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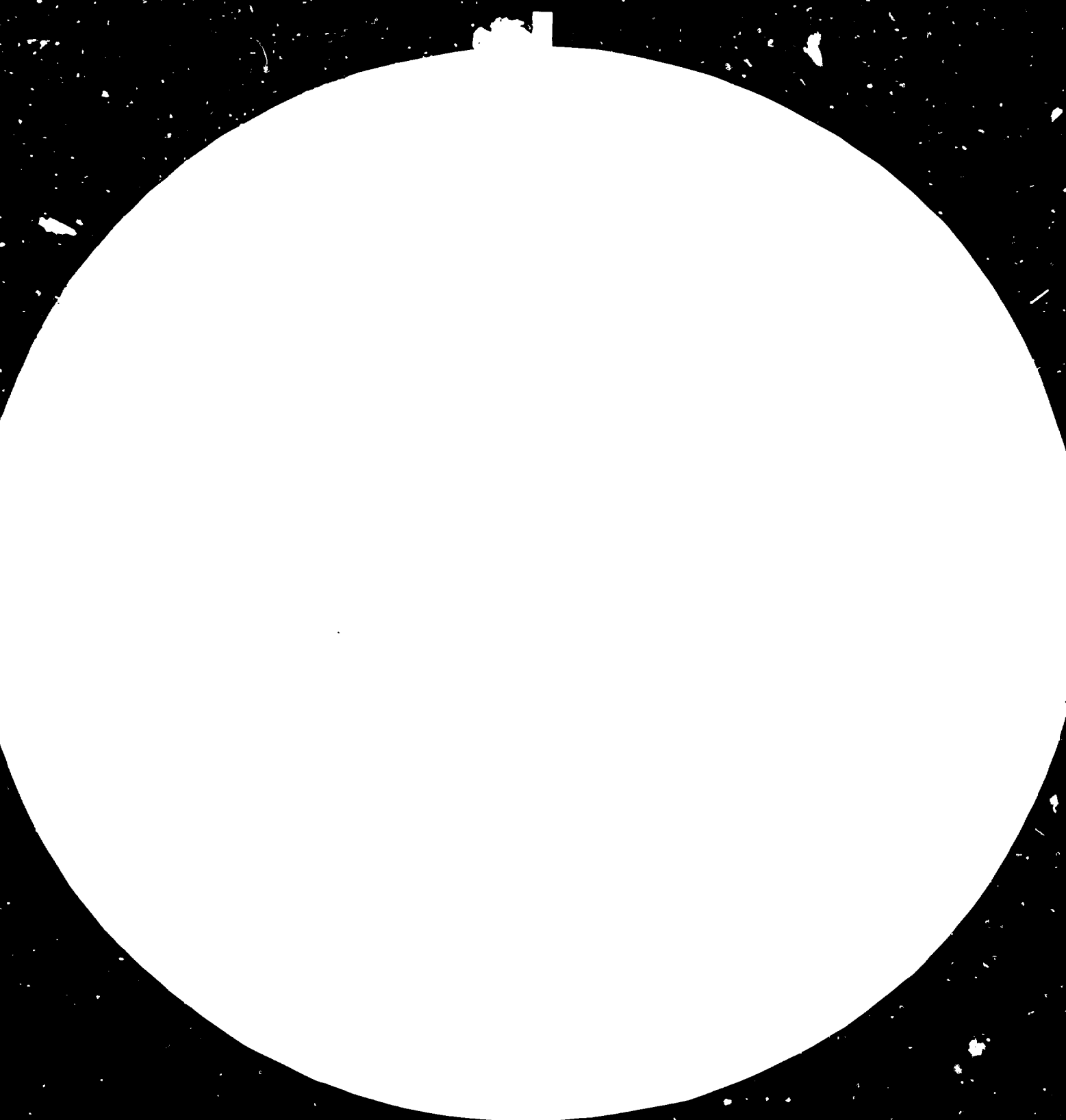
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10 March 1983
English

STRENGTHENING OF THE PLANT FOR SCIENTIFIC DEVICES

SI/BUL/82/801

BULGARIA

Technical Report*

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

Based on the work of Mikhail M. Butusov,
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United Nations Industrial Development Organization
Vienna

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EXPLANATORY NOTES

1. THE AVERAGE VALUE OF THE BULGARIAN LEVA (LV) IN TERMS OF UNITED STATES DOLLARS DURING THE PERIOD OF THE PROJECT IS AS FOLLOWS:

LV 1.- = US\$ 0.97.-

2. ABBREVIATIONS USED IN THE TEXT:

SI	- SCIENTIFIC INSTRUMENTATION
BAS	- BULGARIAN ACADEMY OF SCIENCES
NPC	- NATIONAL PROGRAMME CO-ORDINATOR
NPP	- NATIONAL PROJECT PERSONNEL
IMB	- INSTITUTE FOR MECHANICS AND BIOMECHANICS OF BAS
IE	- INSTITUTE OF ELECTRONICS OF BAS
ISSP	- INSTITUTE OF SOLID STATE PHYSICS, BAS
CLOZOI	- CENTRAL LABORATORY OF OPTICAL RECORDING AND INFORMATION PROCESSING.

ABSTRACT

THE EXPERT WAS ATTACHED TO THE PLANT FOR SCIENTIFIC DEVICES, BULGARIAN ACADEMY OF SCIENCES (BAS), SOFIA, PEOPLE'S REPUBLIC OF BULGARIA, SI/BUL/82/801.

THE DUTIES WERE TO:

- ADVISE ON ORGANIZATIONAL AND STRUCTURAL PROBLEMS;
- ASSIST THE PLANT IN SELECTION OF ITEMS TO BE DEVELOPED, PRODUCED AND IMPLEMENTED;
- ASSIST IN ESTABLISHING CONTACTS AND LINKS WITH SIMILAR PLANTS ABROAD.

THE BASIC CONCLUSIONS ARE AS FOLLOWS:

1. UNIDO ASSISTANCE IS CONSIDERED AN EXTREMELY IMPORTANT FACTOR ESPECIALLY IN THE FIELD OF SCIENTIFIC INSTRUMENTATION;
2. PROJECT OUTPUTS ARE CARRIED OUT WITH THE SUBSTANTIAL HELP OF THE GOVERNMENT AND BAS; THE COMPETENCE OF THE NATIONAL PROJECT PERSONNEL (NPP) BEING THE OTHER IMPORTANT FACTOR OF PROGRESS.
3. SCIENTIFIC INSTRUMENTS ALREADY DESIGNED AND PRODUCED ARE UP-TO-DATE AND STRONG DEMANDS TOWARDS THEM EXIST IN BAS;
4. THE DEVELOPMENT OF A BRANCH FOR OPTICAL AND OPTOMECHANICAL SI AND PURCHASING OF THE EQUIPMENT FOR DEMONSTRATION PURPOSES ARE ALSO STRONGLY DESIRED FOR FULFILLING THE PROJECT OBJECTIVES TO THE FULL SCALE;
5. STRONG CONTACTS ARE QUITE NECESSARY BETWEEN NPP AND BAS INSTITUTES FOR CONSULTATIONS AND MUTUAL HELP IN DESIGN AND TESTING.

THE BASIC RECOMMENDATIONS ARE AS FOLLOWS:

1. THE NEW BRANCH OF THE PLANT HAS TO BE ORGANIZED IN ORDER TO MEET THE DEMANDS IN OPTICAL AND ANALYTICAL DEVICES. IN ORDER TO KEEP THE CLOSE CONTACTS WITH BAS INSTITUTES IT SHOULD BE SITUATED IN SOFIA.
2. THE SUBSTANTIAL HELP OF BAS INSTITUTES IS NEEDED FOR THE PLANT PROGRESS BASED ON CONSULTATIONS, LENDING PRODUCTION FACILITIES, TESTING AND DELIVERING OF SCIENTIFIC INSTRUMENTS.
3. THE PURCHASE OF THE SPECIAL EQUIPMENT FOR DEMONSTRATION PURPOSES SHOULD BE APPROVED BY UNIDO FOR THE COMPLETE ATTAINMENT OF THE PROJECT OBJECTIVES.

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INTRODUCTION

PROJECT BACKGROUND

TAKING INTO ACCOUNT THE RAPIDLY INCREASING IMPORTANCE OF SCIENTIFIC INSTRUMENTATION IN THE PROGRESS OF SCIENCE AND INDUSTRY, THE BULGARIAN GOVERNMENT MADE A DECISION TO ESTABLISH A PLANT FOR PRODUCTION OF SCIENTIFIC INSTRUMENTS AND AUTOMATION OF SCIENTIFIC EXPERIMENT WITH THE AIM OF CREATING CONDITIONS FOR INTENSIFICATION OF RESEARCH AND DEVELOPMENT ACTIVITIES AND RAISING EFFICIENCY OF PRODUCTION AND EXPORT FOR OTHER COUNTRIES.

RELYING ON THE RESEARCH AND DEVELOPMENT WORK CARRIED OUT AT THE BULGARIAN ACADEMY OF SCIENCES THIS PRODUCTION PLANT SHOULD BECOME A BASIS FOR THE SCIENTIFIC INSTRUMENTATION BRANCH. IT WAS ESTABLISHED ON 20 FEBRUARY 1981 IN SOFIA, BY DECREE OF THE BULGARIAN GOVERNMENT. IT IS ENVISAGED IN THE FUTURE TO ESTABLISH SUBSIDIARY FACTORIES IN OTHER TOWNS OF THE COUNTRY.

TAKING INTO CONSIDERATION ALL THE DIFFICULTIES THAT IT WILL ENCOUNTER DURING THE ORGANIZATIONAL PERIOD OF THE PLANT ESTABLISHMENT THE BULGARIAN GOVERNMENT DECIDED TO REFER TO THE UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION FOR TECHNICAL ASSISTANCE. IT IS EXPECTED THIS ASSISTANCE TO FIND EXPRESSION MAINLY IN THE FOLLOWING ASPECTS:

- EXPERT TO PROVIDE ASSISTANCE IN THE PLANT ORGANIZATION, CREATION OF APPROPRIATE PRODUCTION STRUCTURE, AS WELL AS IN THE DETERMINATION OF THE IMMEDIATE AND PERSPECTIVE PRODUCTION NOMENCLATURE;

- SEVERAL ITEMS OF EQUIPMENT TO SUPPORT THE START-UP OF THE R & D ACTIVITIES.

LAST BUT NOT LEAST IS THE TECHNICAL SUPPORT EXPECTED TO FIND EXPRESSION IN THE PREPARATION OF THE LIST OF NECESSARY EQUIPMENT FOR THE PLANT, AS WELL AS IN PROVIDING THE DELIVERY OF SOME SPECIFIC DEVICES.

OFFICIAL ARRANGEMENTS

THE OFFICIAL GOVERNMENT REQUEST FOR TECHNICAL ASSISTANCE WAS HANDED OVER BY THE MINISTRY OF FOREIGN AFFAIRS OF THE PEOPLE'S REPUBLIC OF BULGARIA ON 20 NOVEMBER 1981. THE PROJECT PROPOSAL.

SUBMITTED BY THE ENGINEERING INDUSTRIES SECTION WAS APPROVED AT THE 21ST MEETING OF THE PROJECT REVIEW COMMITTEE, HELD ON 27,28 AND 29 JANUARY 1982. THE PROJECT DOCUMENT FOR US \$ 27,300 WAS APPROVED ON 12 MARCH 1982. LATER, ON 2 JULY 1982 A REVISED PAD WAS ISSUED FOR A TOTAL OF US\$ 29,000. ACTUALLY THE PROJECT BECAME OPERATIONAL IN FEBRUARY 1982.

CONTRIBUTIONS

ACCORDING TO THE PROJECT DOCUMENT AND THE REVISED PAD THE UNIDO CONTRIBUTION IS US\$ 29,000, COVERING EXPERT ASSISTANCE (B/L 11-01) US\$ 27,000 AND EQUIPMENT SUPPLY (B/L 49-00) US\$ 2,000.

THE GOVERNMENT CONTRIBUTION IN 1982 WAS MORE THAN LV.1,800,000 LOCAL CURRENCY TO COVER ASSIGNMENT OF THE NATIONAL PERSONNEL, EQUIPMENT, OFFICE FACILITIES AND BUILDINGS, OPERATING COSTS.

THE DISTRIBUTION OF THAT MONEY BETWEEN THE MAIN ITEMS OF ACTIVITY WAS THE FOLLOWING:

ITEM	CONTRIBUTION (BG LV)
ASSIGNMENT OF THE PERSONNEL	72,000
EQUIPMENT AND MATERIAL	1230,000
CONSTRUCTION INVESTMENTS	500,000
MANAGING, ETC.	86,000

DUE TO THE COMING ORGANIZATION OF THE PLANT FACILITIES IN SOFIA AND THE BROADENING OF THE EXISTING PLOVDIV SUBSIDIARY FACTORY THE GOVERNMENT CONTRIBUTIONS FOR 1983 AND THE NEXT TWO YEARS ARE PLANNED TO BE HIGHER.

OBJECTIVES OF THE PROJECT

THE DEVELOPMENT OBJECTIVES OF THE PROJECT ARE TO INCREASE THE NATIONAL CAPABILITIES IN DEVELOPMENT AND PRODUCTION OF SCIENTIFIC INSTRUMENTS FOR DIFFERENT INSTITUTES OF THE BAS. THE TECHNICAL SUPPORT AND ORGANIZATION ASSISTANCE MUST BE PROVIDED IN ORDER TO ESTABLISH A SPECIAL PLANT PRODUCING SMALL BATCHES OF SCIENTIFIC INSTRUMENTS. THIS WILL BOOST THE DEVELOPMENT AND IMPLEMENTATION OF SCIENTIFIC ACHIEVEMENTS IN THE NATIONAL ECONOMY.

THE IMMEDIATE OBJECTIVES OF THE PROJECT ARE AS FOLLOWS:

A) TO ESTABLISH AND STRENGTHEN THE PLANT FOR DEVELOPMENT AND PRODUCTION OF SCIENTIFIC DEVICES THROUGH THE FORMATION OF AN APPROPRIATE ORGANIZATIONAL STRUCTURE.

B) TO DEVELOP AN EXPEDIENT MODERN PRODUCTION NOMENCLATURE THAT WILL MEET THE WORLD MARKET REQUIREMENTS, TAKING INTO CONSIDERATION ALSO THE DEVICES DESIGNED, DEVELOPED AND NEEDED AT DIFFERENT RESEARCH INSTITUTES OF THE BAS.

C) TO PREPARE ELABORATE LISTS OF THE NECESSARY EQUIPMENT, MACHINES AND MEASURING SYSTEMS.

D) TO IMPROVE THE PLANT MANAGEMENT AND LEADING SPECIALISTS QUALIFICATION IN THE FIELD OF INSTRUMENTATION, COMPUTING TECHNIQUES, FINE MECHANICS AND ELECTRONICS.

THE OBJECTIVES OF THE MISSION WERE TIGHTLY CONNECTED WITH THOSE OF THE PROJECT WITH INEVITABLE CHANGES MADE IN THE PROGRESS OF THE MISSION CAUSED BY THE ACHIEVEMENTS REACHED BY THE NATIONAL PROJECT PERSONNEL DURING THE PERIOD OF TIME BETWEEN THE ACTUAL START OF THE PROJECT AND THE DATE WHEN THE MISSION BEGAN.

TRAINING

NO OFFICIAL TRAINING OF THE PERSONNEL INVOLVED IN THE PROJECT WAS ARRANGED WITHIN ITS FRAMEWORK. THE PROBLEM OF TRAINING IS RATHER COMPLICATED CONCERNING THE SPECIFIC NATURE OF THE PROJECT, I.E.:

- BECAUSE THE PLANT TO BE ESTABLISHED IS DEDICATED TO BE OF SERVICE FOR THE INSTITUTES OF THE BAS, THE PROJECT PERSONNEL SHOULD HAVE VERY WIDE AND FUNDAMENTAL KNOWLEDGE IN ALL FIELDS OF SCIENTIFIC INSTRUMENTATION IN ORDER TO BE ABLE EVEN TO FORESEE ITS PROGRESS;

- THE R & D SCIENTISTS WITHIN THE BAS INSTITUTES SHOULD GET AN APPROPRIATE INFORMATION ABOUT THE FACILITIES AND INTENTIONS OF THE GROWING SI PLANT AND SHOULD FORMULATE THEIR IDEAS AND DEMANDS TO IT IN THE MOST ECONOMIC AND UNIFIED FORM.

THUS A GREAT DEAL OF INFORMAL TRAINING HAD TO BE ARRANGED WITH BOTH GROUPS OF SPECIALISTS IN ORDER TO REACH THE CLOSER COINCIDENCE OF THEIR VIEWPOINTS AND CONCEPTS. SUBSTANTIAL EFFORTS WERE DONE IN THIS WAY DURING MY MISSION ON DIFFERENT LEVELS OF BAS, ITS INSTITUTES AND OTHER ORGANIZATIONS INVOLVED.

I. RECOMMENDATIONS

1. THE NEW BRANCH OF THE SI PLANT HAS TO BE ORGANIZED BY BAS, NPC AND HIS STAFF IN ORDER TO MEET THE WIDE DEMANDS OF THE BULGARIAN SCIENCE IN OPTICAL, OPTOMECHANICAL AND ANALYTICAL DEVICES. THIS BRANCH, AS WELL AS OTHER ORGANIZED FACILITIES OF THE PLANT, IS TO BE SITUATED IN SOFIA OR ITS OUTSKIRTS IN ORDER TO KEEP CLOSE CONTACTS WITH THE BAS INSTITUTES.

2. THE SUBSTANTIAL HELP OF THE BAS INSTITUTES BY GIVING CONSULTATIONS, LENDING PRODUCTION FACILITIES, SHARING THE HUMAN RESOURCES AND SI TESTING AND DELIVERING IS NEEDED FOR THE PLANT PROGRESS. THE WIDE EXCHANGE OF IDEAS BETWEEN THE SI USERS AND THE NPP IS TO BE STRONGLY SUPPORTED.

3. THE PURCHASE OF THE SPECIAL EQUIPMENT FOR DEMONSTRATION PURPOSES SHOULD BE APPROVED BY UNIDO FOR THE COMPLETE ATTAINMENT OF THE PROJECT OBJECTIVES.

4. THUS THE PROJECT REVISION IS NECESSARY, RESULTING IN THE INCREASE OF BUDGET LINE 49-00 BY THE SUBSEQUENT DECREASE OF BUDGET LINE 11-01.

5. THE PROJECT REVISION MENTIONED SHOULD BE APPROVED BY UNIDO NOT LATER THAN 30 MARCH 1983 IN ORDER TO ACHIEVE THE PROJECT OUTPUTS THIS YEAR.

II. ANALYTICAL ACCOUNT OF ACTIVITIES

A. A CONCEPT OF SCIENTIFIC INSTRUMENTATION DEVELOPMENT IN BULGARIA

GENERAL ASPECTS

THE PROGRESS OF SCIENCE IN BULGARIA DURING THE LAST DECADES IS THE IMPRESSIVE RESULT OF THE COMBINED EFFORTS UNDERTAKEN BY THE GOVERNMENT, BULGARIAN PEOPLE AND COMPETENT INTERNATIONAL ORGANIZATIONS.

THE HUMAN ASPECTS OF SUCH A PROGRESS ARE CONNECTED WITH THE SUBSTANTIAL PRESTIGE WHICH IS AWARDED BY BULGARIAN SCIENCE WITHIN THE GIVEN COUNTRY AND ABROAD AS WELL. IT HELPS TO APPEAL THE YOUNG PEOPLE TO THE UNIVERSITIES, THE MOST TALENTED BECOMING SCIENTIFIC RESEARCHERS AT DIFFERENT INSTITUTES. IT SHOULD BE MENTIONED THAT THE COUNTRY ALSO STRONGLY SUPPORTS THE PROGRESS OF OTHER DEVELOPING COUNTRIES BY EDUCATING THEIR STUDENTS AND POSTGRADUATES, BY PARTICIPATING IN THE INTERNATIONAL PROJECTS AND BY CREATING A GREAT AMOUNT OF GOODS AND TRADES TO BE DELIVERED TO THESE COUNTRIES. NOWADAYS, MORE THAN 2,500 STUDENTS FROM DEVELOPING COUNTRIES ARE STUDYING IN THE BULGARIAN EDUCATIONAL INSTITUTIONS.

THE SCIENTIFIC RESEARCH IN BULGARIA IS CARRIED OUT IN UNIVERSITIES, IN INDUSTRIAL INSTITUTIONS AND TO A GREAT EXTENT - IN THE NETWORK OF INSTITUTES OF THE BULGARIAN ACADEMY OF SCIENCES (BAS). A GREAT DEAL OF RESEARCH WITHIN THE TECHNICAL BRANCH OF BAS IS INTENDED TO BE RATHER HELPFUL IN SOLVING THE COMMON PROBLEMS OF THE MANKIND:

- THE PROTECTION AGAINST POLLUTION AND ENVIRONMENTAL CONTROL
- THE ABOLISHING OF THE HARD LABOUR AND THE INCREASE OF LABOUR EFFICIENCY BY INDUSTRIAL AUTOMATION;
- THE INFORMATION PROCESSING AND THE COMMUNICATION PROBLEMS;
- THE INCREASE OF THE AGRICULTURAL EFFICIENCY;
- THE EXTENSIVE RESEARCH IN THE MEDICAL AND BIOMEDICAL FIELDS.

THE CO-OPERATION OF THE EFFORTS MADE BY DIFFERENT BAS INSTITUTES AND THEIR CO-ORDINATION WITH NATIONAL PLANS AND INTERNATIONAL OBLIGATIONS ARE ADJUSTED WITHIN THE FRAMEWORK OF THE CERTAIN NUMBER OF NATIONAL PROGRAMMES ESTABLISHED IN BULGARIAN ECONOMY DURING THE LAST YEARS OF DEVELOPMENT.

THE PICTURE DRAWN SHOULD NOT RESULT IN THE IMPRESSION THAT THE REMAINING PROBLEMS IN BULGARIAN SCIENCE AND INDUSTRY ARE ONLY THE MARGINAL ONES. ON THE CONTRARY, THERE IS A CERTAIN AMOUNT OF TROUBLES AND "BOTTLENECKS" WHICH SHOULD BE OVERCOME BY THE COMBINED EFFORTS OF DOMESTIC AND INTERNATIONAL INSTITUTIONS WITH THE HOPEFULLY SAME DEGREE OF CONSOLIDATION AS BEFORE.

CONTRADICTIONS IN THE MODERN SCIENTIFIC INSTRUMENTATION

THE MAIN PROBLEMS OF MODERN SI DEVELOPMENT IN EACH COUNTRY CAN BE DEVIDED INTO THE FOLLOWING GROUPS:

- THE HUMAN RESOURCES PROBLEM, I.E. THE QUALITY AND THE NUMBER OF SPECIALISTS AVAILABLE;
- THE SCIENTIFIC PROBLEM, I.E. THE CHOISE OF POSSIBLE DIRECTIONS OF SI PROGRESS;
- THE ECONOMICAL PROBLEMS, I.E. THE VALUE OF THE FINANCIAL SUPPORT FOR SI DESIGN AND PRODUCTION, THE DEGREE OF ECONOMIC EFFICIENCY OF SUCH A PRODUCTION;
- THE ORGANIZATIONAL AND MANAGING PROBLEMS.

DUE TO THE JOB DESCRIPTION SI/~~BUL~~/82/801 ALL THESE PROBLEMS WERE TO BE MET DURING THE MISSION BUT IT HAPPENED SO THAT THE PROBLEMS OF SCIENTIFIC AND ECONOMICAL DECISIONS APPEARED TO BE THE MOST CRITICAL AND HAVE TAKEN SUBSTANTIAL EFFORTS. CONCERNING THE ORGANIZATIONAL AND STRUCTURAL PROBLEMS THE VALUABLE PROGRESS WAS ACHIEVED BY THE NPP, BUT THEY ALSO WERE THOROUGHLY DISCUSSED AT DIFFERENT LEVELS (SEE CH.III). WHEN SOLVING THE SCIENTIFIC AND ECONOMICAL PROBLEMS IT SHOULD BE EMPHASIZED THAT IN SI THE USERS' REQUIREMENTS SHOULD BE TAKEN INTO ACCOUNT TO THE UTMOST EXTENT COMPARED TO ANY OTHER BRANCH OF INDUSTRY. THESE REQUIREMENTS ARE IN TURN ORIGINATED BY THE CURRENT NEEDS OF A GIVEN SCIENTIFIC INSTITUTE OR LABORATORY IN A HIGHLY ACCURATE, WIDE-RANGE, EASY-TO-DEAL DEVICES OR INSTRUMENTS.

TO MEET THESE REQUIREMENTS WHICH ARE SOMETIMES EVEN CONTRADICTORY, THE SI INDUSTRY HAS TO PRODUCE HIGHLY SPECIALIZED DEVICES AND SETUPS IN CONFORMITY WITH INDIVIDUAL NEEDS AND FACILITIES OF THEIR CLIENTS.

ON THE OTHER HAND SUCH AN ATTITUDE SEEMS TO BE IN A DEEP CONTRAST TO THE GENERAL INDUSTRIAL TRENDS FOR UNIFICATION OF INDUSTRIAL PRODUCTION. THIS INEVITABLY LEADS TO THE DOMINATING

TENDENCY IN THE MODERN SI INDUSTRY SUPPORTED BY PROSPEROUS COMPANIES AND RICH UNIVERSITIES IN DEVELOPED COUNTRIES WHO FORM THE MAJORITY OF THE CUSTOMERS. THIS TENDENCY CONSISTS OF MANUFACTURING THE HIGHLY SPECIALIZED INSTRUMENTS WITH EXCELLENT PARAMETERS IN ORDER TO MEET THE MOST URGENT NEEDS OF THE CUSTOMERS. THE PRICE OF SUCH INSTRUMENTS IS INEVITABLY HIGH BUT IN MANY CASES DUE TO ABOVE MENTIONED REASONS IT IS CONSIDERED TO BE A NATURAL RESULT OF NARROW SPECIALIZATION AND HARDLY BOTHERS THE CLIENTS.

THEN BECAUSE OF THE NARROW SPECIALIZATION OF THE SI PRODUCTION THE CUSTOMERS NOWADAYS ARE FORCED TO GET OTHER INSTRUMENTS OR EXPENSIVE ADDITIONAL ACCESSORIES IF THEY GET SOME NEW PROBLEMS TO BE SOLVED. IT HAPPENS EVEN WHEN THE NEW PROBLEMS ARE NOT FAR FROM THE OLD ONES.

THOSE IN DEVELOPED COUNTRIES WHO CANNOT STAND FOR SUCH A SITUATION FREQUENTLY USE A NETWORK FOR RENTING THE NECESSARY DEVICES OR SHARE THEIR FACILITIES WITH THOSE OF NEIGHBOURING LABORATORIES.

HOW TO SOLVE THESE CONTRADICTIONS IN DEVELOPING COUNTRIES?

IN THE DEVELOPING COUNTRIES SUCH AN ATTITUDE IS NOT TO BE RECOMMENDED BECAUSE OF TWO REASONS:

- FIRST OF ALL THE FINANCIAL STANDING OF SCIENTIFIC INSTITUTIONS IN THESE COUNTRIES IS LOWER THUS LIMITING THE POSSIBILITIES OF BUYING THE NECESSARY SI IN PROPER AMOUNTS;
- SECONDLY THE NUMBER OF SUCH INSTITUTIONS IS LESS THUS MAKING THE ORGANIZATION OF RENT SERVICE UNEFFICIENT AND ALSO PREVENTING THE POSSIBILITY OF INTERCHANGE OR SHARING OF SI.

DOES IT MEAN THAT THE NUMBER AND/OR QUALITY OF SI IN THE DEVELOPING COUNTRIES SHOULD NECESSARILY BE SMALLER COMPARATIVELY TO THE RELATIVE INSTITUTIONS OF THE WELL ESTABLISHED COUNTRIES? NO! THE MATTER IS THAT EXCEPT OF THE HUMAN RESOURCES AND CREATIVE CAPABILITIES THE LEVEL OF SCIENTIFIC RESEARCH NOWADAYS DRAMATICALLY DEPENDS UPON THE LEVEL OF SI USED IN A GIVEN LABORATORY.

BUT THERE IS NO SUCH A "LOCAL" OR "REGIONAL" SCIENCE, THE SCIENCE IS AN INTERNATIONAL MATTER. THUS IT IS OF VITAL IMPORTANCE IN EACH COUNTRY TO KEEP THE LEVEL OF SCIENTIFIC RESEARCH APPROXIMATELY UNIFORM WHICH ALSO MEANS TO BE OF SUBSTANTIAL AID IN MEETING THE TARGETS OF THE LIMA DECLARATION.

IT DOES NOT, OF COURSE, RESULT IN THE CONCLUSION THAT THE

SCIENTIFIC POWER OF DIFFERENT COUNTRIES SHOULD BE SIMILAR, BUT PROVIDED THAT A SCIENTIFIC INSTITUTION IS ESTABLISHED, ITS RESEARCH WORK SHOULD BE KEPT AT THE INTERNATIONAL LEVEL OR CLOSE TO IT.

CONSIDERING THE HIGH AND GROWING PRICES OF THE MODERN SI IT SEEMS TO BE ALMOST INEVITABLE FOR THE DEVELOPING COUNTRIES TO BEGIN WITH MANUFACTURING OF AT LEAST SOME TYPES OF SI - THE VIEW-POINT NOW WELL APPROVED IN BULGARIA AND SUPPORTED BY UNIDO.

MORE SI WITH LIMITED RESOURCES

AFTER ADOPTING THIS VIEW POINT AND MAKING SOME INVESTMENTS INTO SI PRODUCTION THE DEVELOPING COUNTRY SHOULD NOT, FROM MY VIEW POINT, COPY IN ITS SI PROGRESS THE COURSE TAKEN BY DEVELOPED COUNTRIES. THE NEW CONCEPT ON SI DESIGN AND MANUFACTURING IS TO BE WORKED OUT BASED ON THE FACILITIES OF THE COUNTRY AND ON THE TOTAL VOLUME OF SCIENTIFIC RESEARCH TO BE FULFILLED .

I RECOMMEND MORE ATTENTION TO BE PUT ON THE FOLLOWING ITEMS WHICH CAN BE USED AS A BASIS IN ORDER TO ELABORATE THIS CONCEPT:

- A THOROUGH ANALYSIS OF PRODUCTION FACILITIES OF A COUNTRY SHOULD BE DONE IN THE BRANCHES OF INDUSTRY WHICH ARE CONSIDERED AS A FUNDAMENTAL FOR SI PRODUCTION, I.E.: ELECTRONICS, OPTICS, FINE MECHANICS, SOME BRANCHES OF PHYSICS AND CHEMISTRY;

- THE DEMANDS IN SI OF THE LABORATORIES AND INSTITUTES (WITHIN BAS AND CO-OPERATING ORGANIZATIONS) SHOULD BE CHECKED AND ANALYSED;

- THE DESIGN AND PRODUCTION FACILITIES OF THE SI PLANT SHOULD BE ESTIMATED ON THE BASIS OF HUMAN AND MATERIAL RESOURCES;

- AT THE FINAL STAGE OF THE PROJECT THE NOMENCLATURE OF THE SI TO BE PRODUCED AND THE VOLUME OF PRODUCTION ARE TO BE WORKED OUT AND TO BE APPROVED BY THE BAS.

THE BEST APPROACH TO BE RECOMMENDED AT FULFILLING THESE NECESSARY ORGANIZATIONAL STEPS IN ORDER TO MEET THE DEMANDS OF THE MOST OF BAS INSTITUTES IN SI, IS TO CHOOSE THE CERTAIN NEW PRINCIPLE OF SI DESIGN, NOW USED MAINLY IN ELECTRONICS. IT IS THE SO CALLED MODULAR PRINCIPLE OF DESIGN. THE BROAD APPLICATION OF SUCH A PRINCIPLE HELPS TO SUBSTANTIALLY SAVE THE PRODUCTION POWER AND TO MEET MORE USERS' DEMANDS AT THE SAME TIME. BEING PRODUCED AS A SET OF UNITED BLOCKS OR SEPARATE UNITS THE SI OF SUCH A TYPE CAN EASILY BE REARRANGED FOR APPLICATION IN QUITE A WIDE VARIETY OF R & D

WORK. AN EXAMPLE OF THE IMPLEMENTATION OF SUCH A PRINCIPLE CONSIDERING THE OPTICAL SI DESIGN IS CLARIFIED IN ANNEX 1.

B. ON THE OPTIMAL CHOICE OF THE SI NOMENCLATURE

SO, THE CHOICE OF THE NOMENCLATURE MUST BE A RESULT OF A REASONABLE TRADE-OFF BETWEEN THE DEMANDS OF THE BAS INSTITUTES AND THE PLANT'S FACILITIES. BOTH THE COMPLEXITY AND A NECESSARY AMOUNT OF A GIVEN TYPE OF SI SHOULD BE CONSIDERED IN THE DESIGN-MAKING PROCEDURE.

I HAVE UNDERTAKEN A SERIES OF MEETINGS WITH THE AUTHORITIES AND THE PERSONNEL OF MANY BAS INSTITUTES AND RELATED ORGANIZATIONS (ANNEX 2). ON THE BASIS OF THESE DISCUSSIONS I APPROVE THE FOLLOWING NOMENCLATURE OF THE SI, PLANNED FOR FUTURE PRODUCTION AT THE PLANT:

1. MEDICAL AND BIOMEDICAL SI AND SYSTEMS
2. CHEMICAL ANALYSING SI
3. SI FOR PHYSICAL AND MECHANICAL MATERIAL TESTING
4. SPECTROMETRIC DEVICES AND SYSTEMS
5. OPTICAL AND OPTOELECTRONIC SI
6. CHROMATOGRAPHIC SI
7. VACUUM METERS, PUMPS AND SYSTEMS
8. LABORATORY EQUIPMENT
9. SYSTEMS FOR FLEXIBLE AUTOMATION OF SCIENTIFIC EXPERIMENT.

C. THE PLOVDIV DIVISION

THE INVESTIGATION OF THE CURRENT ACTIVITY OF THE RECENTLY ORGANIZED PLOVDIV SUBSIDIARY DIVISION AND THE DISCUSSION ABOUT THE RATE AND WAYS OF ITS DEVELOPMENT SHOWED THE FOLLOWING:

- THE SUBSTANTIAL EFFORTS WERE UNDERTAKEN BY THE NPC, NPP AND THE LOCAL AUTHORITIES IN ORDER TO ORGANIZE THE SUBSIDIARY DIVISION (ANNEX 3), TO TRAIN PERSONNEL AND TO ARRANGE THE DESIGN, PRODUCTION AND IMPLEMENTATION OF THE FIRST SPECIMEN OF THE SI;

- THE SI AND SYSTEMS ALREADY PRODUCED HAVE A RATHER HIGH LEVEL OF DESIGN AND WILL BE, FOR SURE, SUCCESSFULLY USED BY THE CUSTOMERS OF BAS;

- THE FOLLOWING ITEMS UNDER PRODUCTION ARE TO BE MENTIONED:

1. THE BC-1300 SYSTEM WITH A 16-BIT MICROCOMPUTER FOR DATA ACQUISITION AND PROCESSING, PROGRAMMED FOR MEDICAL AND BIOMEDICAL APPLICATIONS. AND DESIGNED FOR THE UNITED CENTRE OF BIOLOGY, BAS;

2. THE SERIES OF DIGITAL HYGROMETERS AND OXIMETERS WITH HIGH ACCURACY, WIDE RANGE TWO INPUTS, DIGITAL READOUT AND VOLTAGE AND CURRENT DRIVING OUTPUTS, DESIGNED FOR THE UNITED CENTRE OF CHEMISTRY, BAS;

3. THE VALVES FOR GAS FLOW CONTROL AND GAS FLOWMETERS, DESIGNED FOR APPLICATIONS IN CHEMISTRY, ELECTRONICS, ETC;

4. THE SYSTEM FOR EXTRACTING THE RESIDUALS OF ETHERIC OIL FROM WASTE WATERS, DESIGNED FOR THE UNITED CENTRE OF CHEMISTRY, BAS;

5. THE MICROPROCESSOR-DRIVEN LABORATORY FERMENTATOR, DESIGNED FOR THE UNITED CENTRE OF BIOLOGY, BAS;

6. THE SET OF EQUIPMENT FOR EXTRACTING VERY SMALL CONCENTRATIONS OF METAL OUT OF WATER FLUX, DESIGNED FOR THE UNITED CENTRE OF CHEMISTRY, BAS.

- ALL THESE ITEMS AND POSSIBLY SEVERAL OTHERS ARE RECOMMENDED TO BE EXPOSED AT THE FORTHCOMING PLOVDIV TRADE FAIR THIS YEAR IN ORDER TO ACHIEVE A FURTHER ADVERTISEMENT OF THEM AND TO MAKE THE DIFFERENT INSTITUTES OF BAS AWARE OF THE HIGH QUALITY OF SI ALREADY PRODUCED BY THE PLANT;

- THE DISCUSSION ON THE FUTURE DEVELOPMENT OF THE PLOVDIV DIVISION SHOWED THAT THE NPC AND HIS STAFF SUCCESSFULLY SOLVE THE PROBLEM OF OBTAINING THE NECESSARY BUILDING FACILITIES FOR THE NEEDS OF THE DIVISION. NOW THE SET OF TEMPORARY BUT WELL INSTALLED BLOCKS IS CONSTRUCTED AND USED. THE ARCHITECTURAL DESIGN FOR REPAIRMENT AND REARRANGEMENT OF AN OLD THREE-STORY BUILDING GIVEN TO THE PLANT BY THE TOWN AUTHORITIES IS ALREADY AT HAND;

- THE RECONSTRUCTED BUILDING WILL BE READY FOR INSTALLATION IN 1984;

- UNTIL THIS HAPPENS, THE NPC AND HIS STAFF ARE ELABORATING THE PROGRAMME FOR THE ENLARGEMENT OF THE PLANT FACILITIES ON THE EXISTING TERRITORY WHICH PROGRAMME WAS THOROUGHLY DISCUSSED AND APPROVED DURING OUR MEETINGS WITH THE NPP.

- THE COMPARISON OF THE NOMENCLATURE (SEE ABOVE) WITH THE SI UNDER PRODUCTION SHOWS THAT OPTICAL SI ARE NOT YET INCLUDED WHICH MADE A MATTER OF MY PERMANENT EFFORTS DURING THE MISSION TO CLARIFY THE BAS DEMANDS IN THE ITEMS 4, 5, 6 OF THE GIVEN NOMENCLATURE AND TO ADVISE THE NPC ABOUT THE OPTIMAL STRATEGY OF MEETING

THESE DEMANDS.

ON THE ORGANIZATION OF OPTICAL SI BRANCH

THE NUMBER AND VARIETY OF THE NEEDED OPTICAL SI IS SUBSTANTIALLY HIGHER THAN THE NUMBER TO BE IMPORTED. THUS IT SEEMS URGENT TO ORGANIZE IN ADDITION TO THE ALREADY EXISTING GROUPS (SEE ANNEX 3 AND 4) ALSO THE POWERFUL GROUP OR SUBDIVISION FOR OPTICAL SI PRODUCTION .

IT WAS RECOMMENDED (SEE CH.1 RECOMMENDATIONS) TO KEEP AND ENLARGE THE CONTACTS ESTABLISHED DURING THE MISSION WITH THOSE BAS INSTITUTES, THAT ARE ALREADY STRONGLY INTERESTED IN OBTAINING OPTICAL SI. THE FIRST STEPS OF ORGANIZING SUCH AN OPTICAL SUBDIVISION WERE DISCUSSED WITH NPP AND IT WAS AGREED THAT THIS GROUP WILL BE ARRANGED WITHIN THE SOFIA CENTRAL PLANT FOR SI (ANNEX 4).

MANY OF THE LOCAL ORGANIZATIONAL PROBLEMS CONNECTED WITH THE SOFIA CENTRAL PLANT FOR SI WILL BE HOPEFULLY SOLVED DURING THIS SEPTEMBER WHEN THE SECOND PART OF THIS MISSION SEEMS TO BE DESIRED. THE AIM OF THAT PART WILL BE DICTATED BY THE CORRESPONDING ITEMS OF THE PROJECT AND JOB DESCRIPTION BUT MORE STRONGLY INCLINED TOWARDS THE OPTICAL SI DESIGN AND PRODUCTION. WITHIN THE FRAMEWORK OF THE ORGANIZATIONAL EFFORTS A COURSE OF LECTURES AND WORKSHOPS IS PLANNED TO BE GIVEN FOR THE PLANT PERSONNEL.

THE OBTAINING OF SEVERAL PIECES OF EQUIPMENT PRODUCED ABROAD WITH THE APPLICATION OF MODULAR PRINCIPLE IN ORDER TO DEMONSTRATE THE ADVANTAGES OF SUCH A CONCEPT IS MOSTLY DESIRED. THE MOST APPROPRIATE OF SUCH AN OPTO-MECHANICAL SET OF COMPONENTS OR PRE-ASSEMBLIES FOR CONSTRUCTION OF A WIDE VARIETY OF OPTICAL SI IS THE SET PRODUCED BY KLINGER SCIENTIFIC CORP.(USA). I HAVE INITIATED THE CONTACTS WITH KLINGER SCIENTIFIC, AND NOW THE PRICE LIST IS ON ITS WAY TO BULGARIA. THE ESTIMATED COST OF THE KIT INCLUDING MORE THAN 800 SIMPLE ELEMENTS IS ABOUT US\$ 8,000. I WOULD STRONGLY RECOMMEND TO UNIDO TO HELP WITH GETTING THIS PIECE OF EQUIPMENT.

FOR PROMOTING THE SAME MODULAR PRINCIPLE IN THE FIELD OF CHROMATOGRAPHY AND DENSITOMETRY THE CONFIRMING DEMONSTRATION SETS ARE ALSO QUITE NECESSARY. THESE DEMONSTRATIONS ARE AVAILABLE WITH THE AID OF THE SET OF SI PRODUCED BY TOBIAS ASSOCIATES, INC.(USA). THE PRELIMINARY NEGOTIATIONS WITH THIS COMPANY CONFIRMED THE STRONG NEED OF THE TOBIAS ASSOCIATES DEVICES TO ACHIEVE THE PROJECT

OBJECTIVES. THEREFORE, THE AMOUNT OF ABOUT US\$ 3,400 FOR PURCHASING THESE DEVICES IS ALSO OF VITAL IMPORTANCE.

THE LAST NECESSARY ORGANIZATIONAL EFFORTS THOROUGHLY DISCUSSED DURING THE MISSION WERE CAUSED BY THE NEEDS IN THE ESTABLISHMENT OF A QUALIFIED GROUP OF CONSULTANTS TO MAINTAIN THE PERMANENT LINKS WITH THE CURRENT, RECENT AND FUTURE CUSTOMERS AND TO KEEP AN EYE ON THE PROGRESS OF THE SIMILAR SI PRODUCING COMPANIES ABROAD.

III. THE DIGEST OF DAILY ACTIVITIES

I ARRIVED IN VIENNA ON 26 JANUARY 1983 AND IN SOFIA ON 28 JANUARY 1983 AND STARTED WITH MY WORK ACCORDINGLY TO THE PROGRAMME (ANNEX 2) PREPARED TOGETHER WITH THE NATIONAL PROJECT COORDINATOR ON THE BASIS OF THE JOB DESCRIPTION.

THE MEETING WAS ORGANIZED ON 1 FEBRUARY WITH THE VICE-PRESIDENT OF BAS, PROF. D. SHOPOV, WHO IS RESPONSIBLE FOR SCIENTIFIC INSTRUMENTATION DEVELOPMENT IN THE BAS. IT WAS EMPHASIZED DURING THAT MEETING THAT THE GROWING DEMANDS IN THE NUMBER OF DIFFERENT VARIETIES OF SI CAN HARDLY BE SATISFIED BY USING THE GENERAL APPROACH BASED ON ACQUIRING THOSE SI ONLY FROM ABROAD. THE STRESS SHOULD BE PUT ON THE ESTABLISHMENT OF SI PRODUCTION IN THIS COUNTRY IN ORDER TO MEET AT LEAST THE MOST TYPICAL REQUESTS OF THE BAS INSTITUTES. PROF. SHOPOV CONFIRMED HIS APPROVAL OF MY VISITING THE DIFFERENT BAS INSTITUTES IN ORDER TO GET ACQUAINTED WITH THEIR FIELDS OF INTERESTS AND THE RANGE OF NECESSITIES IN SI. THE ALTERNATIVE CONCEPT OF THE SI DEVELOPMENT STATED ABOVE (SEE CH. II) WAS BRIEFLY DISCUSSED AND SOME USEFUL DETAILS WERE WORKED OUT. MR. VICE PRESIDENT ALSO APPROVED THE IDEA OF ARRANGING THE SECOND MISSION OF THE EXPERT AT THIS COUNTRY AT THE TERMINATION STAGE OF THE PROJECT.

AFTER THIS MEETING I GOT AN IMPRESSION THAT THE AUTHORITIES OF BAS SUPPORT THE IDEA OF THE GIVEN PROJECT AND ITS MAIN OBJECTIVES, AS WELL.

THE MEETING WITH THE NPC - MR. I. KARARIZOV, AND HIS STAFF (NPP) WAS ALSO ARRANGED ON 1 FEBRUARY. HERE THE MAIN OBJECTIVES OF THE PROJECT WERE DISCUSSED AND THE WAYS OF HOW TO REACH THEM WERE CONSIDERED. I GOT ACQUAINTED IN ALL POSSIBLE DETAILS WITH THE IMPLEMENTATION OF THE PROJECT, WITH EXISTING AND POSSIBLE PROBLEMS AND WITH ACHIEVEMENTS, AS WELL. I WAS IMPRESSED BY THE COMPETENCE AND ENTHUSIASM OF NPC AND HIS STAFF.

THEN I HAD TWO MEETINGS WITH DR. I. PETROV, DIRECTOR OF THE INSTITUTE FOR INSTRUMENT DESIGN. VISITING DIFFERENT DEPARTMENTS OF THIS INSTITUTE I MADE TWO CONCLUSIONS. FIRST, THAT ALTHOUGH THE TRADITIONS OF INSTRUMENTATION PRODUCTION IN BULGARIA ARE PRETTY YOUNG, DUE TO THE PROPER MANAGEMENT AND STRONG EFFORTS MOST OF THE INDUSTRIAL INSTRUMENTS AND SYSTEMS PRODUCED THERE ARE NEATLY MANUFACTURED AND WELL DESIGNED. SECOND, THAT BECAUSE OF VERY DENSE PROGRAMME AND GROWING DEMANDS IN THE INSTITUTE PRODUCTION, THE SI PRODUCTION COULD HAVE HARDLY BEEN ORGANIZED HERE, WHICH DOESN'T EXCLUDE

THE WORKING CONTACTS AND PROVISIONAL AID FROM THE INSTITUTE FOR INSTRUMENT DESIGN, THE LATTER BEING A FACT.

ON THE 2 FEBRUARY I VISITED THE LASER LABORATORY OF THE ISSP, BAS AND MET ITS HEAD, DR.N.SABOTINOV. AFTERWARDS THE VISIT TO IE, BAS, WAS ARRANGED WITH THE MEETING OF ITS DEPUTY DIRECTOR, DR.M.DRAJEV. BOTH VISITS CONFIRMED THE IDEA THAT THE PROGRESS OF SCIENTIFIC RESEARCH IS STRONGLY HINDERED BY THE DEFICIENCY OF APPROPRIATE SI. THE NOMENCLATURE OF THE SI NEEDED FOR THESE INSTITUTES WAS ESTABLISHED.

NEXT DAY WAS DEDICATED TO PLOVDIV SUBSIDIARY DIVISION WHICH IS ABOUT 160 KM FROM SOFIA. MY IMPRESSIONS ARE REPORTED ABOVE (SEE CH.II). TO BE SHORT, THERE IS A GOOD ENTERPRISE BUT THE FURTHER STRENGTHENING OF FACILITIES IN SOFIA IS STRONGLY NEEDED BECAUSE OF THE SIMPLE REASON THAT MOST OF THE FUTURE CUSTOMERS ARE SITUATED IN SOFIA, AND FOR SI PRODUCTION VERY CLOSE LINKS AND FREQUENT CONSULTATIONS WITH THE CUSTOMERS ARE OBLIGATORY.

THE SECOND VISIT TO PLOVDIV DIVISION WAS ARRANGED ON 17 FEBRUARY IN ORDER TO GET ACQUAINTED IN MORE DETAILS WITH THE FACILITIES INTENDED FOR THE BUILDING TO BE RECONSTRUCTED AND TO SOLVE SOME ORGANIZATIONAL AND STRUCTURAL PROBLEMS CONNECTED WITH THE FUTURE OCCUPATION OF THIS BUILDING. THE STRUCTURE OF THE DIVISION IS SHOWN IN ANNEX 3.

ON THE 4TH OF FEBRUARY I VISITED THE IMB, BAS, AND MET ITS DIRECTOR, ACAD.G.BRANKOV. THE TYPES OF SI MOST STRONGLY DEMANDED BY THIS INSTITUTE WERE DISCUSSED. FURTHER I GAVE A LECTURE ON OPTOELECTRONIC SI FOR THE PERSONNEL OF THIS AND NEIGHBOURING INSTITUTES.

ON THE 7TH OF FEBRUARY MY NEXT VISIT TO IMB WAS ARRANGED WITH THE SPECIAL PURPOSE TO MEET THE PERSONNEL OF THE LABORATORY OF DR.P.KULEV. THE ACHIEVEMENTS MADE BY THIS LABORATORY IN LASER NONDESTRUCTIVE TESTING WERE DISCUSSED WITH UTMOST SCRUTINY BECAUSE SOME OF THEM CAN SUCCESSFULLY BE USED FOR DESIGN OF NEW TYPES OF THE OPTICAL SI.

ON THE 11TH OF FEBRUARY I MET DR.P.PARUSHEV AND DR.ST. RADEV OF THAT INSTITUTE TO DISCUSS THE FIELDS OF IMPLEMENTATION OF FIBER OPTICAL COMPONENTS FOR CONSTRUCTION OF MEASURING DEVICES TO BE USED IN THIS INSTITUTE. SOME INTERESTING CONCLUSIONS WERE MADE AND THE DECISION WAS ACHIEVED TO MOVE FURTHER IN THAT DIRECTION DURING THE SECOND PART OF THE MISSION.

IN ORDER TO ESTIMATE THE DEGREE OF SUPPORT AND EXCHANGE BETWEEN THE GROWING PLANT AND THE MINISTRY OF MACHINE BUILDING AND ELECTRONICS ON 7 FEBRUARY I VISITED THE DEPUTY MINISTER, MR.P.KISJOV. THE CONCLUSIONS OF THE DISCUSSIONS CONFIRMED BY THE NEXT MEETING HELD ON 15 FEBRUARY ARE THAT THE IDEA OF THE PROJECT TO BE IMPLEMENTED IN BULGARIA IS QUITE APPROPRIATE BECAUSE MANY OF ELECTRONIC SUB-ASSEMBLIES AND DEVICES FOR COMPLETION OF THE SI SYSTEMS ARE ALREADY PRODUCED IN THIS COUNTRY.

THE WHOLE DAY OF FEBRUARY 8 I SPENT IN THE CLOZOI, BAS, WHERE I MET ITS DIRECTOR, DR.M.KOVATCHEV, THE VICE-DIRECTOR DR.V. SAINOV, VISITED THE LABORATORIES AND HAD VERY USEFUL DISCUSSIONS THERE, WHICH RESULTED IN THE FOLLOWING CONCLUSIONS:

- THE CENTRAL LABORATORY IS WELL EQUIPPED, HAS WELL DEFINED SCIENTIFIC TARGETS AND HAS ALREADY ACHIEVED A LOT;
- SOME OF THE IDEAS SEEM PROPER TO BE IMPLEMENTED IN A SERIES OF SI;
- SOME DISAGREEMENT ON THE DEGREE OF APPLICABILITY OF MODULAR PRINCIPLE TO OPTICAL SI WAS FOUND AND THE REASONABLE LIMITS OF UNIFICATION ARE TO BE ESTIMATED FURTHER;
- DR.M.KOVATCHEV ALSO SEEMED TO BE CONFIDENT IN LICENCE POLICY WHICH WILL BE USEFUL IN FUTURE;
- DR.M.KOVATCHEV AND HIS PERSONNEL ARE ABLE TO BE OF CONSIDERABLE HELP IN THE STAGE OF OPTICAL DIVISION ORGANIZATION AND ITS MANAGEMENT.

ON THE 14TH OF FEBRUARY I GOT A PERMISSION TO VISIT THE INSTITUTE OF RADIOELECTRONICS OF THE MINISTRY OF MACHINE BUILDING AND ELECTRONICS. TWO FOUNDINGS ARE TO BE MENTIONED: THE RESEARCH AND DEVELOPMENT WORK CARRIED OUT IN THIS INSTITUTE IS AIMED AT THE TURNING OF THE COUNTRY MORE OR LESS INTO AN INDEPENDENT ONE IN ITS NEEDS OF DIFFERENT COMPONENTS AND SYSTEMS IN RADIOELECTRONICS WHICH IS POSITIVE; BUT IN MANY SCIENTIFIC GROUPS OF THIS INSTITUTE THE DEFICIENCY OF MODERN SI MAKES THE PROGRESS OF R & D SLOWER THAN IT IS DESIRABLE.

ON THE NEXT DAY A VISIT WAS ARRANGED TO THE COMMUNICATION INSTITUTE OF THE MINISTRY OF COMMUNICATIONS. DURING THE MEETING WITH THE HEAD OF THE INSTITUTE, AS WELL AS DURING THE SUBSEQUENT EXCURSION, THE PROBLEMS OF OPTICAL MEANS FOR COMMUNICATION PURPOSES WERE WIDELY DISCUSSED.

IN BOTH VISITS DESCRIBED I TRIED TO PAY ATTENTION TO THE INSTITUTES' AUTHORITIES ON THE NECESSITY OF SUSTANTIAL AID TO THE

SI PLANT, ESPECIALLY AT THE FIRST STAGES OF ITS DEVELOPMENT.

THE MAIN IMPRESSIONS AND CONCLUSIONS OF THE ACTIVITIES ENUMERATED ARE SUMMED UP IN THE CORRESPONDING CHAPTER BUT I WOULD LIKE TO MENTION HERE THAT THE INTEREST OF DIFFERENT BAS INSTITUTES TO ALL THREE BASIC GROUPS OF SI DESCRIBED IN THE PROJECT DOCUMENT AND JOB DESCRIPTION (SEE P.1 OF THE PROJECT DOCUMENT) IS SUBSTANTIALLY HIGHER THAN THE NUMBER OF SUCH SI TO BE PROVIDED BY IMPORT. THE SCIENTISTS OF ALL INSTITUTES ARE READY TO HELP THE SI PLANT TO FULFIL ITS TASKS.

THE DEGREE OF THE SCIENTISTS' QUALIFICATION AND ENTHUSIASM MAKE IT CERTAIN THAT TIGHT COLLABORATION WITH BAS INSTITUTES AND THE PLANT WILL BE OF UTMOST IMPORTANCE ESPECIALLY DURING THE FIRST YEARS OF THE PLANT'S FUNCTIONING.

IV. CONCLUSIONS

THE STRATEGY AND THE OBJECTIVES OF THE BULGARIAN GOVERNMENT IN SCIENTIFIC INSTRUMENTATION, ^{ARE} OUTLINED IN THE FIVE-YEAR PLANS FOR THE PERIODS 1981-85 AND ALSO 1985-90.

THE ASSISTANCE OF UNIDO IS CONSIDERED AS EXTREMELY IMPORTANT FACTOR ESPECIALLY IN THE FIELD OF SCIENTIFIC INSTRUMENTATION BECAUSE THE FULFILMENT OF THE PROJECT WILL HELP IN ACHIEVING THE FOLLOWING RESULTS WHICH ARE WITHIN THE FRAMEWORK OF THE MAIN TARGET OF THE LIMA DECLARATION, I.E.:

- FURTHER MOBILIZATION OF THE CREATIVE HUMAN RESOURCES BY STRONG AID GIVEN BY SI TO THE PROGRESS OF SCIENCE IN THE COUNTRY;
- AVOIDING OR DIMINISHING THE IMPORT OF NECESSARY BUT EXPENSIVE SI FROM DEVELOPED COUNTRIES;
- ELABORATING OF THE NEW CONCEPT OF SI PRODUCTION BASED ON MODULAR PRINCIPLE AND APPLICABLE FOR DEVELOPING COUNTRIES WITH THEIR LIMITED INDUSTRIAL CAPABILITIES.

IT WAS FOUND OUT THAT THE PROJECT OUTPUTS ARE CARRIED OUT WITH THE SUBSTANTIAL HELP OF THE GOVERNMENT AND BAS, THE COMPETENCE AND ENTHUSIASM OF NPC AND HIS STAFF BEING THE OTHER IMPORTANT FACTOR MAKING IT CERTAIN THAT THE OUTPUTS WILL BE SUCCESSFULLY REACHED.

THE INVESTIGATIONS MADE DURING THE MISSION HAVE SHOWN THAT THE SI DESIGNED AND PRODUCED IN THE FIELD OF CHEMISTRY AND BIOCHEMISTRY EQUIPMENT, ENVIRONMENTAL CONTROL DEVICES ARE UP-TO-DATE AND STRONG DEMANDS TOWARDS THESE SI EXIST IN BAS.

CONSIDERING THE IMMEDIATE OBJECTIVES OF THE PROJECT MORE ATTENTION SHOULD BE PAID TO THE DEVELOPMENT OF THE BRANCH BEING IN CHARGE FOR DESIGN OF OPTICAL AND OPTOMECHANICAL SI ALSO STRONGLY DESIRED BY DIFFERENT BAS INSTITUTES.

THE HUMAN RESOURCES ARE SATISFACTORY FOR SOLVING SUCH A SIGNIFICANT PROBLEM BUT THE PURCHASING OF THE EQUIPMENT FOR DEMONSTRATION PURPOSES IS OF VITAL IMPORTANCE FOR ACCOMPLISHING THE PROJECT OBJECTIVES AND NOMENCLATURE AT THE FULL SCALE.

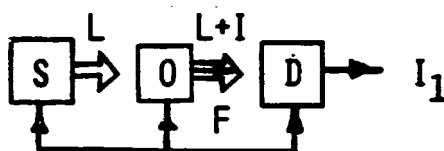
STRONG CONTACTS ARE QUITE NECESSARY BETWEEN NPP AND DIFFERENT LABORATORIES AND INSTITUTES OF RESEARCH AND OTHER RELATED ORGANIZATIONS FOR PERMANENT CONSULTATIONS, MUTUAL HELP IN RESEARCH AND TESTING, WIDER USAGE OF THE EXISTING PRODUCTION CAPACITIES OF THESE ORGANIZATIONS.

WITH VIEW TO THE OUTLINED PROJECT OUTPUTS THE LIST OF THE NECESSARY DEVICES, MACHINES AND INSTRUMENTS WAS ELABORATED AND ALL POSSIBLE EFFORTS WERE MADE TO ACHIEVE THE PURCHASING OF ITS ITEMS (ANNEX 5).

ANNEX 1

MODULAR PRINCIPLE OF DESIGN OF WIDE VARIETY
OF OPTICAL DEVICES

GENERAL DIAGRAM OF MOST OF ALL OPTICAL DEVICES IS SHOWN
IN FIG.1.

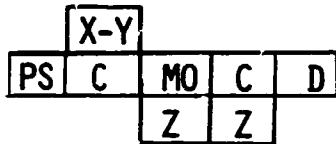


THE SOURCE OF LIGHT S PROVIDES THE LIGHT FLUX L WITH PARAMETERS EITHER SPECIFIED OR UNKNOWN. THE UNIT OR GROUP OF UNITS CONSTITUTES THE OPERATIONAL BLOCK O WHERE SOME OUTSIDE INFORMATION I TO BE PROCESSED OR PHYSICAL PARAMETERS TO BE MEASURED ARE INSERTED INTO THE LIGHT FLUX AND CHANGE ITS SPECTRAL AND SPATIAL CHARACTERISTICS. THE LIGHT SO MODULATED (L+I) IS DELIVERED TO THE DETECTING AND PROCESSING UNIT, WHERE THE INFORMATION I_1 IS DESIPHERED, DISPLAYED OR MEMORIZED. THE FEEDBACK LOOPS F CAN BE ORGANIZED TO S AND O BLOCKS IF NECESSARY.

LET US ILLUSTRATE NOW HOW THE WIDE VARIETY OF OPTICAL DEVICES CAN BE CONSTRUCTED WITH THE LIMITED SET OF UNITS. THE FOLLOWING SPECIFICATIONS ARE USED IN THIS ANNEX:

- PS - POINT SOURCE OF WHITE LIGHT
- L - LASER (CW OR PULSED - OPTIONAL)
- MO - MICROSCOPE OBJECTIVE
- CL - COLLIMATING LENS
- X-Y - X-Y MICROPOSITIONER
- Z - Z MICROPOSITIONER
- G - GRATING (RULED OR HOLOGRAPHIC)
- D - DETECTOR, PLATE HOLDER OR TV UNIT
- BS - BEAMSPLITTER
- C - CELL WITH THE MATERIAL TO BE EXPLORED OR SPECIMEN TO BE INVESTIGATED
- M - MIRROR
- FS - FREE SPACE FOR LIGHT PROPAGATION
- E - ELECTRONIC INTERFACES

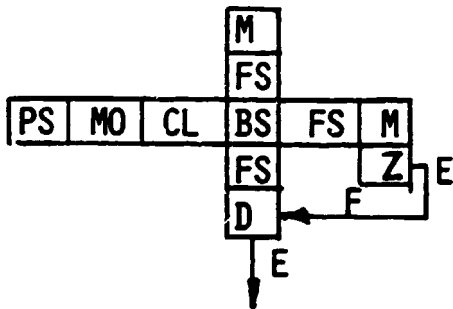
MICROSCOPE



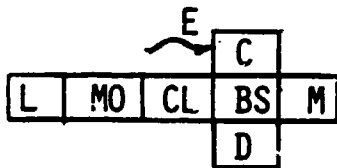
FIBER OPTICAL LINK



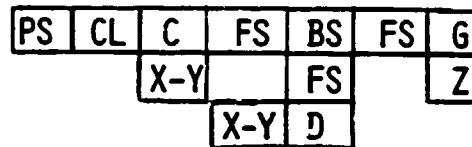
FOURIER SPECTROMETER



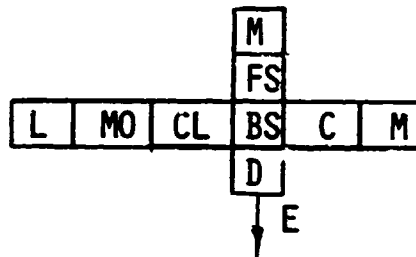
HOLOGRAPHIC SETUP FOR NDT



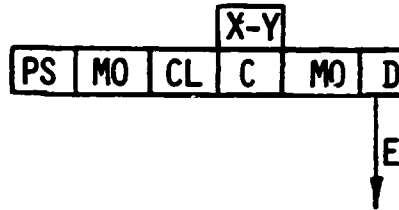
SPECTROMETER



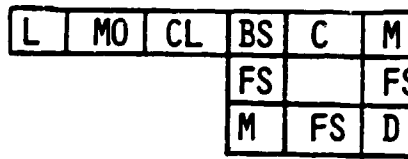
MICHELSON INTERFEROMETER



MICRODENSITOMETER



HOLOGRAPHIC SETUP FOR TRANSPARENT MEDIA



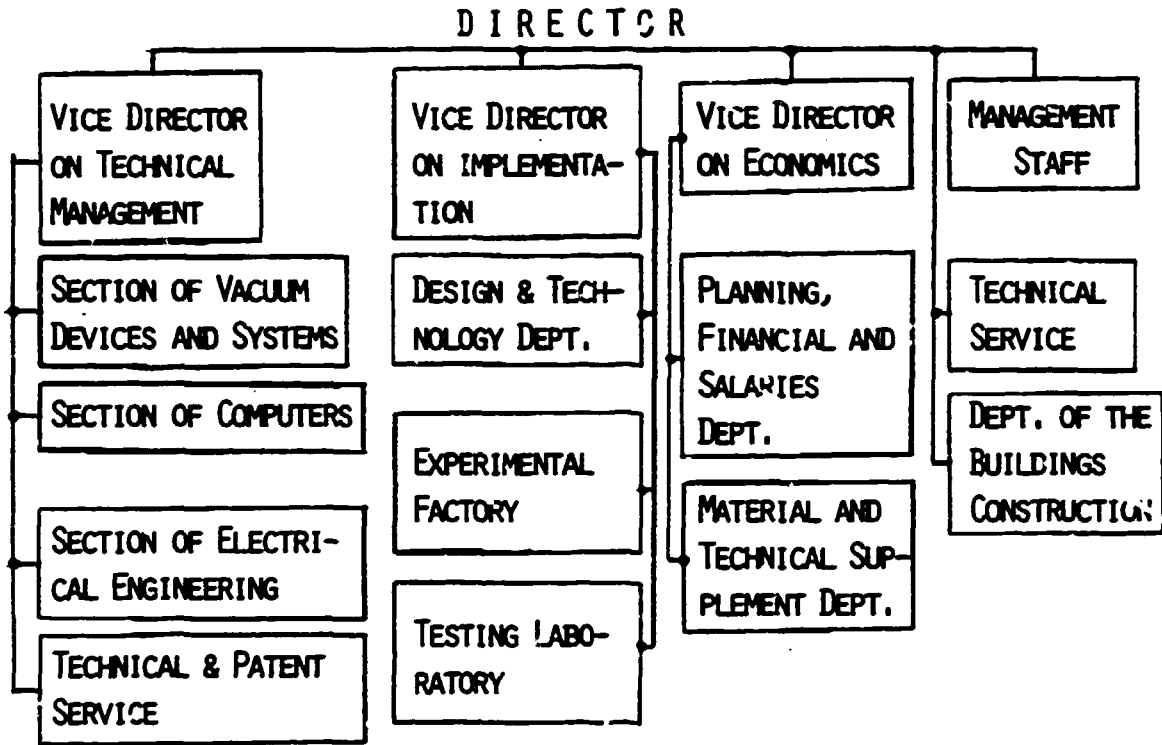
PROGRAMME OF THE EXPERT'S MISSION

JANUARY FEBRUARY
 28 29 30 31 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21

1. ARRIVAL TO SOFIA	X																									
2. MEETING WITH NPP, DISCUSSIONS	X	X				X		X	X																	
3. STUDYING PROJECT DOCUMENTS	X	X	X			X			X	X	X				X	X		X				X	X			
4. MEETING WITH THE NPC	X			X	X	X	X					X		X			X			X					X	
5. MEETING WITH BAS VICE-PRESIDENT					X																				X	
6. MEETING WITH IP DIRECTOR, DR. I. PETROV				X				X																		
7. VISITS TO CLOZOL, BAS				X								X														
8. VISIT TO LASER LAB. OF ISSP, BAS						X																				
9. VISIT TO IE, BAS, MEETING WITH ITS VICE-DIRECTOR						X																				
10. VISIT TO PLOVDIV SUBSIDIARY DIVISION						X																			X	
11. VISIT TO IMB, MEETING WITH ITS DIRECTOR, ACAD. G. BRANKOV							X		X			X														
12. LECTURE FOR BAS SPECIALISTS							X				X							X								
13. DISCUSSION ON LASER MEASUREMENT										X																
14. CONSULTATIONS WITH UNIDO, UNDP							X					X					X									
15. VISIT TO MINISTRY OF ME, MEETING WITH DEP. MINISTER, MR. KISJOV												X												X		
16. DISCUSSION ON CONTACTS WITH FOREIGN COMPANIES											X															
17. VISIT TO IRE																								X		
18. VISIT TO INSTITUTE OF COMMUNICATIONS																								X		
19. PREPAR. OF THE TECHNICAL REPORT																X	X	X	X			X		X		
20. FINAL DISCUSSIONS																							X	X		
21. DEPARTURE FROM SOFIA																										X

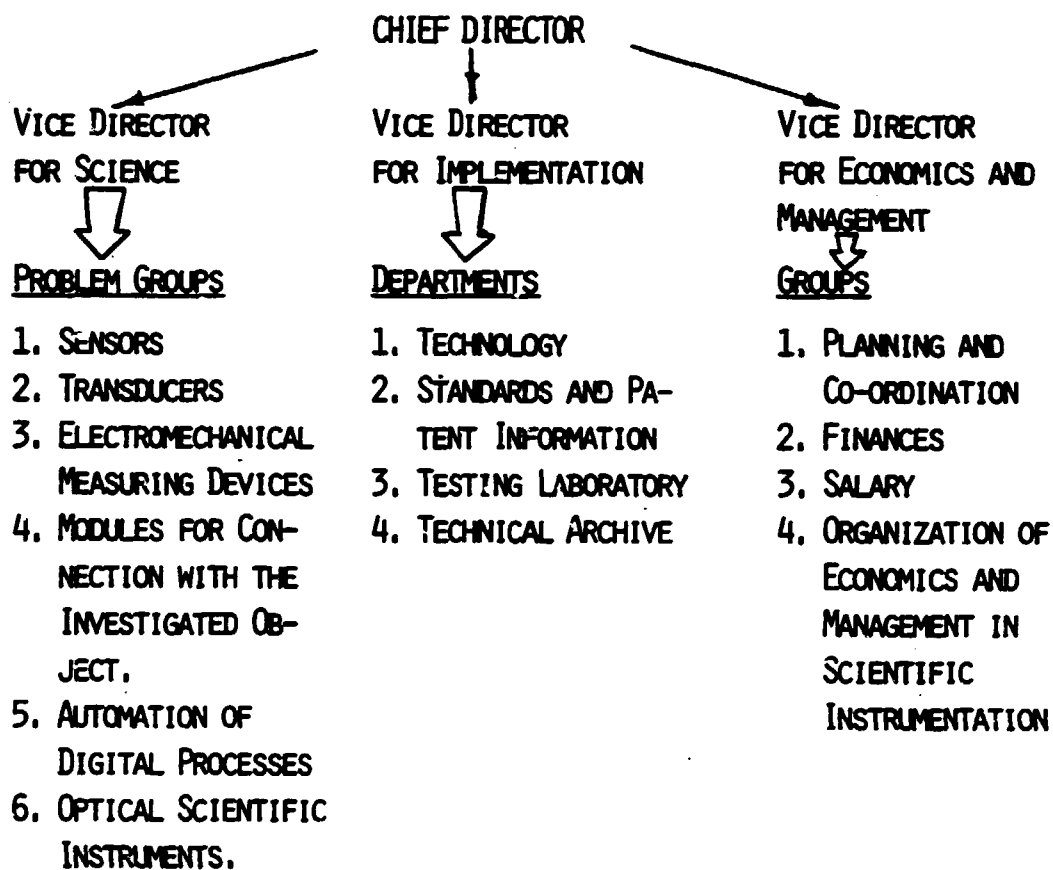
ANNEX 3

STRUCTURE OF THE PLOVDIV SUBSIDIARY DIVISION



ANNEX 4

STRUCTURE OF THE MANAGEMENT OF THE PLANT FOR
SCIENTIFIC DEVICES



ANNEX 5

LIST
OF NECESSARY EQUIPMENT (MACHINES, DEVICES, INSTRUMENTS, SETUPS)
FOR THE SUCCESSFUL DEVELOPMENT OF THE PLANT FOR SCIENTIFIC
DEVICES UNDER THE PROJECT SI/BUL/82/801.

<u>I T E M</u>	<u>PRICE</u>	<u>COUNTRY</u>
	(IN THOUS.LV.)	
1. UNIVERSAL LATHE C8	4,0	BULGARIA
2. ECCENTRIC PRESS PE-40	11,0	BULGARIA
3. POWER HACK SAW ON.254	6,0	BULGARIA
4. CUTTER GRINDER SF.315	1,5	BULGARIA
5. DRILLING MACHINE PK.203	2,0	BULGARIA
6. TABLE DRILLING MACHINE PN.161	1,7	BULGARIA
7. SPOT-WELDING MACHINE "SELECTA"	19,6	SWITZERLAND
8. RIVETING MACHINE "BRECKER"	7,7	SWITZERLAND
9. GAS WELDING EQUIPMENT GASN	0,2	BULGARIA
10. ELECTRIC WELDING MACHINE IZAE 315	1,5	BULGARIA
11. PLATE SHEARING MACHINE	0,2	BULGARIA
12. SPECIAL TOOLS CABINETS	10 x 0,2	BULGARIA
13. KLINGER SCIENTIFIC CORP. OPTOMECHANICAL SET	8,0*)	U S A
14. TOBIAS ASSOC., INC.	3,4*)	U S A

*) IN THOUSAND US DOLLARS. THIS PURCHASE CAN BE ARRANGED WHEN THE PROJECT REVISION IS APPROVED BY UNIDO.

