OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

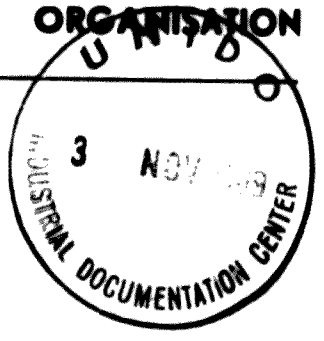
Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

00246-E

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION



Zaire.

REPAIR AND MAINTENANCE

OF

INDUSTRIAL EQUIPMENT

1969

SURVEY CONDUCTED IN THE

DEMOCRATIC REPUBLIC OF THE CONGO

RESEARCH AND DEVELOPMENT

CONSULTING ENGINEERS

10

REPAIR AND MAINTENANCE OF INDUSTRIAL EQUIPMENT

SURVEY CONDUCTED IN THE

DEMOCATRIC REPUBLIC OF THE CONGO

IN DECEMBER 1968

FOR

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

B Y

R. LIENART and G. DE LEEUW, ENGINEERS

MEMBERS OF RESEARCH AND DEVELOPMENT

BRUSSELS 1 - BELGIUM

May 1969

INTRODUCTION

1. GENERAL STATEMENTS ON DEVELOPMENT OF THE MISSION

December 6 : Mission arrives at Kinshasa

December 7 : Audience with the Minister of National Economy and Industry

December 9 : Mission is introduced to UNO's representatives and experts interested in Industrial Equipment Maintenance and Repair.

Introducer : Mr A.E. SAENGER, Chief of Coordination Programme, UNIDO

December 7 to 11 : Steps to obtain Government authorization to visit State owned Industries

December 12 : Meeting with UNO Resident General

December 16 to January 3 : Visit of industries, organisms, etc.. as detailed hereafter

January 3 : Meeting with UNO Resident General Assistant

January 5 : Mission leaves D.R.C.

2. LIST OF PERSONS ENCOUNTERED

Mrs. LEGER, UNO Resident General in D.R.C.

Schoeller, Assistant to UNO Resident General in D.R.C.

A.E. SAENGER, Chief of Coordination Programme, UNIDO

J.F. ROBSON, Administrative Section U.N.D.P.

E. CANALI, I.L.O. Representative in D.R.C.
R. LABRUSSE, Chief of Mission, I.L.O. Special Funds for National Institute Vocational Training (I.N.P.P.)

J.R. CONDE, Chief of Mission F.A.O. in D.R.C.

J. MELOTTE, Public Works Expert, U.N.D.P.

G. FAYAD, UNIDO Consultant to Ministry of Transport

Y. HELBAWI, UNIDO Expert to Ministry of National Economy and Industry

WARNIMONT, Public Works (Waterways), Chief Engineer

K. ZADORA, UNIDO Expert to Ministry National Economy and Industry

WATELET, ROMAIN and MBEMBA, OTRACO Engineers

Mrs. TUMBA, Minister of National Economy and Industry

MALUMBA, General Manager, Ministry of National Economy and Industry

KAWANDA, Secretary General Ministry of Public Works

TCHIBAMBE, Adjunct Manager Public Investments

MBANZILU, Assistant to Adjunct Manager Public Investments

3. LIST OF SURVEYED INDUSTRIES AND MEETINGS

Dates	Visited Centre	Visit organized by	Persons encountered
1968			
12.6	Mission arrives in Kinshasa		
12.7	UNO	-	Mr SAENGER, Mr ROBSON
12.9	Ministry of National Economy and Industry	Mr SAENGER	Mr TUMBA, Minister Mr MALUMBA, General Manager
12.9	UNDP	Mr SAENGER	Mrs SAENGER, ROBSON, CANALI, CONDE, FAYAD MELOTTE, HELBAWI, ZADORA, WATELET, ROMAIN, MBEMBA, WARNIMONT
12.9	Mr ALHADEFF	Mr SAENGER	Mr ALHADEFF, Owner of JOCK and SOTEXCO shops
12.10	Public Works Ministry	Mr WARNIMONT	Mr KAWANDA, Secretary General
12.10	Public Works Shops (Waterways)	id.	Shop managers
12.10	RAY-CONGO workshops	id.	Mr SYEUR, Manager
12.11	Ministry of National Economy	Mission	Mrs. ZADORA, TCHIBAMBE, MBANZILU
12.12	OTRACO	Mrs WATELET and ROMAIN	Mrs MUAYI, General Manager MAHOLO, Manager
	Remark : Authorization to visit workshops not obtained. Should be given by Ministry of Transport.		
12.13	UNDP	Mission	Mrs LEGER and SAENGER
12.13	Ministry of National Economy	Mission	Mr TCHIBAMBE
12.13	CHANIC	Mr ZADORA	Mr PELS, General Manager
12.14	Ministry of National Economy	Mission	Mr TCHIBAMBE

Dates	Visited Centre	Visit organized by	Persons encountered
1968			
12.16	UTEXCO, Cotton Mills	Ministry of National Economy	Mr VAN HUMBEEK, Secretary General
12.16	PLASTICA	id.	Mr BULAERT, Manager Mr KOSINSKI, Adjunct Manager
12.17	GECOMIN (Kinshasa Office)	id.	Mr ROUSSEAU
12.17	CHANIC	Id.	Mr PELS, General Manager Mr VAN GELUWE, Foundry Mr SNEYERS, Chanico Mr FRANCOIS, Shipyard
12.18	BATA	id.	Mr STANEK, Manager Mr BUKASH, Public Relations
12.18	MARSAVCO	id.	Mr BISSCHOT, Manager
12.19	BRALIMA	id.	Mr FLOUR, General Manager
12.19	ENTRELCO	id.	Mr VAN HUMBEEK, Manager
12.20	OTRACO Shipyard	Mr FAYAD	Mr WATELET
12.20	OTRACO Limete Work shops	-	Section leaders
12.21	Public Works Shops	Ministry of National Economy	Supervisor
12.23	JOCK Workshops	Mission	Mr ALHADEFF
12.23	SOCOBELAM	Mission	Technical Manager
12.24	LAURENS-LE KHEDIVE	Mission	Mr VERHULPEN, General Manager Mr MOORMANS, Chief Engineer
12.24	Kinshasa Central Hospital	Mission	Dr LUMUNGO
12.26	ENTRELCO (2d visit in connection with hospitals)		Mr VAN HUMBEEK, Manager
12.26	Reine Elisabeth Hospital	Mission	Sister Manager

Dates	Visited Centre	Visit organized by	Persons encountered
12.26	Ministry of Agriculture	Mission	Mr CONDE
12.27	SOTEXCO	Mission	Chief Engineer
12.27	MECANICONGO	Mission	Mr J.PISSENS, Manager
12.28	BOUKIN	Mr FAYAD	Mr PARADIS, General Manager
12.28	AMATO	Mission	Mr MANGON, Technical Manager
12.30	CONGOFRIGO	Mission	Mr LELEU, Technical Manager
12.30	FAO Training Centre	Mr CONDE	Mr THOMAS, FAO Expert
12.31	ILO (Kinshasa Centre)	Mission	Mr LABRUSSE
1969			
1.2	INPP (Vocational Training School)	Mr LABRUSSE	Mr PAKABOMBA, District Manager Mrs CLAIRENS and SARO, Experts
1.2.	F.E.C. (Fédération des Entreprises congolaises)	Mission	Mr MISSON, Manager
1.3	Buscompany (T.C.C.)	Mr HELBAWI	Technical Staff
1.3	UNO	-	Mr SCHOELLER
1.4	UNDP	-	Mr ROBSON
1.5	Mission leaves D.R.C. for Republic of Guinea		

The mission wants to thank Government Authorities and Responsibles of Industry for their kind collaboration.

I. PURPOSE AND CONCLUSIONS

A. PURPOSE

The purpose of this report is to give an account of the survey on Industrial Equipment Maintenance and Repair facilities and methods conducted in the Democratic Republic of the Congo and to draw therefrom the necessary inferences in the form of possible recommendations for their improvement.

B. RESULTS OF SURVEY

From the survey it follows that :

1°) Most D.R.C. manufacturing industries are run by private interest and are at present not faced with serious problems concerning the Maintenance and Repair of their equipment.

2°) Among public sectors two are definitely found wanting with respect to maintenance of their equipment, viz. Public Works Mechanization Workshops (T.P.M.) and Hospitals.

3°) The main factors affecting the adequacy of maintenance and repair facilities are :

a) the shortage of spare parts,

b) the lack of qualified personnel.

C. CONCLUSIONS AND RECOMMENDATIONS

To remedy the situation, we recommend :

1°) As short-term action programme

a) Assistance to the Public Works Mechanization Workshops (T.P.M.) and to the Hospitals comprising a mission of experts and consultants and the grant of funds for the provision of spare parts.

b) the grant of refresher course scholarships to the Public Works Sector.

2°) As long-term action programme

Personnel upgrading by the organization of seminaries and by actions with the International Labour Office (I.L.O.) and Food Agricultural Office (F.A.O.)

These various programmes should allow of scheduled time extension if need be.

CONTENTS

II. INTRODUCTION

A. SUBJECT

The UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO) is planning to engage in a long-term campaign for the improvement of maintenance and repair services of existing industrial equipment in developing countries.

With this object, UNIDO has selected a number of developing countries, where a sample survey has to be made.

The purpose of this study is to report the survey conducted in the DEMOCRATIC REPUBLIC OF THE CONGO.

B. AIMS OF SURVEY

1. To enable UNIDO to choose, amongst the countries investigated, those in which it is recommended to start the implementation of the campaign.

2. T o formulate a short- and long-term working programme for the technical assistance to be rendered to these countries chosen.

3. To identify crucial fields in which assistance is urgently needed.

4. To draw up a long-term policy for assisting developing countries in the field of maintenance and repair.

C. LINES OF REPORT

We first attempted to assess the relative size of the present various industries in the D.R.C., as well as their part played in the economy of the country and/or in the export trade.

Working from this data, we then tried to examine the situation, from the Maintenance and Repair standpoint, of the most typical firms belonging to the leading branches of industry.

We endeavoured to trace the main central workshops dealing with the maintenance and repair of equipment in the country and we made a survey of such facilities.

The analysis and study of the information thus collected provided us with a general picture of the Maintenance and Repair Service set up and also of the position with spare part stocks in the D.R.C.

Finally, we arrived at the necessary conclusions and made the recommendations we deemed fit to enable UNIDO to pursue the task they had assigned themselves.

III. PRELIMINARY SECTION

A. RELATIVE IMPORTANCE OF VARIOUS D.R.C. INDUSTRIES

No recent official statistics are available relating to D.R.C. industrial activity.

It should however be noted that, in consultation with Banque nationale du Congo, the Ministry of National Economy has just produced a questionnaire to take a census of all the operations of industries established in the CONGO.

Some further time will thus elapse before the relative comprehensive and accurate data comes to hand.

This being so, we adopted as a working basis a Report on Trends for the D.R.C. Industrial Development and Diversification Plan, prepared bu IRES (LOVANIUM) and giving a number of relevant details.

We inferred therefrom the relative size of some main sectors of Congo economy coming into the 1964 Gross Home Product Structure and the comparative importance of the various branches of industry in 1963.

These details are set out in the following Tables I and II respectively.

TABLE I

Relative size of some main sectors coming into the D.R.C. gross home product structure - 1964

Agriculture		34.3 %	
Mining		19.7 %	
Industry :	Exports	24.- %	Total : 46 %
	Home Market	22.- %	
		100.- %	

TABLE II

Relative importance of the various D.R.C. manufacturing industries - 1963

	%
Food, beverages and tobacco industries	48.6
Textile industry	9.4
Ready-made clothes and shoe industries Leather industry	8.8
Wood industry	4.1
Paper industry	0.7
Printing and publishing	2.-
Rubber industry	1.-
Chemical industry	7.5
Non-metal mineral products industry	9.-
Basic metallurgy	1.1
Metal products manufacture	7.1
Other industries	0.7
	100.-

It should be observed that these Tables give no figures concerning transport, a major branch which assigns conditions to all the activities of the country.

According to a survey carried out by the U.S. Department of Commerce, the 1964 gross national product structure showed the following breakdown into the main sectors :

		%
Industry		17
Mining		7
Agriculture		13
Administration Trade Transport	(± 15 % each)	45
Building and public works		1,8

Although the figures from these two sources do not quite tally and are a few years old, they may be considered as being still sufficiently representative, for the purpose of our survey, of the comparative size of the various D.R.C. industries.

B. GEOGRAPHICAL LOCATION OF D.R.C. INDUSTRIES

Industrialization centres in two main districts : the Lower-Congo Kinshasa area and the Katanga area.

Those two areas account for 3/4 of the most elaborated economic activities, about 8/10 of manufacturing production and 3/4 of mining operations.

There is a third centre, Kisangani, but this is now far less important. It was favoured by E.E.C. experts, who considered its development to be desirable to counteract the Kinshasa area tendency to overexpansion.

But, at present, according to the information we were able to obtain from the Fédération des Entreprises congolaises (F.E.C.), industrial operations in this area are markedly curtailed : hardly a few factories are still working.

Considering the time allowed for our survey, we preferred to go as fully as possible into the problem in the Lower-Congo Kinshasa area, while obtaining as much information as available concerning the other areas, to make sure that a similar situation obtained in such areas.

C. INDUSTRIAL SECTORS COVERED BY SURVEY (*)

a) Public transport

1. OTRACO (Shipyard)
2. OTRACO (Railway workshop)
3. PUBLIC WORKS (Waterway equipment maintenance shops)
4. PUBLIC WORKS (Mechanization centre)
5. T.C.C. (Congo Public Transport) (Maintenance shops).

b) Manufacturing industries

b1) Food industry

6. BRALIMA (Brewery)
7. MARSAVCO (Margarine factory)
8. CONGOFRIGO (Cold Storage).

(*) See under Appendix I the table summarizing the main information when visiting the concerns.

b2) Textile industry

9. UTEXCO

b3) Ready-made clothes, shoe and leather industries

10. BATA (Shoes, leather)
11. ATELIERS JOCK (ready-made clothes)
12. SOTEXCO (ready-made clothes)

b4) Fats industry

7. MARSAVCO (Soap works)
13. AMATO (Oil, soap)

b5) Wood industry

14. SOCOBELAM (Peeled wood)

b6) Chemical industry

15. PLASTICA (Processing of plastics)

b7) Tobacco industry

16. LAURENS (Cigarettes)

b8) Metal products manufacture

17. RAY-CONGO (Lorry bodywork)
18. CHANIMETAL (Foundry - workshops - shipyard)
19. CHANICO (Road machines - lifts)
20. MECANICONGO (Mechanical engineering)

b9) Non-metal products manufacture

21. BOUKIN (Bottle manufactory)

b10) Sundries

22. ENTRELCO (Electric installation contractors)

c) Agriculture (*)

23. ATELIER D'ENTRETIEN DE MATERIEL AGRICOLE

d) Hospitals (*)

24. HOPITAL CENTRAL DE KINSHASA
24. CLINIQUE REINE ELISABETH.

(*) Although these are not, so to speak, industrial sectors, they have been included in our survey as requested by UNIDO.

D. RESULTS OF SURVEY

1°) Public transport sectors

In all public transport sectors (water, rail, road), Bus Transport Company (T.C.C.) excepted, the main factors having a detrimental influence on the adequacy of equipment maintenance and repair are : the absence of spare parts and the shortage of skilled personnel both for maintenance and for operating the equipment.

The position is particularly critical in the Public Works Mechanization shops (T.P.M.), where also the condition of machine-tools and tooling is much unsatisfactory.

2°) Manufacturing industries sector

Industrial equipment maintenance and repair in D.R.C. is affected by scarceness of local skilled labour and by absence of spare parts, two specific problems inherent to developing countries.

Manufacturing industries have solved these problems, the former by applying to foreign technical staff for commanding and training native maintenance personnel, the latter by setting up good supply services in order to ensure adequate spare part stocks within the concern.

3°) Agricultural sector

Large farms have adequate maintenance and repair facilities, but small farms have not.

It is in order to assist the latter that F.A.O. is engaged in the setting up of training centres for tractor-mechanicians.

There are but a small number of agents for makes of agricultural equipment, providing on the spot technical service both for the supply of spares and for the maintenance of machinery.

4°) Hospital sector

Hospitals have no facilities whatever for the maintenance of their equipment.

However, there are some local private firms, capable of carrying out the necessary repairs.

E. CONCLUSIONS AND RECOMMENDATIONS

To remedy the situation, we recommend :

1°) As short-term actions

a) For the Public Works mechanization shops sector (T.P.M.)

1. the sending to the D.R.C. of a mission consisting of 5 experts for a period of two years to re-organize the workshops
2. the sending of consultants with expert knowledge of the various types and makes of roadmaking equipment, for a total period of 6 months
3. the granting of 7 scholarships of 6 months each for the further training of correlative personnel
4. the granting of funds intended to spare parts provision, both for vehicles and roadmaking equipment and for shop-machines.

b) For the hospital sector

The sending to the D.R.C. of an expert, for a period of 24 months, charged with the task of organizating, in agreement with the Government department concerned, a hospital equipment maintenance service and, in addition, the granting of funds intended to spare parts provision.

c) To improve training of native personnel

To compensate shortage of qualified native personnel, particularly at managerial staff level, we recommend the organization in the D.R.C. of refresher course seminaries in the various fields of equipment maintenance and repair.

As for the upgrading of labour, we recommend actions with I.L.O. and F.A.O. so that vocational training, already undertaken by them, be pursued.

d) To compensate the lack of original spare parts

We recommend the forming, within the Ministry of National Economy, of a provisionment control department, with the duty of seeing that supply contracts include provisions for short- and long-term assistance, amoung other things for the supply of spare parts.

e) Time length of programmes

The scheduled periods covered by the various programmes should allow extension, if this proved necessary.

IV. D.R.C. INDUSTRIAL EQUIPMENT REPAIR

MAINTENANCE TECHNICAL SURVEY

A. PUBLIC TRANSPORT SECTORS

1°) Water-borne transport

OTRACO

a) In addition to its Kinshasa shipyard, which we have visited, OTRACO operates shipyards in Matadi, Boma and Mbandak (the former Coquilhatville). All are integrated and have independent sections with a responsible management. They work to maintenance and repair programmes.

Besides repair and maintenance work, the shops also build new craft and/or modify existing ones. It has not been possible to estimate for these activities the ratio of work produced to the total volume of work of the shop, as these ratios vary with the priorities given.

It should be noted that at the present time, a private shipyard (CHANICO) assists OTRACO in the achievement of bulky work.

b) The shops cannot be considered as being central workshops, as they only deal but with a part of OTRACO equipment (ships).

The equipment of these yards is fairly complete, although a number of machines are obsolete and should be replaced (see App. 1/C4).

The standard of work may be considered as satisfactory.

These shipyards form a part of the operating company and belong to the Congo State.

c) Spare parts are available except engine parts, the stocks of the latter being often used up because of the many engine breakdowns.

Although the freeing of imports, introduced by the 1967 monetary reorganization, has materially improved the position with spares in many industrial sectors, engine spare

parts supply problem nevertheless remains attended by difficulties and delays of supply are very long.

It should be observed that this refers to special spare parts (spares for internal combustion engines), that cannot be made locally, on account either of their design, material specification, requisite manufacturing precision and heat treatment.

It seems that the present shortage is due to :

- an excessive spare part consumption due to breakage as a result of faulty workmanship in operation
- the cumulative delay over the period of restricted imports
- the lack of credit for stock replenishment
- the slowness of transport and delays attending supply and clearance administrative procedure.

d) The shipyard mechanical workshop is able to provide or repair most general mechanical parts ; still, it is short of a number of machines to enable it to complete the range of parts to be made available to the maintenance shop (*).

Yet, there will always remain a large number of special spare parts that cannot be locally produced and will have to be imported.

e) The yard has well organized stores.

PUBLIC WORKS (Waterways)

Navigable waterway maintenance comes under the Ministry of Public Works. This Ministry has its own shipyards for the maintenance of such equipment as dredgers, ferries, etc.

The Kinshasa shipyard does not work to a maintenance programme. It attends first to the most pressing work and is thus able to cover the maintenance of 50 % of the equipment.

The workshop attached to the yard, is fairly well fitted out with machine-tools but some of those are not in good working condition. Therefore and also for reason of unqualified labour, the shop cannot cope with all the work it may be called upon to perform.

(*) There is a renewal schedule covering a number of machines and some have actually been ordered or are in the process of being delivered (see Appendix I).

Stock of spares is substantial but nevertheless it happens that there is want of special parts mainly as a result of administrative protraction.

The yard is capable of producing or repairing small current mechanical parts. The spare part store is well organized and kept.

The main concern of the yard is the rebuilding of river ferries, many of which desappeared during the events following the establishment of Home Rule.

Teams are specially trained to undertake inland the building of such units.

The reopening to traffic of the road system is contingent upon the availability of these ferries.

2°) Rail transport

a) All D.R.C. Railway Companies have their own maintenance and repair workshops. This is due to the size of the country and railway network disjunction.

So it is that OTRACO has a wagon maintenance and repair shop, as well as a shunting locomotive overhaulshop and a main locomotive overhaul-shop in Thysville. C.F.L. (Chemin de fer des Grands Lacs) has workshops in Kisangani, Kongolo and Kalemie. VICICONGO has railway workshops in Aketi and Isiro.

b) The Kinshasa wagon maintenance and repair shop (which we have visited) services all C.F.M.K. (Chemin de fer de Matadi à Kinshasa) wagons. This railway and the road are the only lines of communication of the Congo with the ocean over national territory.

The workshops equipment is complete and in good condition. The machining shop is in Thysville.

In addition to current inspection service and supply of engines, the Kinshasa locomotive depot has to deal with the overhauling of shunting locomotives.

Work programmes are drawn up by a planning office which also keeps control cards giving for each wagon its history, mileage and work done on it.

All these facilities are Congo State owned.

c) The same problem occurs here as at the shipyard regarding shortage of spare parts for combustion engines,and for the same reasons too.

d) The shops are able to manufacture and/or to dress simple parts.of good quality.

3°) Road transport

a) Transport of goods

Road transport of goods is operated either by private firms or by large semi-public concerns such as : OTRACO, VICICONGO and B.C.K.

Maintenance and repair of the transport vehicles (lorrie) are carried out in workshops owned or not by the transport companies or at the maker's agency-shops.

b) Transport of passengers by bus

1. T.C.C., the leading public transport concern in the Congo, has its own maintenance and repair shops.

These shops are divided into different specialized sections: service station, electricity shop, tyre shop, engine overhaul section, gear boxes and rear axle shop, injection control shop. Each section is managed by a specialized technician (foreign) and all are supervised by a chief engineer.

2. The shops are well fitted out and they work to a programme. Standard of maintenance is high : more than 200 buses and trailors, on the road all day, are thus kept in good working condition.

The Company is owned to the extent of 65 % by the Congo State and 35 % by private entreprises.

Another small private company also operates bustransport in the same area. This company has no maintenance and repair shops, this work being done by the local agent of the make of vehicles.

3. Stock of spare parts is large (more than 12.000 different items, 1.6 million dollars in value). Complete assemblies are available : engines, rear axles, gear-boxes, etc. Nevertheless, parts are sometimes missing as a result of shortage of credit or of delays attending administrative formalities.

4. The machining shop is capable to produce good mechanical parts of simple design.

5. The stores are well run.

c) Road maintenance equipment

Note : Most of the equipment serviceable in 1959, is lost or badly damaged and has not been renewed since. The purchase of new items is under way or contemplated (see App. 4)

1. The country has, for the maintenance and repair of this equipment, 5 main mechanization centres and about 10 secondary centres (T.P.M.). They come under the Ministry of Public Works.

   Owing the shortage of maintenance and repair facilities, the output and efficiency of these centres is now very small.

   Basically, these workshops have also to deal with the maintenance of Government vehicles (lorries, cars).

   There is no maintenance and repair programme.

2. The main centres, such as the Kinshasa centre which we visited, are equipped with a service station and with various operating sections, such as : lorry maintenance and repair, bodywork, road machine maintenance and repair, engine overhaul shop and mechanical workshop. The equipment is still there, but it is incomplete or short of implements and tools ; it is now hardly ever used.

   T.P.M. mechanization centres belong to the Congo State.

3. One of the main reasons of the almost complete standstill of mechanization centres is the lack of spares.

   There is a small quantity of spares provided by a lorry-maker together with special testing equipment and tools, but all are suitable only for the mark concerned.

This shortage of spares is put down to the lack of credit.

The diversity of makes and types of vehicles and the absence of a good working supply service, aggravate the situation.

4. Because of their complicate nature, no spare parts for this equipment can be made locally.

5. Spare parts stores exist but are not operated for lack of spares.

B. MANUFACTURING INDUSTRIES SECTOR

a) It is not intended to deal separately with each branch under this heading. There is a great similarity in the respective position of these various branches ; they only differ from one other in minor details.

All the firms include maintenance and repair facilities; mostly as an independent section with a responsible head.

However, we came across a large textile factory (UTEXCO) with maintenance sections forming an integral part of each shop and coming directly under the production manager, but that was an unusual instance.

Nearly all amongst the visited concerns have a maintenance and repair programme and some even have a preventive maintenance programme and apply it.

b) There are no central workshops in D.R.C.

Some concerns (such as a Mining Company in Katanga and a textile Industry in Kinshasa) have spare parts manufacturing shops which also assist in heavy equipment repair and maintenance. But fully occupied as they are, they do not work for third parties.

There is also in Kinshasa a large-size metal products manufactory (CHANIMETAL), fairly well fitted out, doing jobs for many local industries and even for others in the country. At the time of our visit, the manufactory was not overworked and could cope with a large number of orders.

Those large workshops include several sections : mechanical engineering, sheet metal work, electrical engineering, foundry, forge, welding shop and a heat treatment section.

Their equipment consists of the range of machines basically required for the production of current mechanical parts.

The number of these machines depend on the importance of the workshop.

The standard of work of these shops is satisfactory.

As most of these shops are integrated, they belong to the parent companies, which are owned either by the State or the private sector.

c) Most industries have available a stock of spare parts.

Before the freeing of imports, a very difficult situation prevailed concerning spare part stock replenishment. At present, restrictions if they subsist, are mostly internal and are related to the cash position of firms.

Supply services are not always working properly and this causes often unnecessary delays of supply.

d) As already mentioned (b), local spare parts are produced by large workshops. Maintenance shops within the concerns have the equipment to do so as well, but at a smaller scale, being limited in number and size and to lathe-turned or milled parts.

Parts needing subsequent heat-treatment or superfinishing are seldom made locally, no skilled personnel being available to do so and also because of not knowing the correct material specification and heat treatment conditions. Such parts, if locally made, are always of poor quality compared to the original ones and their consumption is high and so is their price.

Therefore, machine-owners generally prefer overseas original spares, even when those have to be ordered by air, not only because of price of quality, but also because local parts having to be replaced more often for undue wear, increase the volume of maintenance and repair work which finally leads to loss of production.

Only in cases of urgencies, which are not unfrequent, is there called upon locally made spare parts.

We only know of one industry (UTEXCO) in the surveyed area, where production of spare parts was developped on purpose (up to 30 % of needs).

e) Most industries have a well run store with indexed items and stock movement cards.

C. AGRICULTURAL SECTOR

a) In the D.R.C., large farms are mostly owned by private companies, which have a maintenance and repair workshop. This does not apply to small farms, where the facilities for the routine upkeep of the equipment is unadequate.

The D.R.C. has just acquired 1,500 farmtractors of various types but of the same mark. The destination of these tractors is not known. The contract of purchase provides for the supply of spares, but we have not heard of any contemplated working programme for the maintenance and repair of the tractors.

b) There are no central shops for the repair of this equipment, except the case of agents for marks (e.g. CHANICO).

c) Only such agents carry a stock of a few spare parts, but very often a tight cash position precludes the availability to them of all the spares they should prefer to have at their disposal on the spot. Yet, should this necessity arise, these agents are able to obtain supplies fairly quickly.

d) Generally speaking, the equipment used in farming (lorries and tractors, etc) requires original spares for maintenance. No local shops exist for the manufacture of such parts.

e) Only the mark agents (CHANICO) have stores carrying supplies. These stores are well organized.

D. HOSPITAL SECTOR

Hospitals have no means at their disposal for the maintenance of their own equipment.

They are utterly unprovided with spares, very few of which could, as a matter of fact, locally be made.

They have no stores, either in hospitals or outside, no workshop.

However, a number of local private firms are able to carry out most of the necessary repair work (ENTRELCO, CHANIMETAL).

V. PREVAILING CONDITIONS OF REPAIR AND MAINTENANCE ACTIVITIES AND DIAGNOSIS

A. ADEQUACY OF PRESENT MAINTENANCE AND REPAIR FACILITIES

1°) Public transport sectors

a) Water-transport

Maintenance and repair facilities in this sector are inadequate because of shortage of spare parts for explosion motors (marine motors) and underqualification of workshop labour and crew.

As a result, workprogrammes can hardly be kept to.

In the case of OTRACO (380,000 t-fleet, of which 280,000 t is operating), maintenance should include one overhaul every 4 years, or 70,000 tons p.a. In 1964, only 33,000 tons were attended to.

Having no recent figures, we cannot estimate the impact of maintenance inadequacy on the present water traffic.

In the case of Public Works (waterways), we were informed of a 50 % maintenance inadequacy.

b) Rail transport

Maintenance and repair facilities are inadequate as far as availability of special spare parts for traction diesel engines and qualification of personnel are concerned.

As a result, production is lost which has been demonstrated qualitatively to us by means of graphs in the planning room.
Note : Part of the available facilities is used for building new wagons.

c) Road transport

Bus maintenance and repair facilities are adequate but open to improvement by personnel upgrading.

As for the Public Works Mechanization Centres, no facilities whatsoever are available neither spare parts, nor equipment in good condition, nor tooling.

In these centres, hyndreds of vehicles are idle, some having covered but a few hundred km.

2°) Manufacturing industries sector

In this sector, maintenance and repair facilities are adequate, though in some cases open to improvement.

We have not observed loss of production or idle time referable to inadequate maintenance or repair in these industries. It should be observed that few firms are presently working at full production capacity ; this leaves breathing-space for the maintenance and repair of their equipment.

3°) Agricultural sector

We understood from the conversation we had with F.A.O. chief of mission in Kinshasa, attached to Ministry of Agriculture, that large farms in R.D.C. have adequate facilities for the repair and maintenance of their equipment.

As for the small farms, they have no such facilities.

We could not ascertain on site about this.

4°) Hospital sector

This sector is completely deprived of facilities for the maintenance and repair of its equipment.

Therefore, equipment is in an advanced state of wear and some is out of use.

B. INDUSTRIES AND INDUSTRIAL EQUIPMENT IN WHICH THE PROBLEM OF MAINTENANCE AND REPAIR IS PARTICULARLY ACUTE

It emerges from the above that it is the public transport sector, especially the Public Works Mechanization Centre, and the hospital sector which face the major maintenance and repair problems. Those problems are particularly acute for such plant as : internal combustion engines, vehicles and road upkeep machines, hospital communal equipment.

C. FACTORS AFFECTING THE ADEQUACY OF MAINTENANCE AND REPAIR FACILITIES AND GRADING OF THESE FACTORS ACCORDING TO THEIR IMPORTANCE AND IMPACT

Generally, the lack of qualified personnel and of original spare parts are the main factors having a detrimental effect on the adequacy of equipment maintenance and repair.

The poor condition of maintenance equipment (machines and tools) also has an adverse effect, especially in the Public Works Mechanization Centres where for this reason crankshafts cannot be rectified and cylinders not bored out anymore.

D. EFFECT OF ABSENCE OF STANDARDIZATION AND UNNECESSARY VARIETY OF EQUIPMENT ON MAINTENANCE AND REPAIR

It is obvious that the lack of standardization makes for a great increase in the number of spares and faces equipment maintenance and repair personnel with a new difficulty.

Therefore, there is a general tendency towards standardization and only in e few cases has this important matter been overlooked : viz. OTRACO (for the marine motors), Public Works (112 different types and marks of vehicles and road equipment), hospitals (equipment vary from one hospital to another, in origin, type, mark).

E. AVAILABILITY OF GOVERNMENT ORGANIZATION OR PRIVATE INSTITUTIONS DEALING WITH MAINTENANCE AND REPAIR

There are no public works concerned with maintenance or repair work for third parties, but some private firms are :

ENTRELCO : electric installations

CHANIMETAL : sheet-metal work, erection-work, ...

CHANICO : for equipment supplied by them (road building machines, lifts, etc)

CONGOFRIGO : cold storage plant.

The service provided by these firms is good.

F. EXISTENCE OF GOVERNMENT POLICIES AFFECTING MAINTENANCE AND REPAIR

The full significance of the industrial equipment maintenance and repair issue has not been overlooked in Government circles. There are applications planned (*) for assistance in the training of personnel, or the setting up of central shops for maintenance and repair work or the production of spare parts, or for the formation of an industrial equipment maintenance and repair central service (**).

The latter application for assistance may be taken as a first move towards the laying down of a national policy in this field.

(*) We know of two projects aiming at the setting up of central shops for the machining of detached parts, the maintenance and repair of heavy plant and industrial equipment.
We are also aware of an application to UNIDO for technical assistance mainly for the training of industrial labour, especially foremen. We have not heard the details of these projects.

(**) There has further been an application for assistance recently made to UNDP for the setting up in the D.R.C. of an industrial equipment maintenance and repair central service.

VI. PERSONNEL

A. AVAILABILITY OF SKILLED MAINTENANCE AND REPAIR PERSONNEL

We have not obtained in the surveyed industries, precise information on qualification and number of maintenance personnel. No rosters with the name of each workman, job carried out and his qualification for this job, were available. As time allowed was too short to draw up a roster ourselves (which must cover all personnel to have real statistical value), we had to be satisfied with general information such as the total force of available maintenance personnel, general appreciation, etc.

From this information and from our own findings, we conclude on this subject as follows :

Native workmen have not yet attained the skill and the know-how of those in industrialized countries. If properly set to work and supervised, they can achieve good work.

Good foremen, able to command and to train native labour, are scarce in D.R.C. All have experience of the work to be done but easily get lost when unforeseen things happen. They also lack fundamentals on theory and have difficult to understand and read electrical wiring-diagrammes or to think of causes of failure in service.

In private industry, where this shortage is made up for by the almost exclusive employment of foreign managerial staff, maintenance and repair problems are on a minor scale.

On the other hand, in the public sector such problems remain unsolved or take far too much time to solve.

In a number of public sectors water-borne and rail transport, native managerial personnel receives the help of foreign specialists, but these are not always in sufficient number and moreover, as they do not come into the actual operations, their efficaciousness is thereby often quite restricted.

B. AVAILABILITY OF TRAINING FACILITIES

Up till 1964, there was no training school, where instruction was specially aimed at equipment maintenance and repair work. All those engaged on this work were trained by various organizations or firms having their own school (BATA, OTRACO).

Since 1964, the I.L.O., within the UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP), has undertaken the implementation of a programme for the establishment in the D.R.C. of an Advanced Vocational Training Institute (Institut national de Perfectionnement professionnel - I.N.P.P.P).

This institution that we have visited, has given top priority to the in-plant training of labour and has provided assistance to about fifty firms in various branches including maintenance and repair.

Up to now, some 2,500 workers have been trained, or are in the process of being so, in various technics.

These include almost all those occuring in maintenance and repair work : general mechanics, industrial electricity, farm mechanics, motor-car mechanics (petrol and diesel), welding, electronics.

The institute also runs training and refresher courses for intermediate superintending staff and instructors.
It has a Central Management and so far one Regional Management for the Kinshasa area. A centre will shortly open in Boma and the setting up of a new Regional Management in Lubumbashi is planned to take place in 1969.

Although the ground already covered is substantial and promising, one should have no illusions on the immense extent of the task that remains to be fulfilled.

But there is a much more serious matter, namely the lack of managerial personnel, for whom the training takes much longer thant that for intermediate superintending staff.
It will take years to make good this shortage.

We do not know of any institute specially concerned with the training of managerial personnel for maintenance and repair activities.

Therefore, firms train their own maintenance and repair personnel. Some of them have developed systematic training programmes, often with the help of I.N.P.P.

F.A.O. has, for its part, undertaken the setting up of Agricultural Mechanization Centres (*). Their purpose is to train in the routine maintenance and small repairs of farming plant. A central school has been opened in Kinshasa for the quick training of 40 tractor-driving apprentices (a training-session lasts three months).

This centre is a model organization of the kind and it should be made possible to set up identical centres in other parts of the country.

(*) See Appendix 23

VII. FUTURE POLICY

A. MAINTENANCE AND REPAIR NEEDS AND ESTABLISHMENT OF PRIORITIES

1°) Maintenance and repair requirements

In order to make out the requirements of maintenance and repair, we have tried to ascertain for the various industrial sectors under survey to what extent the factors bearing on the standard of equipment maintenance and repair work has a beneficial or adverse influence.

To this effect, we have weighted the influence of the different factors, awarding the following marks :

- 0 : good
- 1 : fair
- 2 : poor.

A "good" grading means that the factor has a sufficiently good influence on the standard of maintenance, so that under the present circumstances it entails no serious consequences from the production standpoint.

A "fair" grading means that the factor has just enough influence on the standard of maintenance, so that under the present circumstances it entails no serious consequences from the production standpoint.

A "poor" grading means that the factor has, under the present circumstances, a detrimental influence on the standard of maintenance, so that it brings about serious consequences from the production standpoint.

Table III gives weighted values. It shows in columns 1 to 4 factors having an influence on the standard of equipment maintenance and repair. These different factors have been condensed as much as possible, so as to concentrate on the main ones to chich secondary factors can easily be related.

TABLE III : MAINTENANCE AND REPAIR REQUIREMENTS AND PRIORITIES

Sectors	Factors affecting the adequacy of maintenance and repair facilities						5	6
	1	2	3	4				
	Equipment	State of equipment	Amount of original spare parts	Qualified personnel			Total marks per sector	Priority per sector
				Managerial	Foremen	Operative		
1. Public transport								
- water-borne	0	1	2	1 (a)	0	1	5	II
- rail	0	0	1	1	1	1	4	II
2. Public works								
- navigable waterways	0	1	1	1 (b)	1	1	5	II
- road machines (T.P.M.)	1	2	2	2 (b)	2 (b)	1	10	I
3. Manufacturing industries	0	0	0	0 (c)	1	1	2	III
Total marks per factor of sectors 1, 2 and 3	1	4	6	5	5	5	-	-
Priority per factor of sectors 1, 2 and 3	III	II	I	II	II	II	-	-
4. Agricultural	1	1	1	1	1	1	6	II
5. Hospitals	2 (d)	2 (d)	2 (d)	2 (d)	2 (d)	1	11	I

a) Foreign advisers with no authority to make decisions
b) Inadequate in number and qualifications
c) All managerial staff is foreign
d) Non-existent

These different factors are :

- Equipment

This word means the quantity of workshops, machine-tools, tooling, available for the satisfactory maintenance and repair work, which does not exclude additional equipment to better the situation in some cases.

- State of equipment

This refers to the present condition of shops, machines, tools. Such equipment may be worn out, in a state of disrepair, incomplete, etc.

- Amount of original spares

As already mentioned, it is not possible to do without original spares. There is a minimum of parts which cannot be made locally and, if they are missing, adequate repair work cannot be carried out.

- Qualified personnel

Marks awarded sometimes indicate the amount, but in most cases they measure the qualification.

Qualified personnel has been subdivided into managerial, foremen and operatives, weighting not being the same for this different categories of personnel.

Notes

1. We have not considered in table III maintenance programme and structure and spare part stores, because, as explained in Chapter IV, these factors seldom have impact on the existing maintenance and repair facilities.
2. The sector of Passenger Public Transport by bus (T.C.C.) has been included in the manufacturing industries as the respective positions are similar and as the concern under survey is run by private interests (whilst being mostly owned by the Congo State).

2°) Priority per sector

Table III also shown (column 5), by adding up the figures along the horizontal lines, total marks awarded the various sectors under review. Such total ranges from 0 to 12, it is being understood that the lowest marks are the best.

We thus arrive at the priorities per sector, shown in column 6. Such priorities are shown by means of roman figures with the following meaning :

- I : first priority
- II : second priority
- III : third priority.

It follows that the sectors requiring urgent assistance are those covering the maintenance of public works road machines, also including the Government fleet of cars (10 marks out of 12) and that of hospitals (11 marks out of 12).

Then come the other sectors, practically on equal terms, namely :

- Agricultural sector : 6 marks out of 12
- Water-borne public transport sector : 5 marks out of 12
- Navigable waterways public works sector : 5 marks out of 12
- Rail public transport sector : 4 marks out of 12.

Finally, the manufacturing industries, usually under the management of private interests or foreigners, range third for priorities (2 marks out of 12).

3°) Priority per factor

By adding up the figures of the different columns, one obtains the marks awarded to the various sectors having an influence on equipment maintenance and repair. We have derived therefrom the priorities per factor, which are shown by means of roman figures with the same meaning as under 2° above.

The agricultural and hospital sectors cannot really be considered as industrial. Therefore, their marks have not been taken up in the totals, in order to avoid a misrepresentation of the results concerning the priority of factors to which improvement efforts will have to be directed.

For factor appraisal, the lowest marks are the best. Total marks may range from 0 to 10. Consequently, priority factors rest on the lack of original spares (6 marks out of 10) and of qualified personnel (5 marks out of 10).

It should be observed that the various categories of personnel : managerial, foremen and operatives, carry the same total number of marks. This is a more coincidence, the relative importance of such different categories varying according to the various sectors under survey.

B. RECOMMENDATIONS ON THE UPGRADING OF EXISTING FACILITIES

1°) Assistance to public works mechanization shops (T.P.M.)

It emerges from a study of Table III, that it is the Public Works Mechanization Shops-sector that is in urgent need of assistance (*).

In further appears from this Table that such assistance should cover all the factors having an influence on the standard of equipment maintenance. In other words, these shops need complete reorganization.

We suggest that this assistance should take the form of expert and consultant service as well as the granting of training scholarships, and of the supply of the requisite parts for the repair of the existing machine tools in the shops.

The experts should include :

- an engineer who is a specialist in motor-car mechanics and organization
- an engineer or technician who is an internal combustion engine (petrol and diesel) specialist
- a technician who is a car electric installations specialist
- a technician who is a specialist in mechanics and machine-tools
- an expert with specialized knowledge of the building up of stocks of spare parts and of the organizing of a perpetual inventory system
- consultants with expert knowledge of the different types and makes of machines, to help the above mentioned experts in some definite fields (such as for the replacement work of missing or worn parts of machine-tools).

(*) The efficiency of the shops would be all the more valuable as they could be entrusted with the overhaul of farming tractors. These shops are distributed over the main centres of the country and are thus conveniently located.

The services of the team of experts would cover a total period of 24 months and that of consultants 6 months.

The scholarships would be granted for the training abroad of the correlative personnel in the various specialized fields of maintenance of motor vehicles. There would be 7 such scholarships each for a period of 6 months.

The assistance would likewise cover the in-plant training of the correlative personnel.

We recommend the granting of funds in foreign currency immediatly available at the abovementioned experts' demand and intended to purchase spare parts.

2°) Assistance to hospitals

Table III shows that hospitals too are a sector in which urgent action is quite necessary. As, in this case, there appears to be no sort of organized service, we suggest that assistance should take the form of services provided by an expert, whose therms of reference would cover the organizing, in agreement with the Government departments concerned, of a hospital equipment maintenance service. This service should develop programmes and make recommendations regarding maintenance budgets, as well as promote and supervise implementation.

It is suggested that such assistance should cover a period of two years.

In view of the restricted amount of services to be rendered and the urgency of the requirements, private firms could be entrusted with the performance of maintenance work in the hospitals (as was the case a few years ago) (see Appendix 25).

3°) Recommendations as given under 1° et 2° above should be included in a short-term assistance programme.

C. RECOMMENDATIONS ON THE ESTABLISHMENT OF NEW FACILITIES AND OF MAINTENANCE PROGRAMMES IN THE DIFFERENT FACTORIES

1°) Considering that practically all organizations or firms have got a maintenance and repair shop, we do not feel it is to be

recommended, at the present state of affair, to set up now new maintenance shops, whether central or not, regional or national.

A case for the installation of a new central maintenance and repair shop could only be made out within the frame-work of the formation of a new industrial depot in an area, having no engineering shops. But the co-ordinating of work in a central shop as well as the determining of priorities among various industries not always coming under one and the same general management are attended by great difficulty.
And further, the profitability of such a shop is quite questionable and only social or communal compelling motives could warrant its installation. Even if this central shop were set up under the abovementioned conditions, it would not relieve the "customer" industries from the necessity of having within their own organization, maintenance and repair workshops of varying importance according to the kind and size of the firm.

2°) Most firms and organization have developed maintenance programmes but these are seldom clearly formulated under the form of written orders or diagrams and are not always strictly carried out.(*). In order to streamline equipment maintenance and repair methods and organization, we recommend training seminaries for managerial staff and foremen responsible for maintenance and repair services (see E. below).

D. RECOMMENDATIONS ON IMPROVING EXISTING STORES AND THE ESTABLISHMENT OF NEW ONES

1°) Most firms and organizations possess spare part stores, which are fairly well run but open to improvement. We recommend therefore seminaries to be hold as suggested under E. below.

(*) Four among all the concerns surveyed had a comprehensive maintenance programme and practically followed it.

2°) There is no point in opening a new materials or spares central store. The number of parts common to different industries is comparatively small, so that this store could only carry stocks of currently used materials or parts, which are already obtainable locally.

E. TRAINING OF PERSONNEL

Training seminaries

Table III has laid bare the fact that the lack of qualified personnel was one of the factors having a prejudicial effect on the standard of equipment maintenance and repair.

This shortage of qualified native personnel obtains at all levels : managerial, foremen and operatives.

However, at managerial level, the deficiency is mainly quantitative. Maintenance and repair native managerial personnel is extremely scarce and found wanting in experience. Foremen are found in a slightly greater number but their qualifications are on the low side.

From these facts it emerges that a long-term training programme is to be advised and we suggest this should, in the case of managerial staff and foremen, take the form of training and refresher seminaries.

As for operatives, we feel that the action taken by the I.L.O., mentioned under VI.B., is worthy of support and should be pursued. The same applies to the action taken by the F.A.O. in the agricultural field and mentioned in this chapter.

F. ROLE THAT CAN BE PLAYED BY DEVELOPED COUNTRIES AND BY MOTHER FACTORIES

Provisionment control department

At the present time, industrialized countries and parent companies do already play an important part in the field of equipment maintenance and repair, either by sending experts on the spot or by assisting in the supply and provisionment of spares, or in the training of personnel, etc.

It stands to reason that these lines of action should be promoted. To be effective, they should preferably be contemplated before the supply contracts are entered into.

As the rendering of assistance is presently more frequent in private concerns than in State-controlled organizations, we suggest that a Provisionment Control Department be set up in the Ministry of National Economy, with the duty of seeing that all supply contracts contain provisions relating to this short- and long-term assistance.

This department should likewise ascertain that new industries which obtain a license for establishing themselves in the country, have also provided for an assistance programme. This obligation should further devolve upon importing firms; these should have on the spot a qualified technical agency and an adequate stock of spares.

Importers of motor car equipment, agricultural machinery and other machines should no longer be authorized to import equipment unless they set up specialized local agencies.

In addition, the said department should take the necessary action so that companies, which have previously supplied important equipment material, provide aid by setting up an agency carrying a stock of spares or by sending experts to help in the maintenance of the implements supplied. This is particularly the case with Société de Construction Automobile FIAT, who supplied the D.R.C. with many lorries and tractors and has no qualified agent on the spot.

In this connection we suggest assistance in the form of the provision of an expert entrusted with the establishing of the abovementioned provisionment control department.

These services should cover a period of 24 months, with possible extension if need be.

G. TIME LENGTH OF ASSISTANCE PROGRAMMES

As it appears from what we have said that the qualified personnel factor has a major and adverse influence as regards the standard of equipment maintenance and repair, it is recommended that the time length of assistance programmes, in particular those comprising a correlative personnel training purpose, allows of possible extension as required.

H. SUGGESTED ASSISTANCE PROGRAMMES SCHEDULE AND PRIORITIES

Table IV shows the schedule and priorities of the assistance programme suggested in the previous paragraphs.

TABLE IV : SUGGESTED ASSISTANCE PROGRAMME SCHEDULE AND PRIORITIES

	Phase I																		Phase II					
	1st year												2nd year												3rd year					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Assistance																														
1°) Short-term programme																														
a) Public works mechanization (T.P.M.)																														
- Experts	———												———												- - -					
- Consultants			———																											
- Parts for machine tools				———																										
- Spare parts							———						———																	
- Scholarship													———																	
b) Hospitals																														
- Experts	———												———						- - -						- - -					
2°) Long-term programme																														
a) Training seminaries														- - -																
b) Setting up of provisionment control department							———						———												———					

APPENDIX O

CONVENTIONAL SIGNS

A. GENERAL

- A0 Name of industry surveyed
- A1 Year of establishment
- A2 Branch of activity
- A3 Production Capacity
- A4 Present Production
- A5 Economic Importance
- A6 Equipment for maintenance
- A7 Personnel
- A8 Ownership

B. MAINTENANCE AND REPAIR SERVICE

- B1 Structure
- B2 Programme
- B3 Equipment, Shops, Tools
- B4 Spare Parts, Stores
- B5 Personnel

C. COMMENTS

- C1 Adequacy of Maintenance and Repair Facilities
- C2 Factors affecting the adequacy of maintenance and repair facilities and grading of these factors according to their importance and impact
- C3 Effect of Absence of Standardization
- C4 Proposed Remedies

APPENDIX 1

A0 OTRACO (Office de Transport du Congo)
Shipyard and work shops of Kinshasa

A1 Before 1940

A2 Shipyard with mechanical engineering shop (shipbuilding, conversion, maintenance)
Note : Survey confined to maintenance

A3 To carry out fleet maintenance, should be able to heave down 70,000 tons p.a.

A4 Carried out the maintenance of 33,000 tons p.a. in 1964 (1965 and subsequent annual tonnage figures not obtained)

A5 OTRACO is the foremost water-transport organization in the country

A6 Boats and their equipment (engines, electrical appliances, air conditioning, etc)

A7 Native managerial staff. Important foreign technical assistance

A8 State owned

B1 Various departments (sheet metal work, mechanical workshop, engine overhaul workshop, electricity, joinery) with responsible persons in charge.
These departments carry out at the same time new building, heavy repair work and ordinary maintenance. Movable teams ensure repair and maintenance on board.

B2 Yes, such as careening maintenance established on 4 years' intervals

B3 Machine-tools and sundry items of tooling for mechanical workshop, sheet metal work, engine overhaul and electrical maintenance

B4 Well organized stores with adequate stock of spares, except for engine parts which are missing

B5 Labour qualified to do routine work, but needs assistance for special jobs (precision machinery adjustment)
Training action under the technical assistance scheme is in progress
Native managerial staff not adequately qualified

C1 Facilities with respect to number and kind of equipment are adequate (although some machines need replacement as explained below) but other facilities (see C2 below) are not.

C2 -Shortage of genuine spare parts especially for ship engines because of lack of credits, too long supply delays and extremely high consumption (to many breakdowns)
-Subqualification of native staff and labour especially for specialized jobs (rectifying work, milling work, etc)

C3 Perceptible because of variety in ship engine origin (mark, design)

C4 1. Provision of original parts for ship engines
2. Training action to be applied on shop personnel and boatcraft
3. Shop equipment to be improved by :
   a) replacing obsolete milling machines by universal new ones
   b) purchase nex machine-tools : one 10 m b.c. lathe, six 2.5 m b.c./275 mm c.h. ordinary lathes, one spur and bevel gear cutting machine, one grinding machine, one journal boring machine that can be fitted on to a lathe.
   (Note : some of these machines are already on order).

Note : As our visit was interfered with by a number of formalities, we were not able to obtain more detailed information, especially on maintenance programme and spare part stores.

APPENDIX 2

A0 OTRACO - Limete Workshops (Kinshasa)

A1 Before 1940

A2 Maintenance of railway wagons and of shunting-locomotives. Occasionally wagon building

A3 Variable according to work to be carried out at each wagon

A4 Variable, may be set at 2 to 10 wagons/day

A5 Maintenance of rolling stock that ensures important rail transport between Kinshasa and Matadi

A6 The whole rolling stock of wagons of all types and passenger coaches (the number of which we were not told)

A7 Native management and personnel. Foreign technical assistance

A8 State owned

B1 Different departments (mechanical shops, forge, wagon shop, electricity, joinery, painting, lining) with responsible persons in charge

B2 Planning office with statistics. Descriptive index card for each wagon giving its history with mileage and work done on it

B3 Limete Shop

Wagons

Equipment for wagon routine maintenance, complete overhaul, repairs and lubrication, checking, lifting
Several lathes for wheel-tyre grinding, ordinary lathes, shaping machines, etc.

Shunting locomotive Shed

Equipment fur shunting locomotive overhaul, dismantling and remounting of assemblies (particularly diesel engines)

Main-line locomotive Service Station and Inspection Pit

Sundry items of equipment, e.g. fuel oil pump, spraying ramps, etc

B4 Stores with too few spare parts

B5 Labour qualified to perform routine work but not skilled jobs
Native managerial personnel and foremen inadequately qualified

Note : The Thysville shop looks after the grinding and replacing of wheel tyres.

C1 Adequate except for : (see below C2)

C2 Not enough spares (especially for diesel engines)
Native labour underqualified

C3 Small, standardization is applied

C4 Spare part provisionment to be improved
Personnel at all levels to be upgrated
Pursuance of technical assistance

APPENDIX 3

A0 PUBLIC WORKS (waterways) - Kinshasa

A1 Before 1940

A2 Building and repair of river ferry-boats
Maintenance and repair of dredgers and other waterway maintenance equipment

A3 Not applicable

A4 Manage to cope with the maintenance of 50 % of the equipment

A5 Ferries are the only means of conveyance across most rivers (no bridges). Waterways play an essential part in transport

A6 River ferries, dredgers, inspection boat and other equipment

A7 Native managerial personnel and operatives
Technical assistance at staff level
Attempt to train teams for building ferries inland

A8 Owned by Congo State

B1 Various departments (sheet metal work, mechanical workshop, overhaul workshop for diesel and internal combustion engines, joinery) with responsible persons in charge

B2 Programme confined to ferrie building. No maintenance programme, maintenance and repair according to urgent needs (parts worn out or broken)

B3 Shops

a) Sheet metal work with sheet and tube bending machine, folding machine, shearing machine, drilling machine (not all in good condition : wear, breakage)
b) Mechanical workshop with 3 lathes, 1 shaping machine, 1 milling machine, 1 radial milling machine
c) Joinery with complete equipment
d) Engine-shop (in good condition)
e) Spare part and material store

B4 Important stock of spares. Store well run.
Time of delivery rather long in the case of provisionment of certain parts (2 years)
Administrative formalities too long
Several dredgers idle for over a year for want of spare cylinders

B5 Managerial staff too few in number and not sufficiently qualified
Foremen and operatives not sufficiently qualified

C1 Slightly inadequate (see C2)

C2 -Bad condition of some workshop equipment
-Shortage of some essential spare parts (such as dredge-cylinders)
-Labour subqualifications
(These three factors are equal in influence)

C3 None. Series equipment (ferries) is standardized.

C4 Defective machines to be repaired (it may prove necessary to replace the obsolete ones)
To cut down the time for obtaining supplies
Managerial staff to be increased in number
Labour to be upgraded (mostly welders)

APPENDIX 4

A0 PUBLIC WORKS MECHANIZATION (T.P.M.) (Roads)- **Kinshasa**

A1 Before 1940

A2 Maintenance and repair shop for machines used for the building and maintenance of roads, bridges and structures. Further entrusted with the maintenance of the fleet of Government cars.

A3 No obtained

A4 Very small (the stock-yard is full of hundreds of vehicles of all types, waiting for maintenance)

A5 Of prime importance, connected with road transport

A6 Road equipment . bulldozer, graders, asphalting machines, etc. . lorries, sundry vehicles
According to the information obtained from the General Secretariat of the Ministry of Public Works, there remains but little serviceable equipment. No maintenance has been done since 1960
Contracts for the purchase of new equipment have been entered into or are under consideration. For instance, orders have been placed for the supply of 1 UNIMAG and 2 dump lorries per district. The purchase of a set of loading-shovels is being considered

A7 80 to 100 (est.)

A8 State owned

B1 Specialized Sections each with responsible head supervised by chief engineer

B2 No maintenance programme

B3 Several shops with a fairly large number of machines :

a) service station
b) engine overhaul - shop with test bench
c) pump - control shop
d) mechanical workshop
e) shops for bodywork, tyres, etc

The whole shop equipment is in poor condition. Several machines are short of essential parts, others are not connected up. Only a Fiat outfit, recently supplied for the overhaul of engines, seemed to us to be in a good state and complete.

B4 No spares. No organized shops. Dozens of engines have been stored away in the shops pending the provision of parts and maintenance

B5 Personnel is numerous but underqualified
No foreign assistance

C1 Entirely inadequate

C2 Absence of spare parts
No qualified managerial staff and foremen. No programme.
Equipment, machines and tools in bad condition

C3 Major influence : increased volume of maintenance work as a result of different types and origins of vehicles

C4 Complete reorganization under foreign technical assistance scheme

A0 SOCIETE DE TRANSPORT EN COMMUN DU CONGO (T.C.C.) - Repair and Maintenance Shops in Kinshasa

A1 1955

A2 Bus maintenance and Repair

A3) Originally planned for 100 units, now looks after more
A4) than 200 units (3 shifts)

A5 Important transport and bus company in the Congo

A6 930 with 25 foreigners (including drivers)

A7 202 buses and 57 trailers of Belgian make (VAN HOOL), fitted with British (LEYLAND) engines, supplied in 1957 (100 units) and in 1965 (102 units). Specially made for heavy duty, with trussed chassis.

A8 Mixed-ownership company : 65 % State owned including 5 % through OTRACO, 35 % private.

B1 Technical Department under a manager with an assistant, grouping an inspection section and 4 shops

B2 Comprehensive, detailed and strictly applied working programme

B3 Shops

a) Lubrication, sump draining and oil replacement (every 2,500 km) : 4 hydropneumatic platforms
b) Repair shop (except engines and bodywork) with tools, lifts, jacks and tyre-machines
c) Complex of specialized shops
   - electrical (starters, batteries, etc)
   - pneumatic (door-control devices)
   - diesel engines (shaft line boring machine, crankshaft grinding machine)
   - injection pumps
   - gear boxes
   - rear axles
   - cleaning of parts
d) General Mechanical Shop
   Lathes, milling machines for making bolts, axles, bushes, etc

B4 Very well organized stores, well supplied with spares covering over 12,000 different items. Complete spare engine assemblies (overhauled and new)
Standard exchanges

B5 Foreign management and managerial staff. Each shop-foreman has a native assistant but only in the training stage

C1 Adequate

C2 a) Poor efficiency of local labour
b) Bus driver subqualifications
c) The very essence of the thankless task influenced by the unexpected character of accidents
d) Slight shortage of credits

C3 Nil. Standardization is applied, all equipment is of the same make.

C4 To pursue the training of workmen, especially bus drivers No training abroad. Elementary education to be reexamined and, possibly, make this more comprehensive.
(I.N.P.P. is giving help and is busy on the spot with respect to a number of specialities).

APPENDIX 6

A0 BRALIMA (Kinshasa)

A1 Before 1950

A2 Brewery, makers of limonades, yeast, ice and carbon dioxide production
Group of 4 units, the main one (4 to 5/7 of total) being in Kinshasa. The others are in Kisangani, Boma and Bukavu

A3 165,000 bushels of beer p.m. or 7 million bottles p.m.

A4 100 % (10 to 20 % increase under consideration)

A5 The most important brewery in the country. No exportation

A6 Lemonade manufacture :

Water purifier (aerating, sand/active carbon double filtering, syrup making, bottle washer, filling machine, bottle-capping machine, conveyor belts)

Brewery :

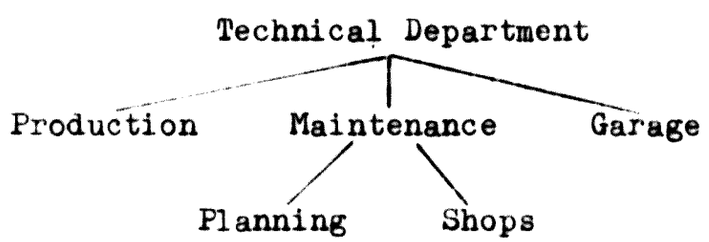
Copper brewing vats, fermenting and storage vats, press-filters, refrigerating compressors, pumps, 4 bottling lines each with : washer, drawing off machine, bottle-capping machine, conveyors.

Fleet of about 100 vehicles including 50 lorries

A7 Staff of 900, including 25 foreigners.

A8 Private industry

B1 Independent unit as shown by the following chart :



B2 Preventive maintenance schedule practically kept to
Preparation of work (card recording, time registering)

B3 Mechanical Workshop : 4 lathes, milling machines, shaping machine, forge, welding.
Garage : complete overhaul of vehicles, including engines (except crankshaft-grinding, done outside)

B4 Normal and adequate stock of original spares. Few local parts, except bearings, bronze castings, parts for cars, etc
Well-kept store.

B5 40 workmen under foreign chiefs (head of department, shop foreman, garage superintendent)
The person in charge of planning is also a foreigner.
On the whole, workmen are satisfactory ; but it is observed that electricians are not equal to the job of trying to trace the causes of breakdowns. (Note : this is presumably also the case with mechanicians)
There is a workman training system, applied by I.N.P.P. and based on actual field conditions (f.i. electric wiring diagram of factory).
Stress is laid on training and on the capacity the foreign head should possess for undertaking this.

We found the following skilled labour

a) refrigerating compressor fitters (factory trained)
b) bottling machine fitters (highly specialized labour, trained by a foreigner, himself trained at the works of the makers)
c) pump fitters
d) pipe fitters
e) electricians

C1 Adequate

C2 The following factors seemed to us to have a detrimental influence :

a) electricans' inability to locate faults
b) the standard of lorry drivers

C3 Small. No unnecessary variety of equipment

C4 Nil.

APPENDIX 7

A0 MARSAVCO (Kinshasa) (LEVER Group)

A1 1922 (formed for the processing of palm oil), developed since 1953

A2 Palm oil refinery, soap and margarine works

A3 5,000 tons of food oil, 3,000 t of margarine, 15,000 t of soap (per annum)

A4 70 % A3 (market)

A5 Local palm oil processing (LEVER plantations).
No exportation
Distribution in the country handled by two commercial firms

A6 Oil Purification Department :

Autoclave with stirrer, pumps, pipework

Margarine Department :
Feed regulating piston pump, ammonia circulating exchanger (stainless), proportioning and filling machines

Soap Works :
Saponifying vats, press-filters, distilling apparatus, storing vats
Pulverising tower, conveyors, packing machines (soap powder)
Extruding machines, moulding, screw granulator shaping, packing (soap bars)

General Services :
Boiler room : three 20 t/h 15 kg/sq/cm (W.P. = 8 kg/sq.cm)
Babcock Wilcox boilers

A7 Staff numbers 985, including management 8 foreigners, 29 native managerial personnel and 60 native foremen.

A8 Private industry

B1 Independent unit with 1 foreign shop foreman and 1 foreign head store-keeper

B2 No preventive maintenance : not useful for this sort of industry.
Ordinary maintenance at regular intervals (lubrication, cleaning, inspection)
Other maintenance and repair to suit emergencies

B3 Shops with basic equipment (lathes, etc) in good condition

B4 Key parts in stock. Shops properly run. Occasional problems of missing spares

B5 Skilled native labour (assistants, welders, electricians, mechanicians).

C1 Adequate

C2 We did not come across any major deficiency

C3 Small. No long series of equipment

C4 Nil.

APPENDIX 8

A0 CONGOFRIGO (Kinshasa)

A1 1935 (under the style of FRIDAM)

A2 Importation, conditioning, preservation and distribution of perishable commodities

A3 Old C. Fcs. 600 million monthly turnover

A4 According to market

A5 Largest Congo firm of its kind ; branches in Thysville, Matadi, Kisangani and Boma

A6 Cold stores : 10,000 cu.m.
Lorries : 117

A7 Staff of 2,000

A8 Private company

B1 Maintenance is department-wise

Namely :
a) ammonia-based plant
2) freon-based plant
3) garage
4) handling machinery
5) buildings and insulation

Each department looks after the installation, inspection, maintenance and repair of the plant allowed to its care. It has no direct connection with another department.

B2 Maintenance at regular intervals according to a strictly followed programme. Also accepts to do maintenance and repair work on refrigerating plants other than its own.

B3 The equipment of the refrigerating installation department is highly specialized and is portable. It includes such items of apparatus as a vacuum pump, standard pressure-gauge, thermograph, compressor tightness control, etc required for the checking of installations and automatic appliances, coolants-refilling, etc.

B4 Normally adequate stock of spares. Stores properly run but administrative formalities are protracted.

B5 Labour is specialized but no versatile. It is trained by departmental head, but is not yet sufficiently skilled

C1 Adequate

C2 a) Sub-standard qualifications of labour
b) Time of delivery of new supplies of spares very long in the event of stock interruption (1 year) (no technicalness on the part of the parent company's provisioning service)

C3 Small. (standardization is applied)

C4 1) Labour to be upgrated
2) Provisioning service to be reorganized.

APPENDIX 9

A0 UTEXCO (Kinshasa)

A1 1929

A2 Cotton spinning, weaving and printing

A3 Not obtained

A4 50 %. Direct imports competition

A5 The most important textile factory in the country.
Exports 20 % of its production

A6 1,400 looms, 25,000 spindles
The plant is 20 years old ; some of the looms were obtained in 1963
Some pieces of equipment have been modernized in order to increase their capacity

A7 Management and managerial staff comprising 80 foreigners (one native administrative manager), 4,000 workmen

A8 Private concern

B1 Works divided into departments, each operating on its own in regard to maintenance, but under the control of the production superintendent

B2 Maintenance programme but no preventive maintenance, save one department as a trial

B3 Departmental workshop located close to factory building and equipped with a few standard machine tools (lathe, drilling machine, grinding wheel, shaping machine).
Important and independant well- and comprehensively equipped central workshop having a foundry with pattern shop, a very well fitted out mechanical shop (able to cut gears up to Ø 1,200 mm and module 12), a sheet metal work, an electrical shop with rewinding facilities (4,000 electric motors in service), a joinery, a building upkeep service and a garage.

B4 Adequate stock of spares. 30 % of total spare parts are made by own central workshop, but are qualitatively not up to the standard of genuine parts. The fact is that the workshop has neither heat treatment nor high-grade finishing (grinding) facilities.
Well organized store in each department (Kardex system)

B5 Labour is locally trained, often initially unskilled.
This labour is on the whole satisfactory but efficiency is on the low side

C1 Adequate

C2 The quality of self-made spares appears to be an important point ; an application for credit has been filed in order to remedy this deficiency

C3 Small(standardization is applied)

C4 Nil.

APPENDIX 10

A0 BATA Works (Kinshasa)

A1 1942

A2 Shoe Manufacture and Tan Yard

A3 Varies according to types and sizes

A4 Poruction reduced to 70 % due to markets

A5 Covers 75 % of market. Some items not locally manufactured are imported

A6 Tan Yard :

Sundry fabricating equipment
(12 fulling machines, presses, scraping machines, slitting machines, dryers, suppling machines, etc)

Plastics Shop :
Rubber-Soles Shop :

(preparation of mixings, mixers, calenders, vulcanizing presses, injection machines, sewing-, chaping and gluing machines)

Leather Shop :
(4 production lines, each with : sewing, shaping and gluing machines)

General Services :
(7 kg/sq.cm Cochran boilers, 5 kg/sq/cm pumping station, etc)

Sundry :
School with informative material

A7 Staff of 1,300, inclusive of 50 foreigners and clerical staff of 49 selling branches

A8 Private industry

B1 Independent maintenance unit with 1 departmental head, 1 chief electrician and 1 foreign chief mechanician

B2 Suitably organized preventive maintenance. (The stoppage of any one of the line-machines brings about that of the whole production line)

B3 Good workshop with equipment complete and in working order

B4 Important stock of spares. Good provisioning organization (time of stock delivery : 6 weeks). Locally made parts are not advantage due to inferior quality and higher price Well kept store

B5 Foreign staff. Native labour to be satisfied of (30 units)

C1 Adequate facilities. Every possible means are used to prevent the untimely stoppage of production lines by favouring both quality of production equipment (modern plant) and all factors which exercise an influence on maintenance (personnel, spares, equipment).

C2 None

C3 Small. No unnecessary variety of equipment

C4 Nil.

APPENDIX 11

A0 Ateliers JOCK, Kinshasa

A1 Established some 25 years ago

A2 Men's ready-made shirts

A3 13,000 shirts per day

A4 2,000 shirts per day (market)

A5 Wares of high consumption
Labour 100 % native

A6 Electric sewing machines, all of the same mark and power

A7 1,400 native workmen for the two shops JOCK and SOTEXCO

A8 Private concern

B1 Small maintenance unit composed of chief mechanical aided by some workmen, all native

B2 Cleaning, lubricating and overhaul work at regular intervals

B3 No workshop, except a work-room for motor rewinding

B4 Practically no spares, but several complete spare engines
Supplies obtained by air as and when required
Small store keeping some parts, run by chief mechanician

B5 Labour 100 % native

C1 Adequate

C2 Shortage of spares is compensated by availability of spare plant and possibility to supply spares by air

C3 Small (standardization is applied)

C4 Nil.

A0 SOTEXCO (Kinshasa)

A1 1963

A2 Men's ready-made trousers

A3)
A4) Not obtained

A5 See Appendix 11/A5

A6 150 sewing machines (SINGER, PFAFF)
1 automatic boiler
5 steam presses

A7 200 workmen - 1 foreign head

A8 Private industry

B1 Independent maintenance unit

B2 Maintenance work at regular intervals : minor maintenance over week-ends, quarterly inspection of sewing-machine heads, annual overhaul of all machines

B3 No workshop

B4 Important stock (worth several thousand dollars) of spare parts, generally small ones. SINGER has undertaken to build up a stock of spares and has asked for a list of priority parts
Applies to MECANICONGO for speedy supply of lathe-turned parts
Well kept store

B5 4 mechanicians, 2 electricians : good experience (15 years)
Good electrical maintenance. Workmen able to install new motive plant

C1 Adequate

C2 Mechanicians are lacking in theoretical knowledge

C3 Small, standardization is applied

C4 Mechanicians to be upgrated.

A0 AMATO FRERES (Kinshasa)

A1 1942

A2 Oil and soap works based on palm-nut processing

A3 4,000 t of seeds and 750 t of soap p.m.

A4 2,000 to 2,500 t of seeds and 500 t of soap (due to market)

A5 Whole crude oil production is exported

A6 Crude Oil :
3 units (incl. 1 stand-by unit), each consisting of 3 presses, 1 crusher, 1 dryer

Soap Works :
Vats with coil, pipework and pumps, press-filter, Mazzoni machines (slubbing machines, shaping machines), dryers, packing machines

General Services :
2 boilers (1 as stand-by unit) with a capacity of 7,000 kg/h at 12 kg/sq/cm (1957/1962)

A7 3 Europeans (1 engineer as manager and 2 maintenance mechanicians), 300 native workmen and foremen

A8 Private industry

B1 No independent maintenance service (comes under production superintendent who also controls regularly stock of spare parts).

B2 No definite maintenance programme. Regular lubricating but maintenance and repair to suit emergencies

B3 Mechanical Workshop :
Shop with 2 lathes, 1 milling machine, 1 shaping machine, 1 welding set
Specializes in fabrication of parts subjected to heavy wear, e.g. screw axles for presses, nuts, etc.

Electrical service :
Well supplied, having rewinding shop for motors up to 50 HP

B4 Large stock of original spares. Under steady control of Chief production engineer. A few components (e.g. oil-crusher plates) made by CHANIC (see App. 19)
Well kept store

B5 45 native workmen (mechanicians, turners, electricians, greasers)

C1 Adequate

C2 Slow progression in training native labour (turners, welders, electricians, greasers)

Shortage of qualified foremen, such as Chief winder, calls for assistance from managerial staff

C3 Small, no unnecessary variety of equipment

C4 Appropriate course for foremen.

A0 SOCOBELAM (Société belgo-américaine pour le Transport du Bois au Congo)

A1 1959

A2 Lumbering, tree felling, rough timber transport, peeled wood fabrication

A3 1,500 cu.m of timber/month

A4 1,200 cu.m/month (shortage of rough timber)

A5 Whole production exported

A6 Forest :
Chain saws, 3 bulldozers (Caterpillar), traxcavator, 3 lorries

River Transport :
7 powered whale-boats, slipway, unloading bridge (20 t)

Factory :
2 lorries, gantry, saws (chain, band), ovens, wood peeling machine, trimmer, furnaces, sharpeners, boiler (15 kg/sq.cm)

A7 500 persons including 11 foreigners

A8 Private industry

B1 Independent unit with responsible person in charge
Sections : factory maintenance service, garage, boat maintenance service (engine, careening), transport, provisionment service

B2 Heavy road equipment inspected (every six months) by Caterpillar - technician (CHANIC)
Routine inspection and maintenance of other equipment by own staff at regular intervals

B3 Mechanical workshop with lathe, drilling machine, shaping machine
Garage suitably equipped with tools
Electrical service

B4 Large stock, 50 % of which for Caterpillar equipment, which is purchased directly in USA.
CHANIC supplies a few castings and some gears
Large store, well organized but open to better setting of parts

B5 Factory maintenance : 1 foreman and 8 fitters

Garage : 1 foreman and 5 mechanicians

Careening maintenance : 6 sheet-iron workers

Engine maintenance : 2 mechanicians

Transport : 7 workmen

All of them are native. Training on site.

C1 Adequate

C2 a) Sub-standard qualifications of native workmen : need watching and helping. Long training is necessary

b) Shortage of qualified foremen

C3 Small, no unnecessary variety of equipment

C4 Personnel training at all levels to be continued.

A0 PLASTICA - Kinshasa

A1 1965

A2 Polyethylene goods fabricator (bottles, cans, bags)

A3 65 t p.m.

A4 40 t p.m. (market)

A5 Cheap goods, of lasting quality and high consumption, capable of being exported

A6 Polyurethane foam-machine with cutter and preparation of mixings, extruding press, injection machine, calender, printing-machine
Very modern and well installed plant

A7 250 persons including 9 foreigners

A8 Private concern

B1 Maintenance taken care of by machine operator, according to a
B2 Programme laid down by makers

B3 Suitably fitted-out small workshop (with lathe, drilling machine, milling machine, shaping machine, band saw), able to turn out spares of simple design and some moulds (elaborate moulds are made by CHANIC)

B4 Adequate stock of spare parts and store

B5 No separate maintenance staff

C1 Adequate

C2 Nil

C3 Small, no unnecessary variety of equipment

C4 Nil

A0 LAURENS-LE KHEDIVE (Kinshasa)

A1 1962

A2 Manufacturers of cigarettes

A3 3 million cigarettes per day

A4 100 %

A5 Important subsidiary of Lubumbashi main-factory that produces 4 times more
Both together cover 75 % of market

A6 Tobacco processing machinery :
Damping-, chopping-, heating- and rolling machines.
Conditioned storage

Cigarette-manufacturing machines :
6 units (American Foundry) dating back to 1948 - 1,250/ minute

Packing, dispatching machines :
6 packing, cellophane-covering, printing, bundling-up, fastening machines
4 Clayton electric boilers

B1 Independent unit. Foreigner in charge

B2 Half-yearly and yearly overhaul programme
Weekly cleaning and inspection of machines, as they get choked with tobacco dust

B3 Small workshop with basic equipment

B4 Genuine parts in adequate supply. Well run store

B5 Foreign head mechanician with 5 native assistants, trained by him on site. Slow progression in training.
Foreign electrician with native assistant

C1 Slightly inadequate (see C2)

C2 Personnel too few in number and with sub-standard qualifications (as machines require regular maintenance on account of tobacco dust).
Adjustment is difficult. Native workmen are not yet capable of carrying it out.

C3 Small, standardization is applied

C4 Vocational training of workmen to be pursued.

APPENDIX 17

A0 RAY-CONGO (Kinshasa)

A1 1965

A2 Lorry superstructure metal fabrication (coach building, bodies, tipping units, tanks)

A3)
A4) Variable

A5 Small. May serve as training workshop for welders, for instance

A6 Sheet-metal work plant for thin plates (shearing machine, folding machine, bending machine, cutting machine) and welding equipment
Spray booth

A7 Foreign manager (formerly with T.P.M.)
Some 40 native workmen

A8 Private concern

B1 Only one responsible head. As this is a fabricating shop, there is no maintenance and repair workshop

B2 Programme fixed by order

B3 Fabricating plant - see A6

B4 Raw material store (sheets, sections, steels)

B5 Skilled workmen : welders, folders, tracers, etc, trained on site by manager
No outside assistance

C1 Adequate

C2 Nil

C2 Not applicable

C4 Developing shop. Could improve standard of fabrication by ensuring better preparation of the work.

APPENDIX 18

A0 CHANIC - CHANIMETAL (Kinshasa)

A1 1928

A2 Metal engineering and shipyard

A3 Foundry 120 t p.m.

A4 Lower than A3 due to lack of orders

A5 Large-capacity shops, well equipped with plant and provided with skilled labour, capable in particular of producing a wide range of spares

A6 Foundry :
cupola 1 t/h, three 150 kg fuel-oil furnaces, one 500 kg arc-furnace, annealing furnace measuring 3 m x 2.50 m x 1.50 m

General Mechanical Workshop :
5 lathes, 3 milling machines, 2 shaping machines, 1 double grinding wheel, 1 Do-All band saw, 1 hydraulic press, 1 grinding machine, 1 copying-milling machine

Heat Treatment Workshop :
Salt bath furnaces ; case-hardening furnaces

Shipyard :
Planning office with yard equipment (machine-tools) preventive maintenance chart, designing and work preparing office (using full-size drawing projection system for tracing purposes), general stores - sheets - iron sections, sheet-metal work, mechanical workshop (straight-tooth gears up to module 14 Ø 1.00 m, worm gears and bevel gears, surfacing, etc). (7 lathes are on order, one of which measuring 8 m B.C.)

A7 For the whole concern : CHANIC, CHANIMETAL and CHANICO (see Appendix 19)
European management and managerial staff : 80
Native management and managerial staff : 80 (incl. one civil engineer, one man with Comm. Sc. degree)
Workmen : 3,000 (total for CHANIC)

A8 Mixed-ownership company (30 % capital held by Congo State)

B1 Each workshop is an independentunit under a responsible head

B2 Works to a production schedule

B3 See A6

B4 Large stores well run, containing materials and spare parts

B5 See A7

C1 Adequate

C2 Nil

C3 Not applicable

C4 Nil

Remark : The purchase of a sixth furnace (LF induction) for the foundry is being contemplated.

APPENDIX 19

A0 CHANIC - CHANICO

A1 1950

A2 Agents for industrial plant : importation, sale and sales technical service

A3 Does not apply

A4 Does not apply

A5 Agents for plant of marks known all the world over

A6 Plant sold :
Road equipment (bulldozers, traxcavators, graders, etc) (Caterpillar)
Farm equipment (tractors) (Caterpillar)
Air conditioning equipment (Westinghouse)
Hoisting and handling gear (Hyster)
Lifts (Schindler)

A7)
A8) See Appendix 18

B1 Separate shops with responsible heads

B2 Does not apply

B3 Various shops :

CATERPILLAR and HYSTER :
Axle- and bearing unwedging hydraulic presses, surface grinding machines, cylinder boring machines, in-line boring machines, crankshaft grinding machine, valve grinding machine, hydraulic pump test benches, engine (up to 400 HP) testing dynamometrical bench, special Caterpillar tools (dynamometrical benches), routine maintenance and overhaul of tractors.
WESTINGHOUSE :
Maintenance of air conditioning apparatus, refrigerating plants, etc

SCHINDLER :
Local maintenance of 120 lifts by native personnel

B4 40,000 Kardex-recorded spare parts. Stores well run

B5 Not obtained, included in figures given under Appendix 18/A7

C1 Adequate

C2 Nil

C3 Small; standardization is applied

C4 Nil.

A0 MECANICONGO (Kinshasa)

A1 1952

A2 Mechanical Engineering Shop

A3 Varies according to components produced

A4 Not obtained. (Shop closed for annual inspection at the time of our visit)

A5 Good shop, ready to produce spare parts in a short time

A6 General Mechanical Work :
Four 3.50 m B.C. lathes, two universal milling machines (small-size parts), shearing machine, folding machine, drop hammer, welding
The provision of a number of turret lathes would be welcome for mass production.

Engine overhaul :
Crankshaft grinding machine, engine-block boring machine with glazing, cylinder-head planer, injection pump overhaul, checking of starters, etc

A7 55 locally trained workmen, 10-12 years' service, 1 foreign head
(Before Home Rule, the shop was the agent for Bosch and foreign technicians seconded for service by Bosch numbered 6 to 8).

B1 One person only in full charge

B2 The filling of all orders comprises work preparation

B3 See A6

B4 A fair amount of materials in stock, but there is a shortage of engine components, especially oversize shells

B5 Qualified labour

C1 Adequate when confined to manufactory of small parts

C2 Nil

C3 Not applicable

C4 Nil

Note : The shop is facing some financial problems as a result of the loss of the Bosch agency. It is endeavouring to be taken over by an industrial group.
Typical example of small profit-earning capacity when confined to spare parts manufactory only.

APPENDIX 21

A0 BOUKIN (Bouteillerie de Kinshasa)

A1 1951

A2 Glass Bottle Works

A3 60 t/24 h (120,000 bottles of 1.32 pint)

A4 30 t/24 h (insufficient market)

A5 Sole industry of this kind in the country

A6 Proportioning hearths for the preparing of the charge, 3 melting furnaces, bottle-blowing machines, belt conveyors, air-compressors (Ingersoll)

A7 14 foreigners (including one gang foreman per shift)
375 natives

A8 Private industry

B1 Independent maintenance unit with responsible foreigner in charge

B2 No preventive maintenance partly due to the continuous working of the plant

B3 Workshops with machine tools (lathe, grinding wheel, milling machine, shaping machine) in good condition

B4 Adequate stock of spares as a safeguard against slow delivery attending stock supplies (6 months to 1 year)

B5 Sufficient number of personnel. Training by I.N.P.P. in progress

C1 Adequate

C2 Sub-standard qualifications of native labour, even foremen compensated by foreign staff.
Spare part provisionment time of delivery definitely too long, compensated by extra stocks of spares.

C3 Small, no unnecessary variety of equipment

C4 Labour training to be pursued
Provisioning service to be organized to cut down time of delivery

APPENDIX 22

A0 ENTRELCO (Kinshasa)

A1 20 years (est.)

A2 Installation, maintenance and repair of electrical material

A3 Amount of work done varies according to orderd

A4 Curtailed activity for want of orders

A5 Competent and properly equipped concern. Its activities pertain to an important branch of industry where technicians are few in the Congo

A6 Equipped workshop with winding section
The sort of work requires few tools

A7 8 foreigners
Labour force varies according to orders to be filled

A8 Private company

B1 Good management. Office dealing with planning and work-preparation

B2 See B1

B3 See A6

B4 No stock of spares. Where repair work is required, draws on customer's stock of spare parts

B5 See A7

C1 Adequate

C2 Nil

C3 Not applicable

C4 Nil

Note : We contacted this firm following our call on the Kinshasa hospitals (see Appendix 24 re Hospitals).

AGRICULTURAL EQUIPMENT MAINTENANCE

Visit to F.A.O. Mission

Information provided by F.A.O. - Kinshasa Mission Leader

Cultivation in the Congo mainly covers, in order of importance : palm nuts, coffee, rubber, cotton, sugar cane, bananas and cocoa.

Only the work on coffee, cotton and sugar cane plantations calls for mechanization, either for the tilling of fields or for the spraying of weedkillers using therefore tractors. These vehicles also serve for short-distance transport.

The agricultural plant maintenance problem mostly concerns small farms which not always have skilled labour at their disposal. A small workshop located close by seems to be the answer to their problem.

Taking a more general view, the agricultural plant maintenance problem is borne on by the lack of specialized managerial staff and is contingent upon the existence in the farming districts of mechanisation centres of the same type as we saw in Kinshasa (see below).

This problem will also arise in the case of the 1,500 tractors just received, belonging to the Congo State, and for which no maintenance programme has been settled as their allocation is not fixed yet.

Visit of an agricultural mechanization centre

We visited a training-centre run by F.A.O.-expert. This centre provides, on a 3 months-course, the quick training of tractor-driving apprentices.

Following syllabus are given :

1) Elements of management such as costing of a tractor, requirements in tractors (f.i. 1 tractor per 250 acres of field) and maintenance (f.i. 1 mechanization-centre per 10-20 tractors established at an average distance of 5 km from the fields ; 1 centre per 5,000 acres), etc.

2) Elements of maintenance and driving, for instance : tractor-maintenance should be carried out at the end of the day and cover : cleaning, greasing, checking of : oil, water, gasoil (level and leaks), battery and tyres

3) Elements of management of a mechanization centre, for instance : equipment required : welding set (arc, oxyacetylene), grinding wheel, drilling machine, implements for mechanics (metrical benches), pneumatic grease guns, control outfit (battery, tyres, etc), oil and grease supply equipment (to be sheltered from dust).
Value of such equipment : ₩ 3,000

Spares required : filters, belt fans, flexible connections, injectors, injection pumps, steel (sections, bars).

NOTE

1) The agent for the mark is entrusted with the overhaul of a tractor, this service to be provided every 5,000 tractor-hours

2) We observed how keen trainees were on this instruction and its obvious usefulness for minor maintenance. That is why we suggest that this Kinshasa school should be taken as a model mechanization centre.

Several similar centres should be opened in other parts of the country.

A0 Hôpital Général de Kinshasa

A1 Before 1950

A2 Hospital

A3 1,350 beds

A4 Full occupation

A5 Does not apply

A6 a) Communal Equipment :

Kitchen :
1 electric fryer, 2 deep-freezers, 2 electric cookers, 5 lit. steam showers, 2 refrigerators
General conditions good, but a few items need urgent repair (taps leaking, etc)

Wash-house :
1 L.P. fuel-oil boiler, 1 H.P. do
4 60 kg steam-washing machines, 3 spin-dryers, 2 steam-dryers, 1 steam-mangling machine

The steam equipment is entirely worn out.
Replacement equipment has been on the spot for 2 years now and still lies in wooden cases exposed to the weather (a number of boards have been removed).
Shortage of credits, bad condition of laundry-building, and insufficient cable-section for electric power supply seem to be the causes.

b) Medical Equipment :

Such as incubators, sterilizers, lighting of operating room, etc
Are still in working condition, but lack maintenance.
Some items need repair.

A7 Does not apply

A8 State owned

B1)
B2)
B3) Does not exist
B4)
B5)

C1 No maintenance facilities

C2 Does not apply

C3 Perceptible when one considers variety in equipment from one hospital to another

C4 Maintenance service to be set up for hospitals.

A0 Clinique Reine Elisabeth

A1 Not known (before Home Rule)

A2 Nursing Home

A3 100 beds

A4 Full occupation

A5 Does not apply

A6 Standard communal and medical equipment.
No serious maintenance problem, but the equipment is falling into disrepair for want of maintenance (for instance, one out of two reviving sets is out of service)

A7 Does not apply

A8 State owned

B1)
B2)
B3) Does not exist
B4)
B5)

C1 No maintenance facilities

C2 Does not apply

C3 See App. 24/C3

C4 Maintenance service to be set up for hospitals

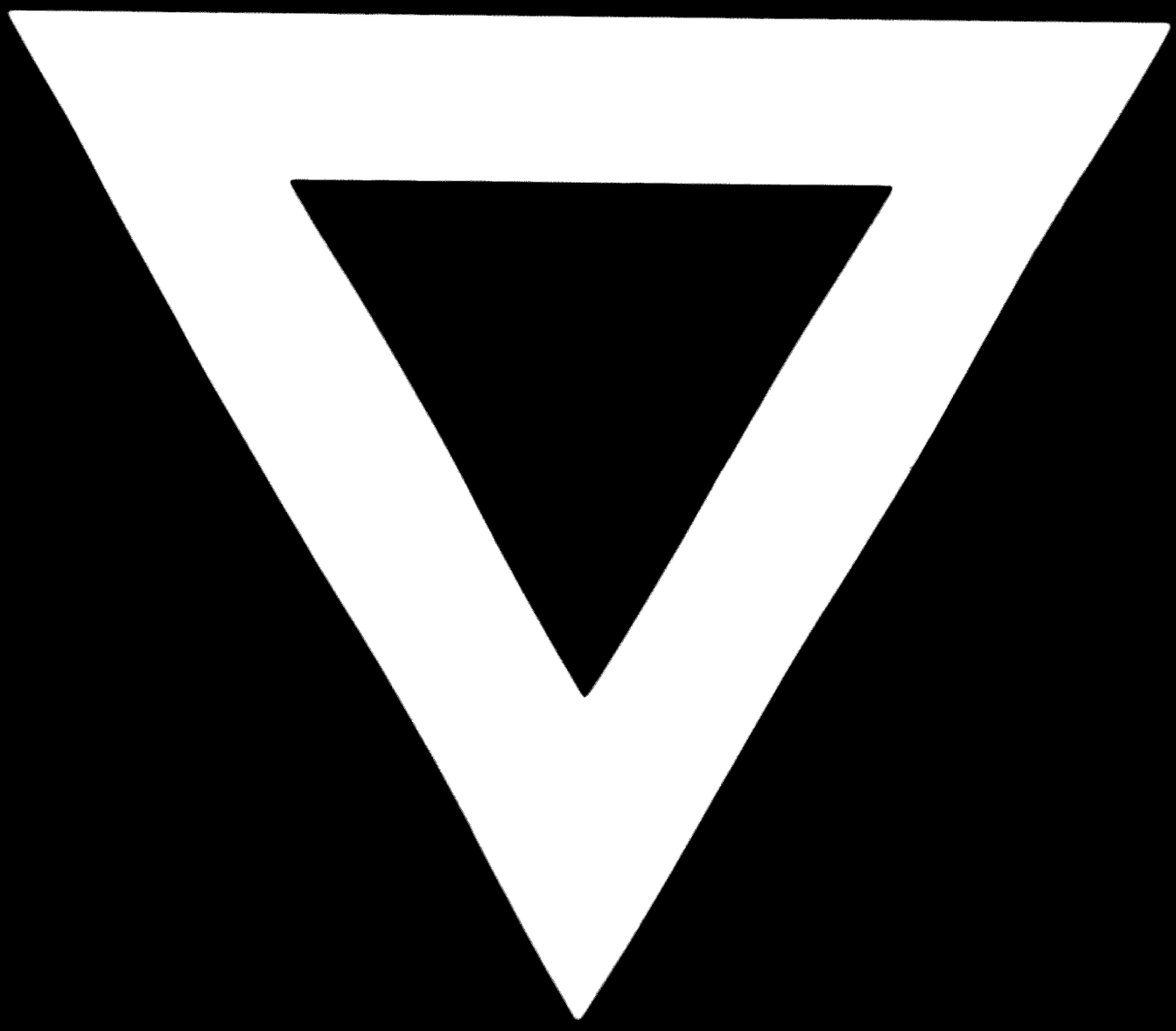
Note

We dit not visit the other hospitals in and around Kinshasa. It was reported that the same state of things obtains all over : absence of maintenance, equipment either out of service or rapidly deteriorating. At Makala Sanatorium, even the boiler-room installation is at a standstill (since several years), so that hospital linen is no longer boiled.

Up to two years ago, maintenance was in the hands of ENTRELCO company. These people also offered their services for a further period. This offer was made against a public tender dated 8th August 1968. No reply has as yet been received.


Routes importantes
Chemins de fer
Limites de provinces
SOUDAN
CONGO (BRAZZA)
PROVINCE ORIENTale
EQUATEUR
KINSHASA
KASAI
KIVU
KATANGA
ANGOLA
ZAMBIE
TANZANIE
RWANDA BURUNDI
OUGANDA
OCÉAN ATLANTIQUE
Bangui
Libenge
Bangassou
Monga
Bondo
Buta
Bumba
Isiro
Aba
Juba
Mungbere
Buma
L. Albert
Mambasa
KISANGANI
MBANDAKA
Lolo
Ingende
Boende
L. Tumba
Inongo
L. Léopold II
Ikela
Ponthierville
Beni
L. Edouard
Kampala
Mbarara
Goma
Kigali
BUKAVU
L. Kivu
Shabunda
Uvira
USUMBURA
Lomela
Kindu
Kampene
Kasongo
BRAZZAVILLE
KINSHASA
Tshela
Thysville
Matadi
Banana
Kenge
Kikwit
Port Francqui
Lusambo
Popokabaka
LULUABOURG
Tshofa
Bakwanga
Kabinda
Albertville
Kabalo
Tanganika
Kasongo Lunda
Tshikapa
Luputa
Kapanga
Kamina
Manono
L. Moero
Bukama
Dilolo
vers LOBITO
Kolwezi
Jadotville
L. Bangwéolo
LUBUMBASHI
N'Dola
CONGO (KINSHASA)

B-582



84.12.12
AD.8G.07
ILL 5.5+10