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SECURING SPARE PARTS SUPPLIES FOR INDUSTRIES

A NEW CONCEPT TO SUPPORT PRODUCTIVITY OF INDUSTRIAL PLANT PRIMARILY IN DEVELOPING COUNTRIES

VOL. I (TEXT)

Prepared for UNIDO under Agreement No.
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SECURING SPARE PARTS SUPPLIES FOR INDUSTRIES

A NEW CONCEPT TO SUPPORT PRODUCTIVITY OF INDUSTRIAL PLANT PRODUCTION IN DEVELOPING COUNTRIES

VOL. II (ANNEXES)

PREPARED FOR UNIDO UNDER AGREEMENT NO.

[illegible]

I N D E X

I N D E X (cont'd)
(see Volume II)

ANNEXES

1. PREFACE

This study has been prepared in connection with a planned Expert Group Meeting initiated by the Investment Co-operative Programme of UNIDO.

The paper is based on proposals put forward to UNIDO early in 1985. After a series of discussions with UNIDO and industry experts, the concept was adapted to the particular circumstances and needs, of UNIDO, of the International Monetary Funds, and of Industries in both industrialized & developing countries. I extend my particular thanks to all discussion partners for their frank, helpful and constructive contributions.

The study is put forward in the hope, that the concept may stimulate a constructive discussion and lead to tangible activities. The current extremely unsatisfying situation numerous industrial plant in developing countries are confronted with could be overcome with the joint support of all concerned. It demands a close cooperation between Industry of the industrialized countries, UNIDO, Monetary Funds, Political Authorities, Private Enterprise and those, whose situation calls for urgent remedial action.

Norbert Hering
Dr.-Ing., Pr. Eng.

Hösel, December 1985

2. INTRODUCTION

The problems many industrial plant in developing countries are more or less permanently confronted with has been the subject of a series of UNIDO initiated studies. Numerous valuable proposals have been made, some have been fruitfully realized. These studies have been valuable for the development of this concept.

According to these studies, the main causes for the lack of efficiency and operational availability of industrial plant in developing countries are the following:

1. problems relating to insufficient local infrastructure and logistics

2. problems relating to raw material supply, sales and marketing

3. problems relating to lack of managerial experience

4. problems relating to spare parts' supply

5. personnel problems, in particular regarding training, transfer of know-how and motivation.

Problems relating to insufficient infrastructure & logistics, raw material supply, marketing etc. are the the subject of various realistic remedial concepts. Consulting firms are available to offer assistance and practical solutions.

To solve the managerial problem (aside from management assistance & training programmes, offered from various entities) UNIDO offers assistance in the areas of capacity

utilisation and industrial auditing. (Industrial Capacity Utilisation, UNIDO- Document V.84-94613 and UNIDO Technical Assistance to Industrial Auditing, Check Up & Rehabilitation, UNIDO Document Jan. 1985)

The problem of a quick and efficient repair service for industrial plant in developing countries is still not satisfactorily resolved. This issue has been the subject of a study, the Investment Co-operative Programme prepared by UNIDO in 1981. The goal was to establish a "global joint venture" for maintenance, repair & rehabilitation of plant in developing countries. The particular problem of spare parts provision was included as a central issue of maintenance & repair activities.

The concept of a Spare Parts Agency, incorporated in this paper, concentrates, in particular, on the procurement & delivery of spare parts. Long term provisioning of required spare parts - not only as a supporting activity for repair and rehabilitation programmes - appears to be of paramount importance in an attempt to improve productivity and efficiency of industrial plant in the regions concerned.

To secure an external spare parts provision service, new ways to provide the necessary working capital for a quick ("Just-in-Time") delivery service have to be found.

Therefore, the establishment of an institution is proposed (IRMA). It is suggested, that IRMA's role be restricted to financial and organisational duties, the key issue for the successful wind-up of spare parts deliveries, repair or rehabilitation contracts.
If project financing and spare parts supply can be secured, all other functions, services and contributions can be contributed from existing sources. This includes also the execution of large scale rehabilitation.

A necessary further element, in the attempt to improve productivity, is to find new and effective means to transfer operating know-how. A concept, which in particular takes into account the technical background & state of training of operators in developing countries, is proposed. It provides suitable ways for training & equipment operation. Better and up to date information and know-how about "what-to-do", "when" and "why", will improve motivation and efficiency. The result is reduced wear, consumption of spare parts and technical failure.

The paper purposely exceeds the original frame work, set by the terms of reference. It is felt that only defined assumptions and pragmatic structures can serve as inevitable prerequisites in the attempt to realise necessary solutions to the problem. In this view, some issues of the terms of reference can be dealt with more effectively, if general agreements on the main subject have been reached and main strategies are formulated.

At the risk of repetition of salient points, each chapter has been treated independently despite the fact that they are interrelated.

The report has been prepared on the basis of proprietary concepts, developed by the author.

3. DEFINITIONS

3.1 TECHNICAL TERMS

To avoid confusion, technical terms used in this report have the following defined meaning (see Annexes I - IV), although these definitions are not constantly used in this paper, they are deemed useful also for further discussions of the issue:

- o Wear Potential (Annex II, III, IV)
  The wear and wastage factor reflected in the original design and construction of a plant, machinery, or a component (Projected Status). All maintenance measures are directed to maintain this status. Repair and rehabilitation activities are undertaken to eliminate effects of wear and restore the Projected Status.

- o Wastage, Wear (Annex II, IV)
  Reduction of Wear Potential. If no provisions are undertaken, wear will finally result in breakdown. Wastage and wear cause functional and material losses of components/machinery.

- o Projected Status - Actual Status - Required Status (Annex III) In optimal condition, machinery is in Projected Status. Wear and wastage result in the Actual Status. Maintenance efforts are directed to keep the difference between the Projected and the Actual Status as small as possible.

  The Required Status can be a newly defined status to substitute the originally Projected Status, according, for example, to operating experience.

- o Components
  All integral parts of machinery, apparatus, plant

- o Maintenance (Annex I)
  all activities directed to minimize the difference between the Projected and the Actual Status of components, e.g. to preserve the original Wear Potential. Maintenance activities include:

  - Inspection (Annex II)
    Activities to recognize and judge the Actual Status of components and deviations from the Projected or Required Status, search for reasons which caused wastage, projection of life expectancy. According to Annex III: The inspector diagnoses the further progression of the curve and judges actual and further development.

- Servicing (Annex I, II, IV)
  Activities to reduce Wear and Wastage by means of cleaning, adjusting, oiling, lubricating, attending, replenishing of process materials. Recommendations to adapt operating procedures. According to Annex IV: all means which are suited to influence a positive further development of the curve.

- Repair (Annex I, II, IV)
  Restoration or exchange of wear and wastage - effected parts of machinery and installations. "Production" of new Wear Potential. According to Annex III: a negative tendency of the curve is corrected to a positive trend.

o Substitution (Annex 4)
  Exchange of worn-out Systems, components, elements of machinery by new or overhauled parts.

o Overhaul
  Regeneration of worn out parts and elements from the actual status to the projected or required status. Reinstating the Wear Potential.

o Rehabilitation (Annex IV & V)
  Restoration of plant or main parts of plant, which have been worn out to the extent, that productivity is seriously jeopardized. Correcting an installation from an unreliable, inefficient, unsafe and bad product quality status to the Required or originally Projected Status.
  The relation between time and capital requirements in the Rehabilitation process is shown in Annex V.

3.2. CLASSIFICATION OF SPARE PARTS

Spare parts and components can be classified according to necessity into the following groups (see Annex XIX):

- routine-parts
- dispo-parts
- risk-parts

Routine-Parts are determined for disposition in the current year, consumption regulates reordering (e.g. hoses, filters, gaskets, etc.)

Dispo-Parts are determined for disposition at an unknown point in time, (e.g. a gear box with a statistical life expectancy of, say, 4 years may break down - depending on quality, treatment and maintenance - within 30 - 70 months).

Risk-Parts are parts, which normally do not fail. If - under unusual circumstances - they should fail technical or economical risk of severe damage to the productivity of the plant may arise. In view of long term delivery and proprietary design, these parts are often preferably stocked (e.g. propellers of ships, special high power motors for rolling mills etc.).

Risk parts amount to approximately 5% of the value of a normal industrial spare parts stock, dispo-parts to approximately 30-35% and routine parts to 60-65%. After a period of operation, the proportion of routine parts increases steadily.

Annual turnover of spare parts stocks, for example in a German steel mill is 30% of stock value.

For the external spare parts concept all routine and dispo-parts are considered as qualified items. Even risk parts - a generally expensive single investment - may

from case to case be included. This applies to those parts, which are usually stocked in the same kind of industry (risk parts pooling).

Consequently, varying between industrial sectors and geographic regions, about 60 - 85 % of the volume of normal spare parts stocks of industrial plant can be considered as to be included in an external spare parts administration scheme as proposed with this paper.

4. THE SPARE PARTS PROBLEM

4.1 THE ACTUAL SITUATION

4.1.1 DEVELOPING COUNTRIES

"Shortage of spare parts is a permanent nightmare for all those who operate and maintain an industrial plant in a developing country."*) The reasons for this continuous calamity have been the subject of numerous investigations and studies.

Normally, the effects of wear and wastage in developing countries are considerably higher than in industrialized regions due to difficult climatic and environmental conditions. Often, design and technical considerations are based on experiences gained in traditionally industrialized regions, not taking local conditions sufficiently into account. "Often very badly chosen material" (De Groote, see below) and lack of technical support further aggrevate the situation.

The purchasing of spare parts creates particular problems to all purchasing departments in all industries. Whilst industries in industrialized countries disoose of enough skilled personnel, organizational structure, technical means (EDP) and capital (stockkeeping) to cope with this issue, industrial plants in developing countries are faced with problems ranging from the lack of adequate technical documentation, non-existence of a proper codification to identify parts related to failure, the inadequate experience of buyers and - last but not least - language difficulties. "Experience has proven, that the lack of adequate technical documentation is one of the most serious handicaps which developing countries encounter

*) (P. De Groote: MAINTENANCE SERVICES IN DEVELOPING COUNTRIES, UNIDO-Study V.85-27406'

when trying to aquire a technology."(De Groote, see above) Further difficulties exist in finding the right supplier for spare parts needs. This includes the difficulty in tracing name and address of the manufacturer of such parts with the additional obstacle to persuade him to sell the parts in question. In particular, older components are not kept in stock and the manufacture of single items is often not feasible for the producer. Consequently, the break-down of parts of even negligable value may already cause partial or even full shutdown of a plant.

Problems normally outside the sphere of influence of either supplier or the 'consumer' exist in the payment terms and conditions, procurement of import licenses and documents, time consuming custom clearance, import taxes and other bureaucratic obstacles. When finally on site, the parts may then be stocked under inadequate conditions or get lost, if the organisational structure is inadequate.

Additionally, often too sophisticated equipment with complex electronics and instrumentation (to compensate for the lack of operating know-how) is encountered, and in many cases very little attention is paid to the accessibility, maintainability and repairability of machinery and plant under conditions in developing countries. Lack of industrial experience, construction shortcomings and insufficient transfer of (understandable) operational know-how often results in poor operation and sporadic maintenance of machinery and plant. This results in a drastically reduced operating lifetime. Examples are mentioned (see P. De Groote, above) of plant with a normal life span of 20 years, which had to be replaced after only 3-6 months of operation. Consequently, the necessity of an adequate transfer of operating & maintenance know-how is closely related to the spare parts issue, (see § 10).

For the solution of all problems related to individual project organization and financing (set-up of bilateral funds, project selection and budgeting, financial controlling and repayment schedules etc.) an independently operated, UNIDO-controlled entity is proposed to be formed. The Investment Co-operative Programme 1981, suggested the foundation of an INDUSTRIAL REPAIR & MAINTENANCE SERVICE (IRMA). IRMA is now proposed to cover key functions in the financial and organisational fields.

The tasks of resolving all problems related with project financing, pay-back schemes, coordination of aid programmes etc. have little in common, practically, with the technical side of spare parts documentation, administration, procurement and delivery. To solve this complex properly a specially structured, flexible and efficiently operating privately organized company is proposed. This SPARE PARTS AGENCY (SPA) would be set up as an entity to administer spare parts needs, externally. This can be done in a new, and cost effective manner. A proposal is submitted with this study.

All further activities, related to external maintenance, repair and rehabilitation tasks, - under financial coordination of IRMA - could be performed by existing companies, consultants, general contractors, specialized firms etc.

5. THE IRMA CONCEPT

5.1 THE ORIGINAL CONCEPT

The IRMA-CONCEPT was developed and outlined in detail in a preparatory study in 1981.
Since then, the basic idea has been further discussed, however, a practical approach leading to implementation has, so far, not been found.

The main objective was to establish an entity[1] funded by developing countries and repair and maintenance companies with equal shares (40 p.c. each) and international institutions and banks with a share of 20 p.c.

The goal was to provide mainly large nationalized companies in developing countries, with assistance in the fields of maintenance, repair, rehabilitation and procurement of spare parts. Emphasis was placed on large power plants and utilities.

The following objections have been voiced in subsequent comments to the study:

- a single organisation "could or should"[2] hardly "attain a dominant position" in providing repair services in a market internationally serviced by numerous contractors.

- to operated successfully, IRMA would have to have a technical service economical superior to that clients presently receive from other bidders.

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1) see: "Preparatory Study on the Feasibility of Implementing a Global Joint Venture which is to provide quick and efficient Maintenance and Repair Service incl. the Provision of Spare Parts to Industrial Plant", 1981, UNIDO

2) comments to the study

- o 'to what extent should UNIDO associate itself with a particular single supplier' of maintenance expertise and services - in view of the worldwide network of qualified suppliers.

- o problems in recruiting competing companies to co-operate as IRMA shareholders.

- o some governments are more likely to expect IRMA services as a form of UNIDO-aid rather than as a service they would be prepared to pay for.

5.2 THE MODIFIED CONCEPT

The new concept concentrates on two main issues: the project financing and coordination on the one hand and the permanent procurement of spare parts. The concentration of efforts on these central issues is a pragmatic, simple approach to the problem which can be carried out by a small organization and a comparatively modest investment. It bypasses all the negative comments voiced towards the original IRMA concept, while providing the latter freedom of action to concentrate on the funding of spare parts needs for plants in developing countries. It allows a clear yet interlinked functional seperation of the two entities.

According to this concept, IRMA would in future be a central ard main promoter of projects (maintenance, repairs, rehabilitations, ad-hoc or continuous spare part supply, know- how transfer), offering mainly project co-ordination in the financial and orgarisational fields. IRMA's service would be offered to private plant owners, nationalized industries, industrial development corporations and other governmaental bodies on the one hand, and UNIDO and International Monetary and Aid Funds at the other. IRMA's functions will be as well as in the fields of economic policy as in the free market project financing and contracting. They will be determined by rules of IRMA's future business environment: a competitive, at business-results orientated free market. Consequently, IRMA has to be organized as an independent operating company, UNIDO-controlled and obliged to operate as effective and profitable as possible. IRMA's tasks are not of an administrative nature. Therefore, a clear separation of IRMA from the UNIDO-structure appears to be advisable. The necessary flexibility can only be secured by an independent entity.

An organisational structure and an organogramme for the set up of IRMA are proposed in Annexes XI and XV. The charts show the principal functions to be covered and a structural mode for the realisation of the proposal.

5.2 ADVANTAGES OF THE MODIFIED IRMA-SPA-CONCEPT

To compare the modified concept with the original proposal, the future activities of IRMA and SPA have to be seen in combination. The modified concept is marked by the following characteristics:

- IRMA, as a directly UNIDO-controlled entity, could restrict its activities to fund raising, fund administration, selection and supervision and control of projects. The expectation of counterparts, to obtain services free of charge as an UNIDO aid, would be forestalled (see comments to the original concept).

- rehabilitation and repair contracting could be offered as services outside the IRMA - SPA sphere of activities, thus making the most effective use of existing contractors.

- there is no need to bring competing firms ' under one roof' (see original concept).

- The realisation of the concept would serve the objectives of all concerned in UNIDO and in the International Monetary Funds, dealing with actual spare parts supply problems. A close joint venture between qualified partners covering the political, financial, technical and service fields would bring a breakthrough and set a standard benefiting all concerned.

- the concept is applicable to industries in regions at all stages of development.

- A spare parts supply service covering the entire demand of an industrial sector - irrespective of the original manufacturered goods. Such a service does not presently exist.

- A spare parts administration service cross-referencing supply and demand would be an innovative service of additional attraction in terms of the optimum utilisation of surplus parts offered.

- A spare parts entity, working with a transparent cost + fee system operating in an agency status, and unassociated with any one manufacturer, would be unique.

- A spare parts agency closely co-operating with UNIDO would as a novel concept hardly be confronted with justified counter arguments from any side.

If all sides concerned are prepared to concentrate their abilities and to polarize their efforts on a rapid and carefully organized implementation, the modified concept would offer the basis for drastic changes in the longterm desire to recover suffering plants in developing regions.

As far as the key issue of an adequate spare parts supply is concerned, a combination of IRMA (financial side) and SPA (organisational and technical side) would be able to change this field in a way, which can be compared with the situation of the European car-rental market before and after professionals stepped in; in former days, car renting was an obscure, tricky business and a client was lucky, if he could obtain a relatively reliable car under reasonable terms and conditions. Meanwhile, the branch has developed into an absolutely reliable, established, world wide business without any contractural pitfalls. With adequate organisation and system, a scale of quality and confidence has been achieved which is a far cry from the ill-reputated market of earlier days.

5.4 DISTRIBUTION OF TASKS

A practicable solution, calls for the various tasks to be clearly subdivided and distributed between the cooperating partners. The following scheme is proposed:

Table 1

MODEL FOR DISTRIBUTION OF TASKS - MAIN AREAS

1. UNIDO

- decision to implement the new concept
- set-up of IRMA
- set-up of an international fund
- coordination in the political arena
- co-operation & coordination with governments
- coordination of international aid programs
- co-operation & coordination with International Monetary Funds
- development & control of aid & development strategies
- selection of regions, industrial sectors etc.
- supervision of IRMA
- political trouble shooting
- industrial auditing*)

2. IRMA

- general and individual rehabilitation strategies
- establishment and administration of a rehabilitation fund (bilateral agreements with interested partners and governments)
- survey, qualification & selection of projects (project commissioning)
- budgeting for rehabilitation programmes
- coordination of funds for individual projects
- financial control of projects
- project management (to be delegated casewise with supervision)
- supervision of project wind-up
- payment of services & supplies
- invoicing (recepients, donors, etc.)
- regulation of guaranties
- repayment procedures

*) see "UNIDO Working Paper on UNIDO Assistance to Industrial Auditing, check-up and Rehabilitation" Dr. C. Rydeng, I/1985 and "Industrial Capacity Utilization" Dr. C. Rydeng. XII (1984;) V. 84- 94613).

3. SPARE PARTS AGENCY (SPA)

- together with UNIDO/IRMA: selection of regions and sectors
- procurement and deliveries of spare parts
- administration of spare parts contracts
- machinery overhaul
- setting up spare parts specification & codes
- supervision of spare parts identification & listing, supervision of installations
- instructions for repairs

4. REALISATION OF MAINTENANCE AND REHABILITATION PROGRAMMES

For the realisation of these projects, the following types of contractors could be retained on a project basis.

- free-lancers
- general contractors
- manufacturers
- inspection and service companies
- contractors for training and transfer of operating Know-how (see § 10)

A scheme for the coordination of various tasks in a maintenance and a rehabilitation project is shown in Annexes VIII, IX and XII.

5.5 SCOPE OF IRMA ACTIVITIES

5.5.1 GENERAL

Comments to the original IRMA-concept of 1981 took umbrage to the fact, that the proposed organisation would be too large and it was doubted, if it would be more flexible, effective and economically viable[1] compared with existing consultancy and service companies. Global aspects not withstanding a division of tasks among co-operating partners could provide IRMA with adequate prerequisites, to concentrate efforts on its primary functions.

5.5.2 IRMA-FUNCTIONS

The scope of IRMA-functions is outlined in § 5.3. The following highlights some aspects of particular importance. UNIDO currently provides an industrial auditing and check-up service[2]. Such a service could ideally be combined with IRMA and SPA-services. In combination, it could be an extremely effective consultancy service package to management of effected industries: Under this scenerio:

- UNIDO would provide a continuous financial auditing service and management consultancy
- IRMA would coordinate funding of M & R - activities and offer a technical auditing and maintenance consultancy concept (probably in combination with co-operating firms),

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1) see comments to the original concept
2) Dr. C. Rudeng: UNIDO working paper on UNIDO Technical Assistance to Industrial Studiting, Check up and Rehabilitation.

- SPA would furnish a continuous spare parts supply within the framework of a spare parts administration contract and/or individual procurement contracts.

A continuous financial and technical monitoring service, combined with a quick means to cure actual insufficiencies, would offer user firms fully effective support.

Assuming a regular auditing service would be provided and a stage of stabilisation and transparency achieved, IRMA could then consider providing a financial scheme for quick services and deliveries, under an insurance scheme, whereby the client would pay a monthly fee and receive - for defined items and to a defined extent - required spare parts and services, with an annual charge calculated under a malus/bonus mode. Aid loans of Monetary Funds could be included into the scheme, for affected regions.

Such an insurance scheme could be a particular arrangement within the normal bilateral contracts between IRMA on the one hand and firms or governments on the other hand. In that case particular funds could be put at IRMA's disposal (and control), enabling IRMA to pay for ugently needed goods (spare parts) and services (e.g. repairs) at time of delivery. This budget would be administered by IRMA and replenished, as necessary.

Counterparts, who are not able to pay for their needs or only dispose of non-transferrable (weak) currencies, could be arranged for sponsorships, monetary grants (e.g. Opec Fund), etc.

In addition to financial services, IRMA's dominant role would be in organisational sectors, as already outlined.

5.6 MODE OF SELECTION OF FIELDS OF ACTIVITIES

In view of the abundance of suitable industrial sectors, indigent regions and potential clients, strategies for selection have to be set-up. The concept is suited to be applied globally and for a broad clientele; nevertheless, a selection is indispensable.

Since the concept is designed for industrialised regions as well as for developing countries, a simultaneous set-up of activities in both areas is advisable, since industrialized areas would be one important source of spare parts in the form of surplus material.

Criteria for the selection strategy are in the main:

1. Developing Regions

   - Ability and readiness to pay for services (and goods) rendered - or available financial suppcrt of third parties
   - Readiness to remove burocratical obstacles, to facilitate imports of needed services and goods (government contribution) *)
   - Readiness to accept long term assistance and to provide all necessary support

2. Industrial Sectors

   - the industrial sectors to be selected have to be of international economic importance,
   - the sector has to be non-military or not of a high security nature (e.g. processing of nuclear material)
   - the installations in use should preferrably be of international standard, with interchangeable equipment

there are rare and parts need to be help

*) Particular contractual provisions would have to be made casewise, if alternative (cheaper) second-hand material out of surplus stocks were imported.

- sectors with specific, larger equipment (motors, pumps, blowers etc.) are more suitable, than sectors using highly-mechanized complex machinery, composed of a great variety of small value components with multiple production sources and low degree of international standarisation.

- the sector should be in a position to operate economically with regard to market conditions, raw material supply, etc.

3. Clientele (in first phase)

- The structure and status quo of the plant should be such that the prerequisites for successful implementation of the concept are given.

- The skills of management and staff would have to be sufficient to justify expectations that improvements in the the plant operation will result

- The management would have to be prepared to accept and support necessary measures

- A suitable organised and operating spare parts and maintenance team or adequate pre-conditions to set up and properly train such a team, must be present.

4. Clients in Industrialized Regions

No particular restrictions as long as principal preconditions are fulfilled (sector, equipment, finance)

5. Procurement Services

With regard to the variety of spare parts to be provided, two kinds of services have to be distinguished:

- an 'ad hoc'-service, procuring spare parts for all actual needs (e.g. in connection with rehabilitation projects) and

- continuous service, supplying clients constantly with parts needed over long periods of time (external spare parts administration service).

In the frame of the 'ad hoc'-service, all needed parts have to be provided in the shortest possible time. For parts not registered in the SPA-computer, delivery time will be determined by availability resp. time for production.

Parts administrated in the external spare parts co-operation scheme, are normally kept available at short notice. This service has to be built up step-wise. Therefore, it would be initially confined to standard parts, preferably of European manufacture. The variety of parts would then be enlarged a step-wise.

6. Contractors

With regard to services offered from outside contractors and consultances, no particular limitations have to be foreseen. The partners to be selected have to render a qualified, economic most feasible service.

7. Selection of Candidate Sectors

In view of the preconditions outlined, the following groups of industrial plant (sectors) appear to be suitable for the services to be offered:

- cement - mining - power generation - water utilities - building equipment (e.g. road construction)
- metallurgical plant
- basic chemicals, fertilizer, detergents, pulp & paper plants, food processing
- petrochemical plants

From the regional point of view, the choice of 'target areas' may follow concurrently and include countries in all phases of development and from all continents. Practical considerations require that this global aspect be narrowed - at least for the initial stages - to neighboring regions ('clientele - islands'). A definitive selection of candidate - areas at this stage of concept development appears a little premature.

This paper is principally designed to familiarize interested partners with the principles to point out strategies for the implementation, and to demonstrate first practical steps for project realization. The final selection of areas etc. will constitute the next step, if a basical agreement has been reached.

Once these have been achieved, policy guidelines for UNIDO/IRMA, appear to be essential. Here political, financial, organisational etc., considerations for the qualification of clients/beneficiaries, geographical regions etc. would have to be laid down.

5.7 FUNDING

5.7.1 SOURCES OF INCOME

UNIDO finally has to decide the financial structure of IRMA. In view of UNIDO'S general outline brief a non-profit structure appears to be suitable. IRMA principally could derive income from the following sources:

- handling fees for projects (i.e. project supervision etc.)
- differential interest fees for funds administrated (credit/loan)
- handling fees for spare parts administration budgets
- fees for technical auditing, control functions.

Project-related contribution of IRMA could be remunerated either by fixed fees or en bloque (rates + overhead) and charged with other project costs (deliveries and services). Investigations in the pre-project phase, however, cannot be attributed to projects. Therefore it would be necessary, that IRMA initially will be supported by UNIDO or Monetary Funds.

5.7.2 SOURCES OF FINANCING

Equities should preferrably be offered to groups whose interest in IRMA's activities reflects their own interest in the field. Such would be:

- International organisations (UNIDO and possibly UN-branches)
- International and national Monetary Aid Funds (e.g. OPEC Fund, World Bank, Kreditanstalt für Wiederaufbau, Inter-American Development Bank, etc.)
- Countries concerned

For bilateral agreements, partners of IRMA would mainly be government authorities, local industrial development organisations and selected companies. Casewise, this role could also be filled by sponsoring organisations.

5.8 ORGANISATION

5.8.1 STRUCTURE

In the intitial phase, necessary responsibilities to build up IRMA-services and to accompany first projects could be delegated to a suitable UNIDO department. At a later stage, this department could take over certain supervisory functions (e.g. financial and cost control). After the establishment of IRMA as an independent legal entity the IRMA organisation (see Annexes XI and XV) would encompass the following activities:

- management
- accounting and contracting*)
- internal administration*)
- financing:
  establishment of funds, bilateral contracts, administration of funds, reimbursement schemes, financial winding up of contracts
- cost control, final project control
- project selection:
  general rehabilitation programs, survey, qualification and selection of projects, individual rehabilitation strategies
- project preparation
- project execution:
  supervision of maintenance, spare parts supply, repair and rehabilitation contracts, project budgeting and cost control, performance control, warranties (see 7.3.8)
- technical auditing
- maintenance consultancy

*) alternatively to be provided by UNIDO

The organizational structure should already at an early stage be able to fulfill all preconditions for an effective operation. It is suggested that different functions be organized in corresponding departments, even if initially they are only staffed with one (or two) persons. The personnel requirements would then be as follows:

Table 2

Personnel	Preparatory Phase	Pilot Phase	Operating Phase
Managing Director	1	1	1
Accounting, Bookkeeping	*)	1	2
Internal Administration	*)	*)	1
Controlling	-	1	2
Project Selection	1	1	2
Project Execution	1	1	3
Finance	1	1	2
Office Staff	2	2	3
Total Management & Staff	6	8	16

*) in this phase function temporarily carried out by UNIDO

5.8.2. PERSONNEL

To organize and handle the scope of activities envisaged for IRMA, personnel with the following qualifications would be required:

Table 3

Job	Tasks	Necessary Professional Profile / Training	Responsible for (R): Reporting to (r):
Managing Director (MD)	Chief Executive Personnel, Organisation, finance, strat. planning, PR, partner to UNIDO, Funds, Governments, clients	Top management experience financial and/or international experience partly in developing regions, Mcom, multilingual,	R: Management of IRMA r: supervisory board, co-operation with the advisory board
Commercial Manager (Com.Mgr)	All commercial activities of IRMA administration, project budgeting & cost control, accounting and finances, business reports, project administration	Management experience in appropriate fields, administration, bookkeeping, etc. B or Mcom, multilingual	R: Commercial Management of IRMA r: MD
Finance Officer (Fin. O.)	All financing of projects, contacts with funds, financial budgeting & supervision of realisations pay back schemes and supervision	Adequate experience in international financing, Bcom, multilingual	R: financial sector (later: department) r: Com.Mgr
Project Selection Officer (Proj.Sel.O)	General rehabilitation strategies & programmes, spare parts admin. schemes, survey, selection & qualification of projects, individual project planning & budgeting project preparation (before wind up)	Commercial & financial experience with international projects, technical background Bcom or similar multilingual	R: All duties up to project qualification Member of the Project Commission r: MD

Table 3 (cont'd)

Job	Tasks	Necessary Professional Profile / Training	Responsible for (R): Reporting to (r):	
Project Execution Officer (Proj.Exc.O.)	Wind up of projects technical & commercial supervision of projects, budget control, taking over contracting of sub-contractors, proj. co-ordination, expenditing	Technical & commercial experience (job mgmt. in industrial plant) Mech. Engineer, multilingual	R: r:	Job management & coordination Member of the Project Commission MD
Internal Administration Officer	All internal administration, personnel salaries, wages, internal organisation	Experience in the internal administration field Administrator, English	R: r:	Internal Administration Com Mgr
Controlling Officer	Project control, financial control of contracts, time scheduling	Experience in financial controlling Controller, English	R; r:	cost controlling Com. Mgr.

5.9 EXPENDITURES

IRMA's cost structure is principally determined by:

- overhead costs (personnel, management, administration, rental, communications, etc.), including all costs for the selection, qualification and preparation of projects (travelling, outside expertise etc.) and

- project costs (all costs directly attributable to the execution of individual projects).

Costs for project preparation can be treated as tendering costs, if later allocatable to particular contracts. The basis of calculations are hourly/daily rates for financial, commercial, technical, controlling and further advisory services, the rest (management, administration, accounting & bookkeeping) are overhead costs.

A rough estimate of the cost structure of IRMA for the preparatory, pilot and operating phases is given in Table 4:

Table 4

Type of expenditure	Amount (in US$ p.a) estimated Preparatory Phase	Pilot Phase	Operating Pha
Management	400.000,-	625.000,-	890.000,-
Staff			
Office rentals	25.000,-	27.000,-	30.000,-
Depreciation office equipment	18.000,-	20.000,-	23.000,-
Communication, travel*) expenses	130.000,-	375.000,-	620.000,-
Misc. (office materials etc.)	10.000,-	13.000,-	18.000,-
Total expenditures US$	583.000,-	1.060.000,-	1.581.000,-

*) assumption: 30, 90, 150 trips/year at US§ (excl. project-linked trips

6. THE EXTERNAL SPARE PARTS ADMINISTRATION & PROCUREMENT MODEL

6.1 IMMEDIATE PROBLEMS

In non-industrialized environments, "at least 50% of the un- availability of equipment is due to lack of parts"*) . De Groote investigated factors, which influence the extra-ordinary high consumption of materials and spare parts, and came to the following conclusions:

- The high number of wear prone parts
- The high load on equipment & its elements (depending on the type of production process and the degree of equipment utilisation)
- The lifetime of production equipment
- The technical background and training level of operating & maintenance personnel and their motivation
- The managerial attitude towards care of equipment
- The general organisation of production, maintenance and repair

He further states "the selection and quantity of materials & parts to be stored is not in accordance with the needs of local operating conditions. The quantity of specific parts is insufficient and standard parts and consumables are generally not provided."

Also according to further studies, the factors determining the volume of a traditional (as compared to the proposed model) spare parts & maintenance stock are the following:

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*) (P. de Groote: Maintenance Services in Developing Countries UNIDO-study V.85-27406)

- local industrial infrastructure
- commercial and administrative strains on the purchasing of parts
- delays in the ordering and delivery procedure
- delays in the process of identifying suppliers and
- The physical availability of these parts

The annual needs and consumption of spare parts in non-industrial regions is estimated by de Groote as follows:

Table 5

KIND OF PARTS	ESTIMATION OF NEEDS (% of replacement value of equipment)	
	GENERALLY NEEDED	ANNUAL CONSUMPTION
SPARE PARTS (incl. safety parts)	8 %	6 %
STANDARD PARTS	1.4 %	1.0 %
CURRENT MAINTENANCE ITEMS	1.6 %	1.2 %
TOTAL	11 %	8.2 %

6.2 ELEMENTS OF INFLUENCE

The relationship between suppliers in an industrialized region and their potential clients in the developing countries is subject to the following influencing factors:

- problems of long distances
- language barriers
- different mentalities from a technical standpoint
- organisational problems to coordinate planning at both ends
- bureaucratic obstacles
- in less and least developed countries: non-existence of qualified engineering counterparts for the supplier
- and as main problem: financing and financial co-ordination

The current situation demonstrates, that only in exceptional cases individual solutions to such problems have been found.

6.3 THE SPARE PARTS AGENCY CONCEPT

6.3.1 OBJECTS

The SPA concept is based on the following objects:

- to assist clients in solving the identification and documentation problems of spare parts stocks
- to eliminate problems related to identifying adequate sources for the supply of spares and components
- to bridge mental and communication barriers
- to provide necessary parts "just in time"
- to solve and prevent problems related to poor organisation of spare parts stocks
- to minimize 'frozen' capital investments in spare parts stocks
- to deliver spare parts in the most economic way (cost + fee)

The realization of the SPA concept is proposed in the following manner (see also Annex IV):

SPA would be set up as a private company, operating as external spare parts procurement and - in the spare parts administration scheme - administration agency for industrial clients. These functions of SPA can be compared to institutions, operating successfully in the pharmaceutical and food sectors: centralized, privately operated buying organisations provide retailers with their needs, thus saving them own buying and stock administrating problems. With regard to SPA, a centralized and adequately structured

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*) In the sector of car manufacturing in Germany, the introduction of a 'just in time' system for subcontracted deliveries has reduced own stockkeeping form 12.5 to 7.8 days of production needs. The savings amount to a billion US $ range.

organisation would concentrate know-how concerning sources of broad variety of spare parts, thus saving its clients own problems in tracing and procuring these parts. Combined with an input of potential needs from the client's side into the SPA computer spare parts can be delivered 'just in time'*) of need, instead of being stored over long periods at side.

To fulfill these tasks correctly, SPA has to dispose of an adequate hardware & software computer configuration and dispose of a team of specialists, being well experienced in the technical field of the industrial sectors attended and the pare parts business in general.

Generally the following sources of spares are available:

- manufacturers of machinery and components
- manufacturers of fittings, etc.
- specialized workshops
- stockkeeping agencies
- surplus material offered by plant with corresponding technical setup.

Sources for spares may be situated in the region of a client or in industrialized countries. Once the concept is in operation, the surplus material of industrial plant in particular - but not necessarily exclusively situated in - industrialized regions, may be considered as an important source. Modernisation of plants, improved cost-consciousness, increasing quality of materials and advanced know-how achieved with modern preventive maintenance strategies have minimized spare parts consumption. Thus an organized demand may stimulate an interesting supply market.

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*) In the sector of car manufacturing in Germany, the introduction of a 'just in time' system for subcontracted deliveries has reduced own stockkeeping from 12.5 to 7.8 days of production needs. The savings amount to a billion US$ range.

The SPA administration scheme is principally designed to work in conjunction with the internal spare parts department of plants within the frame of longterm contracts: beginning with the start-up phase, adequate routine and dispo parts could be procured and delivered in time of need. Terms of delivery have to be agreed upon at the beginning taking into account that SPA is not able to influence local import conditions and that SPA has to avoid own stockkeeping in view of the related cost factor, or otherwise would have to pass these on to the customer. A long term external spare parts administration scheme provides the client with considerable savings in his spare parts budget.

In addition to a current external partnership, SPA would have to be designed to cope with single or repeated tenders for spare parts supply and also assist in particular requirements such as machinery overhaul or access to comprehensive repair manuals from manufacturers. The financial clearing for contracts with partners in developing countries falls under IRMA's responsibilities.

6.3.2 ADVANTAGES FOR SUPPLIERS & CONTRACTORS

The SPA concept provides not only advantages for industrial plants (clients). Additional advantages can be seen in regard to the many problems relating to communications between manufacturers and users.

Manufacturers who normally would deliver their products via buying organisations or general contractors, could be provided with better information feedback, (for example how much machinery of which type are still in operation etc.) Consequently, their own spare parts stocks could be kept at adequate levels and production could be scheduled accordingly. Their spare parts marketing would change from a reactive to an active mode.

In co-operation with UNIDO and IRMA, it is also conceivable that, in individual cases special import restrictions and problems regarding financing could be resolved. As a result, the SPA activity should not be seen as an intervention into existing business relationships, but as a positive contribution. First talks with manufacturers gave a strong support to this view.

General contractors and engineering firms have frequent problems in securing an adequate post-sales follow-up service. Their organisational structure is usually designed to cope preferably with new projects. Only when this market is slow, more attention is given to R&M-problems.

Consequently, also for engineering partners and general contractors, the SPA offer to satisfy spare parts obligations could be advantageous. Additionally, with the proposed continuous spare parts service, initial spare parts stocks may be kept smaller, an advantage for the price structure of tenders of those co-operating with SPA. Talks with engineering companies have demonstrated their positive attitude towards the concept.

6.3.3 ADVANTAGES FOR INDUSTRIAL DEVELOPMENT ORGANISATIONS

The key objective of the concept, to facilitate and secure spare parts administration and procurement for clients particularly in developing countries also incorporates benefits for those organisations, concerned with the financing or organisational wind-up of industrial projects. These are (scheme see Annex VI) :

- avoidance of financial losses arising from investments in mismanaged stocks or misused parts,

- enhanced transparency of the flow of aid funds for spare parts procurement (as seen from the donor's side): the recepient states his needs and receives the desired components ready to be installed. The payment is directly negotiated in an outer circle between a bilateral/international donor (e.g UNIDO and Funds) and SPA. Diversion of loans for other than intended purposes can thus be avoided.

- the reduction in the share of unproductive capital is in direct proportion to reduction in stocks. Financial means can be kept available until really needed (IRMA or Monetary Funds).

- with SPA organisation caring for administration, procurement and delivery of parts in time of need, internal expenses for procurement and stockkeeping can be reduced at the clients end, thus further improving cost structure and competitiveness.

- if adequate parts can be located in surplus stocks, both the client and aid funds profit by a corresponding price advantage. Operating on a cost + fee basis, SPA passes on the actual savings to the user.

In summary, the concept has the potential to solve existing bottle necks in spare parts supply to the advantage of all sides concerned. Its further advantage is the reduction of capital requirements for not yet needed material. If properly installed, it would stimulate adjacent processes such as maintenance, repair and rehabilitation.

6.3.4. FINANCIAL ADVANTAGES

In order to predict the advantages of the SPA concept for the client, a comparison between the conventional and the SPA system of stock keeping has been prepared based on the following assumptions:

1. Approx. 75 % of the Client's spare parts stock are parts which appear to be principally suited to be externally administered following the SPA concept (see Annex XIX). However, in reality certain parts for immediate consumption have to be kept available. Therefore, our example bases on an external administered share of 65 %.

2. The Consumption of spare parts is taken at 60 % of the conventional stock (see Annex XIX).

3. Spare parts worth 1 Million US$ are kept on stock.

4. Costs of conventional spare parts stock keeping are taken at

   - 10 % interest rate per year on total spare parts stock
   - 10 % depreciation per year on total spare parts stock
   - 20 % costs for organization and administration of spare parts stock keeping on total spare parts stock.

5. Costs of administered spare parts stock keeping (SPA system) are taken at

- 7.5 % costs of identification and listing on administered spare parts stock. These costs will only occur once when starting the SPA-system. Regular up-dating will amount to 1.5 % of administered spare parts stock

- 8 % external administration fee on administered spare parts stock

- 8.5 % handling fee on consumption of spare parts.

6. Capital can be invested at an interest rate of 10 % p.a.

   However, considering a certain price increase for spares, an annual adjusted interest rate of 5 % has been taken.

TABLE 6

Comparison between conventional spare part stockkeeping and SPA-Concept (representative year)

	Conventional keeping	SPA-Concept stock keeping
Investment in Spare Parts	1,000,000 US$	350,000 US$
Cost of Stock keeping		
- Interest	100,000 US$ [1)]	35,000 US$
- Depreciation	100,000 US$ [1)]	35,000 US$
- Organization and Administration (incl. buying)	200,000 US$*)	70,000 US$
Subtotal I	300,000 US$	140,000 US$
Externally administered spare part stock		600,000 US$
Cost of administered spare part stock		
- Identification and Listing (updating)		3,750 US$**)
- External Administration		52,000 US$
- Handling fee		27,625 US$**)
Subtotal II		89,375 US$
Total	300,000 US$	229,375 US$
Interest income ./.		32,500 US$
Total expenditures of stock keeping	300,000 US$	196,875 US$

*) Mismanagement of stock keeping in many companies may lead to much higher depreciation rates and organization/administration costs esp. in developing countries, which may further increase conventional stock keeping costs.

**) It has to be noted that initial cost of identification and listing will amount to 48,750 US$ (7.5 % of administered spare partss stock). These costs will partly be compensated in the first years by a reduction of the volume to be handled (reduced handling fees).

The analysis indicates a clear cost advantage of the SPA-Concept over conventional stock keeping. A cost comparison of both alternatives gives costs of conventional stock keeping of 300,000 US$ and costs of SPA-Concept of 229,375 calculated for one representative year, which means more than 23 % cost reduction by using the SPA system. Taking into account the possibility to invest the capital not bound in spare parts stock at an interest rate of 5 %, interest income of 32,500 US$ will reduce SPA-Concept cost further and lead to a more than 34 % cost reduction compared to the conventional stock keeping.

The described cost advantages can be slightly effected in case of urgent needs (e.g. surcharges for airmail etc.).

It has to be noted that SPA-Concept combines a (reduced) stock keeping to secure a continuous operation with a steady external procurement of needs.

6.3.5. THE SPARE PARTS AGENCY OPERATING SCHEME

In brief, the activities of an external SPA scheme for industries in industrialized and in developing countries can be characterized as follows: (see also Annexes VI, VIII, IX, XII, XIII):

The OFFER:

External computer aided administration of spare parts stocks, procurement and supply of components and spare parts, (dispo-routine and certain risk-parts) under long term contracts and/or occasional tendering for supplies.

SOURCES

see 6.3.1

COOPERATING PARTNERS:

Special service companies for identification and listing of needs (supervision and coordination by SPA)

Material testing and inspection companies
Maintenance service companies
Erection companies
Training companies
Forwarding agencies
Free-lance specialists

CLIENTS:

Plants to be rehabilitated

Plants prepared to reduce their own stockkeeping of applicable components and spare parts.

New plants, prepared to be linked to the SPA administration scheme,

Groups of companies, (e.g. same firm or different firms, firms in the same industrial sector) prefering a cooperate spare parts stockkeeping scheme (spare parts pooling via SPA)

Companies with occasional or short term component needs

Engineering companies, who wish to delegate post-sales spare parts obligations.

6.3.6 THE SPA STRUCTURE

The parameters of influence, which determine the organisational structure of the Spare Parts Agency, have been described. As a consequence, a small privately organized entity is proposed, which will grow coresspondingly to market demands.

As seen from the client's side, a reliable business partner is expected, able to identify needed parts and to trace and deliver them rapidly under economic conditions. At the time ('ad hoc') orders would be the beginning of the test phase - seen with the client's eyes - a continuous provision with spares (external administration scheme) will probably follow at a later date.

UNIDO and IRMA would expect a technically competent, rapid, reliable and economically operating partner, who is able to fulfill all spare parts obligations at any time and any place.

To meet these requirements, structural consequences are:

- the personnel has to be well trained and experienced, in particular in the industrial sector dealt with, in the spare parts technique and business, in Third World markets

- the individual know how of the personnel would be 'combined' with a SPA data bank, where offer and demand would be registered. An adequate hardware configuration is essential, the software has to be developed (or existing software has to be adjusted).

- the organisation would be a matrix orientated: a staff member looking for the solution of his porblems (e.g. sector-orientated team) cooperates with another, able to provide solutions (EDP, buying etc., see Annex XIV)

- at a later stage, the foundation of affiliated companies in important markets has to be foreseen in time

- organisational provisions have to be made to minimize misinterpretations in the identification of parts, to secure availability and rapid delivery

- the main activities of SPA have to be on the procurement side. Consequently, the company is preferably located in the centre of the important 'input' market (e.g. Ruhr-Area, FRG)

To build up such an organisation, outside assistance is indispensible. Otherwise, too high initial investments in logistics, special services and even personnel has to be made, resulting in (avoidable) high standing charges and overheads. Therefore, a close link to an existing industrial group (non-manufacturer) is recommended. This is also indispensible, since all future business partners will expect an economically and technically backed up partner, who is able to fulfill short and long term obligations correctly.

The business concept foreseen for SPA would be that of an agency, operating on a cost plus (percentage or fixed) fee basis. SPA should take a go-between function between supply and demand and carefully avoid own stockkeeping.

6.3.7 THE ORGANISATION OF SPA

6.3.7.1 BUILD UP PROCEDURE

The current preparatory phase includes (see Annex XVI):

- o pre-investigation, definition and design of SPA and IRMA
- o definition of future relationship SPA - UNIDO, IRMA, other institutions, clients, partners, suppliers,
- o development of programmes and strategies for
  - the selection of candidate regions, sectors, client
  - general business concepts
  - a growth concept
  - data collection and recording (EDP), code system for documentation etc.
- o set up of a partnership with an industrial partner
- o general agreements between partners concerned - SPA
- o recruiting of first personnel
- o start up of data collection and recording
- o first operations

Initial operations would preferably be in close co-operation with UNIDO-departments: identification and listing of needs and - financing presumed - procurement of parts, delivery, wind up. All contacts in the pilot phase are - per definition - of an 'ad hoc'-nature: an actual request has immediately to be served. With time, some of these clients might decide to contract the continuous external administration and supply programme of SPA. Meanwhile the set up of this programme would be prepared (listing of potential sources and items etc.) and interested partners approached. These can be as well those intending to set up

new plants, operating plants or disposing of installations to be rehabilitated. Whilst the external administration programme is suitable for new plants and plants of all phases of life-cycle, the 'ad hoc' programme by nature would be suitable for meeting urgent actual requirements.

After sucessful completion of the pilot phase, which has to prove the feasibility of the concept, an 'onion-ring' like expansion of sectors and regions (Annex X) is foreseen. A side of contracting projects in Third World regions, concurrently potential clients in industrialized regions and Eastern Block countries have to be found. There the same sectors would be treated.

If development justifies, subsidiaries of SPA could be opened in central market regions. These SPA-subsidiaries, if situated in advanced developed regions, would in the first instance act as intermediaries between local supply and demand and only import parts with assistance of SPA, if not locally available.(see Annexes IX & XIII). If activities of both partners are included, these subsidiaries could be joint offices of IRMA and SPA.

6.3.7.2 PERSONNEL

The following personnel resp. qualifications will be required in accordance with the scope of activities envisaged.

Table 7

Job	Tasks	Necessary Professional Profile / Training	Responsible for: (R) Reporting to: (r)
Managing Director (M.D.)	Chief Executive personnel, organisation, strategical planning, acquisition & coordination of projects, contacts to clients and partners, financial supervision, PR	Top-Management Experience in design and erection of industrial plant & service contracting in foreign markets acad. engineering degree and/or business administration multilingual,	R: Management of the company r: supervisory board cooperating with the advisory board
Commercial Manager (M. Co.) (Deputy Director	Finances and Accounting, contracts, commercial assistance in project development, business reports, contacts to financial partners, administration, controlling	Management experience in service contracting (internal) EDP, Organisation, Administration, commercial management, accounting, controlling etc. B.com, multilingual,	R: Commercial Dept. EDP, Admin., Finances r: M.D.
Industrial Sector Manager (M. Sec.)	Set-up, operation of the corresponding ind. sector dept.(profit centre), acquisition of clients and suppliers, project mgmt. & control, calculation & cost control	Industrial experience in the sector (e.g. cement industry), in maintenance engineering, project mgmt. intern. markets, sales Mechanical engineer, multilingual,	R: Sector r: M.D.
EDP Manager (M.Dat.)	Set-up, of a techn. doc. system (data bank) incl. specifications, identification, listing, cross reference between demand - supply (internal activities) operation and updating of EDP hardware and (integrated) soft ware, systems data security & protection,	Management of a larger industrial spare parts or techn. material stock-keeping system, sound knowledge of EDP Mechanical engineer, practical technician, English,	R: Data bank (parts identification, parts leasing documentation) r: M.Co.

Job	Tasks	Necessary Professional Profile / Training	Responsible for: (R) Reporting to: (r)
Buyer (Buy.)	Support M.Dat. in securing sources of supply for spares (external activities) together with M.Sec. technical procurement, also responsible for time scheduling & expediting	Technical purchasings expediting experience in comparable fields Sound market and commercial knowledge and technical background English	R: Technical procurement and expediting r: M.Sec.
Spare Parts Engineer	Assists M.Sec.in the acquisition & wind-up of projects in the sector, identification of parts, listing, documentation, partial project management	Experience in maintenance & spare parts in the sector (e.g. cement industry) Mechanical engineer, multilingual	R: Assistance to the M:Sec. r: M.Sec.
Expeditor (Exp.)	Expediting, time scheduling & control export/import formalities, logistics (assembling of shipments, etc.) forwarding	Adequate training & experience in the international forwarding business, English	R: Arrival of material 'just in time' r: Buy.
Inspector (Insp.)	Inspection of spare parts before and at delivery, compliance with standards, quality assurance, identification & listing at site	Adequate inspection experience with spare parts & components Mechanical engineer, English	R: Quality insurance r: M.Dat.
Company Secretary	Accounting administration,	Accounting, administration experience Accountant, English	R: commercials r: M.Dat.

The organisational set-up of the company would be in a matrix-form (see Annex XIV): each industrial sector would be staffed by experienced managers, assisted by a spare parts engineer, whilst the identification, listing, documentation, cross reference to sources, procurement and delivery of parts would be done by the EDP and purchasing departments. The sectorially orientated team would be supported by specialists of other departments, as required in the execution of tasks.

6.3.7.3 SUPERVISORY & ADVISORY BOARD

SPA's supervisory board would be comprised of representatives of equity holders in accordance with their participation. An Advisory Board comprising representatives of UNIDO, IRMA, Monetary Funds or casewise even main customer countries would appear to be useful.

6.3.7.4 FINANCIAL REQUIREMENTS AND FUNDING

Personnel requirements for the first phase (build-up of sector I,II,III) would be as follows:

Table 8

Personnel	Preparatory Phase	Pilot Phase First Year	Operating Phase Second Year	Operating Phase Third Year	Remarks
M.D.	1	1	1	1	
M.Co.		1	1	1	
M.Sec. I	1	1	1	1	
Engineer		1	1	1	
M.Sec. II		-	1	1	
Engineer		-	1	1	
M.Sec. III		-	-	1	
Engineer		-	-	1	
M.Dat.	1	1	1	1	
Buy. *)		1	1	1	*) possibly provided by industrial partner in the initial phase
Disp.*)		-	-	1	
Insp.		-	1	1	
Exec. Secret.	1	1	1	1	
Assistant		1	1	2	
Data Typist		1	2	3	
Total	4	9	13	18	

Annual expenditures for personnel would be approximately:

1st year - $ 450.000,-
2nd year - $ 700.000,-
3rd year - $ 1.000.000,-

The projected revenues are roughly estimated to indicate the expected development of SPA turnover. The following assumptions have been made

- at the beginning income derived from identification and listing will be of relatively high percentage
- income from ad hoc procurement will at the beginning be higher than in years to come
- by the time ad hoc business will be transferred to administration business.

Table 9

Sales of Services:
(in 1,000 $)

Service	Preparatory Phase	Pilot Phase First Year	Operating Phase Second Year	Operating Phase Third Yea
Identification & documentation of parts		100,000	125,000	160,000
Spare parts procurement (ad hoc)	arising project costs will be financed by external & internal sources	450,000	700,000	850,000
Spare parts administration + handling	-			
Advisory services (e.g. repair instructions) etc.		50,000	75,000	100,000
Revenues		600,000	1,100,000	1,500,000

At this stage, it is not possible to determine to what extent the cost structure will be influenced by projects and financial resources, which could be made available by UNIDO during startup, the location of company etc., the personnel needed etc. Only an approximate estimate is given:

Table 10:

Estimate of Costs:

Nature of Costs	Costs in Phases (in 1.000 $) Preparatory Phase	Pilot Phase 1st year	Operating Phase 2nd year	Operating Phase 3rd year
Cost of Labour	150	450	700	1000
Travel	50	65	80	95
Communications	5	12	16	20
Office Rentals	30	30	32	35
Warehouse rent	-	20	20	20
Office Equipment	-	20	22	25
Computer Costs	-	50	75	100
Miscellaneous	5	10	15	20
	240	657	960	1.315

6.3.8 WARRANTIES

In the event that IRMA should carry out project management or coordination, then warranty obligations similar to these of a general contractor would be applicable. These, however, could and should be assumed by the original equipment manufacturers or service contractor.

Spare parts warranty risks assumed by SPA, could also be transferred to the original spare part manufacturer and/or - in the case of surplus parts - be minimized through inspection or NDT-testing by independent testing organisations such as TOV, SGS, etc. In addition it is possible to secure insurance coverage for such risks.

6.3.9 THE CONCEPT AND ITS ALTERNATIVES

The proposal is characterized by a few main elements:

- an UNIDO-controlled, but independently operating entity (IRMA), responsible for the financial coordination and certain supervision and control tasks in the process of wind up of projects

- an UNIDO affiliated, but privately organized and independently operating entity (SPA), responsible for the reliable procurement and supply of spare parts for individual projects (ad hoc) or for continuous spare parts provision

- supplementary services offered by existing companies.

According to the concept, UNIDO's role would be determined by an 'umbrella' function covering mainly the political and economic-political fields.

As the political functions can clearly be separated from further activities, the proposed division of tasks between IRMA and SPA has to be seen in the light of absolutely different 'business environments', both have to cooperate with.

IRMA's proposed tasks - outside of functions delegated from UNIDO - will be mainly in the sphere of financing, financial controlling etc., the partners being national and international monetary funds, development organisations, banking institutes etc. Further activities will be of a coordinating, supervisory or controlling nature. This can be achieved best by a success orientated, independently and flexible organisation, which is closely linked to UNIDO.

SPA on the contrary has to operate in a 'normal' industrial business invironment. SPA has to keep close contact to industrial clients and suppliers, has to be well aquainted with free market conditions and to operate accordingly. SPA's functions are mainly of a technical-organisational nature.

It is self evident, that clients and partners expect a highly effective, flexible, competent and reliable executed service at minimal costs (overheads etc.). This can optimally be achieved, if SPA is a privately organized entity, operating under the same conditions as the industrial environment. Motivation prospers best under free market conditions.

A principle alternative would be a combination of all activities under 'one roof', e.g. operating as UNIDO-departments. In the light of the discussed circumstances, such a solution does not present significant advantages: The necessary integration of as well IRMA as SPA activities in their future business environment would be hampered whilst the consequences, the structure of an international organisation demands, would most probably narrow the flexibility, essentially needed.

A further alternative would be an integration of IRMA and SPA activities within a single entity. As formerly discussed, the two kinds of services complement each other but are of such different nature, that a combination would bring very little synergetic achievements.

Consequently, the variety of different tasks are most probably best resolved by independently organized, yet closely co-operating partners, with either side complementing the services of the other side.

7. THE POSITIONS OF IRMA & SPA WITHIN THE BUSINESS ENVIRONMENT

The concept can only function properly, if able to operate smoothly within the existing international business environment. A particular advantage is gained, if its contribution has a 'catalytic effect' on an existing business structure, without imposing new imbalances or disturbances.

The concept has been designed to meet these preconditions:

- o neither IRMA nor SPA activities conflict with existing business interests,
- o the contributions are mainly of an organisational nature, suited to stimulate other activities in a - so far - rather neglected area.
- o existing manufacturers and contractors profit from the new initiative
- o surplus spare part stocks are usefully employed.
- o international and bilateral organisations gain a trustworthy instrument to channel their aid and support programmes.
- o general principles of operation of international organisations are not affected.

The crux of the concept, this has to be repeated, lies inevitably in a very close co-operation between UNIDO, Industry, IRMA and SPA. This combination could provide the organisational and structural impetus to get the ball rolling and with time to grow in momentum. The original objective of the Investment Co-operative Programme for the 'establishment of a global joint venture to provide quick and efficient maintenance and repair services to industrial plants in developing countries' has realistic chances to become effective - to the benefit of the industries concerned and the economies they are a part of.

8. TIME SCHEDULE

Three phases of evolution are foreseen in the proposed time schedule (see Annex XVI):

- The preliminary phase is intended for familiarization of decision makers with the concept and for further development of the concept up to provisional setting up of IRMA and SPA

  t a r g e t d a t e : mid-March 1986

- The pilot phase beginning with the setting up of IRMA and SPA

  t a r g e t d a t e : 1st July, 1986

  At this stage, actual activities should start, with first pilot projects in one sector and one or two regions to be obtained and wound up. Results would be analyzed and conclusions drawn for development of the strategic planning of the operating phase. The pilot phase ends with the decision to convert started activities into full operations.

  t a r g e t d a t e : 1st September, 1986

- The operating phase starts with a systematic campaign to familiarize potential clients with the scheme. At this stage, the scope of services will be stepwise enlarged (equipment, sectors, regions), countries of various levels of development included, and the spare parts administration scheme systematically offered to clients. It is - optimistically - proposed that the scheme could be working 'full swing' by mid-year 1988.

9. INITIATIVES IN THE INITIAL STAGE

In the initial stage there is no alternative to an UNIDO initiated control committee, which would be given all necessary authority to start and control all operations to be undertaken. Future executives designated to manage IRMA and SPA and the main share holders of SPA should preferably participate at this early stage. After formation of IRMA and SPA, and after first activities have been performed and the decision to start the operating phase has been taken, these responsibilities would transfer to the management of IRMA and of SPA.

UNIDO's role should then be seen in the political economic area and in supervisory functions.

10. TRANSFER OF KNOW HOW

10.1 SITUATION

UNIDO initiated studies, dealing with the subject of identification and analysis of obstacles met during the investigation of the status of plants in developing countries, point out particular problems at the interface operator - machine. Problems of high wear and short lifetime of machinery are closely related to and frequently caused by a lack of know how transfer[1]. Without simultaneous improvements in this area, financial and technical aid has little prospect to stabilize productiveness effectively.

Main reasons for the inadequate machine operation, high wear of machinery and loss of prodcution are for example:

a. machine operating (e.g. at control panels) is often very complicated
b. the operator of a machine lacks access to needed information 'when' to do 'what' and 'why' to do it.
c. operating manuals fail frequently to fulfill their intended purpose of transferring operating know-how
d. training seldom has the desired long term effect.

add to a. Control panels and other control instrumentation are mostly designed for operators in industrialized countries, traditionally familiar with

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1) De Groote (s.a):..."Apart from the problems of motivation and attitude towards the job, the technical qualification of the personnel is extremely low...the complete lack of technical schooling, but above the absence of the industrial tradition and experience, mean that the daily practice of maintenance is, in a word, a catastrophe...how can you expect discipline from lubricators...if he does not understand the usefulness of lubrication...".

such kind of installations. Such devices are designed from the technical-aesthetic point of view to fulfill design requirements. Out of a range of, say, 80 similar black round switches it is not easy to pick out the right one at the right time. Consequently, lack of functional design and operator qualifications jeopardizes production efficiency and product quality. It can even lead to rapid wear of machinery. Further, if functions of single switches etc. are not known, design features and flexibility of a machine cannot be precisely used or only be used after time consuming trial and error. Everyone using a manager's telephone certainly has experienced the problem of 'surplus' buttons or buttons with special functions, which are never used, since their purpose has been forgotten.

add to b. Few provisions are made at control panels of larger industrial machinery and plants to enable the operator to inform himself on the spot about the need and consequences of user procedures. The complexity of the equipment remains obscure. Lack of information on, and fading recollection of seldomly executed operations, makes the quick, correct and effective operation of the equipment difficult.

add to c. Traditional operating manuals have several main disadvantages:

- o they are normally very volumeneous
- o they are - even in the original untranslated version often too complex and hardly understandable, (as every user of household appliances will appreciate)
- o translations aggrevate these problems

- o operators, even in industrial countries, tend to follow a "monkey see - monkey do"assimilate approach rather than to study written instructions
- o operating manuals often fill a sort of 'status-symbol' function and are mislaid or locked away in offices instead of being used at the machine,
- o even, if available, finding the right heading, reading, understanding and carrying out operating procedures accordingly, is time consuming and normally not possible in critical situations.

add to d. The training period is normally used to teach the operator all necessary know-how about 'his' machine, its operating details etc. etc. Manufacturers in industrialized countries seldom have access to proper didactic methods, and are not able (or unwilling) to discipline customers' representatives to submit themselves to strict learning procedures[1]. Language barriers might aggrevate the problem even further. Even if properly trained abroad at the machine, seldomly executed operations are often forgotten with time.

---

1) De Groote (s.a):..."in most cases, this training is reduced to a vacation stay in Europe or to a completely inadequate training..."

10.2 PROPOSAL FOR A SOLUTION

To solve these problems, a company (INDERG, Company for Industrial Ergonomy & Know-how Transfer) has developed a special copyrighted service. No similar approach to faciliate know-how transfer is known.

The service is based on computerized audio-visual modules installed in each piece of equipment and subdivided into programmes and sub-programmes, so that any instruction or information can be called up in a few seconds. The information and instructions can be transmitted via movie film, slides or computer graphics and tables. The system is designed to transmit background information about processes in the machinery/ plant, the manufacturing process, functions of individual modules, consequences of operating procedures or their omission. Both specific operating and maintenance information can be retrieved at time of need as well as specific repair instructions of a frequent nature, trouble-shooting- aids and a full list of spare parts. The same device can be used effectively in the training phase as well as during operation. Thus the operator is visually trained for this tasks with information he can call up at any time. The operator is in the position of someone, who has learned to use a dictionary instead of knowing the whole content by heart.

As a result, training can be done in a shorter period of time and more cost effectively, further, an operator who has immediate access to the information related to each situation, knows what to do and why to do it, is more motivated, is able to reduce spare parts consumption. The product quality is improved as is the productive utilisation of the machine. The visual spare parts lists enable quick determination of needs, a visual comparison between intact and worn out parts, and enhancement of the replacement decision making process (see Annex XVII).

11. TERMS OF REFERENCE

This paper has been prepared with the goal to submit a pragmatic solution to the problem, under a concept which could be realized rapidly with progressive increase in volume of activity. The feasibility of the concept is demonstrated as far as possible. All relevant issues of the terms of reference have been dealt with at this stage. However, it is deemed that a selection of target areas (e.g. African countries) is premature, as long as general agreement to realize the concept - embodied in a start-up strategy - has not been reached. Then, it would appear more advisable to select first target areas according to the following criteria as:

- o existing obligations of UNIDO or Monetary Aid Funds
- o existence of infrastructural background and logistics (selected country and client) that support measures and that may serve as a basis to achieve success (in particular during the pilot-phase)
- o selection of a particular suitable industrial sector to start operations (strategic planning)

It is felt that import-statistics are not the ideal source of information at this stage. Very much depends on the respective availability of foreign currencies and on import policies, if within a national programme a certain industry sector is considered of sufficient importance, to be encouraged to import spare parts. Consequently, it is recommended to postpone this issue to a next step, when all preparatory queries have been answered. It should also be coordinated with a fact-finding mission to pre-selected regions.

12. SUMMARY

"Shortage of spare parts is a permanent nightmare for all those who operate and maintain an industrial plant in a developing country...consumption of spare parts is relatively speaking much higher than in industrialized countries...at least 50% of the unavailability of equipment is due to lack of parts"[1] All efforts to improve this situation for once and all have so far failed to be effective. In 1981 UNIDO attempted to solve this long-standing source of vexation. In a preparatory study, the foundation of an Industrial Rehabilitation and Maintenance Agency (IRMA) was proposed. IRMA was conceived to be founded by suppliers of maintenance & repair services, receivers of these services, UNIDO and Financial Institutions. This global operating joint venture was envisaged to offer the provision of spare parts and maintenance, repair and rehabilitation services to industrial plants in developing countries.

Critics saw the main weakness of the concept in the operational size of IRMA, the problem of a possible conflict of interest between an UNIDO-related agency with an existent fully developed free market, and the difficulty to recruit individual firms out of a group of competitive firms to collaborate as IRMA-shareholders. Further, it was felt that some governments would be unlikely to pay for these services. Finally it was stressed, that in a free market economy, governments tend to favour private sector services.

This proposal is based on an analysis if UNIDO initiated fact-finding studies and suggestions and on the original IRMA-concept and comments.

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1) see De Groote, UNIDO-Study V.85-27406

It sets forth an economically feasible, pragmatic approach to the problem, eliminating all objections and combining the best features of all previous models.

The author's experience with industrial procedures in developing countries, led in the past, to concepts, such as 'Plant Services International' and 'INDULOG', which have been amalgamated.

This 'concept' gives main emphasis to two areas:

- o the organisation and financing of projects and
- o a solution of the spare parts supply problem

Therefore, the set up of two small, closely operating entities is proposed:

- o an UNIDO-controlled IRMA to mainly organize the financial aspects and

- o a privately operated, UNIDO-affiliated Spare Parts Agency (SPA)

This 'core' would structurally be capable of continuous activities in this field, making simultaneous optimum use of existing free market sources (consultants, contractors, etc.)

The IRMA-SPA-Organisations with their relatively small set up would thus initiate a broad range of activities through these outside 'contributors' with the target of full scale maintenance, repair and rehabilitation processes.

In the beginning, it is recommended that both organisations work within a modest structure, which at a later date would grow correspondingly to meet market demand.

Therefore initial activities would be confined to one selected industrial sector and one or two target areas (countries). Sources for spares and components are manufacturers, specialized workshops and surplus material out of a similar type of plant (same sector). The concept principally permits all sources to be included regardless of national origin (e.g. also developing countries). One of the main features of the concept is an independent (works-external) non-manufacturer affiliated administration: SPA is designed to administrate spare parts stocks, cross-referencing potential demand and supply using latest EDP methods. Consequently, stocks administrated can be kept at a reduced volume, demand will be satisfied at the time when demand arises ("just-in-time" - J.I.T.).

This procedure would be of considerable financial benefit for clients and International Aid Funds, since the unused capital bound in overstocks, can be economically made use of. It is also of advantage for suppliers (active marketing of spare parts) and for plants interested in, disposing of unsaleable surplus material.

The SPA system is a transformation of modern KANBAN and J.I.T production strategies into the field of spare parts provisioning: Instead of large-scale stocking, a small batch, consumption orientated, steady supply of spares is foreseen. This system is principally suited to be implemented in 'intact' plants. Further, a batchwise procurement of parts for all types of demands would be included (plants to be rehabilitated)

The time factor is determined by parameters inside and outside SPA's sphere of influence. A J.I.T system can only be realised, if all partners co-operate. This includes necessary internal steps at the recipient's end.

Spare parts administration contracts demand a long term, trustworthy relationship with a competent partner. Therefore, SPA is preferably linked to an industrial firm (without manufacturer's interests). This assures necessary logistic support and warrants a long term partnership.

SPA would be set up as an 'agency' with a mediator status, working on a cost + fee basis. Thus for UNIDO and clients, a necessary financial transparency can be secured. SPA would not keep own stocks but dispose of already stocked material.

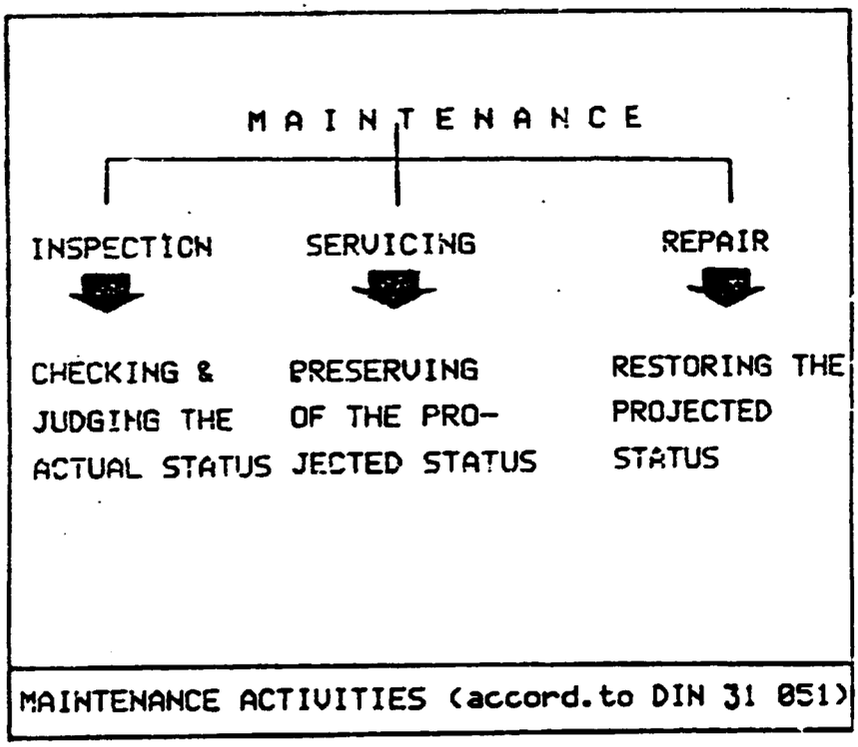
Set up, organisation, structure funding and scope of activities for both, IRMA and SPA, are outlined in detail. A time table is proposed, which, after an initial decision to proceed is taken, will permit a rapid development and implementation of a strategic plan for market entry.

The solution of the spare parts problem is only one part of necessary initiatives. At the same time, the implementation of new ways to transfer operational and maintenance know how is felt to be essential to improve efficiency of production and decrease waste and wear of machinery. An audio- visual system is proposed. From a monitor, installed into the control panel, helpful information about the process, instructions for proper operation etc. can be called up when needed. The display is in the form of movie scenes, slides, tables, computer graphics, etc. and conveys pictures and written or spoken text in any language. This substitutes conventional operating manuals, and provides immediate information: 'what to do', 'why to do it', 'when' and 'how to do it'. Such a cost advantageous system would cover operation, maintenance, trouble-shooting, repairs. Additionally, a full scale, film recorded and easy to understand spare parts list could be included. The system, which is equally designed for training and operation, is partly computerized.

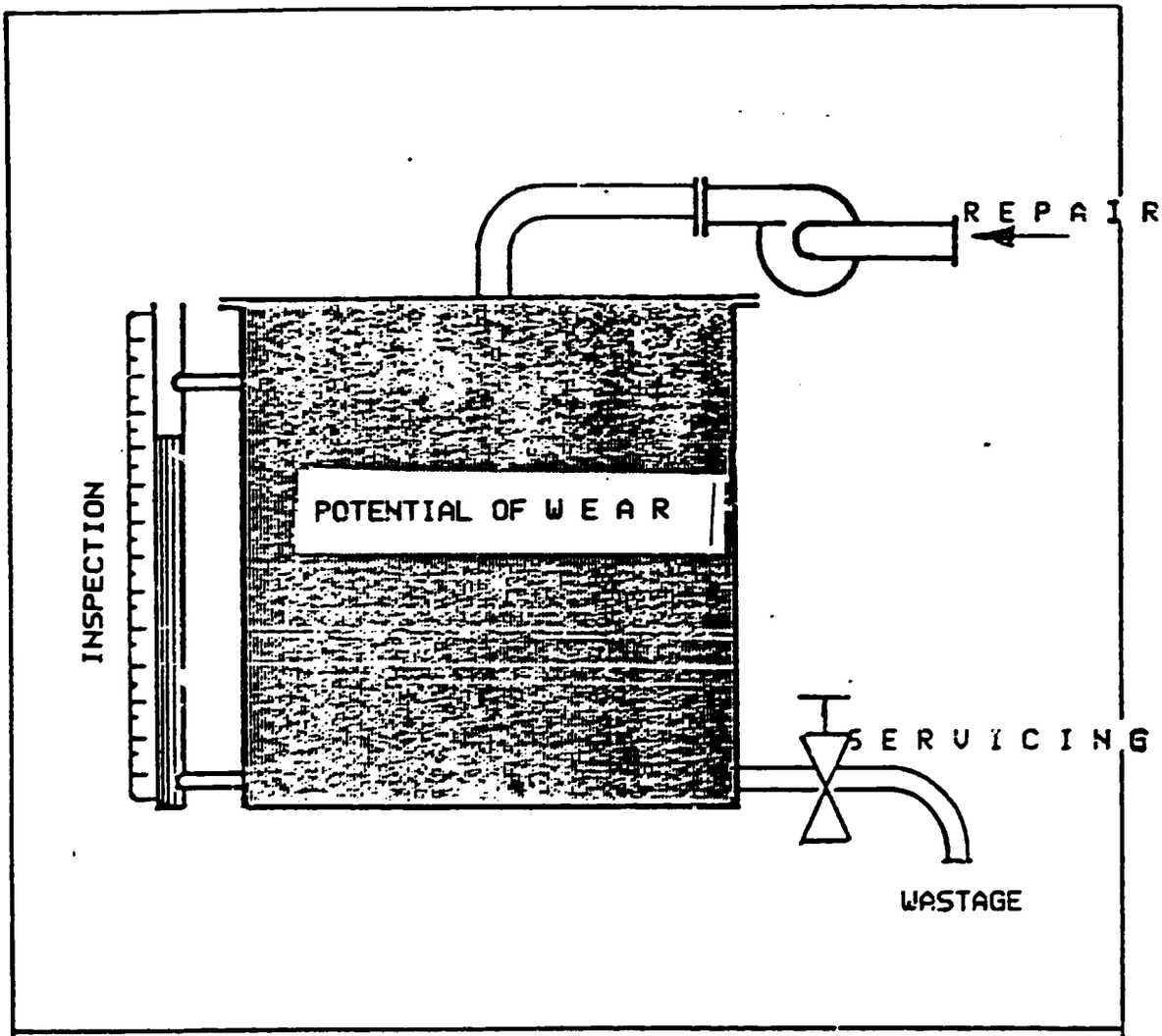
VOLUME II

ANNEXES

A N N E X E S (cont'd)


MAINTENANCE
INSPECTION
SERVICING
REPAIR
CHECKING & JUDGING THE ACTUAL STATUS
PRESERVING OF THE PROJECTED STATUS
RESTORING THE PROJECTED STATUS
MAINTENANCE ACTIVITIES (accord.to DIN 31 051)

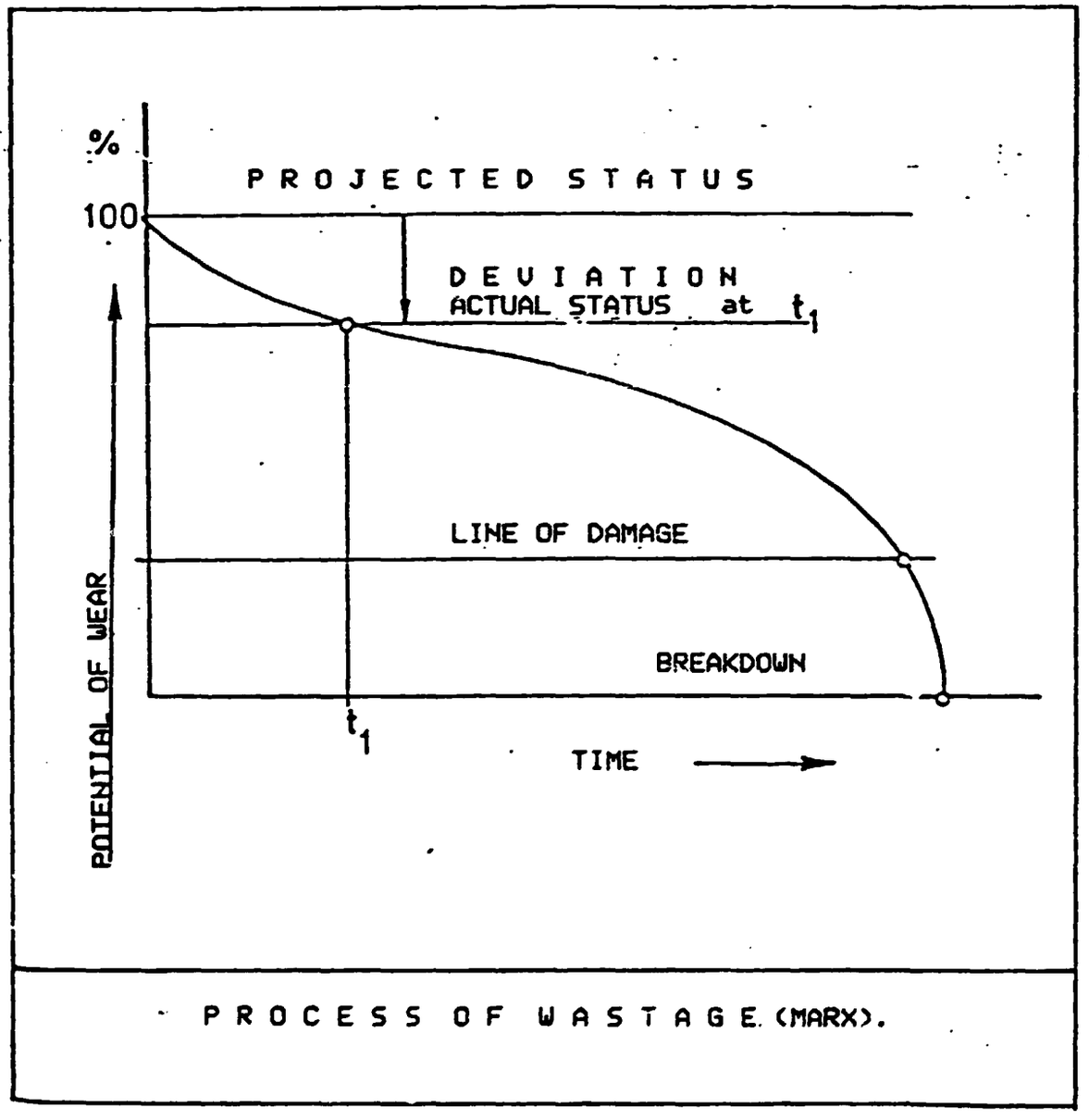
ANNEX I



(MARX)

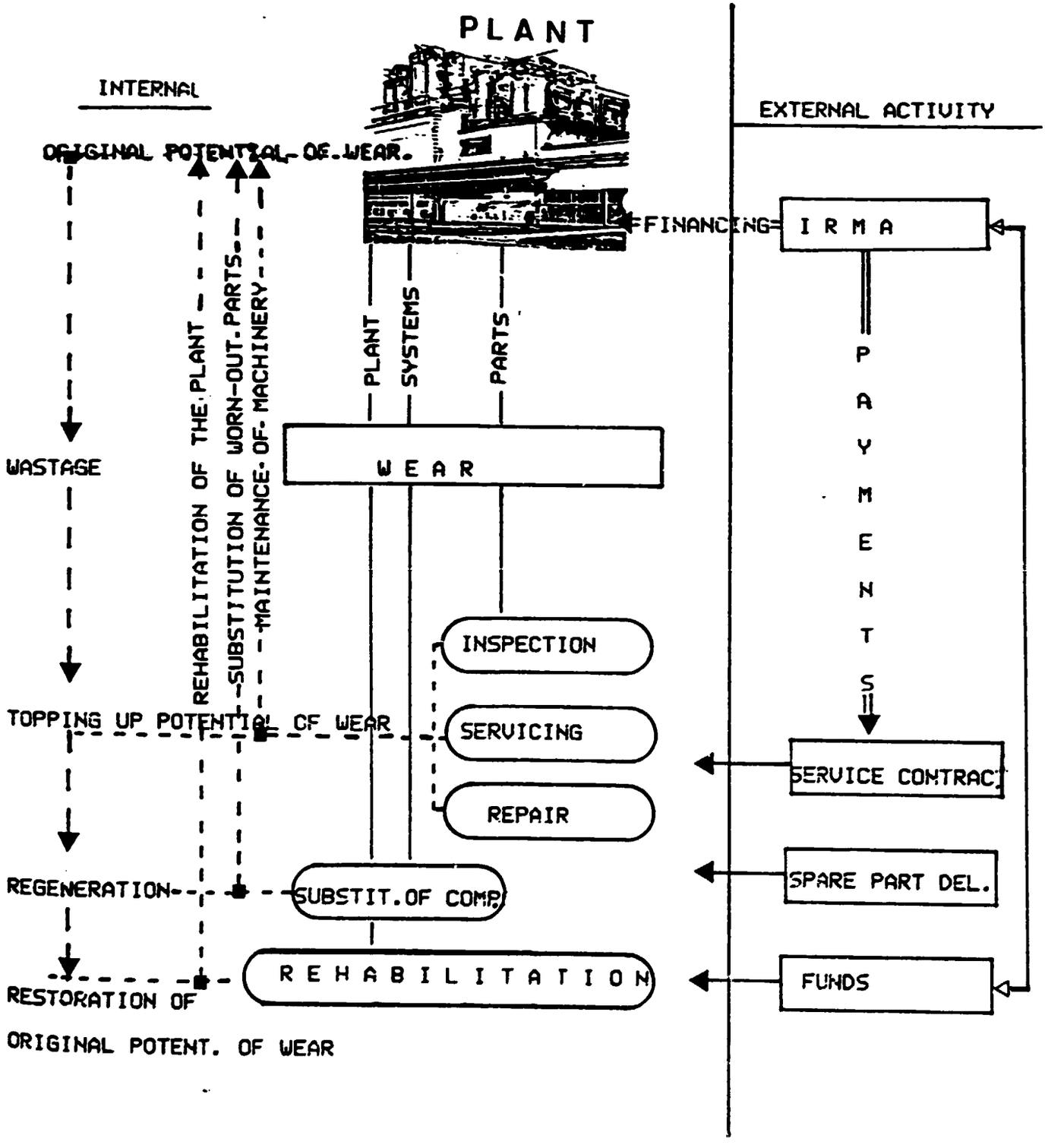
MODEL OF RELATION BETWEEN
POTENTIAL OF WEAR + WASTAGE ↔ MAINTENANCE.

ANNEX II



PROCESS OF WASTAGE (MARX).

ANNEX III

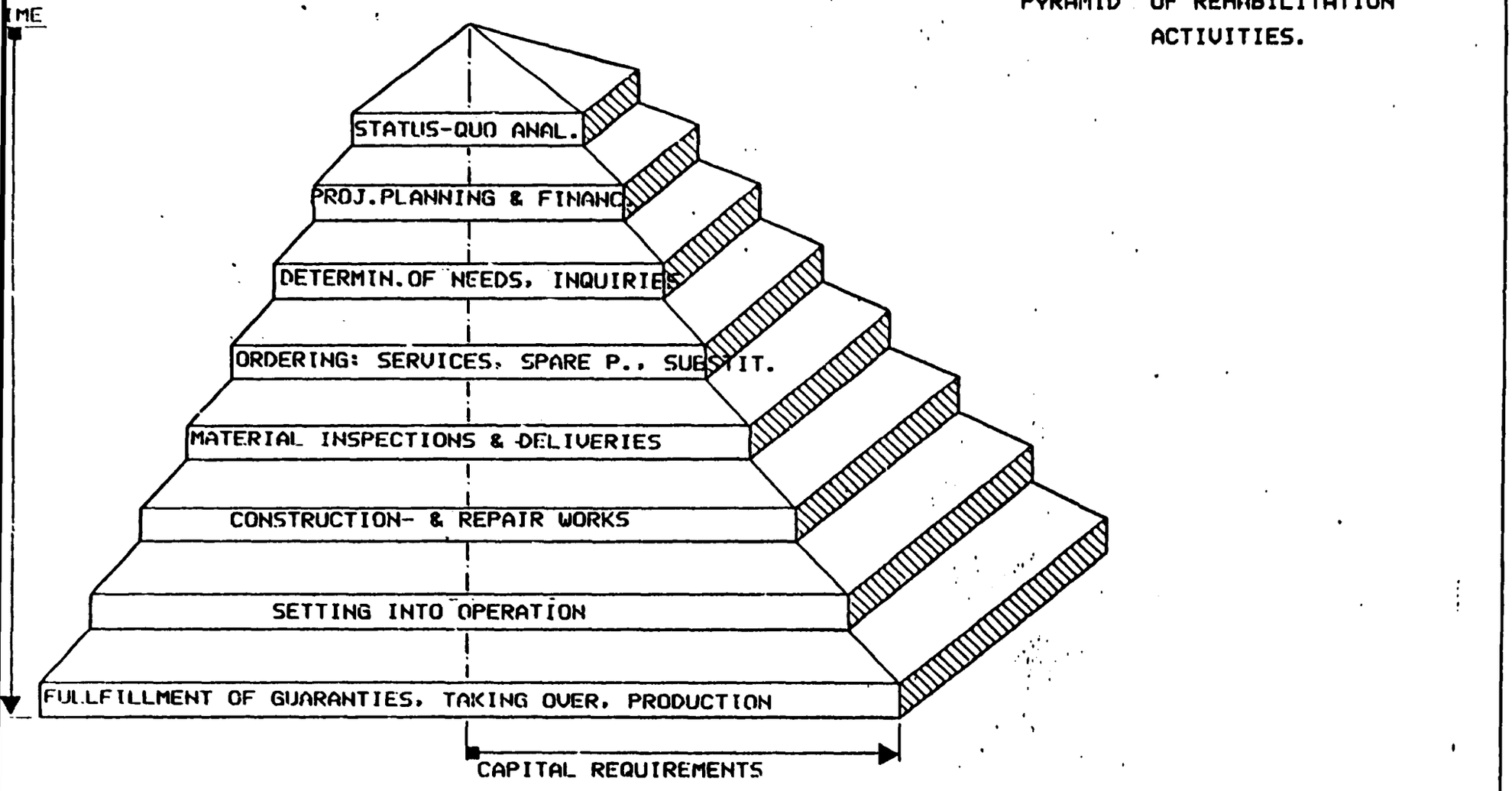


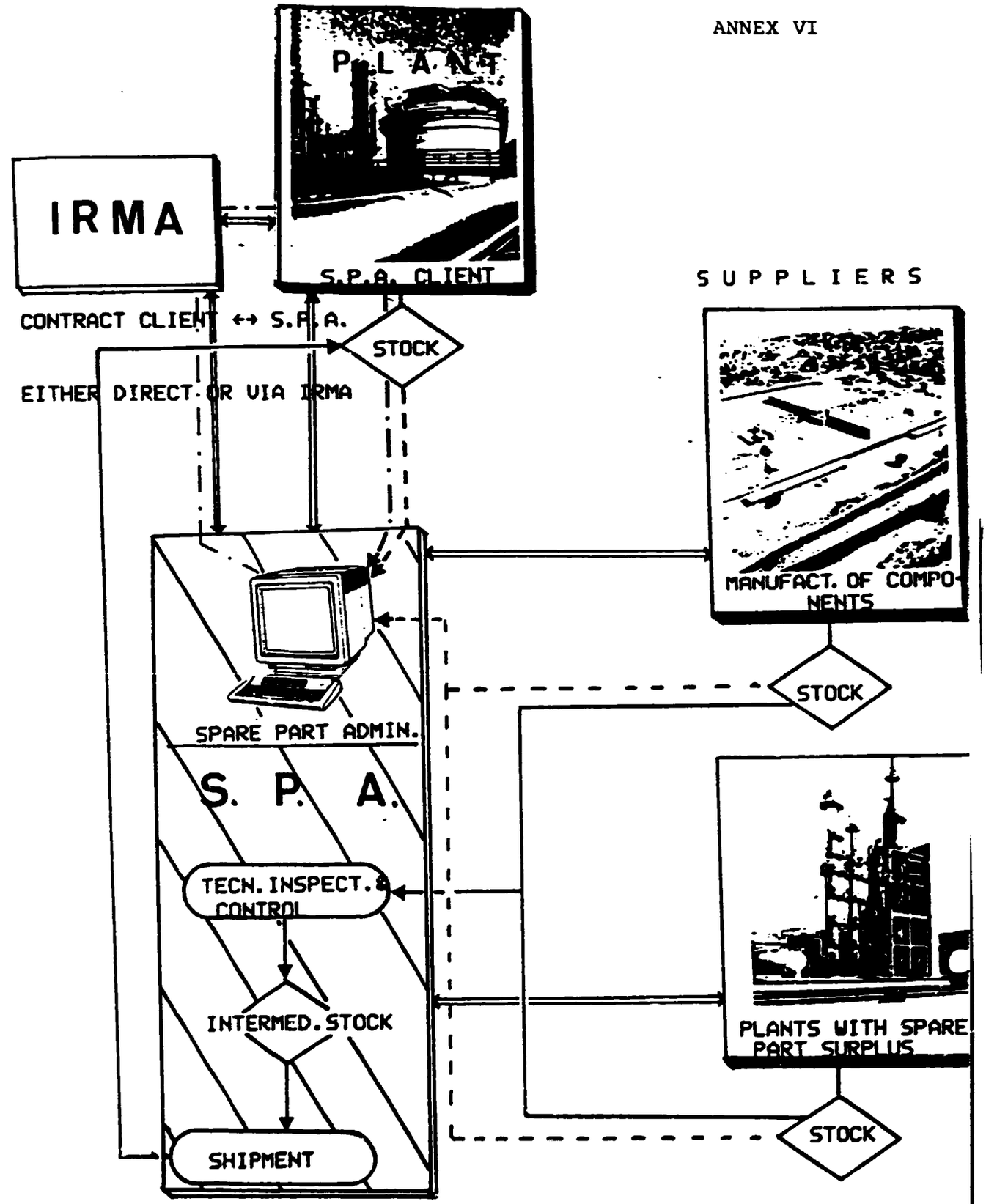
CORRELATION BETWEEN PARAMETERS IN THE

PROCESS OF WEAR ↔ MAINTENANCE ACTIVITIES.

ANNEX V

PYRAMID OF REHABILITATION ACTIVITIES.





THE SPARE PART AGENCY ADMINISTRATION SYSTEM.

AGENDA:

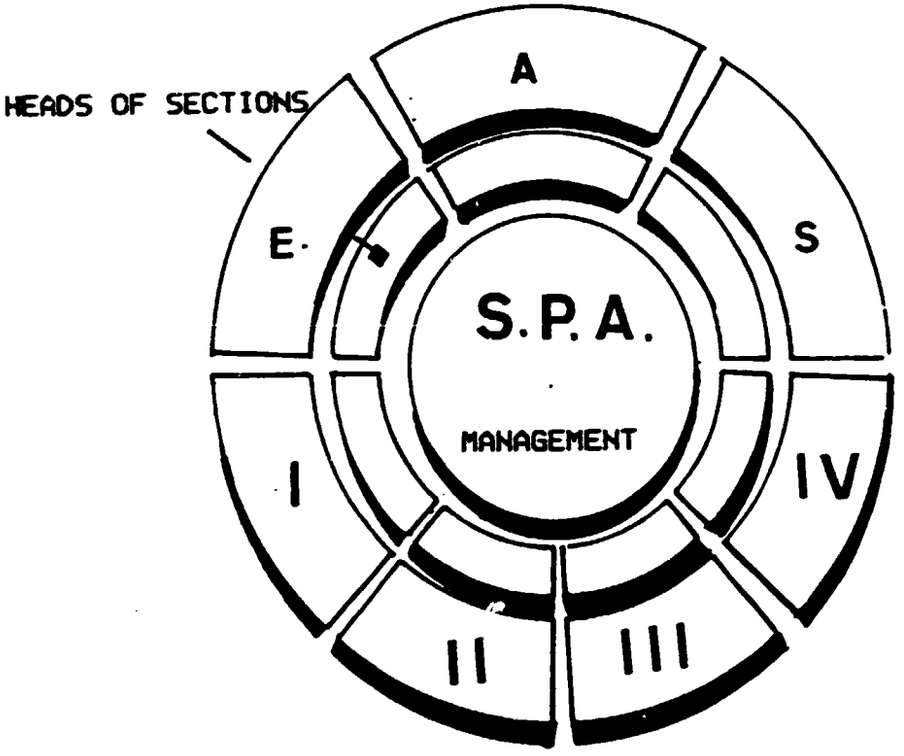
- - - INFORMATION ABOUT COMPONENTS & SPARE PARTS

—·— REQUEST

——— DELIVERY

⟸⟹ INVOICES & PAYMENTS

MODEL FOR THE ORGANISATION OF THE SPARE PART AGENCY



AGENDA:

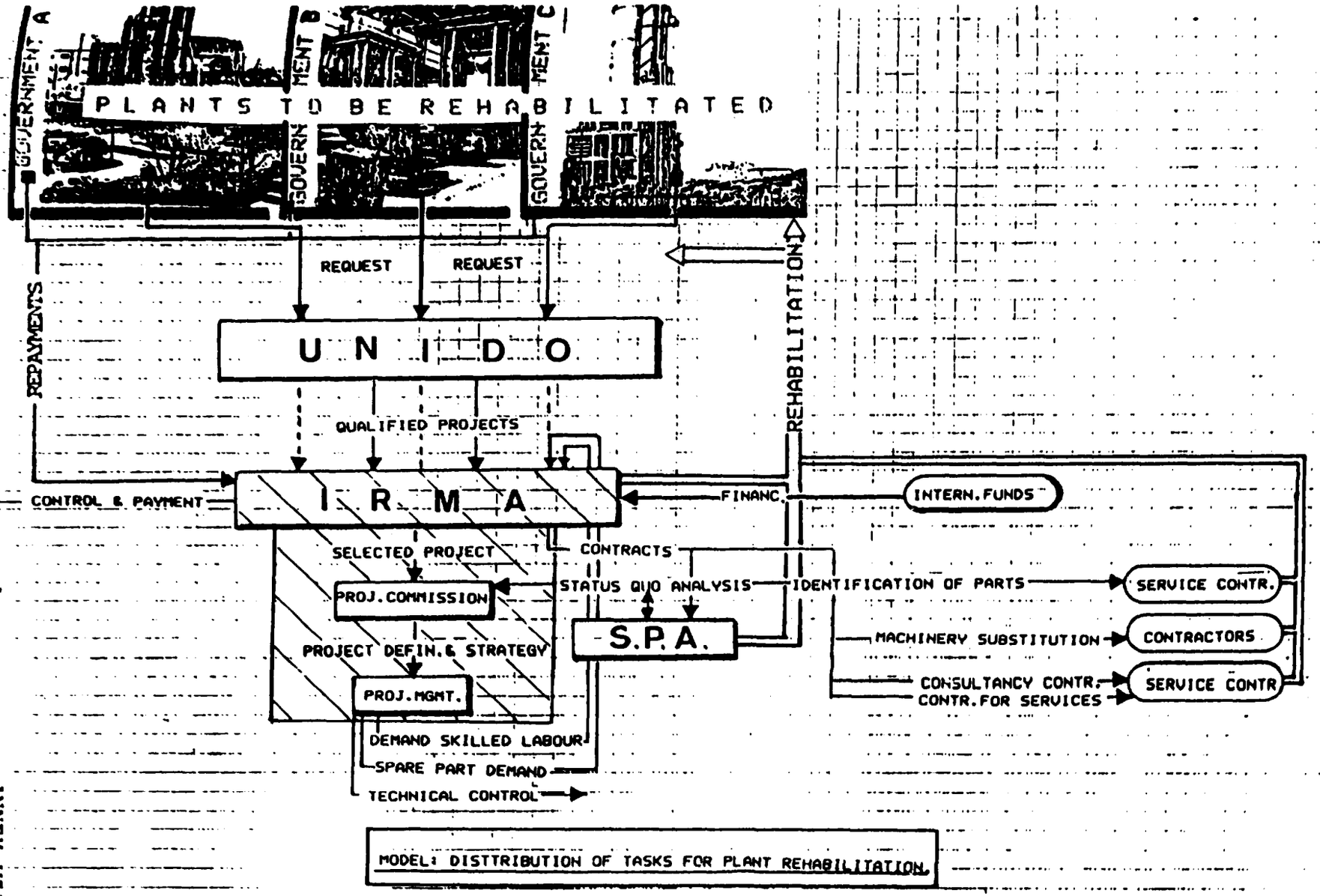
A - ADMIN. COM
FINANCE DEPT

S - PROCUREMENT
SHIPPING DEP'

E - EDP-DEPT.

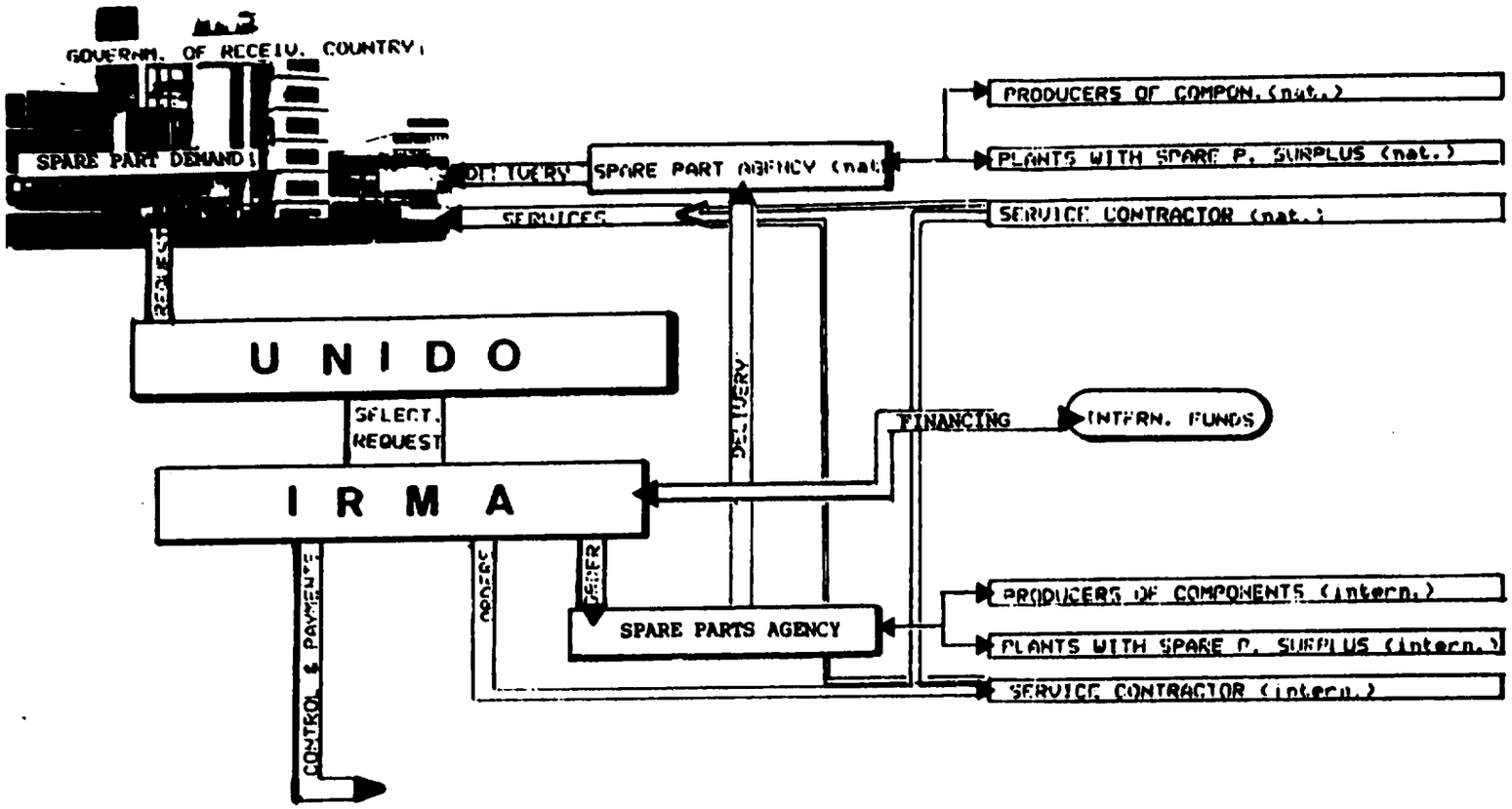
I-IV - PROFIT
CTR

ANNEX VII



MODEL: DISTTRIBUTION OF TASKS FOR PLANT REHABILITATION

ANNEX VII



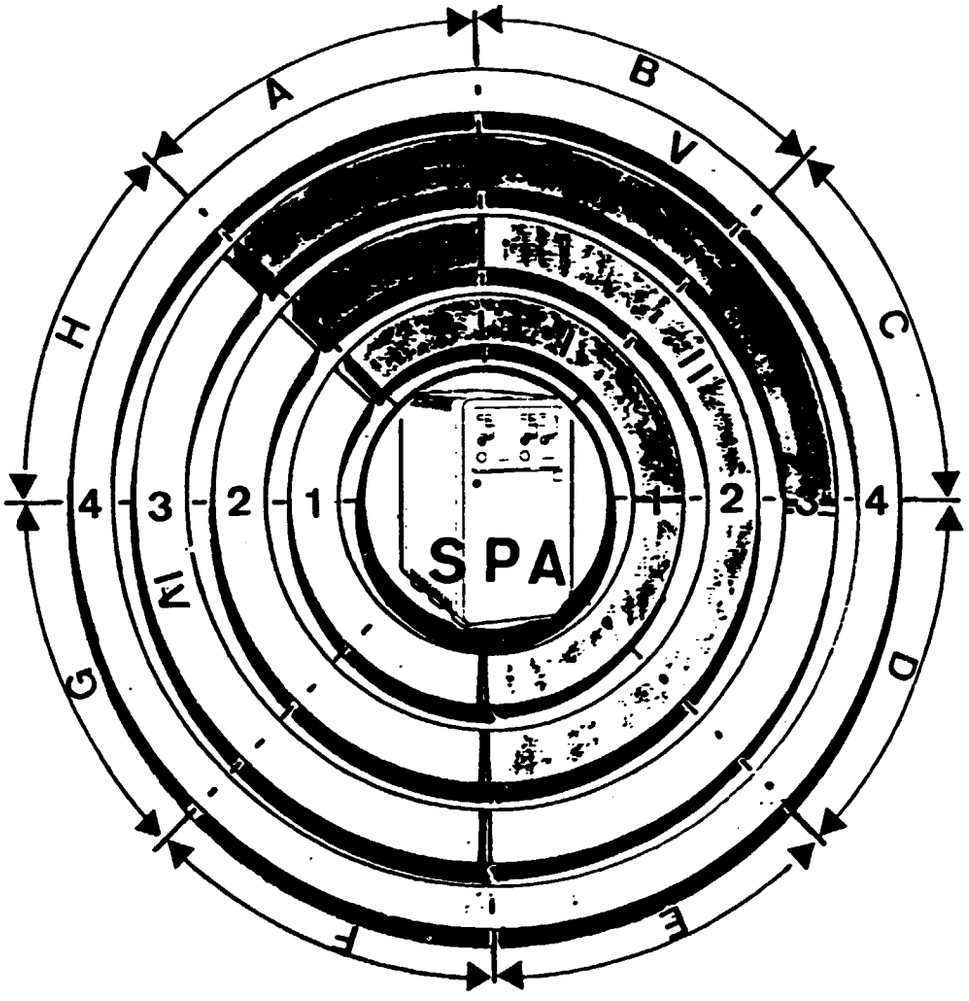
MODEL: EDP SUPPORTED SPARE PARTS SUPPLY & REPAIR SERVICE

ANNEX IX

ANNEX X

PATTERN FOR THE SET-UP OF S.P.A. ACTIVITIES.

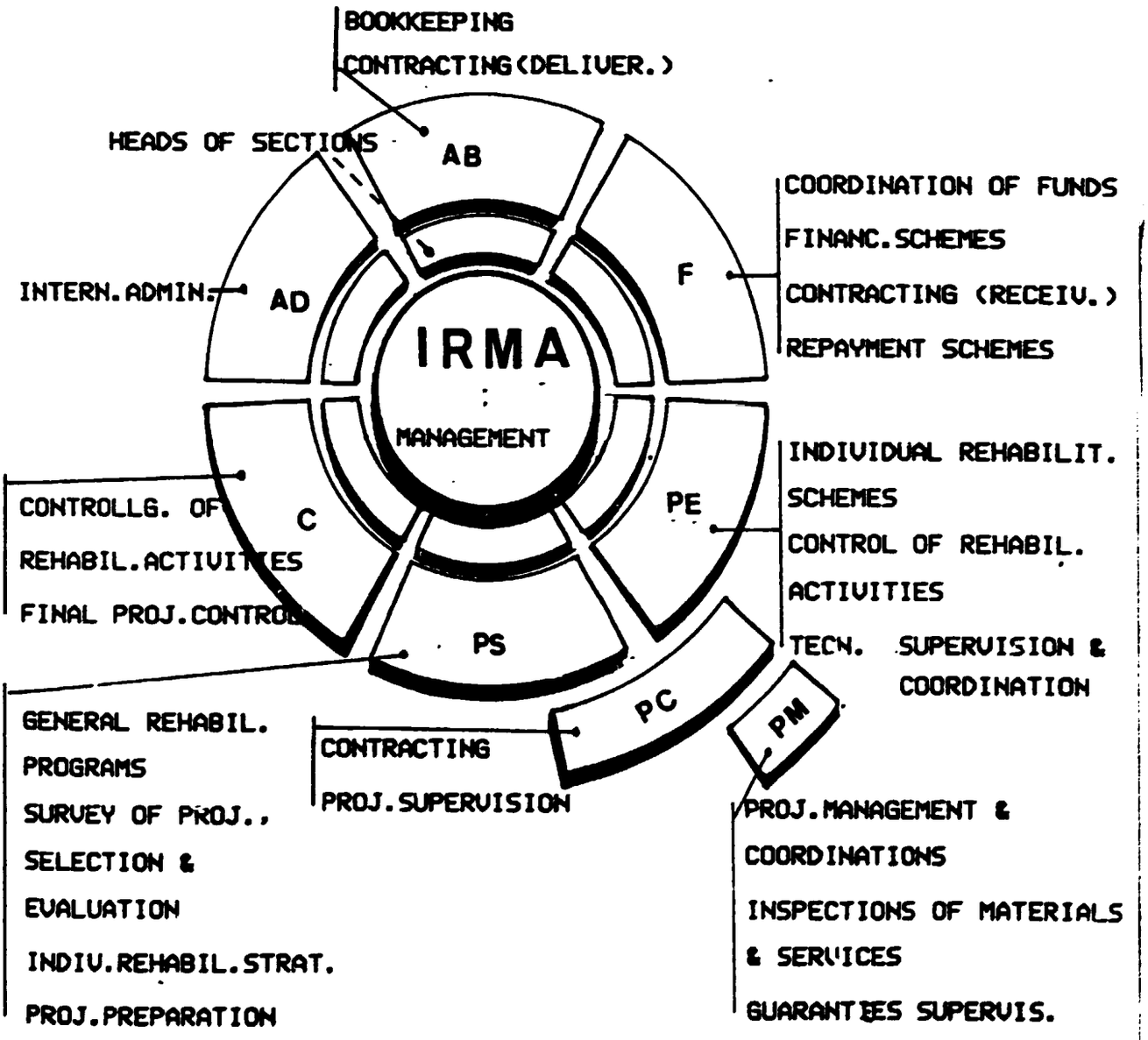
(Regional & Industrial Sectors).



AGENDA:

A-H	REGIONS
I-V	PHASES OF EXPANSION OF S.P.A. SERVICES
1-4	INDUSTRIAL SECTORS

MODEL FOR THE ORGANISATION OF I R M A.

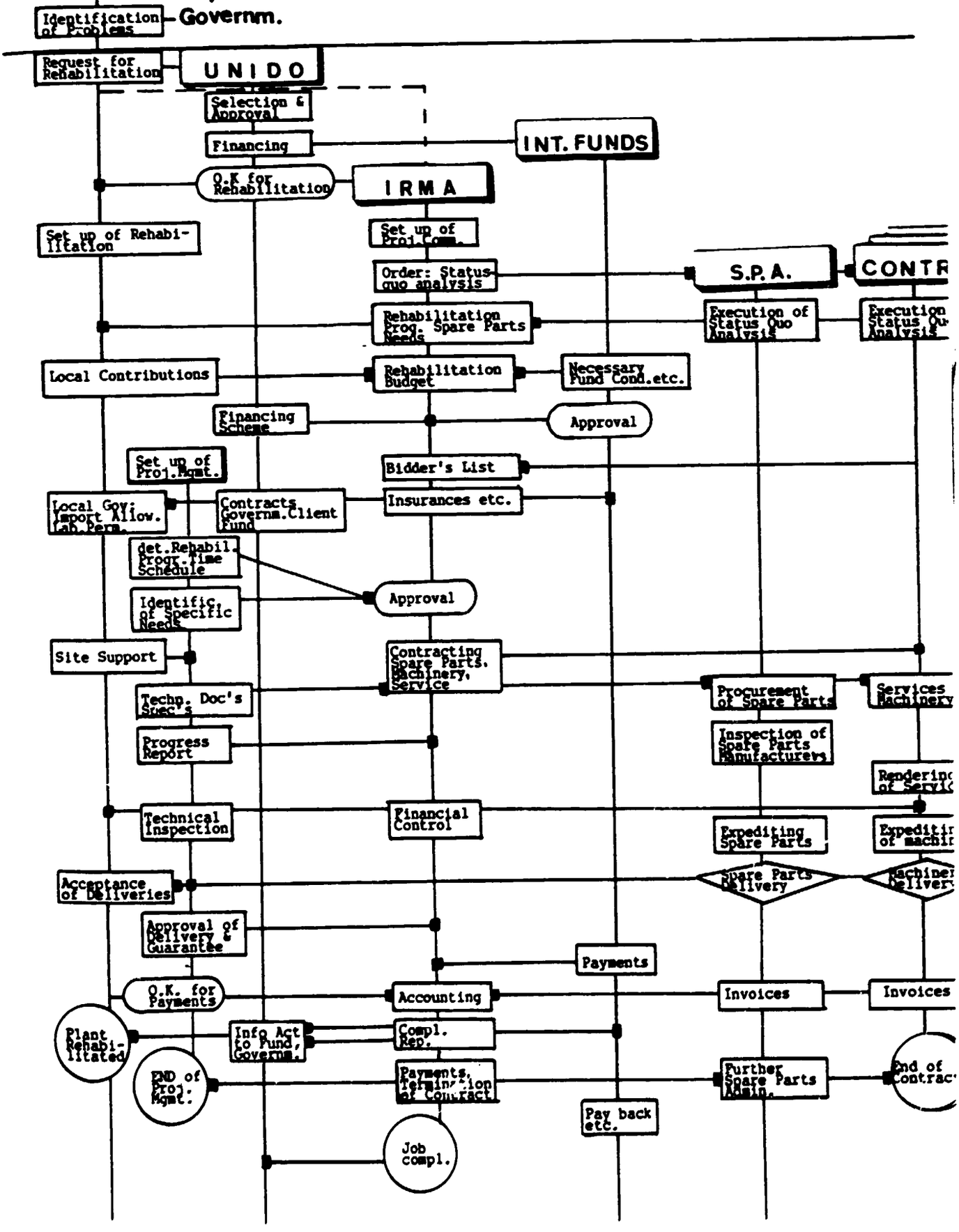


AGENDA:

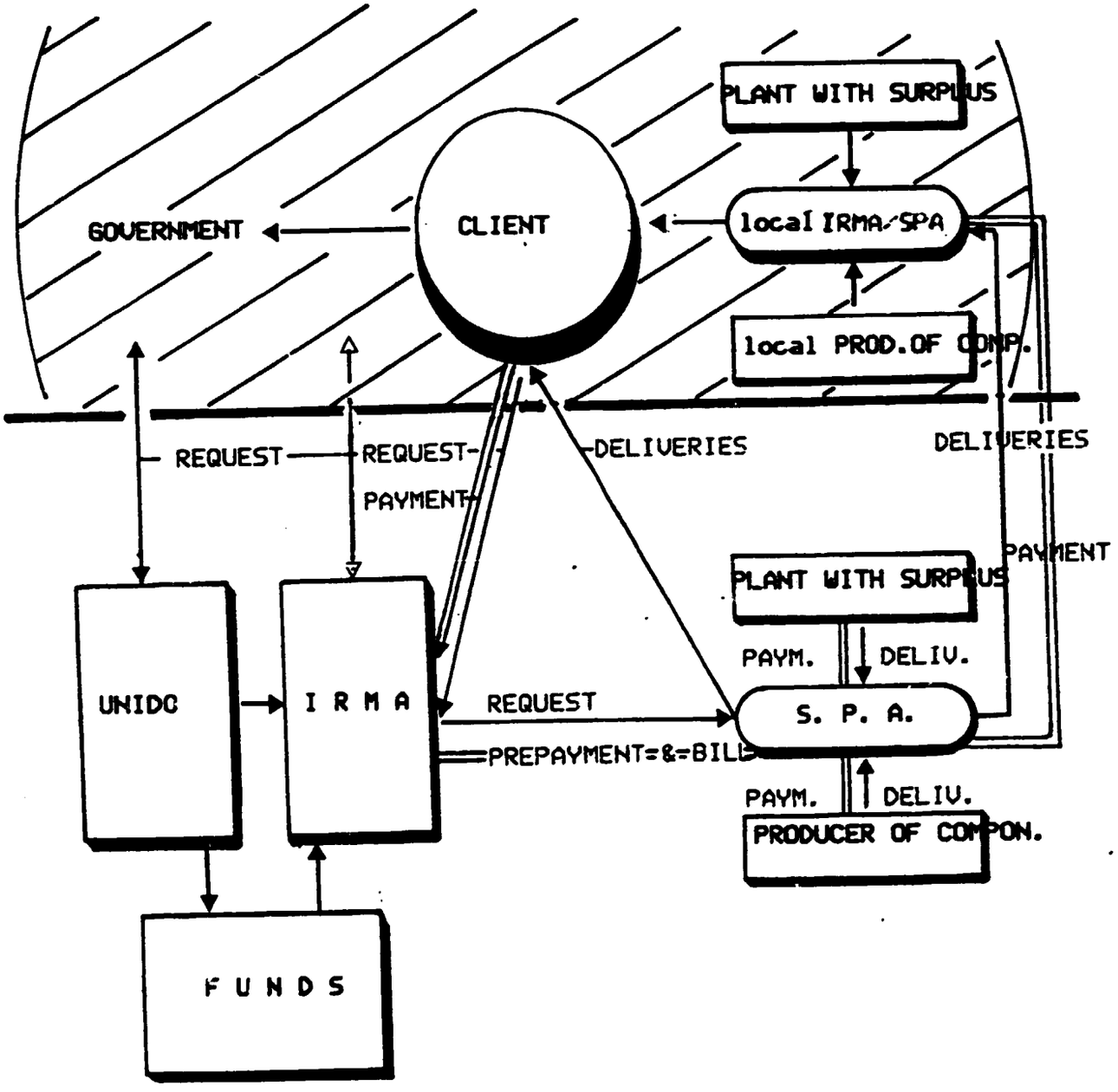
DEPARTMENTS:

AB - ACCOUNTING, BOOKKEEPING
AD - INTERN. ADMINISTRATION
C - CONTROLLING
PS - PROJ. SELECTION
PE - PROJ. EXECUTION
F - FINANCE
PC - PROJECT COMMISS.
PM - PROJ. MANAGEMENT

PLANT TO BE REHABILITATED

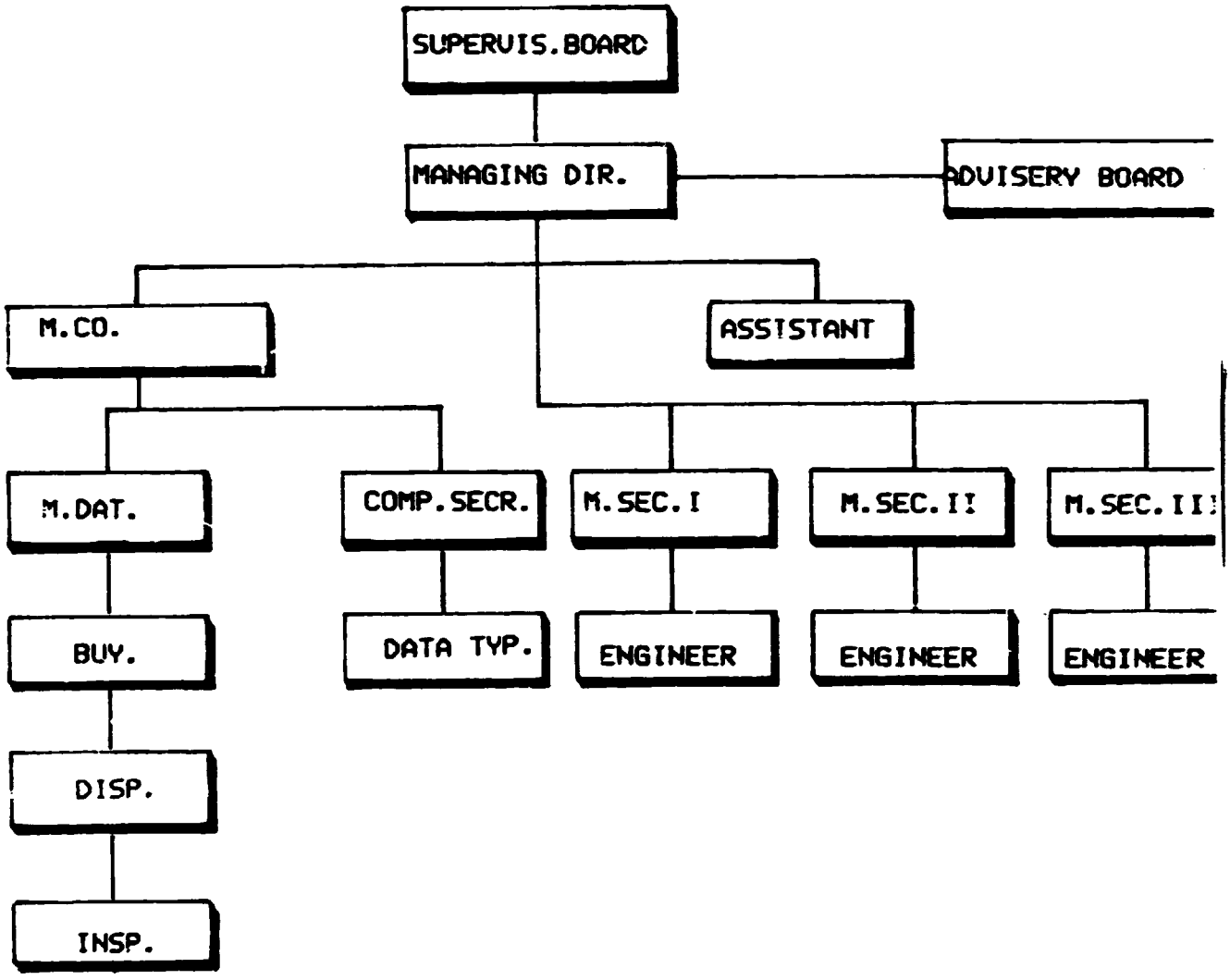


MODEL: PLANT REHABILITATION SCHEME (FLOWCHART)



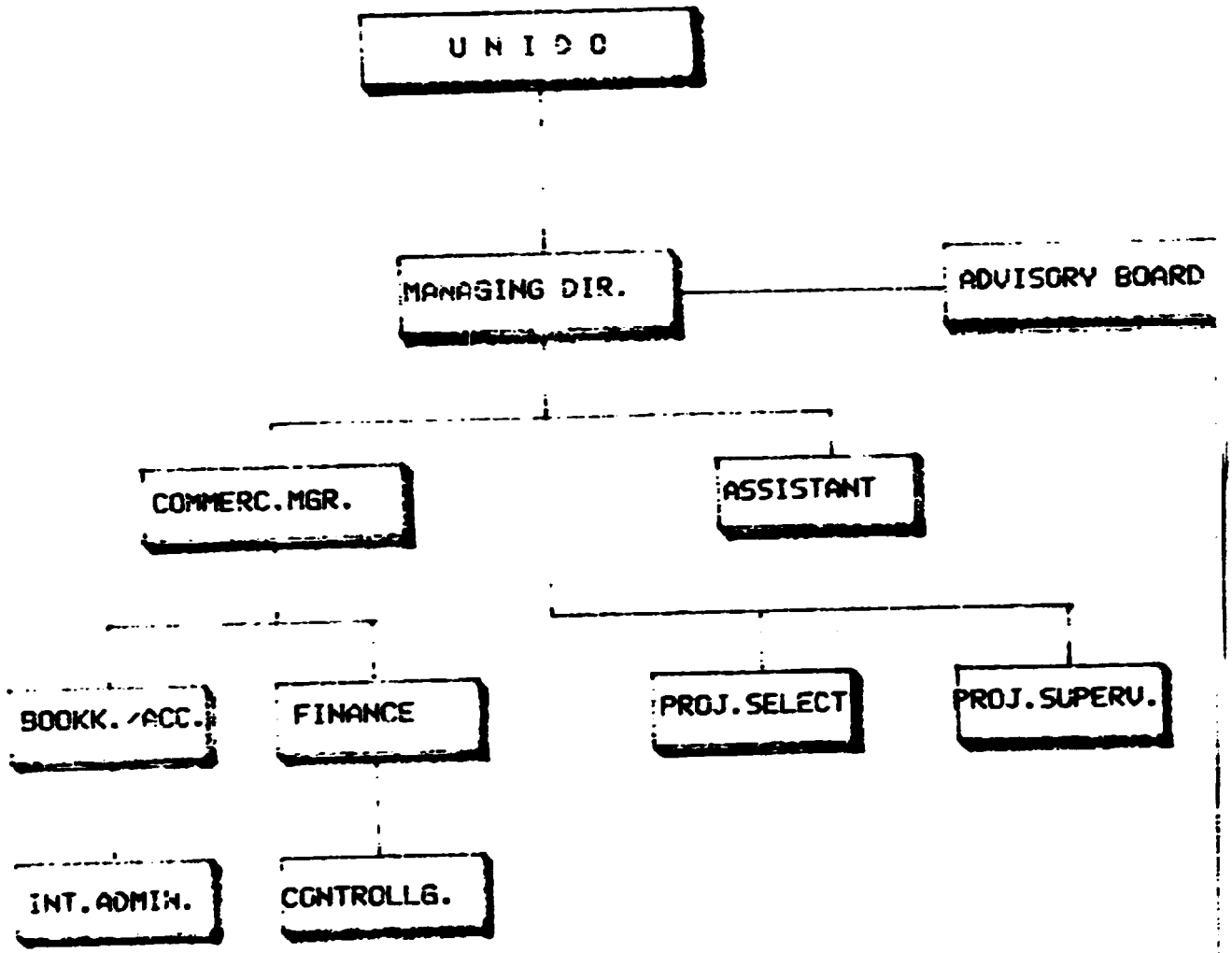
GENERALIZED SCHEME OF THE PROPOSED COOPERATION BETWEEN PARTNERS IN THE SUPPLY OF SPARE PARTS.

PRINCIPAL ORGANISATION CHART OF THE SPARE PART AGENCY



ANNEX XIU

PRINCIPAL ORGANISATION CHART OF I.R.M.A.



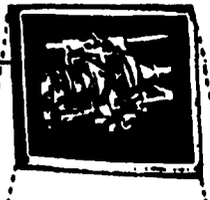
ANNEX XV

ANNEX XVI TENTATIVE TIME SCHEDULE FOR THE SET UP OF IRMA AND SPA-ACTIVITIES

PHASE / ACTIVITY	1986 J F M A M J J A S O N D	1987 J F M A M J J A S O N D	1988 J F M A M J J A S O
1. Preliminary Phase	J F M A M		
o presentation of study	J		
o opinion forming and discussions (UNIDO-Partners)	J F M		
o decisions to start pilot phase	M		
o preparation for start of IRMA and SPA	M A M		
o exploratory dialogues (with governments, funds, plants)			
o strategy for pilot phase			
2. Pilot Phase		J J A S O N D J F M A M J J A	
o start of IRMA and SPA		J	
o aquisition of pilot projects		J J A S O N	
o wind up of pilot contracts		D J F M A M	
o analysis of results of pilot phase		J	
o decision to start operating phase		A	
o strategical planning of operating phase		J A	
3. Operating Phase		A S O N D J F M A M J J A S	
o selection of sectors & regions for operating phase		J A	
o campaign to inform governments/ client about programme		O N D	
o extended aquisition of projects (according to sectors & regions		O N D J F M A M J J A S	
o active set up of activities in industrial countries		J F M A M J J A S	
o aquisition of spare parts administration project		F M A M J J A S	
o wind up of contracts		D J F M A M J J A S	
o full swing operation (2-3 sectors, approx. 3 regions)			J

THE AUDIO-VISUAL MACHINE OPERATING SCHEME

ANNEX XVII



OPERATING INSTRUCTIONS

TRAINING

PROGRAM CHOICE:

MAIN PROGRAM

- COMPANY PRESENTATION
- OPERATING INSTRUCTIONS
- MAINTENANCE INSTRUCTIONS
- TROUBLE SHOOTING ANALYSIS
- REPAIR
- SPARE PARTS LIST
- OPERATING TIPS

SUB PROGRAM

PRESENTATION OF THE MANUFACTURER	OPERATING INSTRUCTIONS	MAINTENANCE INSTRUCTIONS	TROUBLE SHOOTING ANALYSIS	REPAIR	SPARE PARTS LIST	OPERATING TIPS
	ON/OFF INSTRUCTIONS	INSPECTION INSTRUCTIONS	PROBABLE FAILURE SOURCES	SELECTED MODULAR UNITS	SPARE PARTS PER MODULAR UNITS	OPERATING GUIDELINES
	CHANGE OVER PARTS & PRODUCTS	RECOMMENDED OPERATIONAL	DAMAGED & INTACT PARTS			IMPROVEMENT (ENHANCEMENT) SUGGESTIONS
	TOOL REPLACEMENT	MAINTENANCE GUIDELINES	CHECK LISTS			
		LUBRICATION INSTRUCTIONS	FAILURE FAMILY TREE			

INDIVIDUAL CHAPTERS

CONTENTS						
PRESENTATION OF: - MAIN, FIELD OFFICES - COMPANY - PRODUCTS - CONTACT PERSON (SERVICE)	EXPLANATION OF PROCESS AND CONSTRUCTION FEATURES. RECOMMENDED OPERATION, POSSIBLE OPERATING ERRORS	INSTRUCTIONS AND INFORMATION FOR CARE AND MAINTENANCE	ALL PROBABLE CAUSES FOR DIAGNOSIS AND CORRECTION OF FAILURES	INSTRUCTIONS TO CARRY OUT MINOR REPAIRS (PICTURES, FILM)	IDENTIFICATION OF COMPONENTS AND PARTS ON HAND OF FAMILY TREE (PHOTOS, DRAWINGS)	POSSIBILITY TO USE OPERATOR EXPERIENCE

ANNEX XVIII

SPA SPARE PARTS ADMINISTRATION

QUALITATIVE COMPARISON OF SAVINGS
FOR CLIENTS (e.g. Developing countries)

COST FACTORS	Conventional Systeme	SPA Spare Parts Admin. Syst
Buying Department:		
Personnel	+++++	++
Costs for Communication	+++++	+
Travelling (tracing suppliers)		
Spare Parts Admin.	++++	++
Spare Parts Stockkeeping:		
Personnel	+++++	++
Depot	+++++	++
Installation	++++	++
Losses from overstocked parts (parts not or seldomly needed)	+++++	+
Store losses	+++	+
Losses caused by improper stocking (corrosion etc.)	+++	+
Losses due to organisational defects	+++	+
Decreased productivity, caused by late arrival of parts	+++++	++
Capital investment for spares	+++++	++
Interest	+++	+
Depreciation	+++	+

Index: +++++ = tendency: very high

ANNEX XIX

MODEL FOR THE COMPOSITION OF SPARE PARTS STOCK SUITED FOR SPA-ADMINISTRATION

	RISK PARTS	DISPO PARTS	ROUTINE PARTS	SPA ADMIN.
QUOTA OF PARTS	5 %	30 %	65 %	-
STANDARD PARTS	25 %	50 %	90 %	74.75 %
ANNUAL TURNOVER	0.1 %	30 %	100 %	63.025 %