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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

SEVENTH ASIAN ELECTRONICS CONFERENCE
New Delhi, India
5–11 December 1973

ROLE OF UNIDO IN THE ELECTRONICS INDUSTRY

Paper submitted by UNIDO

Id. 73–7148

ROLE OF UNIDO IN THE ELECTRONICS INDUSTRY 1/

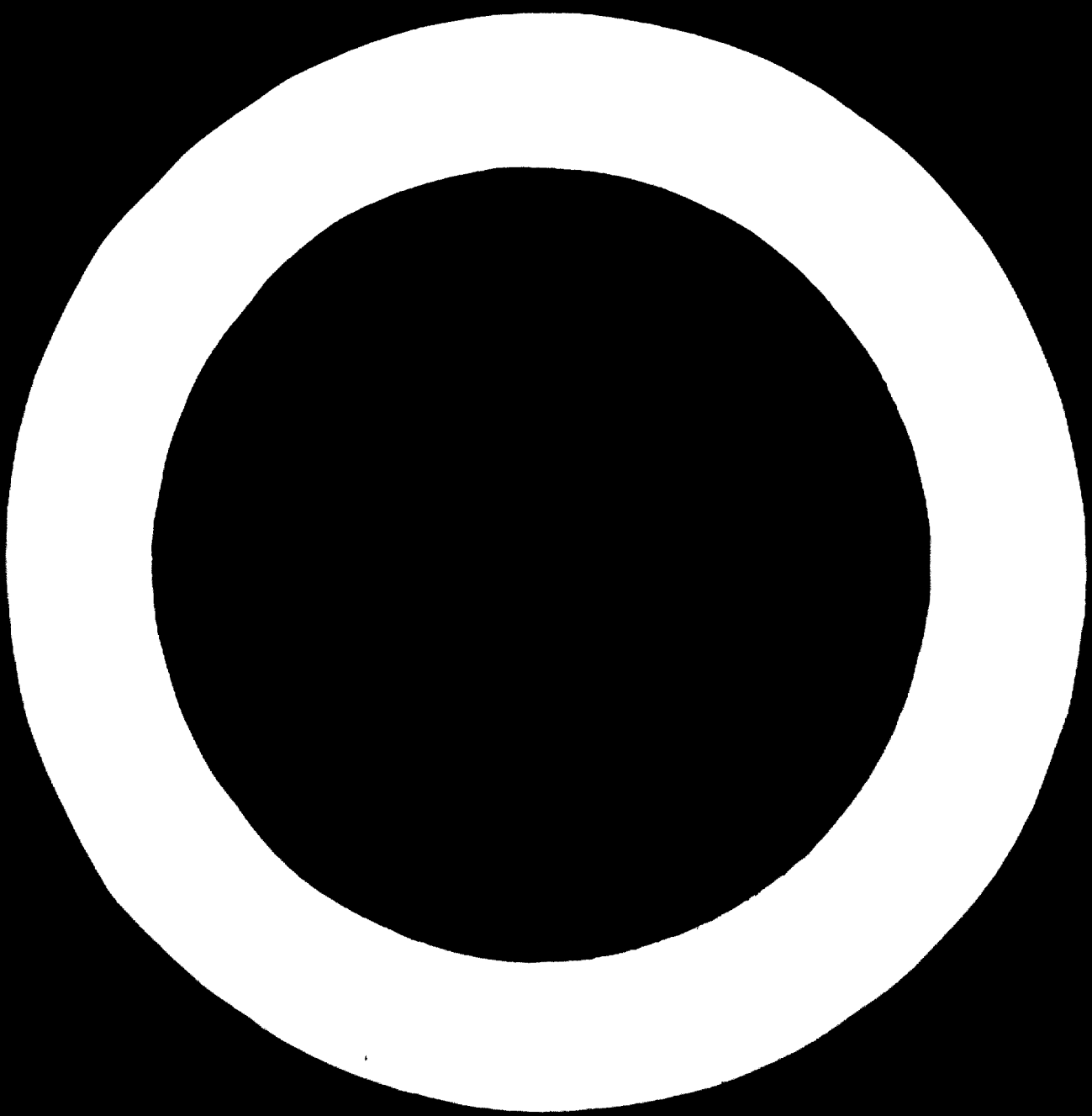
C O N T E N T S

1/ This document has been reproduced without formal editing.

1. Summary

This report reviews general aspects of the market for electronic equipment and its growth potential. An analysis of UNIDO technical assistance is given firstly as stages in the transfer of technology and secondly broken down under sub-sectors of the electronics industry.

Basic information on UNIDO's activities is given in Annex A followed by a series of selected examples of technical assistance projects under the stages identified above in the transfer of technology.



2. Introduction

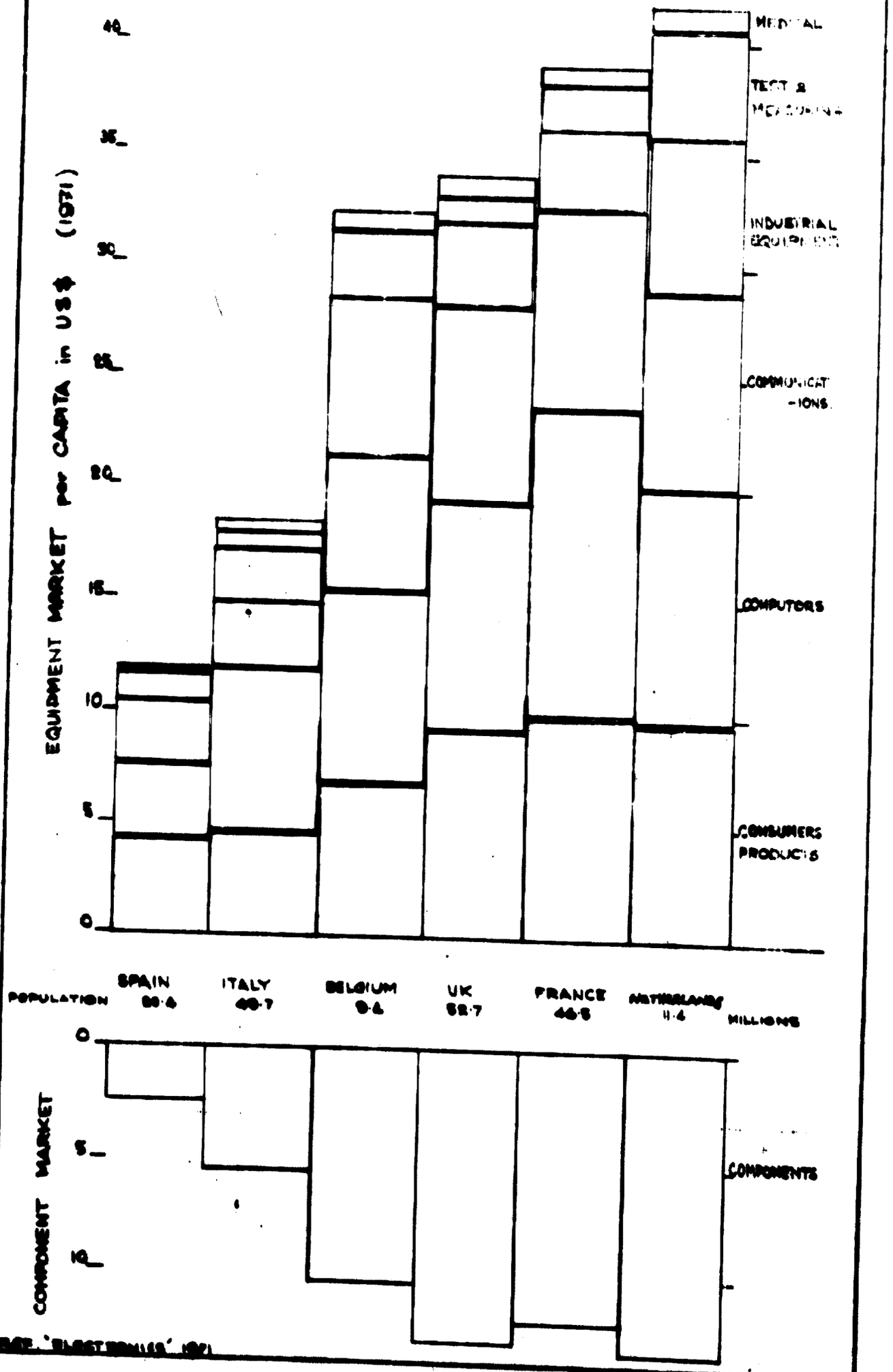
UNIDO is actively promoting the electronics industries in developing countries on social, commercial and technical grounds. The industry achieves special importance socially through the provision of low cost radio receivers whose local production can provide employment opportunities together with savings in foreign exchange. A start with assembly leading to higher levels of development of the electronics industry can be justified commercially because of the relatively large market for these items and high rate of growth which can be expected. For example rates of 26 per cent annual growth have been reported in India while 30 per cent annual growth rate has been achieved in Japan (Ref. 1). The cost of licensing such manufacturing operations becomes onerous with regular design changes as newer components come on to the market and promotion is therefore aimed at self sufficiency in equipment design and manufacture together with a lesser degree in components manufacture.

The wide implications of electronics in all industrial activities and in fact daily life, is perhaps the most important technical resason for promoting the industry as such. In addition special attention has to be given to this sector because of its high rate of innovation by comparison with other industries. A survey carried out by McGraw Hill showed that the percentage of sales values of new products averaged under four per cent for all industries in the USA whereas some electronics and instrument enterprises reached an average rate of innovation of almost 20 per cent.

Figure 1 gives the electronics market per capita for selected European countries during 1971. Such markets show reasonable correlation with the GNP of the respective countries. Unfortunately no comparable figures are prepared for the developing countries which could be used as a general development indicator. The markets also indicate relatively consistent proportions of the markets for subsectors such as consumers' products, computers, communciations, industrial equipment, test and measuring equipment and medical electronics.

Ref.1: K. Fujimoto, "Electronics Industry in Japan"
Asian Electronics Union Journal, No. 2, 1973, Page 38

FIGURE 1. ELECTRONICS MARKET FOR SELECTED EUROPEAN COUNTRIES



SOURCE: 'ELECTRONICS' 1971

NOTES:

3. Transfer of Technology:

UNIDO's technical assistance is aimed at a technology transfer which itself is a sequence of inter-related activities on the part of the donor and recipient countries. Such activities have been very succinctly described by Bar-Zakay (Ref. 2) in his technology transfer model which is reproduced in Figure 2. The model shows four stages each succeeded by a go/no go decision; they are the search stage, adaption stage, implementation stage and the maintenance stage. While not all the activities are of equal importance they are however essential to success and the model is useful as a check list for completeness of the technology transfer.

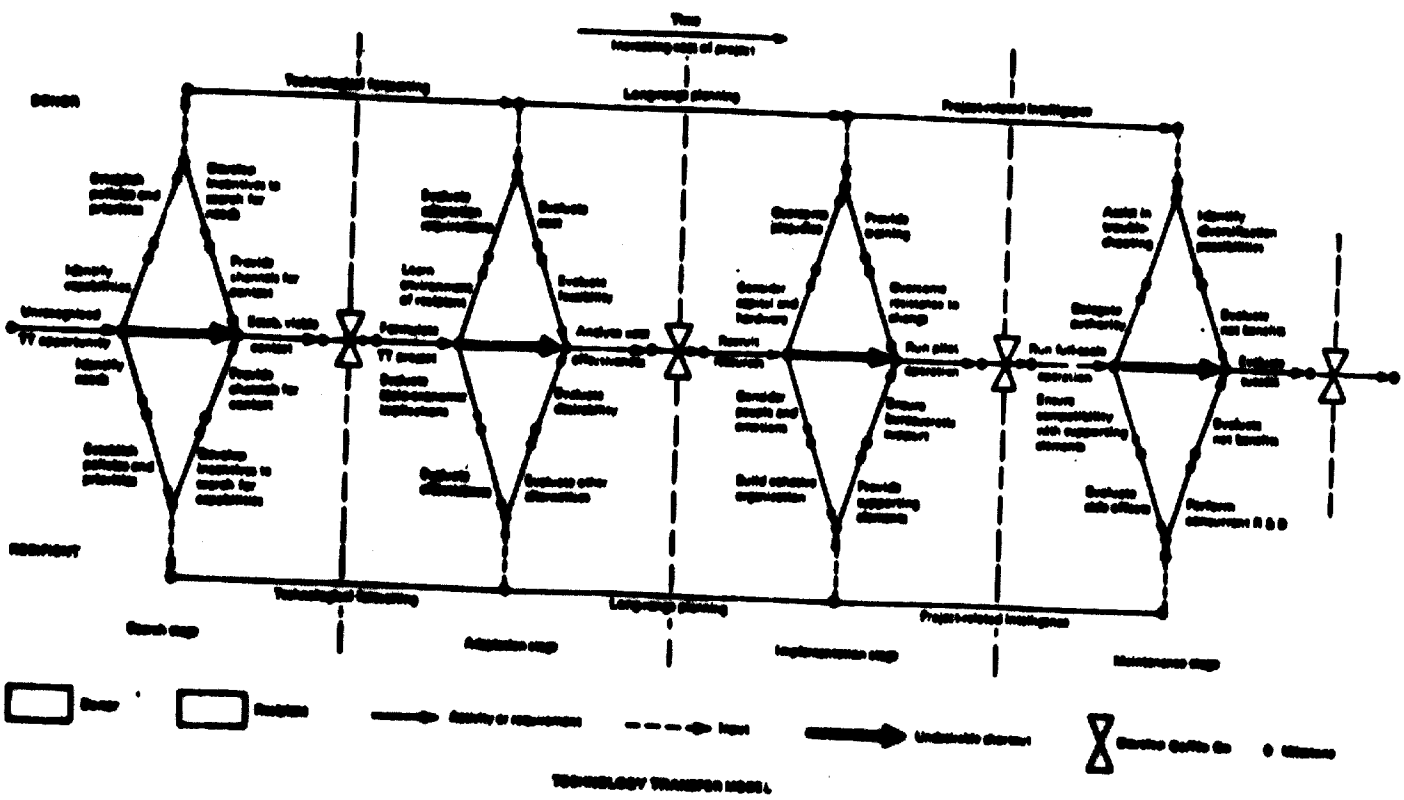


Figure 2

Ref. 2: S. H. Bar Zakay: "Technology Transfer Model", UNIDO Industrial Research and Development News, Vol. VI No. 3, 1972, Page 2 (ID/SER. B. 17)

Since UNIDO only reacts to direct requests from governments it is the latter who decide in what stage of the transfer of technology that assistance is required. UNIDO is currently administering approximately US$4.8 million worth of approved and planned technical assistance projects in the electronics - including instrumentation - field (on a world wide basis). An analysis of the breakdown of this assistance is as follows:-

TT Model	UNIDO's activity*	Percentage of total assistance to electronics %
Search or identification stage	Sectorial and sub-sectorial planning	2
Adaptation or formulation stage	Pre-feasibility studies	8
Implementation stage	Production planning	3
Maintenance or operational stage	In-plant training programme; Design and development Sub-contracting	87
TOTAL		100%

Such an analysis highlights the importance of design and development activities in the electronics industry and re-inforces UNIDO's opinion that the improvement of design capabilities is the most important contribution it can make in the transfer of technology.

One simple but striking example of this activity were some studies undertaken on the impact of technical progress on the price of monochromatic television receivers in the United States. In this case over the period of 1947-1965 the average price of receivers dropped to US$180. An analysis of the distribution of cost reduction showed the source to be as follows: -

Source of reduction	Amount
State of technology	US$110
Scale of production	41
Production mix	29

* See Annexes B1 and B4 for typical examples of technical assistance projects

These are extremely interesting figures in that they show that the introduction of new technologies is much more important than economies of scale of production. The former activity is dependent upon local capabilities in design and development work and hence the importance of assistance for this work.

* * *

A second analysis of the technical assistance broken down this time into industrial sub-sectors gives the following distribution:

Industrial Sub-sector	Percentage of total UNIDO assistance %
Industrial equipment	29
Test and measuring equipment	22
Components	22
Consumers' products	<1
Communications	<1
General sectorial aspects	26
TOTAL	100

Since consumers' products and communications equipment normally comprise half the total electronic market for most countries, the apparent lack of requests for assistance in these sub-sectors is rather surprising.

In the case of consumers' products most countries have already established joint ventures with the larger manufacturers from whom they receive their know-how as a part of the license. On the other hand the communications sub-sector is peculiar in the sense that in any one country there is normally only one major buyer who is more often than not a government organisation. Unless the government is interested in promoting this sub-sector then the situation is not particularly conducive to setting up local manufacturing facilities.

ANNEX A

BASIC INFORMATION ON UNIDO

The United Nations Industrial Development Organization (UNIDO) was established on 1 January 1967 by the United Nations General Assembly as an autonomous organization within the United Nations to promote and accelerate the industrialization of the developing countries. The Assembly also gave UNIDO the central role in co-ordinating all the activities of the United Nations system in the field of industrial development.

The headquarters of UNIDO are in Vienna, Austria. Its Executive Director is Ibrahim Helmi Abdel-Rahman, of Egypt.

UNIDO carries out its task mainly in two ways: through operational activities, involving direct assistance to developing countries, and through related supporting activities, which include action-oriented studies, training and research. In addition, it has a third and growing function, that of promoting direct contact between the financial and business communities in the industrialized world and their counterparts in the developing countries, for the benefit of both.

Operational Activities

Governments are assisted, at their request, at every stage of their industrial growth, from the drawing up of an overall national industrial development plan to the selection of equipment and the training of staff for a single factory. They are helped to manufacture goods making use of their natural resources, raw materials or by-products, to acquire technology and adapt it to their needs, to promote domestic investment and external financing for industry, and to develop products suitable for export. Assistance is also given on request to set up or strengthen national organisations serving local industry, or to develop industry on a regional basis.

An essential part of the operational activities is the Special Industrial Services (SIS) programme, often called "UNIDO's fire brigade". It is designed to provide, at short notice, assistance in solving unforeseen urgent technical problems which might have arisen in the operation of a plant or have resulted from an earthquake, floods or other natural disasters.

Assistance takes the form of expert or consultant services, equipment, and fellowships for nationals of the recipient country to be trained abroad.

Supporting Activities

To increase the effectiveness of its field operations, UNIDO conducts expert group meetings, seminars and training programmes and undertakes research. These headquarter-based supporting activities can deal with specific industries and industrial techniques or with basic industrial issues such as planning, management, investment or quality control.

Acting as a clearing-house for industrial information, it compiles, analyses, publishes and disseminates a variety of data, and answers queries from governments, semi-public bodies and industrial enterprises of all kinds.

UNIDO also organizes in-plant training programmes, in which engineers and technicians from developing countries acquire practical experience in factories in the advanced countries.

Promotional Activities

In exercising the function of a middle-man, UNIDO seeks to mobilise domestic and foreign resources for industry. Its various promotional programmes are designed to liberate, on a business-to-business basis, reserves of technology, skills and finance that are not normally available through an international organization.

These programmes can take the form of meetings bringing together potential investors and representaitve of developing countries with specific industrial projects they wish to promote. Or a scheme for the exchange of information among industrial development banks and other financing institutions. Or efforts to promote joint ventures or sub-contracting or licensing agreements. They are carried out both at headquarters and in the field, as an integral part of technical assistance and supporting activities.

Financing UNIDO's Work

Expenses for the administrative and research activities of UNIDO are derived from the regular budget of the United Nations.

For its operational activities UNIDO draws mainly on the resources provided by the United Nations Development Programme and on a part of the regular budget of the United Nations, as well as voluntary contributions from member governments.

The Industrial Development Board

The principal policy-making body of UNIDO is the Industrial Development Board, whose 45 members are elected by the General Assembly from among members of the United Nations and its agencies for a term of three years. The Board meets annually, and its subsidiary organ, the Permanent Committee, convenes a year to draw up guidelines and policies for UNIDO and to approve its programme of activities. The Board also reviews the co-ordination within the United Nations family of work in the industrial field. It reports annually to the General Assembly through the Economic and Social Council.

In 1971 a Special International Conference convened by the General Assembly examined UNIDO's programmes, organization and finances. As a result, the United Nations Secretary-General was asked to appoint a group of 18 high-level experts to prepare a long-range strategy for UNIDO, a task that was completed in 1973. To assist in implementing the recommendations of the group, and to formulate further the long-term strategy for UNIDO, the Board set up a 27-member ad hoc committee, which will report to the 1974 session of the Board.

A second General Conference of UNIDO is scheduled to be held in 1975 in Lima, Peru.

ANNEX B

Selected examples of technical assistance projects

A selection of technical assistance projects falling in each of the stages of the transfer of technology mentioned previously are given below as examples of current UNIDO work. With each project comments are given on the special features of the technical assistance.

The projects are:-

SEARCH OR IDENTIFICATION STAGE (Annex B1)	Job description for:- Adviser on Electronics Industry: Cost US$10,000
ADAPTION OR FORMULATION STAGE (Annex B2)	Terms of reference for Assistance to the Telecommunication and Electronics Industry: Cost US$35,000
	Draft Project Document: Promotion of investment in electronics and telecommunication equipment manufacture through central facilities of UNIDO investment promotion programme: Cost US$11,000
IMPLEMENTATION STAGE (Annex B3)	Job description for:- Expert in the Manufacture and Design of Printed Circuit Boards: Cost including some equipment US$58,500
	Circular: Inplant Group Training Programme in the Field of Maintenance and Repair of Instruments and Measuring Equipment: Cost: US$48,500
MAINTENANCE OR OPERATIONAL STAGE (Annex B4)	Project Document for: Fine Instruments Center: Cost: including equipment: US$836,000
	Information Sheet on: International Sub-contracting

Comments and details of individual projects are given in the annexes which follow:-

ANNEX B1

SEARCH STAGE EXAMPLES

Job Description: Adviser on Electronics Industries

As may be seen from the job description given below this project comprises a survey of the electronics sector with a view to producing a rational development plan identifying potentialities for specific sub-sectors of the electronics industry.

There is one very important aspect which in this case governs the objectives to be set for the industry. The entry of the particular country into the European Common Community as a full member by 1982 will mean that the local electronics industry will be open to free competition and will have to be self sufficient by that date or disappear. Other countries would be well advised to examine their situation vis-à-vis such economic groupings and plan their industries with such well defined long term objectives as a guide.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Request of the Government of

for Special Industrial Services

JOB DESCRIPTION

POST TITLE	Adviser on Electronic Industries
DURATION	Four months
DATE REQUIRED	As soon as possible
DUTY STATION	xxx
DUTIES	The Adviser will be attached to the Center of Planning and Economic Research, a research institute under the supervision of the Ministry of Planning and Governmental policy. In co-operation with the counterpart staff of the Business Unit, within the Center of Planning and Economic Research, the adviser will be expected to:

DUTIES (continued)

1. Examine the relevant statistics and information, and appraise the various studies available at government departments and agencies, with a view to estimating the pattern of future home demand for electronic equipment and components;

2. Evaluate the viewpoints and opinions maintained by various persons in the public and private sectors, concerning the future development opportunities of the electronic industries in xxx;

3. Conduct occasional factory visits, as required, in order to assess the technical and entrepreneurial potentialities of existing firms in the field of electronics or in closely related fields (electrical, scientific, electro-acoustical, and electro-visual, telecommunication equipment, etc.), with a view to evaluating the development possibilities of the electronic industries in xxx;

4. Select a number of products, subassemblies and components in the field of electronics that could be produced efficiently and profitably in xxx, for the home market and/or for export; the adviser should particularly explore the possibilities of producing electronic components for export, through subcontracting arrangements;

5. Advise the counterpart staff on initiating an in-depth feasibility study on electronics, with a view to promoting specific investment plans, with or without foreign participation.

QUALIFICATIONS

Electronics engineer with experience in research and development and production technology for a wide range of products at the level of major electronics; knowledge of the prevailing patterns of product development and international trade also necessary. Acquaintance with investments and subcontracting desirable.

LANGUAGE English

BACKGROUND INFORMATION

The xxx electronics industry is still underdeveloped, although significant progress has been achieved during the last decade, in fields closely related to electronics. Several firms are presently producing electrical supplies and equipment for household and industrial use, as well as for the Public Power Corporation and the Telecommunications Organization of xxx. Three major foreign concerns have already installed factories in xxx. Television sets are being assembled by several firms under licence agreements, and there exists a firm which produces cathode ray tubes. A unit within the Center of Nuclear Research produces electronic equipment for hospitals and laboratories. Since 1962, xxx has been associated with the European

Economic Community through the xxxx, and will eventually become a full-fledged member of the Communicty. It is, therefore, extremely important that the potentialities of the xxx economy in any field, as in the present case in electronics, are assessed within the context of the economies, of the EEC member countries. There exists a long-term perspective plan for xxx (15-year plan), which may be taken as a general guideline to any study concerning future possibilities of development. There is also a 5-year plan for the period of 1973-77, that will provide useful information on trends, expectations and policy matters. Electronics is the fourth industrial activity that will be studied by a UNIDO expert in xxx. Three other industrial activities, namely : Petrochemicals, Iron-and-Steel and Engineering Industries, have already been studied and the respective reports are available for reference.

ANNEX B2

ADAPTION STAGE EXAMPLES

Terms of reference for consu tant study on assistance to the telecommunication and electronics industry

Draft project document for promotion of investment i: electronics and telecomm nication equipment manufacture through central facilities of UNIDO investment promotion programme.

As may be seen from the extract of the terms of reference given overleaf for the oonsultant study this project has two phases one covering a market study for specific groups of equipment followed by a second phase comprising one or more profeasibility studies. Since the preparation of pre-feasibility studies is costly, only those items identified during phase one as having a market potential are included.

One of the most important problems associated with these types of studies is their limited validity which is probably less than one year. It is therefore essential to have in advance a reasonable assurance that funds will be available for investment in the sub-sector under consideration. The pre-feasibility study, if positive, should be followed by vigorous investment promotion if its full value is to be achieved otherwise it becomes dated and has to be redone. An example of such an investment promotion project is given in the attached draft project document.

TERMS OF REFERENCE FOR A CONSULTANT STUDY (20. 4. 72)

Assistance to the Telecommunication and Electronics Industry

1.00 Aim of the Project

1.01 The aim of the Project is to assist the Government through the Federal Ministry of Economic Development and Reconstruction:

(a) In assessing the current telecommunications and electronics components and simple telecommunication equipment;

(b) To ascertain the possibilities of manufacturing locally electronic components and simple telecommunication equipment.

2.00 Responsibility of the Contractor

2.01 Statement of Work

The Contractor shall under the terms hereinafter set forth undertake and carry out the work as outlined under Phases A and B hereof:

Phase A

The Contractor shall:

(a) Review the existing electronics and telecommunication manufacturing facilities and evaluate the assortment of manufactured products and the present production and its projection for the next five (5) years for:

(i) Electronic components for receivers for sound broadcasting and television and for telecommunication equipment;

(ii) Simple telecommunication equipment, such as telephones, switching equipment, carrier and radio equipment;

(b) Undertake and carry out a market survey and establish the present demand and a projection of the demand for the next five years for the same products;

(c) Undertake and carry out a survey and analysis of the legislative and commercial structure of the telecommunication and electronic industry covering customs, import duties and other tariffs on controls, ruling prices, trade discounts, distribution channels, marketing facilities and competition;

(d) Prepare a detailed report setting out the findings, conclusions and recommendations based on the work carried out under (a), (b) and (c) above.

This report shall be discussed and commented on between the Contractor's personnel and the UNIDO. The UNIDO shall notify the Contractor of his acceptance of this report before the commencement of the work under Phase "B".

Phase"B"

According to the findings, conclusions and recommendations made in the draft final report for Phase "A" above, and accepted by the UNIDO, the Contractor shall, for the equipment for which possibilities of manufacture were ascertained by the Contractor and agreed upon by the UNIDO (Reference Phase "A" paragraph (d) hereinbefore) perform the following services:

(a) Recommend the establishment of new manufacturing facilities or the extension of existing facilities;

(b) Recommend products and production capacities of the recommended new or extended facilities;

(c) Suggest the optimal sites for the new facilities taking into consideration the availability of public utilities;

(d) Prepare lists and estimated costs of major production equipment with neutral specifications suitable for international bidding and covering the additional equipment required for the establishment and operation of the recommended new or extended facilities;

(e) Prepare in an appropriate scale a plan of the building requirements and lay out for the recommended new or extended facilities;

(f) Prepare figures of annual requirements and recommend sources of primary materials wherever possible;

(h) Assess the cash flow and provide profitability forecasts for the recommended manufacturing programmes in the extended and new facilities;

(i) Suggest possible local investment participation for the new and extended facilities;

(j) Assess and report on the relationship of the recommended manufacturing programme to the national development plans.

2.02 Contractor Services:

For the performance of his obligations under the Contract, the Contractor shall make available a total of twenty (20) man months of service, as follows:

(a) Project Area Services:

Eight (8) man months of service shall be carried out in the project area by a team comprising the team leader and four (4) experts.

Time spent in briefing and de-briefing of Contractor personnel in UNIDO, Vienna, as set forth in clause 2.04 and travel time to or from the project area or UNIDO, Vienna, is not included in the number of man months stated above.

(b) Home Office Services

Twelve (12) man months of service shall be carried out at the Contractor's Home Office by the team leader and four (4) experts.

The Contractor shall also provide the services of such additional Home Office personnel and technical facilities as necessary for backstopping support to the personnel serving in the project area.

2.03 Contractor's Personnel:

The personnel to be provided by the Contractor and the duration of assignments in the project area and home office shall be as follows:

Field of activity	Duration of assignment months	
	Project area	Home Office
PHASE "A"		
Planning expert	2	1
Economist	2	½
Electr.-mechanical engineer	2	½
Plant layout engineer	1	½
Civil engineer	1	½
TOTAL	8	2
PHASE "B"		
Planning expert	-	2
Economist	-	2
Electr.-mechanical engineer	-	2
Plant layout engineer	-	2
Civil engineer	-	2
TOTAL	-	10

D R A F T

UNITED NATIONS DEVELOPMENT PROGRAMME

Project of the Government of

xxx

Title: Promotion of investment in electronics and telecommunication equipment manufacture through the central facilities of UNIDO investment promotion programme

Number: xxx **Duration:** 3 months

Sector: Industry

Sub-sector: Industry planning and programming

Government Co-operating Agency

Executing Agency: United Nations Industrial Development Organization (UNIDO)

Date of submission:

Starting date: January 1974

Government Contribution:

UNDP Contribution: US$11,000

I. BACKGROUND AND SUPPORTING INFORMATION

A. Justification for the Project

The Government of xxx in collaboration with UNIDO has completed a pre-feasibility study on the manufacture of electronic and telecommunication equipment and wishes to promote investment in these sub-sectors with the aid of the central facilities of UNIDO Investment Promotion Programme, by locating interested potential partners in these projects.

Current proposals envisage the setting up of the following four factories:

(a) Telecommunication Factory for the annual production of:-

(i) 30,000 telephone handsets;
(ii) 20,000 lines of automatic telephone exchanges.

The tentative investment would be US$4,692,000. Employment for 700 persons is envisaged.

(b) Electronic Component Factory (E1) for the annual production of

(i) 2,500,000 potentiometers and trimmers;
(ii) 1,620,000 printed circuit boards;
(iii) 600,000 loudspeakers;
(iv) 720,000 fuses.

The tentative investment would be US$3,474,000. Employment for 648 persons is envisaged.

(c) Electronic Component Factory (E2) for the annual production of:-

(i) 30,000,000 resistors;
(ii) 7,800,000 electrolytic capacitors;
(iii) 13,500,000 tubular capacitors;

The tentative investment would be US$2,814,000. Employment for 477 persons is envisaged.

(d) Electronic Component Factory (E3) for the annual production of:-

(a) 2,650,000 coils;
(b) 315,000 transformers.

The tentative investment would be US$1,144,000. Employment for 359 persons is envisaged.

B. Institutional framework

The co-operating government agency will be the Federal Ministry of Industry.

C. Provision for government follow-up

During the process of promotion, the co-operating government agency referred to under B. above, will maintain contact with the local sponsors of projects, on the one hand, and through UNIDO with the foreign partners concerned, on the other hand, to provide any guidance and assistance, as needed, to the parties in negotiation.

D. Other related activities

This project is a follow-up of the work done under project IS/XXX/71/803: Assistance to the Telecommunication and Electronics Industry.

E. Further UNDP assistance

Assistance under SIS or Country Programme IPF might be envisaged for further follow-up in respect of individual projects, possibly in evaluating offers for setting up factories or at a technical level during the commissioning and implementation stages.

II. OBJECTIVES OF THE PROJECT

A. Long-range objectives

The long-range objectives of the project are to assist the Government in promoting industrial investment projects, especially those that require a foreign contribution to be feasible, whether it be financing, know-how, or market arrangements.

B. Immediate objectives

To assist the local sponsors in implementing industrial investment projects, under UNIDO Investment Promotion Programme.

III. WORK PLAN

A. Description of project activities

Project activities	Location	Proposed duration and starting date
(a) To prepare project information sheets containing sufficient information to enable potential partners from industrialised countries to determine their interest in principle in these projects and to form the basis for meaningful discussion, at a later stage.	UNIDO HQs Vienna xxx	2 weeks 4 weeks Starting date: January 1974
(b) To "train while doing" the counterpart officers in the above activities.	xxx	Included under activities (a)
(c) To locate and stimulate interest of potential partners in industrialised countries in these projects and to make the necessary arrangements for and service the contacts between local sponsors of projects and the interested foreign partners.	At UNIDO HQs Vienna, industrialised countries and xxx	4 weeks starting date; soon after completion of activities (under a and b) 2 weeks
		Total: 12 weeks

B. Description of UNDP inputs

Assignment of international staff

UNIDO staff member/adviser with experience in the preparatory work for the UNIDO Investment Promotion Meetings for field work in xxx during a period of six weeks, and at UNIDO HQs. Vienna, for a 6-week period to follow-up and promote the projects in industrialized countries.

C. Description of Government inputs

1. Assignment of national staff

Two government officials from the Federal Ministry of Industry of the Telecommunication authorities will be assigned as full time counterparts to the UNIDO staff member/adviser while the preparatory field work in xxx is being undertaken. The necessary secretarial and clerical services will be made available at the time of arrival of the adviser. All private sponsors of the projects concerned are also expected to contribute to the preparation of their respective project proposals.

2. Government provided supplies and equipment:

The government, in co-operation with the local sponsors of project, will provide office accomodation and necessary local transport for the adviser.

ANNEX B3:

IMPLEMENTATION STAGE EXAMPLES

Job Description: Expert in the manufacture and design of printed circuit boards

Circular: In-plant Group Training Programme in the field of maintenance and repair of instruments and measuring equipment

As may be seen from the below job description this project is transfer of technology in a direct technical sense of selection of production equipment and design of products.

This type of project is important in that it enables an enterprise to have neutral specifications for production equipment encompassing the most appropriate technology for the given situation. The choice is particularly important because of the rapid technical developments in electronics and because the technologies being promoted in industrialised countries are per force highly automated and therefore not necessarily the most appropriate in developing countries.

* * *

Also of considerable importance to developing countries is training of an in-plant nature as different from conventional vocational training. In-plant training which is essentially practical, is rarely available in developing countries for the simple reason that the required plants do not exist. Programmes of the type described in the following circular therefore serve an extremely useful role by filling a critical gap in technical training.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

Request from the Government of the Republic of xxxxxxx

for Special Industrial Services

JOB DESCRIPTION

TS/XXX/73/002/11-01/01

POST TITLE	**Expert** in the manufacture and design of printed circuits
DURATION	Three months
DATE REQUIRED	As soon as possible
DUTY STATION	XXX
PURPOSE OF PROJECT	To assist the Government of xxx in the introduction of new techniques and technological advances in electronic equipment through the introduction of printed circuits.
DUTIES	The expert will be expected to: 1. Assist in the specification and selection of equipment for printed board manufacture; 2. Install and commission the equipment; 3. Train local staff in its operation; 4. Assist in the design of printed circuit boards for high quality telecommunication equipment.
LANGUAGES	Spanish; English acceptable
QUALIFICATIONS	Engineer or technician with extensive experience in the setting up of printed circuit board facilities in the design of the circuit boards.

BACKGROUND INFORMATION

The Ministry of Communications decided in 1964 to establish a research centre which was intended to have the following two basic functions in the telecommunication field:

(a) The development of equipment with a view to establishing a national high quality telecommunication equipment industry;

(b) The development of methods and techniques for maintenance of telecommunication systems.

BACKGROUND INFORMATION (continued)

This Centre known as the Central Telecommunications Laboratory, is presently engaged in adapting and applying up-to-date standards and methods of maintenance, to the operating conditions of the communication network, and at the same time in developing equipment required to improve the telephone and telegraph communications. In this latter area it is concentrating its efforts on the manufacture of reliable equipment for transmission of data. This has led to the development of equipment design including the design of manufacture of doublesided printed circuits along with mounting, soldering and other techniques used in this process. The Laboratory is anxious to further improve the production of these circuits and for the reason is seeking assistance.

UNITED NATIONS NATIONS UNIES

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

LEIBCHENFELDERSTRASSE 1, A-1070 VIENNA, AUSTRIA
P.O. BOX 707, A-1011
TELEPHONE: 43 600 TELEGRAPHIC ADDRESS: UNIDO TELEX: 75612

IN-PLANT GROUP TRAINING PROGRAMME IN THE FIELD OF MAINTENANCE AND REPAIR OF INSTRUMENTS AND MEASURING EQUIPMENT

Organized by the United Nations
Industrial Development Organization (UNIDO),
in co-operation with the Government of Hungary,
to be held in Budapest, from 1 September to 30 November 1972

AIDE-MEMOIRE

Background and Purpose of training

The programme, organized by the United Nations Industrial Development Organization (UNIDO) in co-operation with the Government of Hungary, is one of a series of UNIDO's in-plant group training programmes for higher technical personnel from developing countries.

The objective of the programme is to provide the participants, in a relatively short time, with a concentrated practical experience in the field of maintenance and repair of instruments and measuring equipment and to upgrade their theoretical knowledge. This will be accomplished by having the participants work and study under close and continuous supervision of experienced staff.

The United Nations Industrial Development Organization has initiated these in-plant training programmes in industrialized countries and organizes them in co-operation with governmental authorities and industrial enterprises and institutions providing the required training facilities and the services of qualified technical personnel.

The programme in the field of maintenance and repair of instruments and measuring equipment will be organized in Budapest, Hungary from 1 September to 30 November 1972.

Programme

The programme will be divided into a theoretical and a practical part. Theoretical training is designed to give the participants a general survey of modern trends in the field of maintenance of instruments as well as to bring the participants on the same level in order to make practical training most beneficial.

The theoretical training will emphasize the questions of logical fault tracing; the practical training on the other hand will introduce fault tracing routing and the participants will be trained in the practical application of measuring appliances.

The programme will make available to all the participants the knowledge of maintenance and service of instruments and measuring appliances and knowledge of organisation and technology in connexion with customers' service. Products of Hungarian instrument engineering and their application, results of maintenance service and customers' service will all be discussed with the participants.

Organisation, establishment and operation of service stations will specially be dealt with. Particular consideration will be given to fast and provisory fault prevention and starting of operations, being of special importance to practices in the developing countries.

The theoretical part will be identical to all participants and will cover the following topics:

- Refresher course on electro-technical fundamentals;
- Electrical measurements and instruments, elements of metrology, fundamentals of instruments, realisation of laboratory measurements;
- Electronic instruments, fundamentals of electronic circuits/ amplifiers, oscillators, pulse circuits, etc. Presentation of electronic devices by block schemes.

The practical training will be carried out in small groups in laboratories and workshops in accordance with the field of interest of participants. Special visits to instruments manufacturing industry will be organised.

The practical training programme will cover the following fields:

- Fault tracing

- Measurements on faultless operating instruments

- Measurements on malfunctioning instruments

- Repair of instruments and measuring equipment

- Calibration - calibration control

- Study of service stations

This part of the training will be carried out in a number of institutions; among others: Medicon Works, Gans Measuring Instrument Works, Hungarian Measuring Instrument Research Institute, TESCO - Organisation for International Technical and Scientific Co-operation, Office of National Measures, Politechnical University.

The printed material on lectures and exercises will be distributed among the participants.

Date

The programme will be held from 1 September to 30 November 1972.

Fellowships

Twenty fellowships will be awarded to nominees from selected developing countries of Africa, Asia and the Far East, Europe, Middle East and Latin America.

Governments are invited to nominate up to three candidates. They should have a degree in engineering (or equivalent) with at least one year of practical experience as maintenance or service-engineer or -technician in the above mentioned fields in their home countries. Their experience may refer to instrumentation, production of instruments and devices, instrument service, establishment of economical or technical conditions thereof, organisation of service stations and service net works as well as the operation thereof, respectively maintenance and repair of instruments and measuring equipment.

Candidates must have a good working knowledge of the English language. Applicants from non-English speaking countries will have to take a language test and submit a satisfactory English language certificate, before being considered as eligible for a fellowship.

The nominees are requested to select one field of interest as the first choice from the following three topics and indicate this in the nomination form.

1) Medical, electrical and electronic equipment;

2) Process control equipment;

3) Scientific and industrial laboratory equipment (electrical/optical/mechanical).

Other suggestions for study may be put forward and will be given serious consideration by the programme management.

UNIDO will, in co-operation with the authorities of Hungary, select participants from among the nominations received, giving due regard to professional qualifications, level of experience and other relevant considerations. Participants attend the programme in their individual capacity although they have been officially nominated by their respective Governments. They will undertake to attend the whole of the training programme according to the schedule prepared by the host authorities, and to comply with the rules and regulations laid down for their training. They are expected to contribute to the training programme whenever possible, e.g. in technical discussions related to the industries in their home countries.

Final Report

Each participant is expected to prepare, before the closing of the programme, an individual final report (4-6 typewritten pages). This report should cover an evaluation of the programme and proposals for its use under conditions of their respective home countries.

Financial and Administrative Arrangements

1) Financial arrangements for the fellows will be made in accordance with the rules and regulations of UNIDO fellowships, which will cover:

a) Round-trip economy class air transportation between airport of departure in home country and Budapest, Hungary in accordance with the existing arrangements between the United Nations and the country receiving technical assistance. Participants are permitted up to ten kilos of excess baggage for both journeys to be used under the conditions governing official travel;

b) A monthly stipend at the United Nations established rate to cover board and lodging, and incidentals;

c) A book allowance in the equivalent of $50, payable only once;

d) Internal travel within the host country related to the training programme.

2) The host Government will provide all training facilities, including training staff needed for this programme.

3) Governments nominating participants will be required to bear the following costs:

a) All expenses in the home country incidental to travel abroad, including expenditures for passports, visas, medical examinations, inoculations and other such miscellaneous items, internal travel to and from the airport of departure in the home country;

b) Salary and related allowances for the fellows during the period of the training programme.

4) The United Nations and the host Government will not assume any responsibility for the following expenditures:

a) Travel and any other costs incurred by dependants who might accompany fellows;

b) Costs incurred by fellows with respect to travel insurance, medical bills and hospitalisation fees in connexion with their attending the training programme;

c) Compensation in the event of death or disability of fellows in connexion with their attending the training programme;

d) Loss of, or damage to personal property of fellows while attending the training programme;

e) Purchase or other expenses to occur in the use of wearing apparel or other material due to climatic conditions.

Note: Participants are strongly advised not to have members of their family accompany them, since there will be no accomodations available for family members.

ANNEX B4

MAINTENANCE STAGE EXAMPLES

Project Summary: Fine Instruments Center
Information Sheet: International Sub-contracting Programme

Two samples of activities in the instrumentation field are described below, one concerned with technical aspects the other with commercial aspects. Instrumentation accounts for 8 to 10 per cent of the capital costs in major processing industries and contributes a good deal more to its day to day problems. Its complexity arises from the mixture of electrical-mechanical electronic, pneumatic and optical systems. For these reasons there is considerable interest in projects concerned with instrumentation.

The sample project summary which follows describes a large scale project envisaging assistance in upgrading a "Fine Instruments Center" over a period of four and a half years. This type of project differs considerably in magnitude to those described previously in that it is concerned in addition with setting up physical facilities. (See Reference 3 for the general approach to Industrial Research Institutes). These types of institutes provide a range of consultancy and laboratory services covering design, testing or repair and calibration services which are too costly or too infrequently used to be set up full time by small or even medium scale enterprises. As such, these services can be self-supporting. Reports from the Centre described state that over 2000 instruments from 100 companies were calibrated while 300 repairs were effected for 58 companies. A variety of technical consultancy services were provided for 49 companies. As complementary services a two-year training programme is currently under way for 279 students while short courses have been given for 700 persons from industry. Such is the demand for these services.

Ref. 3: Two recommended references on industrial institutes are UNIDO ID/30, Industrial Research Institutes - I Project Selection and Evaluation, II Financial Administration, and UNIDO ID. 70, Industrial Research Institutes - Guidelines for Evaluation

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In quite a different vein is UNIDO's activities in international sub-contracting described in the above-mentioned information sheet.

Electronics shares with automobile industries the highest percentage of finished products which may be subcontracted and therefore is of particular interest to many firms in industrialised countries who are seeking supplies of components abroad (Reference 4). A UNIDO programme has been established to act as an intermediary in establishing contacts for this purpose.

Ref. 4: S. Zampetti, "International Subcontracting Activities as a Tool for Industrial Development", UNIDO Document, 1972

RESTRICTED
15 September 1972

UNITED NATIONS DEVELOPMENT PROGRAMME

Project Summary*, Government of xxx

Project Title: The Fine Instruments Centre

Number: xxx/72/004/A/01/37

Date of submission: 15 September 72

Sector: Industry

Subsector: Industrial services and institutions

Proposed starting date for full project operations: 1 January 1973

Proposed duration: Four years and four months

Proposed Government Co-operating Agency: Ministry of Commerce and Industry

Amount requested from the UNDP: US$ 836,030

Proposed Government counterpart contribution

in cash : 7,938,000 (local currency)

in kind : 387,026,000 (local currency)

Total US$ 987,410

I. Background

1. The Fine Instruments Center (FIC) was established in April 1966 with the assistance of UNDP. The purpose of FIC is to provide technical and consultancy services in instrumentation to the entire manufacturing industry with special reference to small and medium enterprises. The current value of precision instruments in xxx is estimated at over US$150 million. Phase I of the project was concluded at the end of 1971. The joint UNDP/UNESCO/UNIDO Mission concluded the review of the Phase I of the project and recommended Phase II of the project be more directly geared to render services to the industry. The Phase II of the project will be initiated in 1973.

* PLEASE NOTE THAT THIS DOCUMENT IS A SUMMARY OF THE PROJECT AS SUBMITTED AND DOES NOT REPRESENT THE VIEWS OF THE UNDP ON ITS MERITS

2. Under Phase II, the repair and maintenance services for instruments will be expanded and developed to meet the growing needs of industry. The engineering consultative service in the field of quality control, process control instrumentation, and maintenance and calibration of instruments will also be expanded. The FIC will, furthermore, upgrade the existing two years regular course for high school graduates and will increase the annual enrollment from 70 to 240 by 1976. In response to the demand of the industry, an optional third year course will be introduced to train higher grade technicians. Re-training and upgrading courses ranging from one week to six months duration will be run during the project duration. A special 2-year course for calibration will be started to provide trained personnel to approved laboratories under the new calibration service. Specialized courses for specific subjects will be introduced in consultation with industry.

3. An amendment to Phase I established on interim calibration service. The Government has since recognized the need for a calibration service with international traceability and are to pass legislation setting this up before the end of 1972. A survey team from the National Bureau of Standards, Washington, visited the country in June 1972, to advise the Government. The team and the Government co-ordinating committee are recommending that FIC play a major role in the new service.

II. The Project

4. The project is described in paragraphs 67-69 in the proposed Country Programme of xxx, which will be submitted to the Governing Council in January 1973.

5. The project intends to further develop the Fine Instruments Center and thus increase its capabilities to assist xxx manufacturing industry by improving the quality of products by improving the application, maintenance and calibration of instruments for measurement, regulation and control. It is hoped that this will bring about the development of an indigenous precision manufacturing industry.

6. The immediate objectives of the project are as follows:

(i) To further develop the present FIC calibration service facility into an interim calibration service and assist in the development of a xxx national calibration service;

(ii) To develop a repair and maintenance service for instruments;

(iii) To develop and extend the FIC engineering consultative services;

(iv) To develop and extend the services provided by the FIC Electroplating and Surface Finishing Department;

(v) To develop prototype instruments and help improve the design and production of industrial products.

III. Financial Data

		Total m/m	Total $
A.	Contribution requested from the UNDP		
	Project Personnel Component		
	Experts		
	Project Manager and Industrial Liaison	48	120,000
	Electroplating and surface finishing	12	30,000
	Technical training	24	60,000
	Electrical/electronic instruments	24	60,000
	Precision mechanical instruments	24	60,000
	Physical calibration	12	30,000
	Electrical/electronic calibration	12	30,000
	Industrial Instruments	24	60,000
	Optical instruments	12	30,000
	Short-term consultants	36	90,000
	Administrative support personnel	136	34,000
	Component Total	364	604,000
	Training Component		
	Fellowships		
	Management	2	2,900
	Electric and electronics equipment	6	4,800
	Inspection, calibration, repair of instruments	4	3,200
	Die design and manufacture	2	1,600
	Electroplating	4	3,200
	Heat treatment	3	2,400
	Electronics, design and manufacture	3	2,400
	Mechanical instruments design and manufacture	3	2,400
	Optical instruments design and manufacture	6	8,700
	Precision machining	4	4,800
	Component Total	39	36,400
	Equipment Component		
	Expendable equipment		14,500
	Non-expendable equipment		149,200
	Premises		-
	Component Total		163,700
	Miscellaneous		
	Maintenance of equipment		14,130
	Reporting costs		5,000
	Sundry		8,800
	UNDP direct costs		4,000
	Component Total		31,930
	GRAND TOTAL		836,030

B. Proposed Government counterpart contribution in cash		Total m/m	Total local currency
Project Personnel Component			
Support Personnel Cash Counterpart			
Secretary	(1)	48	2,058
Typist	(1)	48	1,764
Driver	(2)	96	4,116
Component Total		192	7,938
GRAND TOTAL			7,938

C. Proposed Government counterpart contribution in kind			
Project Personnel Component			
Project Director	(1)	48	8,280
Counterpart (Eng.)	(14)	672	92,736
Technicians	(22)	1,056	60,720
Administrative manager	(2)	96	11,040
Clerical	(11)	528	42,504
Typist	(2)	96	3,312
Phone operator	(1)	48	1,656
Guards	(3)	144	4,968
Driver	(4)	192	7,728
Component Total		2,880	232,944
Training Component			
Group training			18,694
Food, uniform, board to students			
Component Total			18,694
Equipment Component			
Expendable equipment			34,040
Non-expendable equipment			5,500
Premises			-
Component Total			39,540
Miscellaneous Component			
Operation and maintenance of equipment			30,848
Sundry			65,000
Component Total			95,848
GRAND TOTAL			387,026

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

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INTERNATIONAL SUBCONTRACTING PROGRAMME

Basic Features

As a means of accelerating the transfer of technology from developed to developing countries, the programme of International Subcontracting is organised by UNIDO to promote production arrangements between firms in the developed and developing countries. These arrangements can be defined as a contractual agreement between a company from a developed country, (the contractor), and a company from a developing country, (the subcontractor), whereby the contractor orders products or components from the subcontractor, who manufactures or transforms them according to the design and specifications of the buyer.

Although it is a familiar feature of the business relations between industrialised countries, international subcontracting activities are still a novelty and an unexplored field for most industries in developing countries. However, it is obvious that the fact that several developing countries at present dispose of a surplus of relatively inexpensive and yet sufficiently skilled labour force and have a considerable amount of excess capacity in their industrial network will result in a determining factor for the development of such international arrangements.

Added to that an increasing number of firms in industrialised countries are interested in obtaining supplies of components from abroad, particularly in order to be able to maintain their competitive position and fill up growing volumes of orders without further strain on the domestic economy and with considerable economies in production costs.

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Functions of the Programme

UNIDO, being aware of this upward trend, plays an intermediate role and is trying to identify subcontracting offers from developed country firms and propose suitable partners from developing countries. For that purpose an International Subcontracting Programme has been established to act as an intermediary between firms with the following functions:

(1) to identify, in the industrialized countries, manufacturing processes which could be subcontracted in developing countries;

(2) to locate firms in developed countries which are interested in subcontracting part of their production to developing countries;

(3) to locate firms in developing countries which are able to participate in such arrangements and act as sub-contractors;

(4) provide basic information and contacts to potential partners so as to prepare the grounds for the negotiations of the contract.

In principle, the Programme is geared to operate on existing unutilized manufacturing capacity of potential subcontractors. In order to carry out these functions in an expedient manner, UNIDO has established a network of contact points with the business communities of the following countries:

Argentina
Brasil
Cameroon
Chile
Colombia
Cyprus
Ghana
Greece
Guatemala
Hong Kong
India
Iran
Korea (Republic of)
Ivory Coast
Lebanon
Malaysia
Malta
Mauritius
Morocco
Pakistan
Peru
Philippines
Senegal
Singapore
Thailand
Tunisia
Turkey
Uruguay

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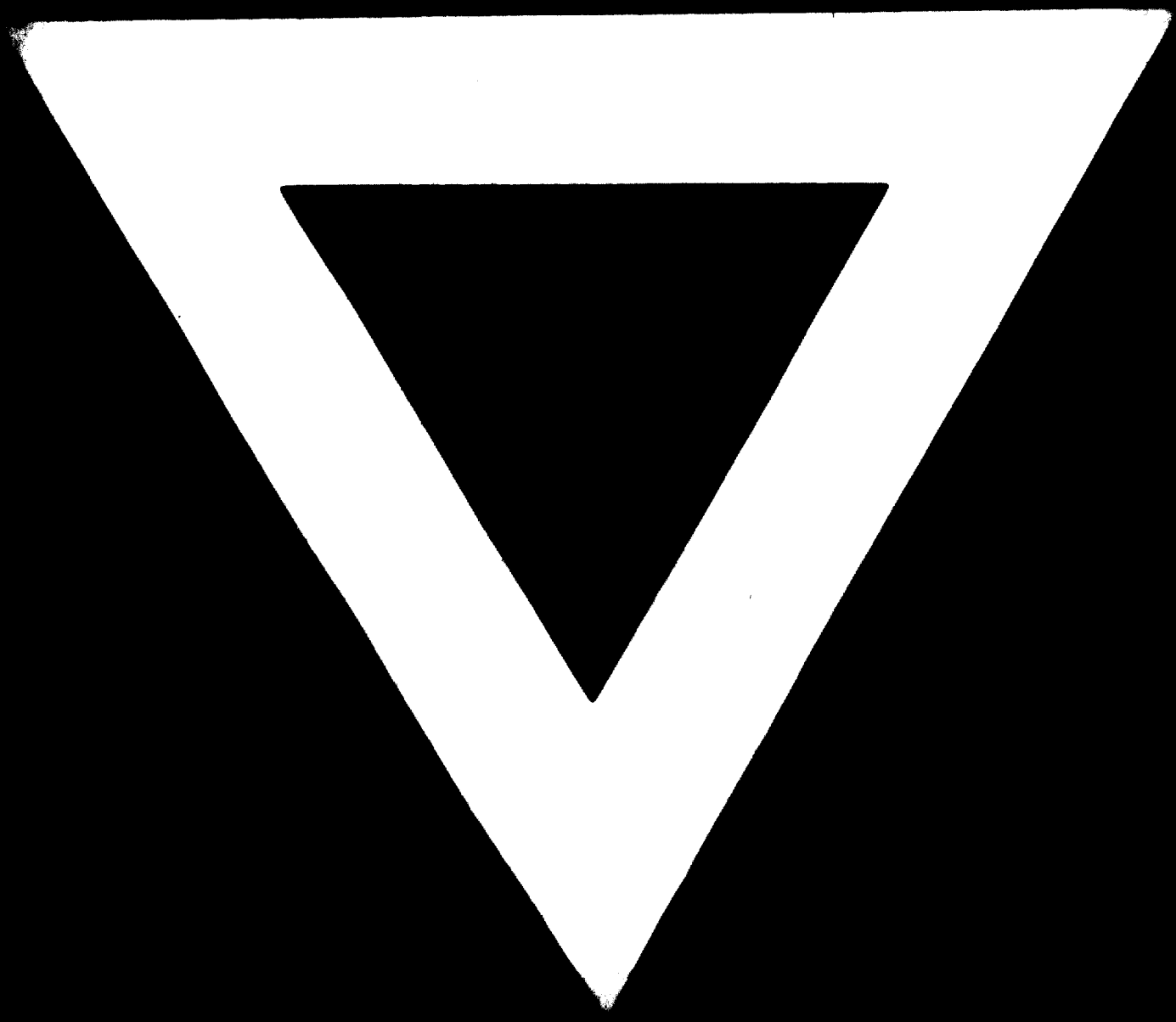
Practical Implementation

The procedure to be followed when entering into an international subcontracting arrangement has been kept to the strict minimum of administrative burden to the business community and is being guided by the fundamental necessity of prompt and expedient action. It is carried out in such a way that the firm interested in an international subcontracting arrangement addresses its request to UNIDO, by specifying the kind of production which it intends to subcontract, together with all details necessary for the implementation of the subcontracting work. The subcontracting offer is channelled through UNIDO to suitable subcontractors and their reply, together with the relevant details on the operations of their firm is subsequently communicated to the contractor. It is normally from this stage onwards that the contractor enters directly into negotiations with the subcontractors which he considers the most suitable for the purpose.

In order to accelerate the process of establishing contacts between firms in developed and developing countries, UNIDO has established a roster of industries from developing countries which have indicated their interest in subcontracting work. This roster contains important information such as type of products manufactured by the firm, capacity of production, number of employees, hourly salary rates, the type of products, parts or components the firm is in a position to manufacture under subcontracting arrangements and detailed technical characteristics and specifications of the machines used in the production. A summary of these details is included in "Lists of Capacity Available" which are forwarded to interested companies upon request.

Further details on this project can be obtained from the Export Industries Section, Industrial Policies and Programming Division, UNIDO, Vienna.



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