'high acid' (fruit) or 'low acid' (vegetables). It was noted that in none of the process recipes available is it specifically stated that any vegetables are blanched. It must be observed that this should be carried out at about 85 degrees Celsius for 3 minutes in order that enzymes, which may result in subsequent spoilage are destroyed. If juices are to be produced, the same procedures are followed; the juice from the fruit being extracted in the hand press or the pulper, filtered in the plate filter to remove fine solids, boiled in the jacketed pans and

then filled into cans. Any syrups or brines along with associated additives etc. are made up and boiled in the steam jacketed kettles at the Northern end of the factory and carried by hand in 100 litre stainless steel containers to the filling section at the Southern end of the building. Reference to the photographs in Annex 3 of the filling/ exhausting / seaming operation on grapefruit segments illustrates the methods described adequately.

In manufacturing jams the same basic procedures are carried out, but at the Northern end of the factory. The fruit is tipped onto tables where it is washed using a hose pipe, sorted, inspected and trimmed. It is then cut by hand, boiled in one or other of the jacketed pans and after a pre-determined period removed by ladle and bucket and transferred to the pulping machine. The purpose of this machine is to break up the softened fruit and drive the soft fruit pulp through a fine mesh screen, thus separating coarse skin, seeds and other matter from the pure fruit pulp. The pulp is then transferred, again by hand, back to the kettles where it is boiled and sugar and any other ingredients added, until the necessary degree of sugar solids concentration is achieved. It is again transferred by hand, to the colloid mill for final texture reduction. The hot jam is then filled, either by hand using jugs or similar containers; or an 'AJAX' type piston filler into either cans or plastic jars as decided. If the jam is filled into cans, it is put into the container at minimum 80 degrees Celsius; but if it is being filled into plastic containers the temperature is allowed to fall to at least 60 degrees. This is to prevent distortion of the container due to heat. Enquiries indicate that the plastic containers at present used are made of P.V.C. and it

is worth noting that this is not the practice in Europe or the USA where it is found that PVC does not have the appropriate Oxygen barrier characteristics, thus causing product degradation. There are some schools of thought which consider that there may also be a risk of possible carcinogenic components being transferred to the contents. The filled cans of jam are pasteurised for a short period at 100 degrees Celsius to ensure freedom from subsequent possible spoilage. This is not the normal case in other areas of the world and it is thought that this practice may have been adopted in the past due to poor double seal quality. Comments under the section on Quality Control highlight this aspect.

When tomato is being processed a very similar operation to that used for jam is operated. If whole tomatoes are being packed they are selected from the raw material & after peeling & inspection are packed straight into cans & filled with either water or tomato juice. The fruit left after this selection process is passed through the pulper to remove skins and seeds. It is then passed through the filter press, with coarse papers fitted, for final polishing and after boiling, either filled into cans as juice or further boiled to increase the solids content and packed directly into cans as puree. This is also used as a base for sauce (ketchup) directly, or canned for subsequent use for sauce or chutney.

Wastage of both raw material and finished product is inevitable with the type of operation being undertaken. The machinery is rigid and the methods of handling used give rise to situations where

spillage or loss occurs. Extraction of juice from fruits is inefficient and the yields obtained must be at least 25% below what one would expect from mechanical extraction. In the case of pineapples, fruit is purchased irrespective of size and the cutting to size to fit the rings into the cans leads to gross wastage. In the case of grapefruit segments and to a lesser extent juice, there are also high losses; due this time to the wrong type of fruit being available. (See comments under Field work).

Changes are offered under Chapter III: RECOMMENDATIONS for improvements to both the handling and utilisation of raw materials and finished products and these are illustrated in the plant layout listed as Annex 4.

B: Quality Assurance (Control).

This departments responsibilities are mainly concerned with the checking of final sugar solids and pH (acidity) in jam manufacture and general hygiene within the factory. They are also responsible for checking exhaust box temperatures before use and the assessment of product parameters after processing, viz. vacuum, appearance, pH, etc.. They are also responsible for the chlorination of the raw water supply, it's filtration & storage and checking on a regular basis of residual chlorine levels. They also arrange to have regular tests carried out on the condition of the waters in the stream into which the effluent plant discharges. They have no say in the setting or control of process times and or temperatures other than that associated with jam making, nor do

they control the retorting parameters. The staff had no knowledge of the checking or evaluation of double seams nor had they the equipment to carry out this work. The only equipment in the laboratory is two pH meters, portable refractometer, mercury in glass thermometer, mechanical comparator scales for checkweighing and a small amount of glassware and dishes & an L.F.G. gas ring. There is no way of checking for bacterial infection of cans nor means of incubation either for spoilage checks or post process inoculation. There is no equipment for trials work or product development such as a small pressure cooker; not even a domestic unit which could be used.

The opportunity was taken to give initial instruction to the staff in the technique of double seam evaluation in order that they may cross check against the Maintenance Dept who are responsible for seamer settings. A telex was sent to Metal Box S.A. for the most recent publications available on double seam evaluation as well as the necessary 'industrial' type nomographs for factory use. This IMMEDIATE programme of training is considered essential to the continued integrity of the product and the development of the Department.

Proposals for the necessary minimum equipment felt necessary for the safe and satisfactory operation of the Quality Assurance department are contained in the RECOMMENDATIONS chapter.

C: Maintenance Department.

This department is responsible for the control of processing parameters for pasteurisation and sterilization as well as the

setting up of the seamers. In respect of the latter, the engineer concerned had no knowledge of the methods used for the evaluation of double seams and appeared to have been setting seams to a method taught during his training in the Sixties. This is not to say that the seams examined were faulty, in view of the age and worn condition of the machines, as well as the total lack of spare seaming rolls and chucks etc.; the seams were remarkably good. However, as with the Quality Assurance staff, it was felt that instruction in the accepted methods and systems of double seam evaluation were necessary and he was included in the instruction programme.

In addition to the above this department is also responsible for the general maintenance function within the factory as well as operation of services such as water supply and effluent plant maintenance. The department is also responsible for the steam raising plant as well as its operation and for maintenance of the Companies properties and fabrics. Maintenance of the motor vehicles is the responsibility of the Accountant through Administration & Personnel. The workshop has a minimum of equipment being restricted to electric arc and gas welding machines, a bench grinder, electric pistol drill and angle grinder. Any machine tool work required is either carried out by one of the local tea estates or if they are busy taken to Blantyre (100 km away). Due to the extreme purchasing policies adopted by ADMARC over the last year or two, stocks of spares are virtually non-existent. These are generally restricted to immediate consumables such as oils & grease, welding rods and the like. There are no spare parts for seamers and these appear

to be ordered only on a break-down basis. General inventory management is good, this coming under the responsibility of accounting.

D: Storage Facilities & Management

The storage facilities at the factory appear to be in excellent condition and are very well managed. There would appear to be an excess of old and slow moving stock as well as stocks of soup powders and some consumables which have not been used for some considerable time. The reasons for these high levels and retention of old stock possibly stems from the attitude of ADMARC in trying to maintain the operational values of the company. Inevitably there are stocks of empty cans, since these have to be imported from Zimbabwe or South Africa. At the moment this stock level is dangerously low and as the lead time on these items is of the order of 6 to 8 weeks; failure to order immediately could cause gross loss of revenue during the coming tomato season starting in June / July. There are some stocks of finished goods which would seem to be at least two years old. The reasons for this, other than soups, would appear to be more an internal sales attitude problem than one of redundant manufacture.

In general record keeping appears to be excellent and spot checks of actuals with records was good. Paperwork is effective and comprehensive, both on stocks and accounts and is produced on time and as far as one can ascertain, correctly.

E: Field Work.

Under this area of responsibility is the planning of crop cultivation and purchasing based upon production plans. The cultivation is carried out in full co-operation with the local Dept. of Agriculture at Mulanje and the appropriate Extension Officers located at the village areas. Purchasing of the produce is organised through local Company designated locations called markets. These are generally located at the side of a good surfaced road giving all weather access for the Company collection vehicles. The farmers are responsible for carrying their crop from the growing area to the market and the price paid is based on this. Since none of the farmers met possess motor vehicles, this appears to be an eminently satisfactory system and does help to tie a grower into the Company structure. The growing of a particular crop is organised by the Company Extension Officer, The Ministry of Agriculture Local Extension Officer and a local growers committee formed of farmers who deliver to and are local to the designated market points. In the case of pineapples, no market is more than half hour by lorry from the factory, with tomato, the travelling time is about one hour. Thus, the Company vehicles are able to make 4 & 2 collections daily of about 4 Tonnes each respectively for pineapples and tomatoes. The various markets were visited and a number of farmers were met and spoken with. In each case it was felt that there was a great deal of good will to the Company and a wish for it to both prosper and expand. Payment for produce is on a cash basis and returns for tomatoes particularly are felt by the farmers to be worth while, whilst tomatoes are purchased on a rough grading system, pineapple are

produced as is. It is felt that more emphasis should be placed on the quality, size and quantity delivered to the markets. Some suggestions are outlined in RECOMMENDATIONS section.

One of the products being canned at the time of the report was grapefruit segments. The fruit used is a local hybrid variety with extremely thick skin and coarse fruit cells. As a result the overall yield is low since a lot of weight is in the peel. This coupled with the normal difficulties of segmenting and a break up of the actual segment during processing, gives an unattractive pack. Reduction in processing temperatures only gave marginal improvement in pack quality. The Field Extension Officer, the Chief Accountant & the writer visited the Ministry of Agriculture Research Centre at Eborbwe to see whether they have any stock of Marsh Seedless grapefruit trees and if possible acquire a supply of fruit sufficient to can a dozen cans of grapefruit segments. This variety of fruit is the standard canning variety and the test would prove whether in the future it may be worth while encouraging farmers to grow Marsh Seedless in preference to the existing local type. Similarly with oranges; the juice from the local variety is extremely bitter and tests using Navel &/or Valencia oranges should indicate suitability for factory use and possible encouragement to farmers to grow these varieties. In the event the meeting was held and the representative of the Ministry confirmed that trials were under way with Grapefruit but, as the trees were only two years old, no crop could be expected for another two to three years. In the case of oranges, they were awaiting a supply of disease free stock and anticipated delivery in the next few weeks. Again, it is unlikely that fruit will be

available for at least four years. It is worth noting however that some fruits such as peach, apricot, plum and apple are under test and due to be released at the end of this year.

Subsequent to the above, a source of Marsh Seedless grapefruit was located by Mr. Nanyumbu at Nafisi tea estate, part of Nanyumba estates. These trees had been grafted some years ago for the estates own use as fresh fruit. The fruit will not be ripe until mid-May and it has been arranged with the Manager, Mr. J. Curtis, that the cannery will be given a sample of about 20 kg to carry out segmenting and processing trials at that time.

A copy of a map showing the approximate location of the growing areas for pineapple and tomato is given as Annex. 6.

Fruit Veg.	Month												Growing Area	Price/kg (Tambala)
	J	F	M	A	M	J	J	A	S	O	N	D		
Pineapple	0	0	0		0	0	0					0	Local	15
Tomato						0	0	0	0	0	0		Local	60/35, 60/10
Green Bns					0	0	0						Local	20
Orange				0	0	0	0						Mwanza/Thyolo	10
G/fruit				0	0	0	0						Local	15
Grenadilla	0	0	0			0							Local	35
Mango	0										0	0	Local	6
Guava			0	0	0								Local	10
Paw Paw						0	0	0	0				Local	10
Strawberry						0	0	0	0				Shire Hinds	85
Dry Beans					All Year									k1.00
Peas				0	0	0							Local	30/80
Carrot				0	0	0							Local	20
Potato				0	0	0							Local	50

Table Showing Cropping Pattern & Prices.
(0 = Maxm. Crop ; o = Low Crop)

F: Marketing & Sales.

If one accepts the definition of marketing as being the persuasion of a potential purchaser to buy something they don't want and sales as being able to persuade them to buy something they only think they need; then these functions do not exist at ADMARC Canning. In essence the sales department act as order takers and do not go out and try to sell the product. This may be due in part to the present situation in which the Company exists, but certainly a more active sales force could achieve results. The same sort of procedures would seem to apply at the Lilongwe sales location, a 4 Tonne lorry is used to re-stock that operation. The sales situation is exacerbated by the closure recently of the Blantyre warehouse. Now all orders for the Southern section of the country have to be serviced from the factory and the balance from Lilongwe. This results in orders being held back until a full van, (Tovolo Dyna) load is ready; at which time a delivery is made. There is some evidence to suggest that orders have been lost as a result of the decision to close the warehouse as the smaller wholesalers/retailers have gone elsewhere for supplies rather than wait for deliveries. It was common for customers to call at the warehouse for items, thus saving the cost of delivery. On this latter point it would seem to be an anomaly that a discount is offered if goods are delivered to shops or warehouses as well as credit terms of from 30 to 90 days. Not only does it cost more to make individual deliveries, but at the same time goods are being taken to the point of sale and not being paid for until anything up to three months later. The costing of product would appear to be based on an average

budget of costs and production. If for any reason the budgeted sales are not realised, the recovery of costs is not made and losses ensue. It would be more logical if the budgeting was sales driven instead of historically driven as is now the case. By adopting this method a system of cost centre accounting could be installed which would highlight loss generating situations as soon as they occurred as well as also informing management of any variations in costs due to other causes, e.g. breakdowns, high wastage, failure to achieve sales targets etc.. At present it is almost inevitable that the Company is in the situation it is.

In general terms, the Company's paperwork is excellent and there are excellent records kept of the various production / stock aspects. Stores documentation would seem to be of a similar standard and the conclusion is that ADMARC, as owners, installed excellent accounting & recording procedures but failed to recognise that unless sales were made at a profit, the Company would fail. Judging by some of the slow moving finished goods stock as well as some of the consumeable stock (i.e. soup powders), it would appear that the classic sales excuse of "if you only made what we aren't now making, I could sell it", has been applied and the General Management have fallen into the trap of over diversifying. As outlined in RECOMMENDATIONS it is felt that a concentration on a smaller range of products made in volume and aggressively sold would give better results.

G: General.

None of the equipment at the factory is new and most of it is at least twenty years old. The motor vehicles, with the exception

exception of the Toyota delivery van, were bought in the 70's. The production plant is of considerable age and some of the seams date from the early 60's. All equipment is clean, though some redundant plant should be taken out of the factory. As stated there is an acute lack of spare parts and this inevitably leads to poor quality seams on cans. Maintenance costs are high for the type of operation, again because of equipment age. The factory floor is pitted due to erosion by fruit juices and this floor would be better re-surfaced using one of the proprietary epoxy resin compounds developed for such a purpose. In general the factory services such as effluent treatment, water & steam appear to be adequate and operating satisfactorily. The oil, wood fired boiler appears to be extremely good and certainly is far more economical regarding fuel costs. Some attention may have to be paid to raising the feed water tank when condensate is returned to it from the factory, as should water temperatures be raised there is a danger of the boiler feed pump cavitating and causing possible damage &/or loss of feed water supply to the boiler.

The quality of labour at the factory appears to be generally good as does the supervision. Labour turn over is low and a nucleus of employees, including supervision & management live in Company property adjacent or close to the plant.

III: CONCLUSIONS.

The Company in its present form can no longer exist. It has been in a loss making situation for a number of years and does not have both the will and the technical expertise to recover its losses.

AGREED, have other interests and have not been able to devote the time or money, or the necessary expertise to solve the problem. In the end they have tried to sell the Company and a group of local entrepreneurs has indicated interest and signed heads of agreement for the purchase. It is essential that they give serious consideration to at least the **IMMEDIATE RECOMMENDATIONS** which follow, otherwise they will just throw their money away as the Company cannot survive. If a programme generally as outlined in the remaining **RECOMMENDATIONS** is followed, then there is no reason why the Company cannot survive and prosper. It is considered that a phased investment programme be undertaken rather than try to carry out all the alterations at one time. This latter course could lead to too high interest charges which could not be recovered against the slow build up of sales which is likely to occur.

Serious consideration should be given by both UNIDO and UNDP to arranging this phased investment on favourable terms or through the appropriate Trust Fund mechanism in order that the Company can survive. For, on its survival depends a not inconsiderable section of the local farming community. Expansion of the production along the lines indicated would lead to an expansion of the raw material supply base and hence an improvement in the local economy. Import substitution can be attained and extra as well as intra-regional exports sought and obtained. The recommended systems and equipment layout would make any product from the factory perfectly acceptable on the general world market including the EEC.

IV: RECOMMENDATIONS.

The recommendations put forward for the rehabilitation of the ADMARO Cannery are divided into three parts, i.e. B: IMMEDIATE; C: SHORT to MID-TERM and D: MID to LONG-TERM.

The IMMEDIATE recommendations have either been instituted by the writer during the first phase of the project or should be put into effect by either the present or proposed new owners of the operation on an urgent and necessary basis.

The SHORT to MID-TERM recommendations should be instituted as soon as is practically possible with reference to funding etc., but no later than as to allow the initial works to be completed by the start of the pineapple season of 1992, i.e. December 1991.

The MID to LONG TERM recommendations should be started about the middle of 1992 and be phased over a period of approximately two years.

The IMMEDIATE recommendations are felt to be essential to the continued safe operation of the cannery, whilst the SHORT to MID-TERM are to start the re-equipment, allowing production to be updated and raw material recovery and finished goods quality improved. The MID to LONG TERM are felt necessary in order to modernise the cannery operation, reduce wastage, increase output & improve quality and rationalise labour utilisation.

A BAR CHART showing the approximate phasing of the various recommendations outlined is given as ANNEX 7.

ANNEX 4 shows a suggested factory layout using mechanical handling techniques as well as modern equipment to improve raw material utilisation, product quality and labour utilisation.

The adoption of the suggested layout would also increase the

ultimate capacity of the factory, thus expanding the farmer supply base and ultimately the economy of the area.

A: Factory Layout.

In essence the proposed layout of the factory has the incoming raw materials entering the factory at the Southern end, being prepared, sorted, processed and packed and leaving at the Northern end for storage &/or despatch. In it's final concept the process flows for the various products are listed below, the plant numbers referred to are the item numbers shown on the Machinery List, ANNEX 5.

Pineapple

The pineapples are fed into the Ginneca (6) for coring and slicing and the cylinders are passed onto the conveyor (7) for slicing and then pass to the visual inspection conveyor (11). Here blemished and damaged product is removed and fed by hand to the juice extractor (4) with the waste from the Ginneca or is removed and utilised for 'chunk' & 'crush' production. The extracted juice is passed to the finishers (5) for polishing and pumped to the blender etc. (14) or into tank (20B). Waste from the juice extractor and finishers is taken to an outside disposal bin via a screw conveyor. The good sliced fruit is packed into cans on (11), the cans being supplied via a can track, which is fitted with an in-line can washer, to the overhead conveyor (part of 11) ; from the floor above which is at present a general store area. The filled cans pass onto the flood fillers (15) where they are filled with heated natural juice or syrup from the blender(14). From the filler (15), the filled cans pass through

the exhaust box (15) where excess air is removed and then on to the sealers (17) for sealing and then to the retorts (18) in this case for pasteurising. The processed cans are cooled in the canal (19), removed by hoist and passed on for labelling and packing into cases. Alternatively the cans may be packed into cases un-labelled for later labelling before despatch.

Tomato

The fruit is fed into the flood washer (1) where field dirt etc is removed. From there the tomatoes are passed over the inspection conveyor (2) where rotten fruit is put for waste and damaged fruit is passed for hand scalding and then to the hot breaker (11). Sound fruit passes through the steam blancher (3) where it is softened and blanched. The fruit passes along transfer conveyor (10) where material unsuitable for packing as whole tomato is returned to the breaker (12). The tomato skin is removed by hand or conveyors (10) & (11) and the whole tomatoes are packed in a similar manner to pineapple using tomato juice or water-saline via blender (14). Alternatively, if it is not wished to can whole tomatoes, all the fruit after blanching passes through the hot breaker (12) and the finisher (13) and pumped to tank (20B). From this tank the juice is pumped to the vacuum boiling pan (21) where, by the addition of further ingredients it can be made into tomato sauce (ketchup), reduced by boiling to puree or just boiled as straight single juice. In each case the product is pumped from the vacuum boiler (21) via the comminutor (22) for final size reduction and to the appropriate filler for sauce (23), cans or jars (24) or sachets (30). It is proposed that a minimum amount of tomatoes be processed, basically to allow for the

production of puree at about 30 degrees solids (Brix) which would be packed into 200 x 5 litre cans for subsequent use of season use for sauce, juice or 'Beans in Tomato Sauce' production.

Fruits

In the case of fruits (other than grapefruit or orange) the material is passed through the washer (1), inspected, trapped & rejected on the inspection conveyor (2) passed via (3), set to a lower temperature than for blanching in order to soften the fruit and then through the hot breaker (12) and finisher (13) and then depending on whether it being used as pure juice or jam to the blender (14) or the storage tank (200). As natural juice the product is blended, diluted, filtered and heated in blender (14), then pumped to the flood fillers (15) where it is filled into cans, exhausted/pre-heated, sealed and processed in a similar manner to pineapple. The overhead conveyor associated with (11) can be adjusted to feed cans direct to one or other of the flood fillers for filling of juice only. If jam is being produced, the fruit pulp is pumped to tank (200) from where it is processed in the vacuum boiler (21) pumped via the Commitrol (31) and then, via the heated intermediate holding tank (25) to the appropriate filler viz. plastic/glass jars and cans (26) and sachets (30.) As can be seen, both vacuum boiling pans (21) when installed, can be used to produce either jam or tomato products; thus increasing production capacity on each of the products.

In the case of orange and grapefruit juice it is proposed that juice is extracted by hand on a unit similar to that shown in FIGURE 6. In this unit the fruit is previously halved by cutting across the axis. The two halves of the fruit are presented front

side to, and pressed upon, the revolving heavy sphere juice extractors attached to the electric motor shaft ends. This extraction process can be comfortably carried out under the canopy at the South East corner of the factory. The juice is collected by a simple chute and tray system into containers which can then be transferred by hand into the infeed of the finishers (5). The juice then follows a similar process route as pineapple juice any required sugar or dilution etc being carried out at blender (14).

Vegetables

In the case of vegetables such as peas and green beans the material is fed through the washer (1) and on to the inspection conveyor (2). At this point the peas are hand shelled and the pods thrown to waste. The shelled peas as well as the beans (French processor bush type) pass through the steam blancher (3), via the transfer conveyor (10) and are filled, exhausted and sealed in a similar manner to pineapple. In processing, these products are sterilised under pressure at a temperature of 115 degrees Celcius in the retorts (18), cooled in the canal (19) and packed 'bright' or labelled as required.

In the case of root crops eg carrots and potato, the material is washed in (1), inspected, trimmed &/or rejected on (2) and then, as the projected initial volumes are low, batch peeled in the existing abrasive peeler. The peeled product is further inspected, trimmed &/or rejected; blanched in (7), conveyed (10) to the packing conveyor (11). From this point processing is similar to peas and beans.

Preparation of Tomato Beans.

This is not a large volume product, but is moderately popular. In the production the dried haricot beans, obtained from A1480, are soaked for the required period, tipped onto and inspected on conveyor (2), blanched in (3), conveyed via (10) and packed, by hand on conveyor (11). The tomato sauce is re-constituted from puree packed in A10 cans and mixed with the appropriate water, vinegar, spices etc in the blending unit (14) and filled into the cans containing the beans as they pass through the flood fillers (15). Processing etc thereafter is similar to peas and beans.

B: Immediate Recommendations.

1: Double Seam Evaluation.

As stated, neither the Quality Assurance nor the Maintenance staff had any knowledge of double seam evaluation. The writer showed the Q.A. staff how to check a double seam and instructed them in the use of the standard nomograph which allows the seam characteristics to be enumerated. C.M.B. Packaging, Harare, were contacted by telex and asked to send, on an urgent basis, the most up to date manuals and industrial nomographs on this matter for retention and future use. As a matter of course, the Quality Assurance staff will now record the seam parameters on a regular basis when they record the normal finished product details. As an interim measure, arrangements have been made for initial training in seam technology and evaluation to be carried out by General Tinsmiths, Blantyre for the Q.A., Engineering & Production staff, this training be accomplished within the next three weeks from mid-April 1981.

2: Product Specifications.

There are no comprehensive product specification sheets in existence at the cannery; the ones in use are either incomplete or have been modified and the changes not recorded. A sample of a blank sheet with the type of questions to be completed is shown in ANNEX B. The Quality Assurance, Maintenance, Production & Field Staff should co-operate in the compilation of these specifications and ensure the updating is carried out if and when any changes to any aspect are made. The purpose of the specifications is to ensure that a full record is always available in the absence of any staff for any reason of the full

details and specification concerning raw material, filling, processing, capping and can type & fill. It is also a record of the operation of the cannery should the Bureau of Standards require any written documentation of the process. The compilation of these specifications is being implemented NOW (April 1981).

3: Technical Management.

It is essential that a qualified and experienced technical manager is installed at the earliest possible date. The cannery has been without such a person for at least 4 years and possibly longer. Many poor practices have crept into the operation and it is obvious that since 1984 there has been no updating of standards or processes. It would seem that Mr. Runne, personally, kept a close check on processing, but no comprehensive process specifications were produced; and from the methods and practices found in operation at the cannery it would appear that some of the methods used even then were suspect. Thus, the Manager must be a person with considerable practical experience who is able and willing to lead by example. He should preferably have had experience in a similar sized operation and be fully acquainted with all the aspects of running a cannery, including administration and finance. In this way his influence will be felt at all levels of the operation and by exercising this practical leadership, the correct methods and systems will be passed on to the staff.

4: Working Capital.

An injection of money is urgently needed to cover the cost of essential spare parts and consumable items as well as a supply of

empt. cans.

The company has been starved of working capital for a considerable time. The result of this is a critical shortage of cans and spare parts which if not corrected could lead to loss of production due to shortage of the former or machinery breakdown. There is a grave danger of product spoilage from poor seams due, in part, to the deterioration and wear on seamer consumable items.

5: Sales Programme.

A serious attempt should be made to institute a programme of aggressive selling of the Company products. There should also be an effort made to tie down the larger customers to an annual contract of supply as well as agreeing for delivery to take place only to their central warehouse: thus giving a base from which to plan production. This may involve giving discounts, but if costings were realistic, then this type of discount could be built in to the system. It should also be considered that further premises be obtained for use as distribution point/warehouse in the Limbe / Blantyre area. The practice of delaying deliveries from the factory until a full van load is ready causes concern and is believed to have lead to a loss of customers. The unit need not be large since the stock should be turned over at a fast rate. It is also recommended that sales be concentrated, initially, on pineapple and tomato products since these two items are local to the factory and the quantities grown can be increased with little effort.

From a personal survey carried out on small shopkeepers and vendors in the Blantyre & Limbe areas, it is obvious that the

products packed at FOMARE Canneries are too expensive for the mass of the population. It is therefore suggested that serious consideration be given to the IMMEDIATE purchase and installation of a sachet form fill packing machine to enable a pack of jam and tomato products to be offered at a price in the region of 40 to 60 Tambala. At this price it is confidently predicted that the sales volume of product will rise as the pricing should now be within the affordability of the 50% of the lower income group of the population. Discussions with staff at FTD & Mandado confirm that a pack of jam / tomato product selling at the price indicated would be an acceptable addition to their range. They cite the recent introduction by Lever Brothers (Malawi) of a 50 gramme pack of Margarine at a retail price of 50 Tambala, sales indications of which show increasing volume.

A concentrated effort should be made to re-institute export sales to neighbouring countries such as Zambia, Zimbabwe and Mozambique. There are indications that there could be a substantial market in these areas, as attendance at trade shows etc. outside Malawi have resulted in the sale of all samples and telephone enquiries for further product. A more active sales staff who have had experience in selling fast moving consumer goods in a more aggressive environment should be recruited. A reduction of credit periods from 90 days to a more realistic 30 or maximum 45 days should also be considered.

C: Short to Mid-Term Recommendations.

Equipment

The cannery floor has been badly eroded by fruit acid attack over the years. Though it is not necessarily a severe detriment if factory hygiene is good, it would be better if the floor were resurfaced using one of the epoxy resin surfacing materials developed for this specific purpose. The floor could be treated in sections, ideally when the equipment is being installed and a particular section is clear. The material could be applied by the cannery's own building staff without any difficulty.

As mentioned previously, it is recommended that a secret form / fill machine (liter 30) be purchased as soon as possible in order to extend sales to the lower income groups at present excluded due to high unit purchase cost. Product can be fed into the machine quite easily by hand from the existing manufacturing operations.

It is recommended that the following items of equipment be purchased and installed also by November 1991:-

Item	Description
4	Screw type juice extractor.
5	Twin unit finishers.
14	Blending/filtering/heating unit.
16	Steam exhaust box & associated conveyors.
21	One off 250 litre vacuum boiling pan.
31	Urschell type Continuator for final product finishing.

This would allow the efficient extraction of fruit juices, the local preparation of juice or syrup for pineapples, the efficient and accurate exhausting of product (the existing equipment is

are completely useless and the preparation of good quality pans, cones, cones etc. as well as the more efficient utilisation of fuel and labour. The equipment can be installed in the location indicated on Drawing ANNEX 4 with a minimum of disturbance to existing equipment. Possibly one or two of the existing boiling pans may have to be removed, but the greater efficiency of the vacuum unit will more than compensate for the loss of these items.

Plant operating manual.

This document should be prepared within the next twelve months. Its purpose is to formally set down all the operating and documentation procedures at the cannery in order that, at any time, a newcomer to the plant can familiarise himself with all aspects of its operation. Of necessity, this document will involve every member of the staff in ensuring that all aspects of the operation are covered.

Quality Assurance.

The equipment carried by this department is minimal. It is recommended that the following equipment be purchased and installed by November / December 1991 :-

One incubator for laboratory bacteriology checks and sample incubation tests.

One 4000 gramme electronic balance, accuracy to 0.01 gm.

Set Flow cups for viscosity measurement.

One Distilled water unit with spares.

One Lovibond MxIII nessleriser with disks for colour matching and chlorine measurement (0.5 to 6 ppm).

Three digital electronic thermometers 0 to 150 degrees Celsius. (Present mercury in glass destroyed).

Set of Petri dishes with necessary culture media, bacteria counting equipment etc..

One compound microscope, field of view 1.382 mm at 9x to 125 magnification with drop in ocular dis- ruled in squares each 1/6th of field dia. with slides etc.

One locally made large incubator cupboard. Use lamps or electric black heaters with thermostat control. Use for production quarantine tests.

One laboratory size retort. Can be used on existing gas hot plate. Use for product development / process checking.

Set of suitable PLASTIC beakers, pipettes, burettes flasks for general work in food environment.

One Bunsen burner for use on L.F.G.

Training

It is essential that a programme of training is instituted for the Supervisory staff. It is suggested that the G.A. staff and the Maintenance Supervisor undergo a seam evaluation / Quality training course at Metal Box Zimbabwe or Kenya at the earliest opportunity. The Production Supervisor should be sent on a course covering production techniques in a similar cannery to ADMARC Canners in Europe, Australia or Kenya. A recommended training schedule is shown on ANNEX 7 under SHORT to MID-TERM recommendations.

General

It is also recommended that serious consideration be given to reducing both the size range of the cans used and the product range. Metal Box South Africa, who are the normal suppliers of cans to the Company, are stopping producing all tin plate cans from April 1st 1991. From that date they are only producing can bodies made of standard tin plate and ends made from tin free steel. In

this method of manufacture, the mild steel end material is coated with a thin layer of chromium & chromium oxide. The outer and inner surfaces of the end are then lacquered to further protect the metal. This results in a greater number of lacquers than used with tin plate since the outside has to be lacquered to withstand product and processing. The alternative source of cans is from CMB Packaging Harare, Zimbabwe and prices are being sought from this source. With regard to size rationalisation; at present there are some 7 cans sizes in use. This creates problems of stock control as well as cash flow.

Stock control, because different products require different internal lacquers and hence segregation of types is essential.

Cash flow, since can deliveries are about 6 to 8 weeks and have to be paid for on ordering, thus moneys are paid long before delivery of the goods. It is recommended that the can sizes be as follows :-

66 X 79	;	227 grammes
73 X 97	;	450 grammes
99 X 119	;	820 grammes
157 X 178		This size is known as A10 and would be used for storing tomato puree, & pineapple crush etc. for use out of season.

Serious thought should be given to renewing contacts with General Tinsmiths who have in the past supplied cans to ADMARC Cannery.

At a meeting with their management, they guaranteed that they would supply side seam welded cans sourced from and initially supplied in flattened form to them by CMB Packaging, Harare, (Metal Box). They would guarantee through themselves and CMB that the material would be supplied by CMB and that all lacquers would be to CMB specification. In this way, agreements could be reached for smaller draw off quantities and hence better control over

cash flow as well as very probably, payment in Kwacha. On their part, General Tinetti specifies that all seeds etc. made or done at the ADMARC Cannery should be to recognised CMI standards in order that they may guarantee can integrity.

It is also recommended that, based on the work done on the Product Specifications (see section B:2), a raw material specification schedule is developed in order that both the Farmers and the Quality Assurance staff know what type of product should be supplied to the Company. These specifications should indicate the size, type, ripeness and appearance of the produce as delivered. Any substantial deviation from these could result in a price penalty. Farmers must be made to realise that the material that they supply must be further processed and that the Cannery does not exist as a place to dump their crops. It is also recommended that every effort be made in conjunction with the Ministry of Agriculture Research & Extension staff to seek ways of extending cropping seasons of pineapple and tomato either by artificially inducing fruit setting in the case of pineapple or using other varieties of fruit in the case of tomato.

It is further recommended that a system of 'Cost Centre' accounting is installed. This would give greater management control over the variables of production and selling and would enable it to take corrective action with greater speed and effect than is now the case. With regard to reducing the product range, it is felt that this is too wide for the present size of the Company. An in-depth analysis should be undertaken with a view to identifying and removing items. It should then be considered whether the contribution of its stocks at the factory justifies the low value of sales.

Ideally, if all fixed and variable costs could be recovered against pineapple and tomato products, the profitability of other items would be of a very high order and more marginal production could be undertaken.

D: Mid to Long Term Recommendations.

It is recommended that the following items of equipment be purchased and installed in the period February to April 1992 :-

Item	Description
1	Flood type washer.
2	Inspection belt.
3	Steer type slicer.
8	Inclined transfer conveyor. 0.5m X 5.5m
9	Inclined transfer conveyor. 0.5m X 3.5m
10	Inclined transfer conveyor. 0.5m X 6m
12	Hot breaker for tomato & fruit.
13	Finisher associated with 12.
20(B)	One off 2,500 litre s/s tank.
	Associated pumps, valves & pipework.

The installation of this equipment will increase the mechanisation associated with tomato processing as well as allowing a greatly increased tonnage of fruit to be handled.

The next stage would be the purchase and installation of the following items of machinery in the period August to October 1992 :

Item	Description.
7	Inspection type conveyor & re-locate pineapple slicers.
11	Inspection/filling conveyor with can tracks, washers and work in store above production area.

- 15 Two off flood type fillers.
- 17 Two off 100 cans per min. sealers.

This equipment would complete the mechanisation of the pineapple line allowing further increases in the input of fruit to the cannery for the 1993 season.

The next stage is the purchase and installation of the following by May / June 1993 :-

Item	Description.
20(C)	2,500 litre s/s tank.
21	One off 250 litre vacuum boiling pan.
22	Locally made tables.
23	Sauce bottle filler / capper.
24	Tomato sauce cooling unit.
25	Electrically heated intermediate jam tank.
26	Piston type jam filler.
27	Locally made table for hand capping.

This, along with the re-location of existing plant would complete the major plant re-organisation allowing greater input of tomato during the 1993 season as well as improving the quality of jam production.

The following plant should be purchased and installed towards the end of 1993 or the beginning of 1994, thus allowing the aseptic packing of fruit / tomato juices in a plastic bag type container for sale in any location since the shelf life, unrefrigerated would be of the order of 6 months. Besides fruit juices, this equipment could be used out of season for packing flavoured drinks etc for general sale. Products packed on this machine could also be aimed at schools supplementary feeding programmes

using vitamin fortified drinks.

Item	Description.
32	Pro Pac type aseptic form/fill machine for juice etc.

E: General.

As a general comment on the foregoing recommended improvements, if it is felt that the time scale is too short, it is quite feasible for the programme to be deferred for a period of twelve months. However, the recommendation regarding the sachet form fill machine should be adhered to as it is felt this would make significant contributions to turnover and profitability for the Company. A delay of a year would also allow the new Technical Manager time to organise himself and the labour before committing him to a programme of rapid development and change at a time when he settling in to the new responsibilities.

There are nine vehicles on the Company books varying from 4 Tonne flat bed vehicles used for collection of fruit and vegetables to a motor cycle used by the Farm Extension Officer to visit growers and farmers. Apart from the motor cycle the youngest vehicle is 7 and the oldest 21 years old. Maintenance costs, mileage and fuel consumption of all the vehicles is high and consideration should be given to replacing all the vehicles in a phased manner over the next two or three years.

The Company possess a number of houses both for factory and management staff, all of which appear to be in good structural

condition. It is possible that some expenditure may be needed to cover decoration, re-furnishing and furniture.



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT IN THE REPUBLIC OF MALAWI

JOB DESCRIPTION

DP/MLW/88/018/11-55/J.12206.

- Post Title:** Consultant in the processing, preservation and canning of fruits, vegetables and juices
- Duration:** Three months (split mission, two months* plus one month)
- Date Required:** As soon as possible
- Duty Station:** Mulanje, Malawi with travel within the country
- Purpose of Project:** The main purpose of the project is to improve industrial productive capability and capacity through the development and application of appropriate industrial management systems and consultancy services, with a view to increasing national income and employment.
- The specific purpose of this assignment is basically to undertake a diagnostic study of the problems of ADMARC Canning Company, and assist in the rehabilitation and improvement of its performance.
- Duties:** Under the supervision of the CTA, and in close cooperation with the management of the ADMARC Canning Company, the consultant will undertake the following duties.
- 1) In the first part of the mission (two months), the consultant will:
Obtain a complete overview of the operations of the Company in Malawi and neighbouring countries regarding import substitution, export and future market development.
 - 2) Regarding raw materials, the study will cover:
availability of various types of fruits and vegetables, both present and potential. Emphasis will be placed on quality and flow of raw material, methods of procurement, and transportation;

* Separated by one month

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

Project Personnel Recruitment Branch, Department of Industrial Operations
UNIDO, Vienna International Centre, P.O. Box 300, A-1400, Vienna, Austria

recommendations will be given for improvement; and advice will be given on long-term plans on development of owned farms, including farming collection and handling methods.

- 3) Undertake complete diagnostic study and provide recommendations on processing of fruits and vegetables on the factory shop floor, with emphasis on the following:
 - Present methods and process flows used for the manufacture of various products.
 - Layout and material handling systems.
 - Use of energy and propose alternative and cheaper sources of fuel.
 - Study wastage and proposals to control them and effect cost reductions.
 - Study present pattern of machine utilization and proposals for modernization.
 - Quality control on the shop floor and proposal for micro-biological laboratory.
 - Repair and maintenance of machinery including the inventory management of spare parts.
 - Storage facilities and storage management.
- 4) Undertake complete diagnostic study of the existing marketing and distribution systems and provide advice on packaging, and on the improvement of the distribution system.
- 5) Make recommendations on product diversification backed up by simple project profiles as necessary.
- 6) Make recommendations for manpower development at all levels of the company personnel.

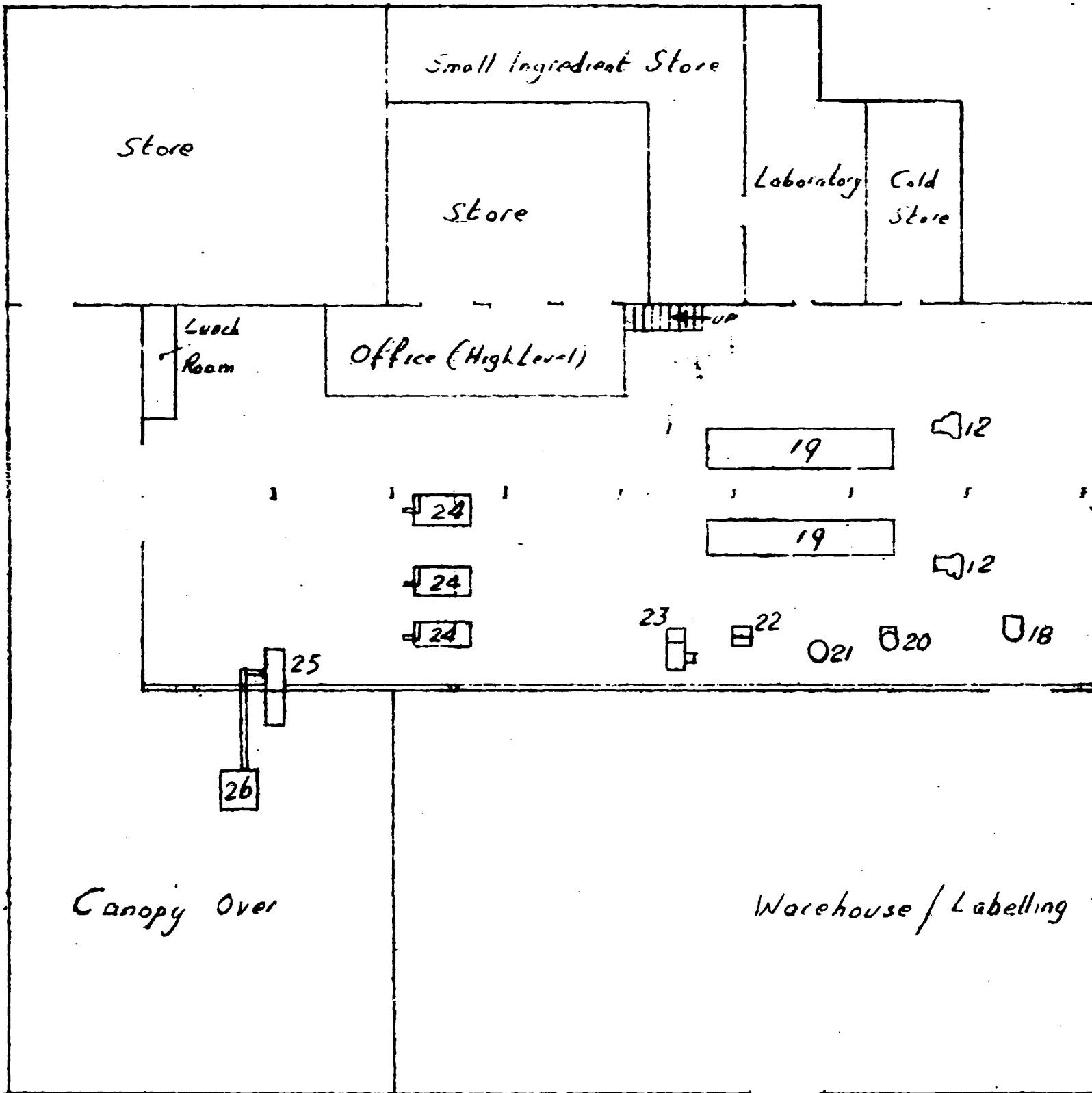
In the second part of the mission (one month) the consultant will undertake the following:

- 1) Review progress of work regarding acceptance of the diagnostic studies and implementation of the recommendations provided.
- 2) Assist in the further implementation of the recommendations where necessary to bring about a full rehabilitation of the operations and performance of the Company.

The consultant will be expected to prepare a final report setting out the findings and recommendations of the mission on future actions which might be taken by the Government.

Qualifications: University degree or equivalent in food technology or food engineering, specialized in fruit and vegetable processing, with extensive experience in the processing, preservation and canning of fruits and vegetables.

Language: English

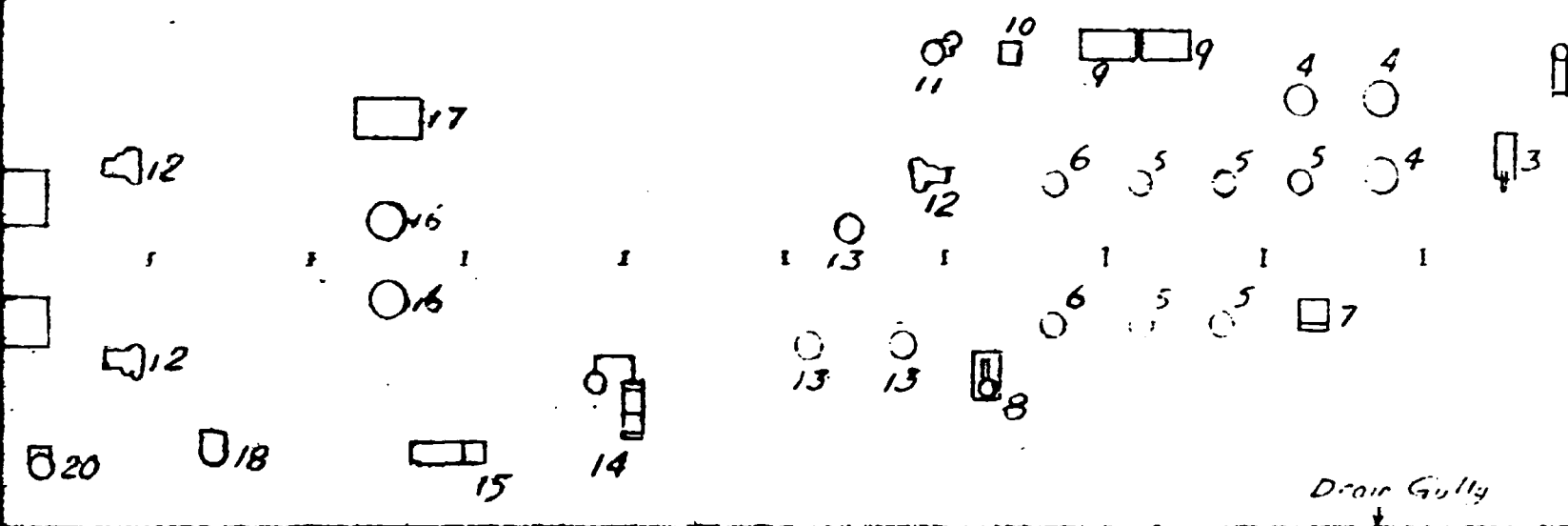


NOTE: 40+ 2.3m x 1m Skylights, steel tubes NOT shown

SECTION 1

Item	Description	Item	Description
1	Bellini de-hydration cabinet	10	Mince
2	Probst & Class Colloid mill	11	12 Hens
3	Ultrasonics Ltd. 2P Homogeniser	12	M-B 94
4	200 Litre Steam kettle (fixed)	13	M-B 1A
5	170 Litre " " "	14	Columbit
6	270 Litre " " "	15	Leachard
7	Army 500 kg Platform scale.	16	Keloids
8	Piston type jam filler.	17	Can cost
9	Hot water baths for can washing	18	M-B 24

Cold Store



use / Labelling

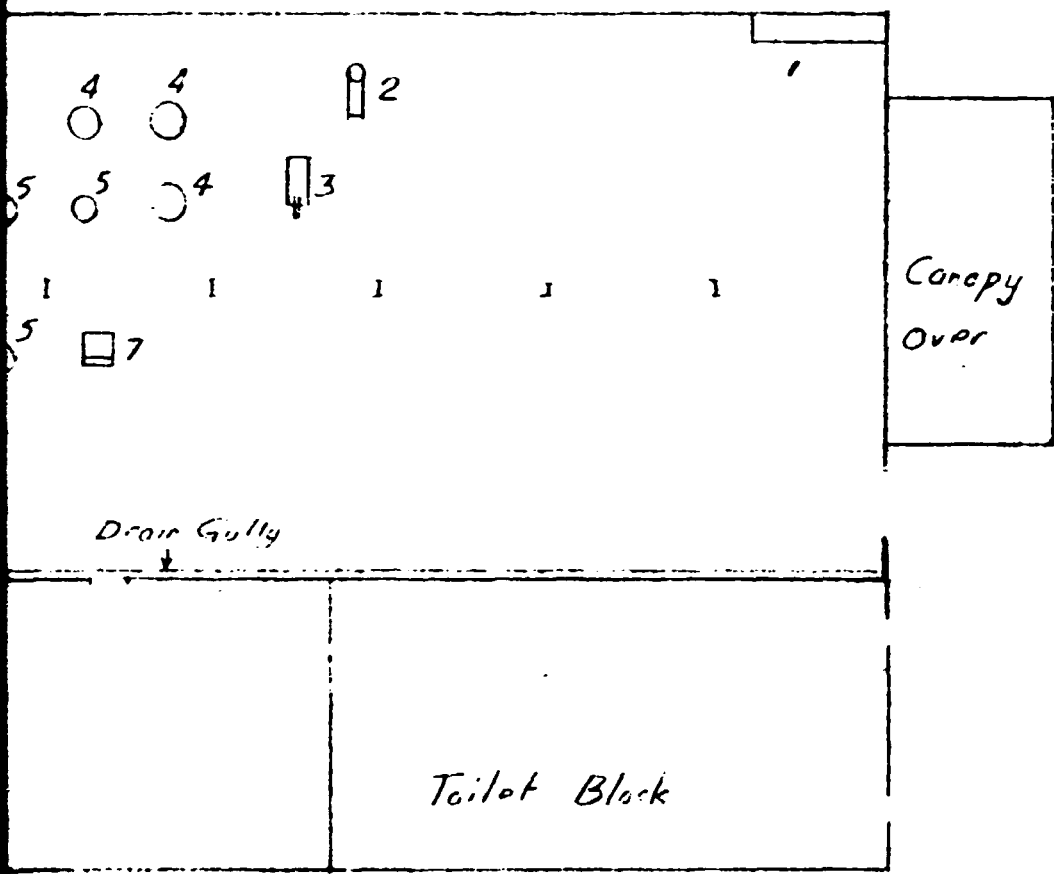
Officers



MARCH 1
EXIS
ADM

shown SECTION 2

Item	Description	Item	Description
10	Mincer (4/3)	19	6m x 1m Exhaust box
11	12 Head liquid filler	20	Metal Closure 15 ROPP Copper
12	M-B 9DS Cleaner/Slicer	21	MJM abrasive Vegetable peeler
13	M-B 1A Hand fed scanner	22	Hand operated fruit juice press
14	Columbit Plate filter/pump/tank	23	Hobart fixed blade dicer
15	Leonhardt fruit pulper	24	Rock Pineapple slicer
16	Relocks with coast & temp controls	25	Ginera pineapple corer/sizer
17	Can cooling tank	26	Pineapple waste bin (high level)
18	M-B 24DS A10 size scanner		40+ off 2.3m x 1m 1/3 tables



SECTION 3

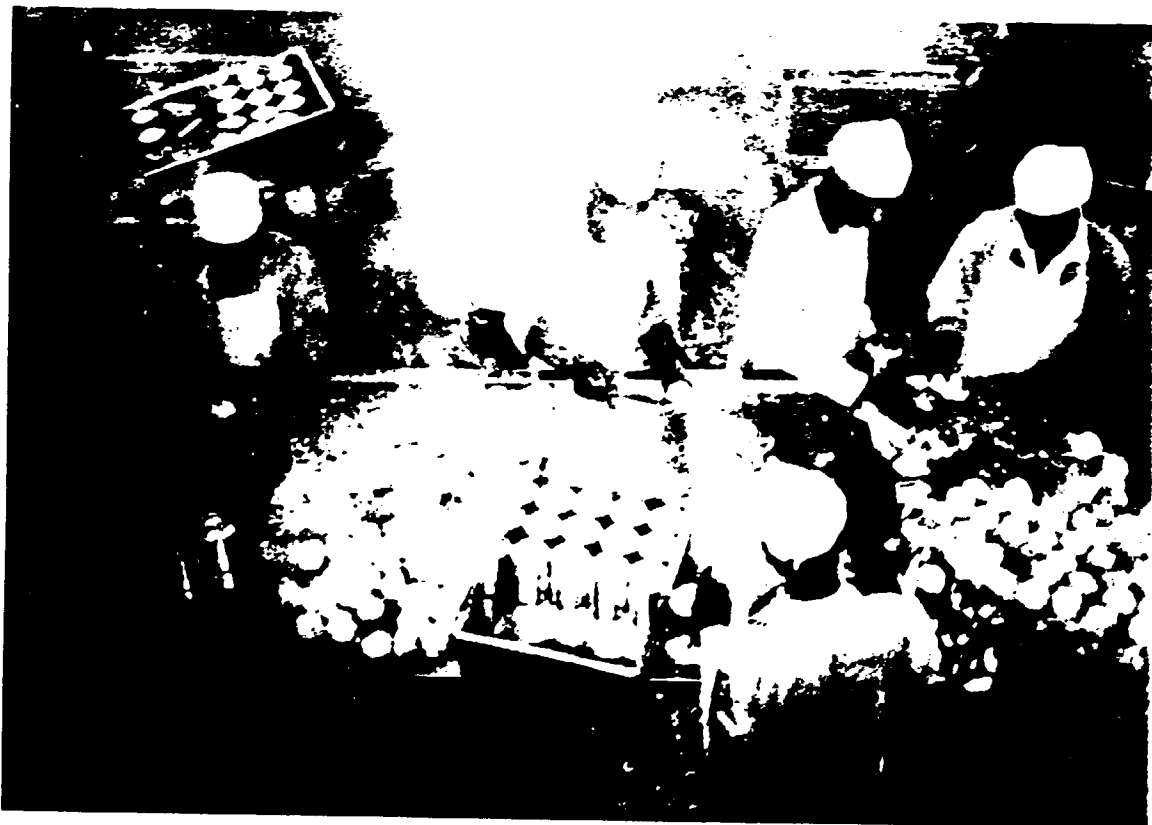
MARCH 1991 Scale: 2:300 ANNEX 2

EXISTING PRODUCTION PLANT LAYOUT

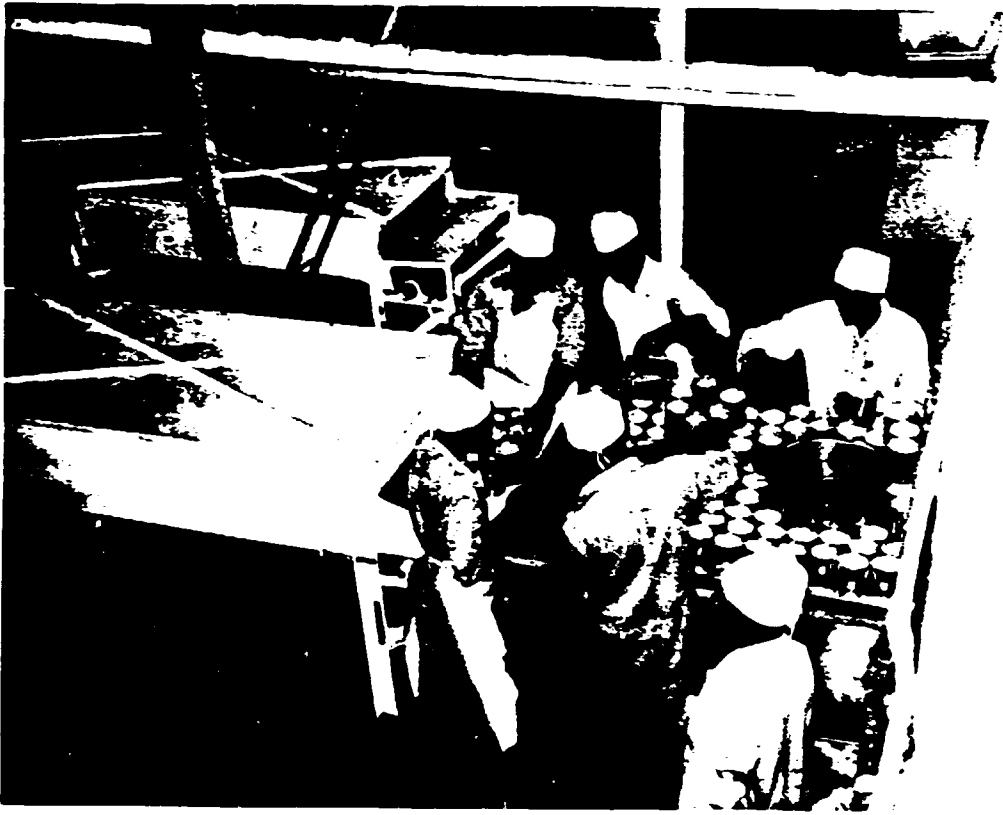
ADMARC CANNERIES, MULANJE, MALAWI



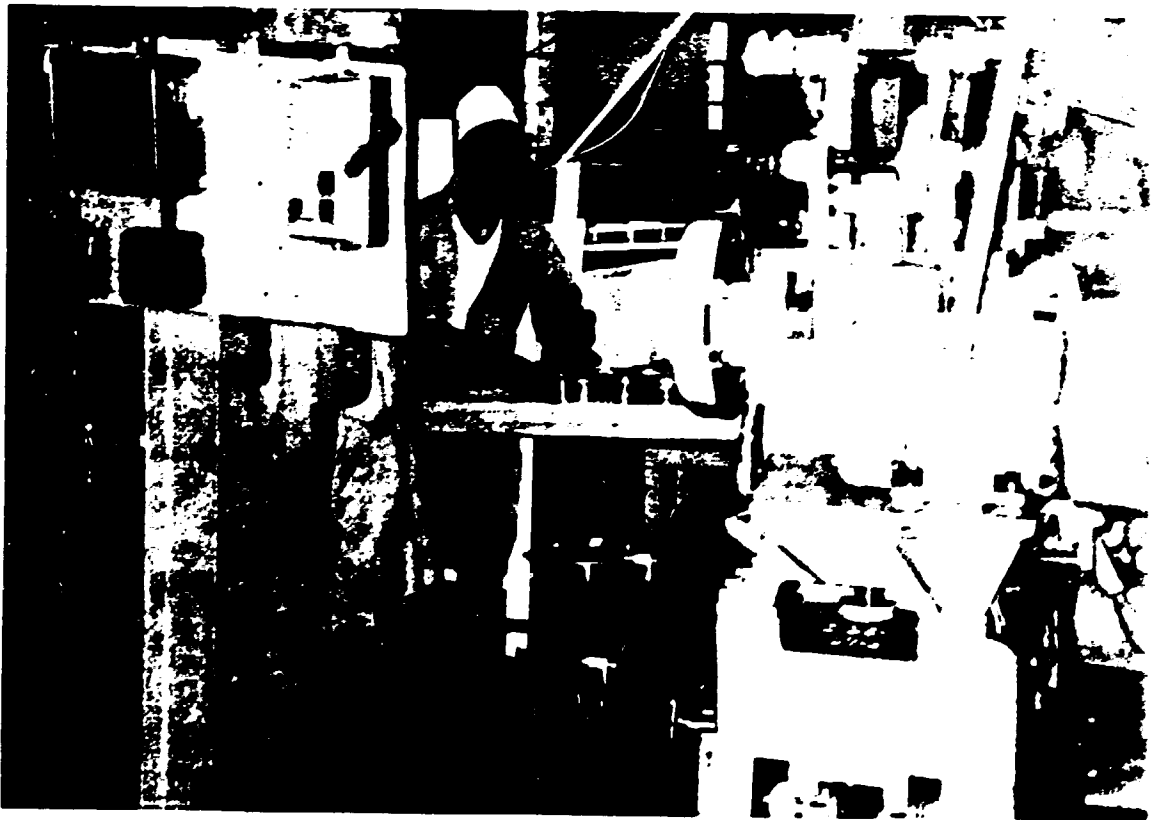
GENERAL INTERNAL VIEW OF PRODUCTION AREA OF CANNERY



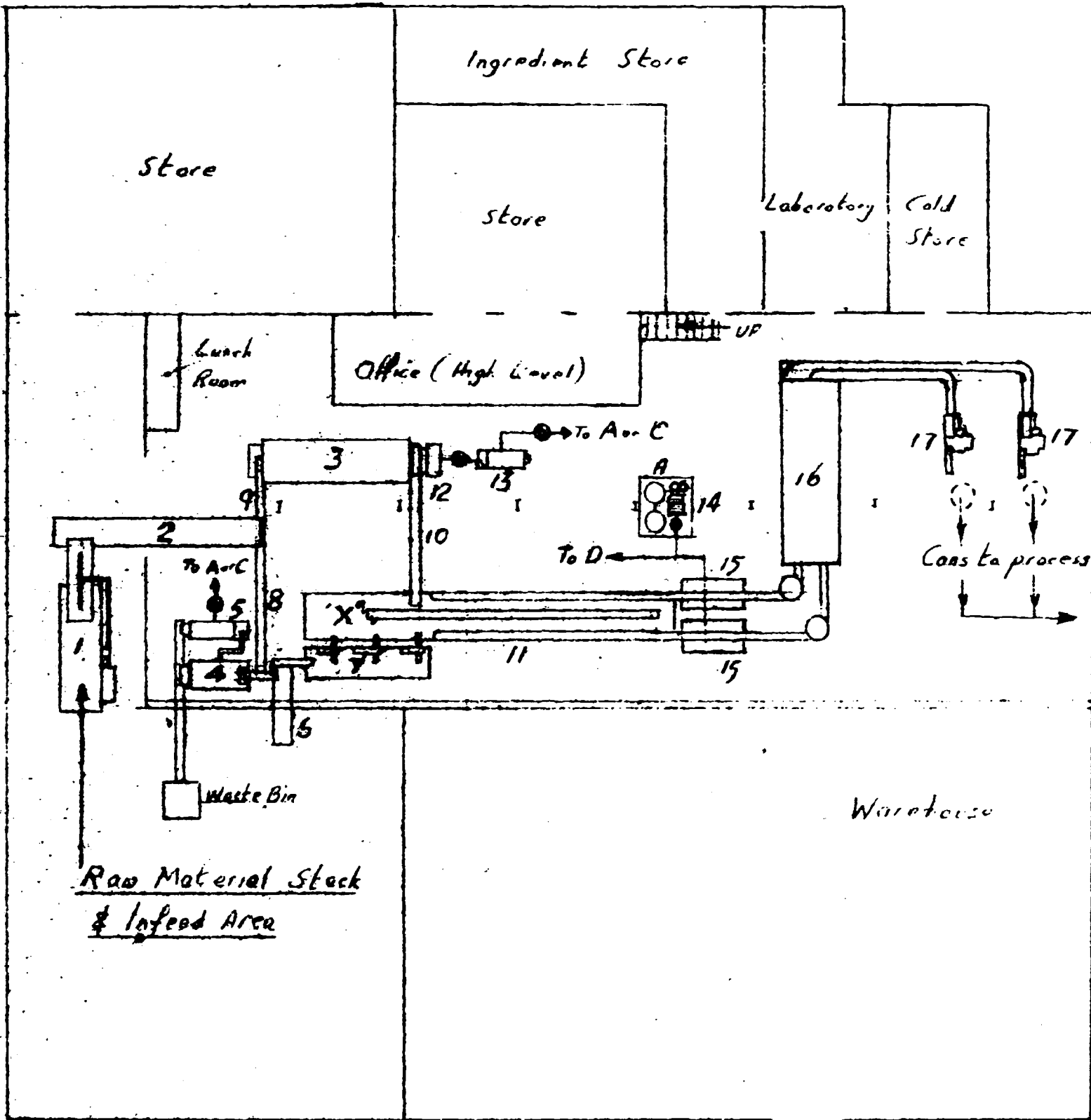
RAW MATERIAL PREPARATION IN CANNERY



HAND FILLING SYRUP INTO CANS BEFORE EXHAUSTING



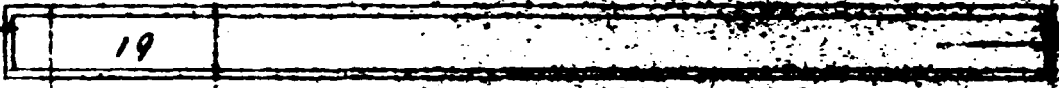
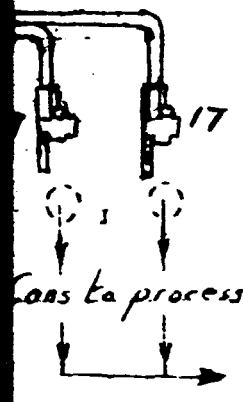
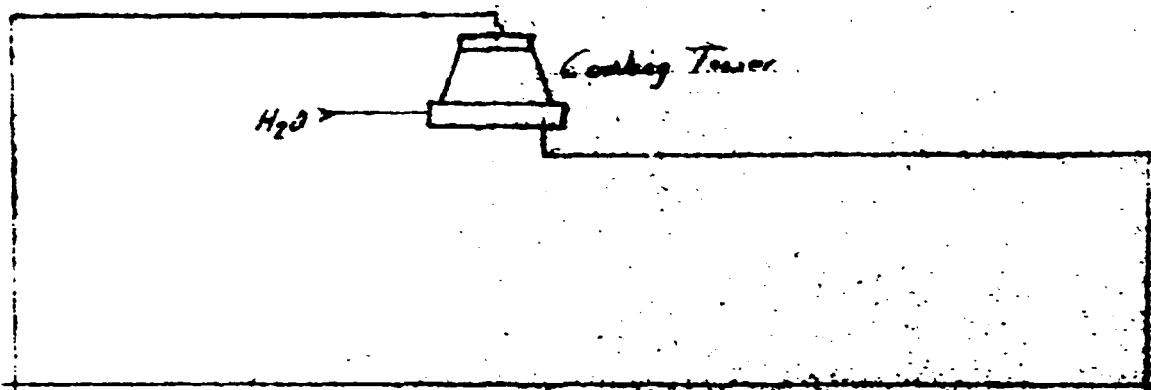
HAND FEEDING CANS TO SLAMER



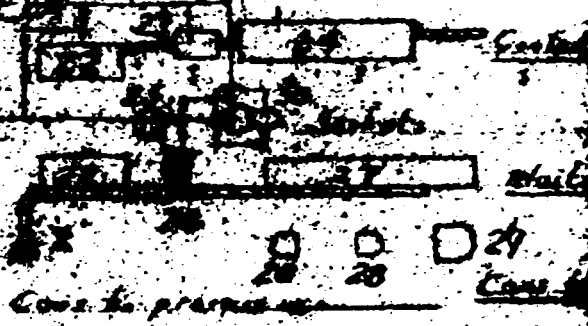
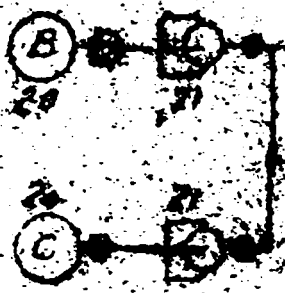
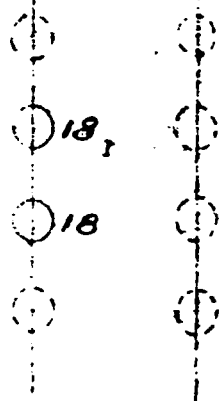
SECTION 1

⊙ Denotes a pump

Id
ore



Stained Hoist & R
Cooler



house

Office

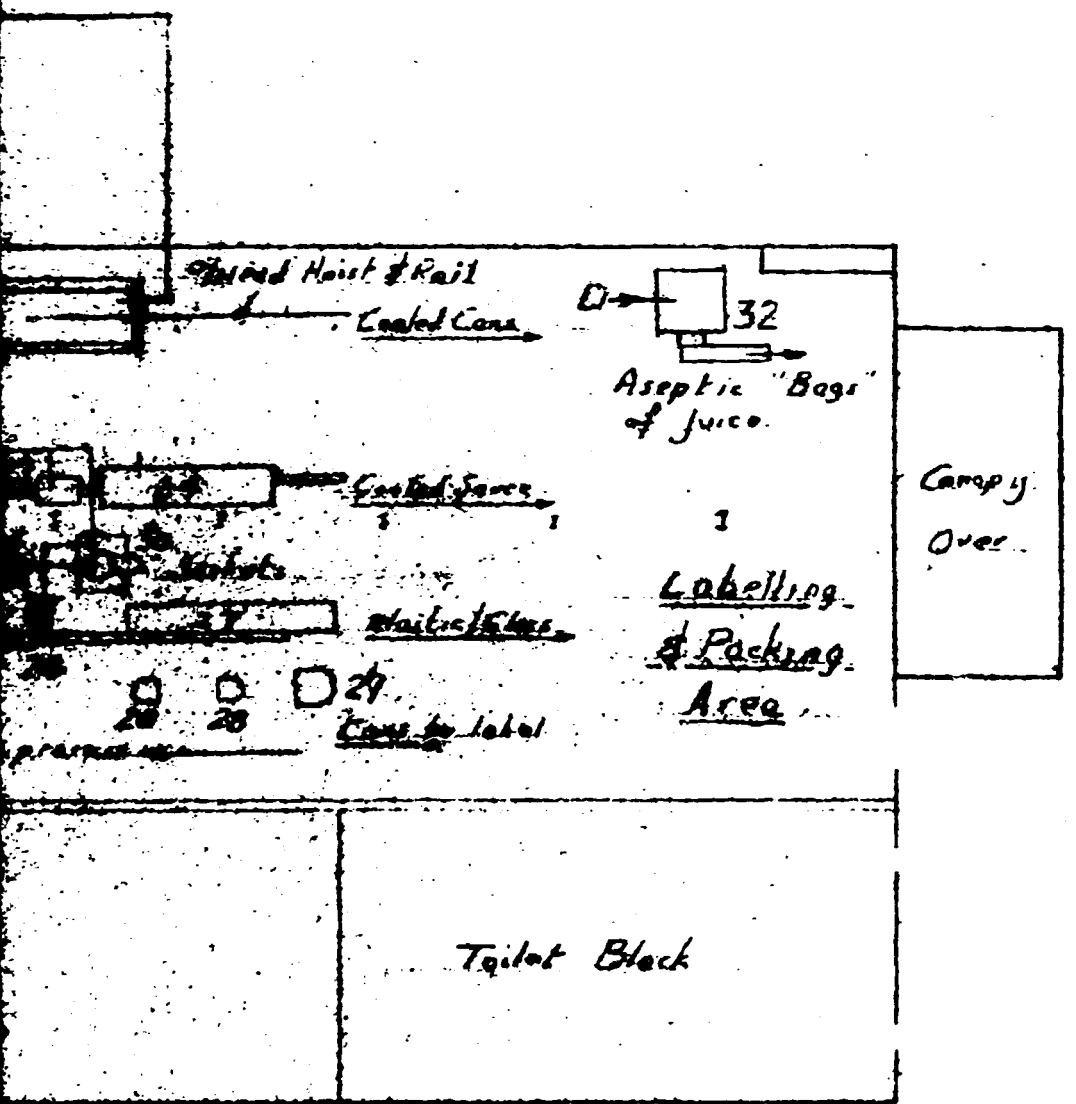


SECTION 2

MARCH 1991

PROPO

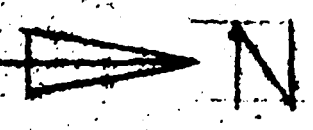
ADMAP



Campy
Over

1
Labelling
& Packing
Area

Toilet Block



SECTION 3

MARCH 1991 Scale: 2:300 ANNEX 4

PROPOSED PRODUCTION PLANT LAYOUT
ADMARC CANNERIES, MULANJE, MALAWI

PROPOSED MACHINERY LIST & OUTLINE SPECIFICATION.

Item No.	Description.
1	Flood type washer with overhead sprays on outfeed & coarse filter & circulating pump attached.
2	Inspection conveyor 7m lng by 1m wide, food quality belt fitted.
3	Steam type blancher load 2T/hr, suitable for pre-heating tomato and blanching peas etc.
4	Screw type juice extractor for pineapple, guava, grenadilla, mango (no stone), paw-paw. With 0.5m wd by 2m lng infeed flighted infeed conveyor.
5	Twin unit coarse & fine finishers with transfer pump from press, waste conveyor for finisher/press & pump for juice transfer.
6	Existing Ginneca pineapple corer/sizer.
7	inspection type conveyor 5m by 1m with existing Rock pineapple slicers fitted.
8	Inclined transfer conveyor 0.5m wd by 5.5m lng (mobile)
9	Inclined transfer conveyor 0.5m wd by 3.5m lng (mobile)
10	Inclined transfer conveyor 0.5m wd by 6m lng.
11	Inspection conveyor 1m wd by 12m lng fitted with overhead conveyor for cans and side guides for filled can transfer to flood fillers. Smooth dead-plate transfer onto fillers item 15.
12	Hot breaker for tomato and fruit (guava, mango (de-stoned), paw paw fitted with chute feed from steam blancher outlet and transfer pump to finisher.
13	Finisher for output of pulp from 12 with transfer pump.
14	Juice/syrup/brine blending/filtering/heating unit for supplying flood fillers item 15.
15	Flood type fillers for filling cans with brine/syrup/ juice from filling conveyor item 11, fitted with outfeed conveyors/turntables to feed exhaust box item 16.

- 16 Steam exhaust box to handle max 60 cans/min (99 X 178) each lane, output product temperature min 85 degrees Celcius with input temp avg 50 degrees Celcius. Fitted with internal divider for two lanes, outfeed transfer table/conveyors to feed seamer infeeds item 17. Belt to be stainless steel supported on cross-bars on side chains. Chain to be self lubricated & sealed. Drive to be to support chains and NOT belt.
- 17 Can seamers rated 100 cans/min with change parts for 66 X 79; 73 X 111; 99 X 178 fitted with steam cissing. and suitable for tin free steel & tin plate.
- 18 Existing retorts and hoist.
- 19 Cooling 'canal'. Construction block/cement with internal drag chain conveyor suitable for total water immersion, complete with circulating pump & cooling tower suitable for similar load as item 16 and air ambient 90 degrees Celcius, RH 90%.
- 20 Stainless steel sanitary construction tanks, covered, conical bottom, on legs to give bottom outlet 750mm above ffl, top inlet. Fitted slow speed agitator Capacity 2,500 litres. Supplied with transfer pump to item 21.
- 21 250 litre vacuum boiling pan for jams and tomato juice concentration with transfer pump to items 31 or 25.
- 22 Locally made tables for loading glass/plastic containers to filling machines.
- 23 Tomato sauce bottle filler/capper for fill range 250ml to 750ml suitable glass & plastic. Fill speed 120 bottles per min (250ml size)
- 24 Tomato sauce cooling unit suitable for fill sizes and speeds as item 23, cool from 85 to 50 degrees Celcius. Complete with 4m outfeed conveyor.
- 25 High level electrically heated tank 300l capacity to supply jams to items 26 & 30.
- 26 Piston type jam filler manually operated range 200ml to 1,000ml, fitted electrically heated hopper. Complete with 10m of 175mm plastic slat band conveyor for jars & cans.
- 27 Locally made table for hand capping filled jam jars.
- 28 Existing M-B 1 seamers.

- 29 Existing M-B 24DS seamer.
- 30 Sachet form/filling machine for jams & sauces into sachets from 10grm to 75grm size.
- 31 Urschell type Comminutor for final size reduction of sauces.
- 32 Pro Pac type aseptic bag filling machine. Output rated at 60 per min range 125ml to 500ml. for juices.

Miscellaneous 35mm dia stainless steel pipes, bends, tees, valves, generally as scaled from drawing Annex 5. All stainless steel and materials to be suitable for operating with high & low acid products, juices and tomato products. Pumps, tanks etc to be to generally accepted sanitary construction standards.

SCHEDULE OF EQUIPMENT FOR CANNERY FOR MALAWI

ITEM -----	DESCRIPTION -----	PRICE -----
1	FLOOD TYPE WASHER With overhead sprays on outfeed and coarse filter and circulating pump attached.....	£ 32,600
2	INSPECTION CONVEYOR 7m long x 1m wide. Food quality belt fitted.....	£ 9,600
3	STEAM TYPE BLANCHER Load 2 tons/hr. Suitable for pre-heating tomato and blanching peas, etc.	£ 48,700
4	CHOPPER For pineapple, guava, grenadilla, mango (no stone), paw-paw, with 0.5m wide x 2m long infeed flighted infeed conveyor.....	£ 16,900
5	TWIN UNIT COARSE AND FINE FINISHERS With transfer pump from press, waste conveyor for finisher/press and pump for juice transfer.....	£ 35,400
7	INSPECTION TYPE CONVEYOR 5m x 1m with existing Rock pineapple slicers fitted.....	£ 8,100

8	INCLINED TRANSFER CONVEYOR 0.5m wide x 5.5m long (mobile).....	£ 5,500
9	INCLINED TRANSFER CONVEYOR 0.5m wide x 5.5m long (mobile).....	£ 5,500
10	INCLINED TRANSFER CONVEYOR 0.5m wide x 6m long.....	£ 6,000
11	INSPECTION CONVEYOR 1m wide x 12m long fitted with overhead conveyor for cans and side guides for filled can transfer to flood fillers. Smooth dead-plate transfer onto fillers, item 14.....	£ 40,100
12	CHOPPER For tomato and fruit, guava, mango (destoned), paw-paw, fitted with chute feed from steam blancher outlet and transfer pump to finisher.....	£ 12,600
13	FINISHER For output of pulp from 12 with transfer pump.....	£ 31,600
14	JUICE/SYRUP/BRINE BLENDING/FILTERING/HEATING UNIT To supply flood fillers item 15.....	£ 28,200
15	FLOOD TYPE FILLERS To fill cans with brine/syrup/juice from filling conveyor item 11, fitted with outfeed conveyors/turntables to feed exhaust box item 16.....	£ 34,500
16	STEAM EXHAUST BOX To handle max 60 cans/min (99 x 178) each lane, output product temperature min 85°C with input temp avg 50°C. Fitted with internal divider for two lanes, outfeed transfer table/conveyors to feed seamer infeeds item 17. Belt to be stainless steel supported on cross bars on side chains. Chain to be self-lubricated and sealed. Drive to be to support chains and not belt.....	£ 86,000

17	CAN SEAMERS Rated 100 cans/min with change parts for 66 x 79, 73 x 111, 99 x 178 fitted with closing and suitable for tin free steel and tin plate.....	£180,000
20	STAINLESS STEEL SANITARY CONSTRUCTION TANKS Covered, conical bottom, on legs to give outlet 750mm above ffl, top inlet. Fitted slow speed agitator. Capacity: 2500 litres. Supplied with transfer pump to item 21.	£131,200
21	250 LITRE VACUUM BOILING PAN For jams and tomato juice concentration with transfer pump to items 31 or 25.	
23	TOMATO SAUCE BOTTLE FILLER/CAPPER For fill range 250ml to 750ml suitable glass and plastic. Fill speed 120 bottles per min (250ml size).....	£108,000
	For every additional cap size.....	£ 2,000
24	TOMATO SAUCE COOLING UNIT Suitable for fill sizes and speeds as item 23, cool from 85 to 50°C. Complete with 4m outfeed conveyor.....	£103,100
25	HIGH LEVEL ELECTRICALLY HEATED TANK 300l capacity to supply jam.....	£ 1,500
26	PISTON TYPE JAM FILLER Manually operated range 200ml to 1000ml, fitted electrically heated hopper. Complete with 10m of 175mm plastic slat band conveyor for jars and cans.....	£ 30,000
30	SACHET FORM/FILLING MACHINE For jams and sauces into sachets from 10gm to 75gm size.....	£ 93,600
31	URSCHELL TYPE COMMINUTOR For final size reduction of sauces.....	£ 43,700

Further to your letter of the 30th April, 1991 I write enclosing the drawing which you kindly supplied and asked us to return.

Obviously in your write up there are several items which we can supply and some that we can't but to be honest with you we really need a proper meeting, after the project has become live, to put forward some proper proposals.

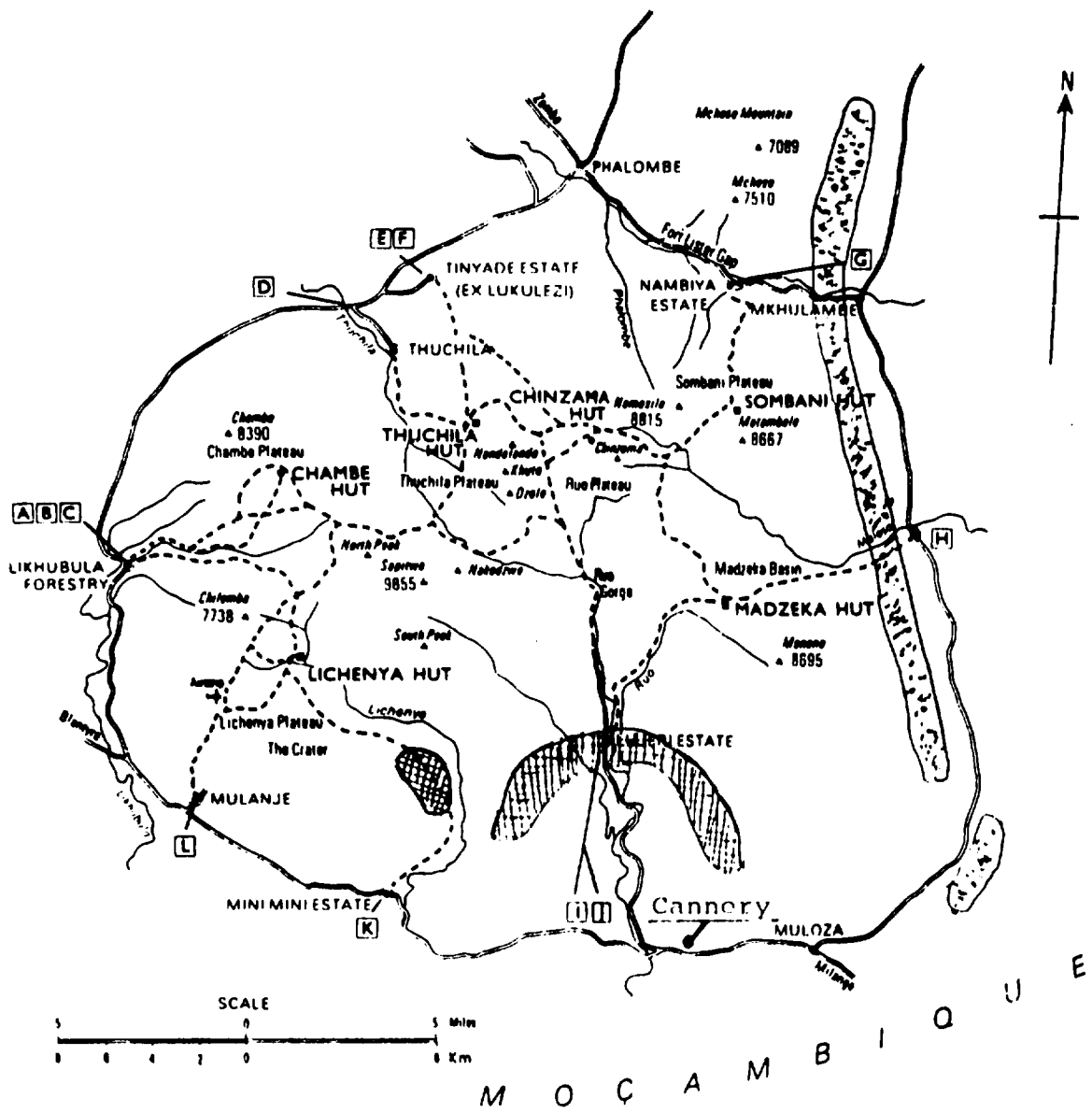
The equipment I know immediately we can supply, I list budget prices below:

Item 2 - Inspection conveyor 7m x 1m wide	£9,000
Item 7 - Inspection conveyor 5m x 1m wide	£7,500
Item 8 - Incline transfer conveyor 5.5 long x .5 wide	£6,000
Item 9 - Incline transfer conveyor as above 3.5m long	£4,500
Item 10 Incline transfer conveyor as above 6m long	£6,300
Item 11 Special inspection conveyor 12m long with accessories	
Item 15 Flood type filler	£16,000
Item 16 Steam exhaust box	£22,000
Item 20 Stainless steel tanks	£40,000
Item 24 Tomato sauce cooling unit	£16,000
	£40,000

I hope these initial estimates are of help to you but obviously when you have had the opportunity of looking at the project in more detail we would like to have a discussion and put forward detailed proposals for this project.

LEGEND.
 Pineapple: - - - - -
 Tomato: - - - - -

MAP SHOWING LOCATION OF PINEAPPLE & TOMATO GROWING AREAS.



RECOMMENDATIONS	1991			1992			1993			1994								
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
IMMEDIATE																		
Doubleseam evaluation	NOW																	
Product specification	---			Up-dating														
Technical mgt.	ASAP																	
Working capital	NOW																	
Sales programme	---			Ongoing														
SHORT to MID-TERM																		
Floor				----- Until completion														
Install Items:- 4, 5, 14, 16, 21, 31	---																	
Plant operating manual				----- Up-dating														
Q.A. Equipment																		
Training: Seam/QA	-																	
Production																		
MID to LONG-TERM																		
Install Items:- 1, 2, 3, 8, 9, 10, 12, 13, 20(B) & assoc. equipt.				---														
Install Items:- 7, 11, 15, 17 and assoc. equipt.										---								
Install Items:- 19, 20(C), 21, 22, 23, 24, 25, 26, 27 & assoc. equipt										---								
Install Items:- 30, 32.																During this period. ---		

BAR CHART of PHASING of RECOMMENDATIONS.

PRODUCT:

CODE:

RAW MATERIAL SPECIFICATION:

RECIPE / PRODUCT SPECIFICATION / YIELD:

(continue over page)

BLANCHING TIME & TEMPERATURE:

FILL WEIGHT:

Can Size:

Solids:

Liquid:

LACQUER TYPE:

Body:

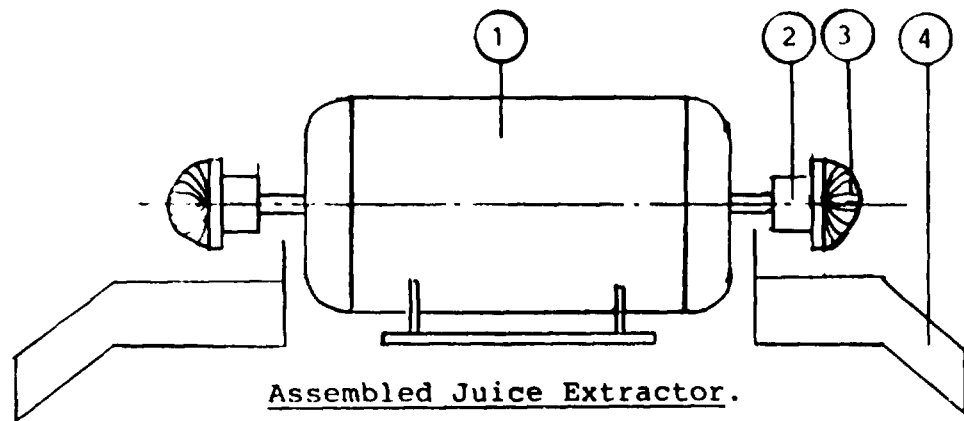
Ends:

PROCESSING TIMES & TEMPERATURES (all can sizes)

Can Size:

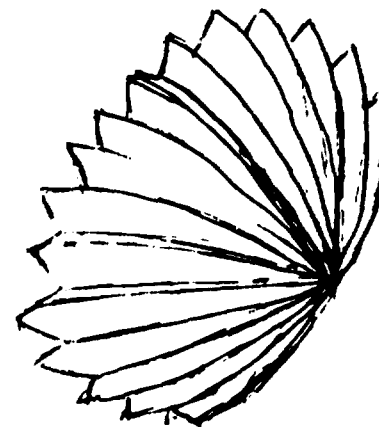
Process Time:

Temperature:

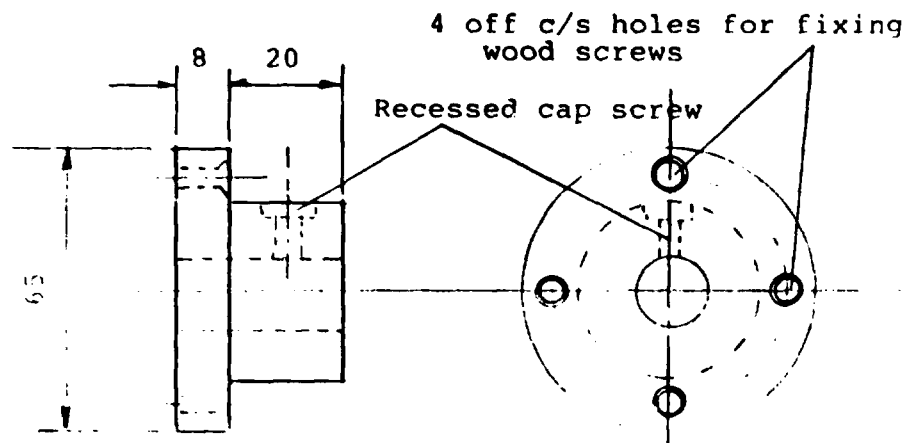


Assembled Juice Extractor.

NB all dimensions approximate.



Sketch of Wooden extractor head. 3



Mounting boss for extractor head. 2

LEGEND.

- 1 Single phase electric motor with double shaft extension.
- 2 Mounting boss for wooden extractor head made from stainless steel if possible.
- 3 Hardwood juice extractor head. Carved by local craft workers.
- 4 Stainless steel juice collecting chute

SIMPLE JUICE EXTRACTOR FOR GRAPEFRUIT AND ORANGE JUICE.

LIST of PEOPLE MET.

Mr K Kohtamaki, UNIDO, Lilongwe.

Mr A Jacob, CTA UNIDO, Industrial Consultancy Services, Blantyre.

Mr I Sabasia, Mag Dar City Motors, Blantyre.) Probable future
 Justice F L Makuta, Blantyre.) buyers of ADMARC
) Canning Co Ltd

Mrs E Kazembe, Marketing Services Controller, ADMARC, Blantyre.

Mr Magombo, General Manager, ADMARC, Blantyre.

Mr MJC Muthali, Chief Accountant (Actg GM), ADMARC Canning Co

Mr W Nanyumbo, Extension Officer, ADMARC Canning Co.

Mr E Molande, Production Supervisor, ADMARC Canning Co.

Mr SA Salimo, Accounts, ADMARC Canning Co..

Mr G Mangani, Engineer, ADMARC Canning Co..

Mr L Chifisi, G A, ADMARC Canning Co..

Mr C Mponda, Q A (Public Health), ADMARC Canning Co.

Mr P Tigoti, Sales, ADMARC Canning Co.

Mr E Joshua, Stores, ADMARC Canning Co..

Mr L Chezani, Stores, ADMARC Canning Co..

Mr P Curtis, Operations Mgr., Kandodo Divn., Import Export Co.
 of Malawi (1984) Ltd., Blantyre.

Mr Z Mukadam, General Manager, General Tinsmiths, Blantyre.

The many Managers & Staff of Kwiksave & PTC's; Owners of Shops &
 mini-markets & Vendors in Blantyre, Limbe, Luchenza, Mulanje
 & Thyolo.