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Albania.

ELECTRONIC INSTRUMENTATION, AUTOMATION AND
PROCESS CONTROL DEVELOPMENT

DP/ALB/84/001

ALBANIA

Technical report: Findings of preparatory missions *

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

Based on the work of Walter C. Haasler, expert in the design
of industrial process control and automation system, and
Eric W. Huggins, expert in research and development of
electronic instrumentation for industry

Nations Industrial Development Organization
Vienna

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Summary

(Suggested key words are in *italics*)

The report covers a split mission to *Tirana, Albania* to finalise the *UNDP Project Document* for *institution-building aid* for a new centre for *process-control* and *instrumentation* using *electronics* and *microprocessors*. A major part of the mission was concerned with developing a *work plan*, *equipment-lists* for *laboratories* and *PCB workshop* (printed circuit board), *component lists* and a *library-list* for inclusion as annexes to the Project Document.

Introduction

The Government of the Socialist People's Republic of Albania had requested funds for the establishment of a new Centre for the development of process control and instrumentation using electronics and microprocessors. The Centre would serve the needs of Albanian industry, particularly the process industries.

Staff of UNDP and UNIDO had already had discussions with Government officials and some of the staff of the proposed Centre, as a result of which a draft project document and a draft budget had been prepared. The details of the budget were tentative because the project document at that time did not yet include:

- work plan
- equipment lists
- detailed Government inputs
- specified outputs
- training, fellowships and study tours
- library list

The objective of these missions was to complete the project document as far as possible after discussion with government officials and staff at the Centre. The two experts worked in the closest possible co-operation and found themselves in complete agreement at all times. Thus the two missions may be considered a one and will be referred to as "the mission" in the remainder of this report which has been jointly written by the two experts.

The mission was in two parts, two separate visits being made to Tirana. At the conclusion of the second visit the revised project document containing revised budgets and all the annexes was agreed with the government officials and the staff of the Centre and was handed, in draft form, to UNIDO. This report is intended to be read in conjunction with that document and therefore is intended to have a similar distribution list.

Summary of Findings and Recommendations

The project as now described in the revised project document is a sound one and the proposed outputs should be achievable. It will greatly enhance the capability of the Centre and thus assist the development of Albanian industry. Recommendations are made in this report and in the project document for equipment and training. This report also contains recommendations on rationalisation.

General

This report covers both parts of the split mission to Tirana by Dr W C Haasler and Mr E W Huggins on 29 Nov to 9 Dec 1984 and 25 April to 6 May 1985. The terms of reference for the second part of the mission are included here as annexes A and B. They differ from those for the first part by the addition of paragraph (e) under "Duties" which requires, *inter alia*, the experts to discuss the project document with local officials and to inform UNIDO of the results.

The First Visit

The first part of the mission proved to be largely fact-finding. The experts had some 35 hours of discussion with the staff of the Centre and with government officials (annex C). They were taken on several visits (annex D) which gave them useful background information on the people, culture and industry of Albania, of the type of work being done at the Centre and of the Centre's role in the Albanian economy. The new building for the Centre had just been handed over and was newly occupied at the time of the visit.

Much of the discussion on this first visit focussed around the equipment lists for the project document, but it transpired that most of the catalogues, data manuals and other reference books held in Albania were either out of date or otherwise inappropriate. It was therefore impossible to finalise these lists in a single mission.

Accordingly the experts recommended to UNIDO that the mission should be extended to a second visit of similar duration to the first. Meanwhile they carried out a large number of investigations in their home bases and in their own time. As a result of this, they were able to start on the second visit with approximately 40 kg of books, catalogues and brochures.

The Second Visit

During the second visit the discussions with the local officials included the main part of the project document as well as the various annexes. During these discussions, which lasted nearly 60 hours a revised project document

with revised budgets was agreed, together with the proposed work plan, requirements for equipment, books and fellowships and, also, the expected outputs from the project. Copies of this document, in draft form, have been given to the Centre and to UNIDO.

Since the equipment represents about 65% of the total budget, the experts have prepared, in accordance with their instructions, a justification in accordance with UNIDO guidelines. At the request of the Albanian government representatives, this justification has not been included in the project document but is attached to this report as annex E.

Findings of the Experts

The experts are of the opinion that this project is a sound one and that UNDP funds will be put to good purpose. In particular they have been impressed by the keenness of the Centre's staff and their willingness to learn and improve their own capabilities. The advances made in the four months between the two visits were, considering the resources at their disposal, impressive. It was also encouraging to note how much of the advice given on the first visit had been heeded.

Fellowships and study tours will help members of the staff to understand how their type of work is carried out in developed countries, but it is believed that even greater learning will occur when the proposed equipment becomes available and they are able to learn from their own "hands-on" experience. On the experience to date, they have the ability to learn fast. Their enthusiasm and willingness to learn must reflect credit on the Albanian education system.

(As an interlude, Dr Maqo Lakrori, of the Enver Hoxha University, Tirana, gave a presentation, at the experts' request, of the doctoral thesis which had earned him his Doctorate at L'Institut National Polytechnique de Grenoble last year. The subject of the thesis was in the area of process control and the theme, an interactive simulation system which he had developed, was, the experts believe, as advanced as any other work of this nature anywhere in the world. This is mentioned because it helps to indicate the high level of ability that is to be found in this comparatively small country.)

With regard to future training and development at the Centre, the project document lists the types of fellowships

that are recommended. One of the criteria for selecting a "fellow" should be his ability (or "her ability", although there are as yet no women engineers at the Centre) to transfer the knowledge gained to other members of the staff. This is likely to be by far the most cost-effective use of training funds. However, the possibility of augmenting this internal training by the use of foreign training experts in Tirana is not excluded and an allowance has been made in the budget. At this stage it is not possible to identify any particular needs for such people and it is suggested that these funds should be held in reserve for allocation later in the project.

Similarly, in the equipment lists there are also reserves for later allocation, particularly for books (where, during the period of the project, new needs will be developing and new books will be published) and components (where the precise demand for individual components cannot be known at this stage).

The advice of the experts was continually sought and it would appear that such continued advice could be a major stimulus to the project. It has therefore been proposed in the draft project document that two experts be nominated at the beginning of the project to act as consultants for its duration. Their proposed contribution is described in the document.

Rationalisation

On their first visit the experts made strong recommendations that the Centre should rationalise its products. There was thus an ideal opportunity of avoiding the problems of variety and of lack of standardisation that is hampering the design of process control and instrumentation systems in the developed countries. This applies particularly to microprocessors, languages, bus formats and protocols. At the beginning of the second visit, certain standards were agreed and these are listed in annex F of this report. These standards have formed the basis for the equipment lists.

Conclusion

Finally, the two experts would like to record their thanks to the staff of the Centre, the Government of Albania and the Albanian people generally for their help, kindness and hospitality during the two visits.

UNITED NATIONS



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

PROJECT IN THE SOCIALIST PEOPLE'S REPUBLIC OF ALBANIA

JOB DESCRIPTION

DP/ALB/84/001/11-01/31.9.C

Post title Expert in the Design of Industrial Process Control and Automation System

Duration Two weeks

Date required As soon as possible (in conjunction with mission DP/ALB/84/001/11-02/31.9.C)

Duty station Tirana

Purpose of project To carry out preparatory work in formulating particular aspects of the documentation for the full-scale implementation phase of project DP/ALB/84/001, which is to assist the Government in the development of the Centre for Studies and Design in Automation and Electronics (Qendra e Studimeve dhe Projektmeve të Automatikës dhe Elektronikës - QSPAE).

Duties The expert will work in close co-operation with another member of the expert team as well as with specialists of QSPAE, and will be specifically required to:

(a) Discuss with the specialists of QSPAE a provisional list of equipment designated for the full-scale phase of the project and make optimal selection of the equipment according to the present and future fields of activities of QSPAE in industrial process control and automation. The list of equipment must bear a realistic relationship to the project budget. Each item of the above equipment must have either a complete specification with names and addresses of possible suppliers or identification by type number issued by specific manufacturers or suppliers.

.... / ...

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

Project Personnel Recruitment Section, Industrial Operations Division
UNIDO, P.O. Box 707, A-1010 Vienna, Austria

- (b) Specify the requirements for the fellowship training of staff members from QSPAЕ. Specify fields of training, duration, and suggest location of training abroad.
- (c) Specify the requirements for training of QSPAЕ staff members by international experts.
- (d) Specify the requirements for technical information to be held by the library at QSPAЕ (technical books, reference books, handbooks, application notes, technical specifications, standards, etc.).
- (e) Discuss with QSPAЕ and Government officials the draft project document and:
 - formulate actual purposes of UNIDC/UNDP assistance with regard to the given project;
 - specify how and where this assistance will fit within growth plan and activities programme of QSPAЕ and what are the target areas of functional departments/services of QSPAЕ on which this project will be focused;
 - specify Government inputs (by components) and prepare a draft of the chapter of the project document concerning activities under the project.

The expert is authorized to discuss with local officials any issues concerning the content of the draft project document, and to inform UNIDC on the results.

The expert is expected to summarize the results of the mission, as per duties outlined above, in his final report which must be prepared according to UNDP/UNIDC standards.

Qualifications

Qualified Electronics Engineer with long-term experience in design of process control and automation systems and their industrial applications, as well as experience in management of research and development of this technology.

Language

English

Background Information

The Centre for Studies and Design in Automation and Electronics (Qendra e Studimeve dhe Projektmeve të Automatikës dhe Elektronikës - QSPAЕ) belongs to a system of institutes which, collectively, support and promote the development of the Albanian economy. It carries out its activities in close co-operation with the other technical institutes in Albania, as well as with both manufacturing and consumer products.

QSPAЕ, as with all other institutes in Albania, is financed by the Government. It is responsible to the Ministry of Industry and Mining.

The Centre, as part of an institutional framework, supports and promotes the development of the Albanian economy in a variety of sectors. All its functional activities are undertaken in accordance and in close co-operation with the other institutes and with industry.

In accordance with the State Plan the already existing electronic and electromechanical sectors of the manufacturing industry, covering cables and wires, electric motors, transformers, switchgear, TV, radio, tape recorders, etc., will in the near future be extended to further support the manufacture of electronic equipment and instrumentation for process control and automation.

In its previous environment within ISPM, the staff of the present Centre have already started some projects in process control and automation for assembly lines and for plants in the chemical and mineral processing industries. Some of these projects have reached the application stage and the experiences drawn so far, indicate that the activities to be undertaken by the new Centre must be strengthened to provide better support for the industrial sector as a whole. In particular, the development of microprocessor-based systems and instruments as well as digital instrumentation has become a matter of urgency as these types of technology offer the greatest reliability and quality compared to older technologies.

The implementation of these new technologies implies requirements for personnel fully familiar with these techniques, and thus for intensive training. In line with this development, the electronics industry is also to be developed, and to support and promote that aspect, the Centre will also embark on activities concerning the development of electronic instrumentation for the process control and automation systems.

Some of this instrumentation, such as time relays, electronic counters (integrators), electronic clocks, metal detectors for mining industry assembly lines, temperature and moisture measuring devices for agricultural products such as cereals, electronic controllers for DC motors and traffic control systems, have already been designed and are presently in the prototype stage. Their development proved that the Centre already is capable of solving some of the design problems and their quality and operation have been proved to be acceptable.

While some of these instruments were relatively low in complexity, a great deal of experience in design and prototype development was gained by the Centre, apart from the fact that the production costs for these instruments compared most favourably with similar instruments imported from abroad.

Semiconductor technology has created enormous possibilities for the application of its devices in instruments and systems, however, familiarization with the latest developments in this field requires not only intensive training of personnel, but also the support of necessary test and development equipment.

The experience gained thus far, has enabled the staff at QSPAЕ to assess the shortcomings of the Centre in terms of staff training and special equipment, for instance in the areas of signal processing, microprocessors and quality control and reliability.

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The experience gained thus far, has enabled the staff at QSPAЕ to assess the shortcomings of the Centre in terms of staff training and special equipment, for instance in the areas of signal processing, microprocessors and quality control and reliability.

Principal People met on the two visits

The main discussions took place with the four principal members of the staff of the Centre:

- Ylli DODE (Acting Director)
- Ilir KULLA (Chief of Automation)
- Telemark THEODOSI (Chief of Instrumentation)
- Artan SILIQI (Software Development)

Other members of the staff of the Centre joined the discussions when the equipment for their particular laboratories were being discussed.

The following also joined the discussions for shorter periods:

- Berdo KULLURI (Ministry of Industry and Mines)
- ARAPI (Ministry of Foreign Affairs)
- SHALESI (Academy of Sciences)
- Kristian BUKIBOCHI (Director, Computer Centre)
- Mira NANO (Scientific Secretary, Section of Natural Sciences, Academy of Sciences)
- Bujar KRIPA (Electronic Engineer, Computer Centre)
- Majo LAKOCHI (Lecturer - Ph.D. in Automation - at Enver Hoxha University)
- Gjeza SHALTI (Electronic Engineer, Committee of Science and Technology)

Visits made during the Mission

The two experts made the following visits:

- Exposition of National Industry on the occasion of the 40th anniversary of the founding of the Peoples' Republic.
- The manufacturing plant "Enver Hoxha".
- The Institute for Applied Mathematics (Informatics).
- A sequential traffic controller *in situ* (as an example of a completed project of the Centre).
- Relaxation visits to the seaside and to the ancient city of Durres.

Annex E

Justification for the use of UNDP resources for Equipment
Project ALB/84/001/A/01/37

1. Conformity with UNDP policy as stipulated in PPM,
section 4602, subsection 1.3.

The controllers and systems designed and developed by the Centre will perform an important role in the development of the Albanian process industries and other manufacturing industries. Without the equipment proposed to be provided by this project, it will not be possible to design and develop the control equipment and systems that industry needs to improve its competitiveness. Furthermore, the availability of the equipment will permit the training of upwards of 30 engineers. Thus the equipment contains both a development and a training element.

2. Necessity of equipment and its cost-effectiveness
relevant to project outputs and objectives.

The equipment is essential to the project. Without it neither the training of staff nor the Centre's contribution to the development of Albanian industry could reach its potential. With regard to cost-effectiveness, it may be noted that the major part of the experts' mission has been involved in finding the most cost-effective equipment list. The list originally proposed by the Centre would have cost at least three times the cost of the present list but would have given virtually no more capability.

5. Equipment suitability, reliability and quality

All the specified equipment is from reputable firms and has been selected with these considerations in mind (see 2 above).

6. Timing of equipment delivery

With few exceptions all the specified material should be delivered as soon as possible to enable early training and commissioning.

7. Availability of infrastructure and services to accommodate equipment.

The Centre is built and already occupied, awaiting delivery of the equipment. Transport imposes no constraints. There is a good road from Tirana airport, good road and rail links with the port "Enver Hoxha" at Durres and a good road from the Yugoslav border for TIR lorries.

8. Maintenance and servicing facilities

All new equipment is expected to be under warranty. At the expiry of the warranty period the Centre staff will, in most cases, have the facilities to carry out repairs. In addition there are good repair facilities elsewhere in Albania for electronics and mechanical equipment.

9. Resources for spare parts, replacing depreciated items, consumables etc.

It is intended to get lists of suggested spares from the suppliers at the time of purchase and allowance has been made in the budget for a limited number of spares. However, in the main, spares are likely to be electronics components with which the Centre will be well stocked. The major part of consumables will be provided by the Government. It is currently intended that the Centre will be self-supporting at the termination of the project and will replace depreciated equipment from its own resources.

10. Expertise to manage, operate and maintain the equipment.

The training programme is designed to provide all such expertise where it does not already exist.

11. Utilisation of the capacity of the equipment

The laboratories will be working five and a half days a week and much of the equipment (eg work-stations and Computer Aided Engineering equipment) will be in almost continuous use. Other equipment, such as measuring and test equipment, may not have such a high utilisation, but it must be readily available when needed.

Agreed Standards for QSPA

The following standards were agreed on 29 April 1985:

- Microprocessor

The Z80 microprocessor will be used for all work in the Centre where a microprocessor is needed.

- Languages

For assembly language the Z80 Assembly Language will be used. As a high level language, it was decided to use one of the extended versions of ISO Pascal that have been developed for process control applications. A final decision need not be made until just before the main equipment is delivered. In the meanwhile, the appropriate staff should learn and practice with ISO Pascal on the Apple IIe which is shortly to be delivered. (In this connection, Pascal is a suitable language for the writing of assemblers and disassemblers. Writing such programs for the Z80 microprocessor will give good practice in Pascal and a good insight into the Z80.)

- Operating System

This will be CP/M+, the multitasking version of CP/M.

- Instrument Bus

The IEEE 488 (IEC 625) instrument bus will be used.

- Communication Bus

This will be the RS232C bus or its faster version, RS422.

- System Bus

The ECB (Eurobus) is currently the most generally used bus in Europe, but several of the largest manufacturers in Europe have agreed to introduce a new bus, STE, in the third quarter of 1985. If it is successful it is likely to replace the ECB bus eventually. Fortunately both busses use the same cards and the same DIN connectors. Thus, ordering of components need not be affected, and the Centre can defer its final decision until, hopefully, the picture becomes clearer.