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DRAFT REPORT

04529

(1 of 2)

RESTRICTED
May 1975

Pakistan.
Broadcasting Equipment Manufacturing
Feasibility Study.
(Technical Side)

PAKISTAN

(DP/PAK/73/000/11-01/01)

Project findings and recommendations

Terminal report prepared for the Government of Pakistan

by

[redacted] (Electronic Engineer)

expert of the

United Nations Industrial Development Organization

C O N T E N T S

ANNEXURES:

S U M M A R Y

The report consists of 4 separate papers namely :

I- Electronic Equipment Manufacturing.
II- Transmitting Tubes Manufacturing.
III- T.V. Picture Tube Manufacturing.
IV- Electronics Industry in Pakistan.

I- ELECTRONIC EQUIPMENT MANUFACTURING :

The local electronics industry is not in a position to manufacture broadcasting equipment. Broadcasting engineering staff had worked themselves a prototype of "Studio Consolette" and "50 KW, M.W. Transmitter." It is recommended to establish in P.B.C. a Design & Development Department", to continue prototype production to achieve quality and reliability and to train the engineering staff, then they can shift to industrial production of Broadcasting equipment, of course when economically viable.

II- TRANSMITTING TUBES MANUFACTURING :

In addition to the feasibility study of broadcasting equipment, we were asked by P.B.C. to study the possibility of transmitting tubes manufacturing. The annual consumption of tubes of many types is relatively low. It is recommended to standardise the transmitting tubes used in P.B.C. and to study the possibility of incorporating the transmitting tubes in a plant of TV picture tubes to utilise the common facilities. It is also recommended to contact the broadcasting organisations in the developing countries in this concern because this case is a general one. This will give chance to standardise, to manufacture and to market the transmitting tubes and the broadcasting equipment.

III- T.V. PICTURE TUBE MANUFACTURING :

We were asked by Scientific and Technological Research Division to participate in the study of "Local Production of T.V. Picture

tubes & transmitting tubes. It was recommended that the local manufacture of T.V. picture tubes has to be considered and it is advisable to negotiate for a second hand plant. In the initial stage of planning, examination, finalisation of the project and implementation, UNIDO experts and local consultants should be associated with the project.

IV- ELECTRONICS INDUSTRY IN PAKISTAN :

The activity of the experts had been extended to the electronics industry in Pakistan as a whole, and the experts assisted the industry in both fields of existing activity and in the study of their future projects. The electronic industries in Pakistan are in need of : planning, co-ordination, follow up, development, research, quality, standardisation, training on different levels (engineers, technicians and skilled workers), and management. It is recommended that an authorised board of electronics should be set-up assisted by UNIDO experts to promote the electronics industry (Planning, Co-ordination, follow-up, development and training).

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Preliminary Report

Broadcasting Equipment Manufacturing Possibility Study.

DP/PAK/73/040

A- Counterparts:

1. Mr. Irfanullah, Director of Engineering,
   Pakistan Broadcasting Corporation, Headquarters,
   01-A, Satellite Town, Rawalpindi. Telephone No: 41864
2. Mr. Imaduddin, Controller, Planning and Research,
   Pakistan Broadcasting Corporation, Headquarters, 35-A,
   Satellite Town, Rawalpindi.
3. Mr. M. Iqbal Baig, Deputy Controller (Planning)
   Pakistan Broadcasting Corporation, Headquarters, 35-A,
   Satellite Town, Rawalpindi.

B- General Situation:

1. Study of employment and income situation.
2. Present availability of electronic consumer goods:

   a) Radios
   b) TV Sets
   c) Telephones and telegraphs
   d) Teleprinters
   e) Other equipment;

3. Present position in imports and local manufacturing of

   - Radio broadcasting equipment
   - TV broadcasting equipment
     Microwave and very high frequency (VHF) equipment
   - Telephone carrier equipment
     Electronic industry
   - Component manufacturing
   - Industries supporting electronic equipment

   This will include assessment of standards, production levels and economy;

4. List of on-going schemes in broadcasting, telecommunications and in electronic industry;
5. Requirements of the prespective plan for broadcasting equipment manufacture;

   a. Electronic equipment (Studio equipment, amplifiers etc)
   b. Antennas
   c. Transmitters
   d. Transmitting valves (Manufacturing transmitting valves is supposed to be joined with the manufacturing of television picture tubes which is a project under consideration by the working group for electronic industry)

These proposals relating to broadcasting equipment, telecommunication equipment and electronic industry should incorporate:

- Modernisation, replacements, expansion
- new capacities
- new production lines and proposals for assembling.

Evaluation.

6) Assessment of feasible alternative for local production of broadcasting equipment, microwave very high frequency (V.H.F.) and telecommunication equipment as well as of electronic consumption goods, components and related products. Economic evaluation of the proposals for expansion of production of electronic and telecommunication consumption goods and components, extent of capital and foreign exchange required; marketing of electronic and telecommunication equipment at present and the out look for the prespective plan period.

7) As there is a vast variety of equipment and devices of different manufacturers there is a great need for standardisation of equipment for future needs of the radio and television broadcasting as well as for other prospective users, in order to justify local manufacture which will be of the character of individual equipment and small series equipment.

0 - Work Plan.

In order to assess the situation we intend:

1. To visit various installations of Pakistan Broadcasting Corporation, Pakistan Television Corporation and Telephone and Telegraph Department (Studios, Transmitters, Workshops, laboratories and training centre).

2. To visit the concerned local industries/television sets, Radio sets telecommunication equipment, Cables and wires and allied industries as to assess the possibilities of the local industries to participate in manufacturing of the required articles.

3. To visit universities, poly-technics, research and development institutions, broadcasting corporations, industries and institutes in order to evaluate the ability of the local technical and Engineering Staff to carry out manufacturing of the required articles.

4. To make a market research for broadcasting equipment, electronic and telecommunication equipment and electronic consumption goods in order to improve the economy of production.

5. To visit specialised firms and plants concerned with the manufacture of transmitters and transmitting tubes, electronic and telecommunication equipment, namely AEG-Telefunken, Federal Republic Germany-Marconi; United Kingdom- Philips; Holland-Brown Boveri; Switzerland-Radio Corporation of America, Gates and Ampex, United States of America, Tesla; Czechoslovakia-Electronimpex; Hungary; and the concerned sections of UNIDO, VIENNA.

It is our consolidated opinion that for proper preparation of the study we shall required six months including six weeks outside Pakistan visiting foreign manufacturers and UNIDO Headquarters.

[redacted]

(Dr. R. El-Hadidi) (J. [illegible]

[redacted]

(Per Broadcasting)

ELECTRONIC EQUIPMENT MANUFACTURING

A) INTRODUCTION:

1- Requirement:

The Pakistan Broadcasting Corporation counterparts handed over to us their "Five Year Plan 75-80 " (attached annex -I) and list of Electronic Equipment For the Five Year Plan" (attached annex-II)and asked us to study the feasibility of manufacturing of such equipments.

2- General Situation:

As mentioned in the " Preliminary Report".

3- Work Plan:

As mentioned in the "Preliminary Report " (See list of electronics industry, annex VIII.

B) FINDINGS:

1- The local electronics industry is not in a position to manufacture the required equipments, but is in a position to supply some parts and components used in these equipments.

2- There is no local market - for the time being - for the electronic equipment intended to be produced by Pakistan Broadcasting Corporation (PBC) other than PBC itself.

3- During our visits to PBC establishments we tried to evaluate the ability of the local technical and engineering staff to carry on manufacturing of the required equipments on an industrial scale. We found that there is not enough staff to do such job, and training and practice are needed.

4- The transmitter staff of PBC in Lahore had worked a prototype of "50 KW Medium Wave Transmitter " from imported spare parts and locally fabricated parts. (see the attached report about locally manufactured 50 KW MW. Transmitter, annex- VII).

5- The [illegible] staff of PBC in Rawalpindi had worked a prototype of " Studio Consolette" from imported spare parts and locally fabricated parts and components. (See the attached report about locally manufactured studio consolette, annex VI).

6- The engineering staff of PBC in Rawalpindi are working on a prototype of "Master Switching Console " transistorised version. Not yet completed.

7- The prototypes which are produced by the PBC staff, even it can satisfy the technical parameters during testing, but it need to be in an industrial form, to verify the requirements of reliability, to have a long term functional stability, and to have long life expectancy.

8- It was agreed to limit the number of equipments to be manufactured from the many types mentioned in "List of requirement of the 5 year plan " to a limited number stated in the attached paper " list of locally Manufactured Electronic Equipment". This choice of kinds of equipment and quantities is based on engineering evaluation for future PBC need of expansion, replacement and modernisation.

9- A " Design and Development Department " is needed to be established in PBC to carry on the design and development work. (See the attached paper about design and development annex - IX)

10- A set up for " Electronic Equipment Manufacturing Organisation" to manufacture the required equipment is attached.

11- A paper about economical study of electronics equipment manufacturing is attached.

12- The equipment of PBC has become very hetrogeneous due to procurement from various foreign sources. The local manufacturing of electronics equipment will assume a certain direction of standardisation. It will be possible to gradually replace the existing worn out equipment at the various units by the locally produced equipment, resulting in greater uniformity in the requirement of spare parts. The standardisation will result in the reduction of the variety of spare parts [illegible]

13- The prototype design has to be based on the locally produced components. To do this, it is needed to establish good contacts with the local industry and to know their possibilities and limitations. The result will be building of technical staff, encouragement of the local industry, and saving of foreign exchange, this also will have a beneficial bearing on the non capital stores requirements for the spare parts.

14- The economical study made by PBC on the sample pilot prototypes of 50 KW transmitter [illegible] and studio Consulette (studies are attached) show an optomistic results. While the economical study made by the UNIDO industrial economist shows another result. Besides, we can take into consideration the advantages discussed in the above mentioned items 12 & 13, the situation of a developing country, their wish for industrialization, the interest to save foreign exchange, and the build up of technical staff and expertise which will pay on the long run and which is needed for the development and build up of the country. For all those considerations, it is worthy to consider the production of some electronic equipment. The PBC engineering staff had initiated this trend by working the above mentioned prototype equipment. This initiation - although it is the first trial and it has not yet the prospective final form - is worthy to be encouraged, guided and evaluated.

15- Before establishing an industrial organisation to produce the required electronic equipment, the following is needed:-

a- To establish the design and development department

b- To train the engineering and the technical staff

c- To prove the reliability and life expectancy of the intended products through the prototype product

d- To explore the possibility of the continuous local and foreign supply of fair quality reliable parts and components needed to run the production

e- After more pilot production, to revise the PBC economical study according to that made by UNIDO industrial economist.

This can be done by establishing the design and development unit to begin the production work on a pilot production scale using the existing possibility plus the minimum supply of production equipment and working staff just needed to begin an organised pilot production.

During the progress of the work, the following should be

done: extensive design and development work, collection and analysis of datas concerning the products, modifications and improvements, quality control, training of the staff to take place, extensive engineering and creative efforts to be done, and market research to be explored.

By doing this, it will be easy to reach the stage where to be in a position to decide to shift over from pilot production to a continuous industrial production.

After the product will pass successfully the tests and the quality control in production, and after to prove reliable in use for sufficient time in PTC with a fair good performance, it would be possible at that stage to market the product to other users.

16- Pakistan Television Corporation (PTC) is a relatively young and is busy with growing more than with manufacturing electronics equipment. It is more busy now with the introduction of colour television which has to begin at the end of this year 1975. Concerning colour television. The television Engineers made a preliminary choice for the colour television system as PAL. But after finding some neighbouring related countries as Saudia and Iran had chosen SECAM system, they are revising themselves. Pakistan Television Corporation and Pakistan Broadcasting Corporation need to have more cooperation and coordination.

6) RECOMMENDATIONS:

1- To establish a design and development department as discussed above.

2- The choice of the type of equipment to be produced has to be investigated throughly, giving enough attention to the following:-

- To follow the modern technical trend in the design
- The use of transistorised version and the use of IC is preferable.
- The equipment has to be tropicalised to suit Pakistan climatic condition.
- To use as much as possible parts and components fabricated locally.
- The equipment has to be produced in accordance to standards.
- The product has to fulfil perfectly the specification and to verify all the required parameters and quality level.
- Reliability has to be considered as an important factor.

Cont'd...

- The design of equipment has to permit an easy maintenance.
- It is preferable if the equipment to be build from plug - in discreet units, because this can help quick replacement of defective part, hence minimising the break down operational time, which is important in the broadcasting equipment.

3- To spend more effort for the training of the engineering and technical staff.

4- Within the establishment of the design and development, to begin a pilot production using the existing possibility plus minimum support required.

5- During the progress of work, the following is to be done:-

- Extensive design and development effort is to be spend using engineering and creative ideas.
- Progressive production datas have to be collected and analysed.
- Continuous modifications and improvements are to take place.
- Quality control is to be strictly applied
- To use the production as a good opportunity to train the working staff and giving practice to them.
- Market research needs to be explored.

6- By doing this, a stage can be reached where it will be possible to decide to shift over from a pilot production to a continuous industrial production. (The set ups of an industrial organisation to produce electronics equipment is attached). This decision will consider - of course - the revision of the economical study.

7- After the smooth run of the industrial production, with a fair quality and reliability results, it will be possible to try to market the products to other users such as: Television Corporation, Telephone and Telegraph Department, Civil Aviation, Water and Power Developing Authority (WAPDA) Pakistan Railway, P.I.A., Sui Gas Transmission Lines. To find bigger market for the products will improve the development and the economy of the project.

Contd.....P/6

8- Better cooperation and coordination is needed between Pakistan Broadcasting Corporation and Pakistan Television Corporation.

9- The TV colour system preliminary chosen in Pakistan has to be revised according to that used in the neighbouring related countries.

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TRANSMITTING TUBES MANUFACTURING

A) INTRODUCTION:

1- Requirement:

The original assignment is to make a feasibility study for broadcasting equipment manufacturing. In addition, after the arrival of the experts, the broadcasting organisation represented by Mr.Irfanullah, Director of Engineering asked to make a feasibility study for transmitting tubes and vacuum capacitors manufacturing (See list of transmitting tubes, Annex 4 ; and list of vacuum capacitors, Annex 5).

2- General Situation:

As mentioned in the "Preleminary Report", and in the report of "Manufacturing of Transmitting Tubes in Pakistan", Annex 10.

3- Work Plan:

As mentioned in the "Preleminary Report", and in the report of Manufacturing of Transmitting Tubes in Pakistan, Annex 10.

B) FINDINGS:

1- The number of types of transmitting tubes in use in P.B.C. is 52 in year 1974 (See Annex IV).

2- The number of transmitting tubes consumed annually is estimated according to that year 1973-74 to be 535 pieces having total cost of 3028021 rupees (See Annex IV).

3- For vacuum capacitors, taking year 1973-74 as reference, number of types is 30, annual consumption is 61 capacitors, with total cost of 663500 rupees (See Annex V).

4- From the first look the manufacturing of transmitting tubes seems to be unfeasible, at least from the point of view that it is not economical to manufacture annually few pieces of the several types of tubes with a limited market, especially if we can visualise the big efforts needed to introduce such a new field of technique locally. But in the developing countries they evaluate the economy of a project as follows.

5- The project may not be initially economical in terms of the cost of end-items readily available in foreign markets. The aim is to find the most economical means of achieving self-sufficiency speedily rather than the most economical means of aquiring equipment and devices from abroad.

6- The economics of a project need to be examined in terms of invisible benefits and long range gains. Balancing of revenues with costs will certainly not be possible in the initial stages. It is the development and production activity generated, which is valuable. This development activity will pay dividends at a later date in terms of economic and technological progress although no immediate profits may be forthcoming.

Cont.../

7- If we take all these respects in consideration, the manufacturing of transmitting tubes in Pakistan becomes to be of interest. Now, when to consider the manufacturing of the transmitting tubes, we have to try to find some way out to make it economical as possible.

8- Approaches towards improving the economy of transmitting tubes manufacturing in Pakistan can be as follows:

a. The transmitting tubes used by P.B.C. are of a very big range They were obtained from various manufacturers from all over the world. They are also using different methods of cooling (air cooled, water cooled and vapour cooled). The big number of tubes can be reduced considerably by local standardisation.

b. The manufacture of transmitting tubes can be joined with T.V. picture tube plant (under study), where common facilities for the two processes could be shared and utilised, there by reducing expenses on overheads, facilities, expertise etc. This will improve the economy of the project.

c. The represent of P.B.C. said that mostly the prices of spare parts are very much higher than their price in the transmitter as a whole, and the manufacturers exploit the developing countries very much in this concern. The price of the manufacturer can be reasonable when selling a transmitter, but the price is much higher when supplying spare parts. This case does not relate to Pakistan only, but it is a general case of the developing countries. If this is the case, then the coopr-ration of the developing countries in this concern will give to them a big chance in manufacturing and marketting of transmitting tubes and broadcasting equipment.

9- The standardisation of the transmitt ng tubes in Pakistan is to be the first step towards the manufacturing of the tubes. Also it has the following advantages:-

a. It will enable the choice of more effieient tubes in terms of their performance, life and price.

b. The number of tubes required as spares will be reduced appreciably.

c. It will facilitate the design of the transmitters envisaged to be fabricated in Pakistan.

d. Increased quantity of one type of tube to be imported to or manufactured in, Pakistan will reduce the cost.

10- A paper about economical study of transmitting tubes in manufacturing is attached (See Annex XIV).

Contd.....P/3.

C) RECOMMENDATIONS:

1- Local standardisation (or profable types) of transmitting tubes used by PBC is needed. This requires an assignment of a UNIDO technical expert for four months:-

- For one month to collect the available information to define the more needed information and to put the general policy.
- For 1.5 month to visit specialised firms and plants concerned with the manufacture of transmitters, transmitting tubes and vacuum condensers such as: Telefunken (Germany), Brown Boveri (Switzerland), Tesla(Czechoslovakia), Philips(Holand), Marconi (England), Electroimpex (Hungary), and RCA(USA).
- For 1.5 month in Pakistan to standardise the tubes theoretically and may be able to make one case application as an example.

2- As the case is general and of interest to the broadcasting organisations in the developing countries, it is recommended to contact them and to send copies of the final report to them, as to be able to study the case separately or in a conference. The cooperation of the developing countries in this concern will give to them a big chance to standardize, to manufacture and to market the transmitting tubes and broadcasting equipment.

3- The manufacturing of transmitting tubes has to be incorporated with the T.V. picture tube plant study. There is a need to study whether the transmitting tubes can be fabricated and manufactured under the same premises of T.V. picture tube with utilisation of the common facilities.

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[redacted]

T.V. PICTURE TUBE MANUFACTURING

A) INTRODUCTION:

The activity of the exports had been extended to the electronics industry in Pakistan a. whole and the exports assisted the electronics industry in Pakistan in both existing activity of industry or in their future projects. Consequently, the exported were asked by the Government of Pakistan, Scientific and Technological Research Division, to participate in the study of "Local Production of T.V. Picture Tubes and Transmitting tubes and Standardization of T.V. Components and Sub-assemblies." Our discussion will be based on the above mentioned activity.

B) FINANCE:

1- T.V. BROADCASTING COVERAGE.

Pakistan has today Television Stations at Islamabad, Lahore Peshawar, Quetta and Karachi and coverage of their programmes have been extended to neighbouring areas by installation of relay stations at a number of suitable locations. A net work of relay stations is expected to be completed in 1975 providing a television coverage to 80% of the population in Pakistan. By 1980 almost the whole of the country will have the T.V. Programme coverage.

It has been estimated that because of the extended T.V. coverage, the number of new TV sets required in 1975, would be around 70,000/-. Assuming a uniform increase in demand, the requirement of TV sets is expected to increase to over 100,000 per year by 1980.

2- T.V. SETS MANUFACTURING:

At present there are seven units for assembly/progressive manufacture of T.V. sets in the country, which are producing about 60,000 sets per annum on a single shift basis. In actual fact the units are capable of producing 100,000 sets per annum.

All the manufacturers import CKD TV kits which do not contain components that they locally produce. The content of locally produced components in TV sets manufactured assembled locally is restricted mostly to cabinets and chassis making and mechnical and plastic parts, and is about 30% in case of most of the units.

3- TRANSMITTING TUBES:

As a consequence of discussions held at SATR Division with U.N. Advisors who are presently working with Pakistan Broadcasting Corporation and who are examining the feasibility of the local manufacture of Transmitting tubes, interest was revived in a TV picture tube manufacturing unit. It was agreed to study whether the H.P/M.P. transmitting tubes which are custom made can be fabricated and manufactured under the same premises with utilisation of some of the common facilities.

The requirement of High power and Medium power transmitting tubes is rather small in the country and to set up a manufacturing unit for this purpose may not be economical. However, if transmitting tubes are

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manufactured as a stated above in a T.V. picture tube plant where common facilities for the two processes could be shared and utilised thereby reducting expenses on overheads, facilities, expertise etc., and the production of transmitting tubes may become an economical proposition.

The low powered transmitting tubes could be introduced at the stage when the fabrication of the electron guns is introduced in the plant.

4- CATHODE RAY TUBES (CRT):

There is going to be a growing need for the C.R.T. in the professional field and scientific institutions with further development in the country and particularly the demand for C.R.T. is expected to increase tremendously with the efforts to improve the standards of education and provision of proper laboratory facilities in teaching institutions under the new education policy. Estimates of the future requirements of C.R.T. for the educational and scientific institutions are being worked out by Dr. Kamaluddin Ahmed in collaboration with the Education Division.

The technology for the manufacture of C.R.T. is more or less similar to that of the picture tubes and as such it is felt that their production can be carried out in a TV picture tube plant, after the smooth running of the plant is established. Perhaps, the demand of the C.R.T. about ten years from now may be so great that once the present TV picture tube becomes obsolete, 10 to 12 year hence, plant may possibly be diverted to the production of C.R.T.

5- ECONOMIC VIABILITY:

The CKD TV kits being imported by local assemblers which exclude a few parts and components locally produced has a C&F cost of about $ 70 to 80 for the 20" set and $ 80 to 90 for a 24" set. Of this the cost of the picture tube is about $ 25 & 30 for 20" and 24" tubes respectively, which is quite a good proportion of the total TV kit cost. It was therefore considered that if local manufacture of TV picture tubes is undertaken, it will be possible to save a substantial amount of foreign exchange expenditure incurred on their imports. It is estimated that the saving in foreign exchange per picture tube will range from $ 10 to 12. Taking annual consumption of 1 lakh tubes, the Foreign Exchange saving could be at lease Rs. 1 crore per annum.

The requirements of Black and White TV picture tubes may be even well above 100,000 tubes per annum by 1980 and that a plant of the size can be an economically viable proposition. However, it was felt that in the absence of details of the machinery, its cost, its source and information on various other related questions, it will not be possible to work out the investments, the cost of production and economics in detail. It was agreed that TV assemblers and component manufacturers in

Contd...P/3

the country may be in a much better position to work out the economics of such a project in collaboration with their principals. The proposal which is most feasible technically and economically could be thus selected out of the proposals received for implementation.

To make it more economically viable, it is advisable to negotiate for a second hand plant possibly with all the facilities of manufacturing of glass envelopes and the gun. The production of glass envelopes in Pakistan is considered to be one of main factors deciding the economy of the final product.

6- PHASES OF MANUFACTURE:

In order to ensure smooth transfer of technology and experience and stabilise the production techniques, the following phasing of the manufacture of TV Picture Tubes is recommended:-

In the first phase of manufacture the glass envelopes, guns and chemicals will have to be imported.

In the second phase glass envelope may be imported in three pieces, i.e., screen, cone and the neck and their sealing be carried out in the plant.

During third phase, the manufacture of electronics guns from imported materials may be undertaken.

These phases can be considered as a general guidance and the period for each phase may be decided according to the progress of the implementation of the project.

In the meantime from the very start effort should be made to develop and locally produce glass and glass envelopes and chemicals for the T.V. picture tubes. Perhaps P.C.S.I.R. could undertake a development project in this respect.

7- DEVELOPMENT OF GLASS:

The type of glass used in TV picture tubes is lead glass and has to be treated and annealed so as to have no stresses at all. Dr. Ahmad Din of the Glass & Ceramics Division of PCSIR was of the opinion that it is possible to produce such a glass in the country without much difficulty. Mr. Hassan of EL&EC informed the house that when the last proposals were submitted by them, the Corning Glass Factory were given the permission to establish/to produce TV picture tube glass provided the number required was quite large, say about 1 lakh pieces/annum.

/Glass factory is located, they had undertaken/

The Sub-Committee recommended that the progress should be ascertained from the Ministry of Industries. A note on the local development of glass from Dr. Ahmad Din, is enclosed as appendix_____.

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5- STANDARDIZATION OF TV PICTURE TUBE :

The sub-committee agreed that Pakistan and the other countries in the region including Middle-east have adopted CCIR system, and it would therefore be advisable to adopt European standards for the TV picture tubes.

As far as the size of the TV picture tubes is concerned the two standards sizes in use in Pakistan are 20" and 24". However a 17" TV picture tube could be subsequently considered and introduced for the development of a popular cheap TV set.

The Sub-Committee recommended that in the initial stage of Planning, examination and finalisation of proposals and implementation of the project, UNIDO expert and local consultants should be associated with the project.

6) RECOMMENDATIONS :

1- Local manufacture of TV picture tube has to be considered.

2- The production of glass envelop for the TV picture tube in considered to be one of main factors deciding the economy of the final product.

3- The production of TV picture tube has to be placed(see the above mentioned "Phases of Manufacture").

4- Preferable types of TV picture tube has to be decided (See "Standardisation of TV Picture Tube").

5- To make the project of TV picture tube manufacturing more economically viable, it is advisable to negotiate for a second hand plant possibly with all the facilities of manufacturing of the glass envelopes and the electronic guns.

6- In the initial stage of planning, examination, finalisation of the project and implementation UNIDO experts and local consultants should be associated into the project.

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ELECTRONICS INDUSTRY IN PAKISTAN

ELECTRONICS INDUSTRY IN PAKISTAN

A) Introduction:

The activity of the experts had been extended to the electronics industry in Pakistan as a whole, and the experts assisted the electronics industry in Pakistan in both existing activity of industry or in their future projects. Consequently, the experted were asked by the Government of Pakistan, "Scientific and Technological Research Division" to participate in the study of "Local Production of TV Picture Tubes and Transmitting Tubes and Standardisation of TV Components and Sub-assemblies Our discussion will be based on the above mentioned activity.

B) Findings:

See the following papers:

1- History of development from 1960-74 and the present state of the industry.(Annex XV).

2- List of electronics industry in Pakistan

3- Electronic Industry in Pakistan (Annex XVI).

4- Standardisation of TV sets in Pakistan (Annex XVII).

5- Manufacturing TV picture tube in Pakistan (Annex XVIII)

C) Recommendations :

1- More care about quality of the products is needed. This can be controled by establishing a governmental quality control centre.

2- More co-operation and co-ordination within electronic industry is necessary. This can be handled through the Ministry of Industry, for example.

3- Industrial organisation has to be adhered in the product

4- It is worthy to study the production of the following:

a) Basic Components:

- TV prioture tube
- Ceramic capacitors
- Ferrites
- I.C.

b) TV & Radio Circuit bounded components:

- Transformers & IF's.
- Frame output transformer.
- Line output transformer
- Deflection coils

5- Standardisation of components, circuits and technology has to be done.

6- Engineering education should be more practical and research orien

7- There is a requirement of a large number of manager, scientists a engineers.

8- The number of technicians needs to be doubled and more care has to be given to poly-technic & similar education.

9- [redacted] should be introduced to train skilled workers.

10- There is a need for electronic research and development centre, beside the universities and the institutes activities in the electronic field, and also the local design and development activities in the different electronic plants.

11- An authorised board of electronics should be set-up assisted by UNIDO expert to promote the electronic industry (Planning, coordination, follow-up and development).

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ANNEXURE – I

PAKISTAN BROADCASTING CORPORATION

I- 5th FIVE YEAR PLAN (1978-80).

The following schemes are proposed for the Development programme of Broadcasting on the basis of the above objectives.

i) Medium Wave Coverage.

As the signal on the Mediumwave is more steady with less of interference and can be received well on cheap single band radio sets, it is the primary objective of the Pakistan Broadcasting Corporation to provide the entire country with mediumwave service. After the completion of the Crash Programme some areas would still be left particularly in Baluchistan and Northern regions where reliable mediumwave reception would not be available during the day time. In order to fill up gaps, it is proposed to install five 10 KW MW Transmitter stations at Rahimyar Khan, Gilgit, Skardu, Chitral and Gwadar three 100/150 KW MW transmitters at Muzaffarabad Panjgur and Khuzdar. With basic facilities of Programme Production at each stations with the installation of these transmitters, mediumwave coverage will increase to 87% in terms of area and 98% in terms of population. The people of the respective areas will get the facility of broadcasts in their own dialects, projecting their cultural heritage. They will also receive news and the programme of national importance on cheap radio sets. A 100/150 KW MW transmitter envisaged in Crash Programme will be completed at Khairpur during this plan.

In addition to the above schemes, a 1000 KW MW Transmitter has also been proposed at Karachi on the basis of the recommendations of the publicity and propaganda committee. This transmitter will be sited at a new place in Karachi and the programme of (Ch. I) will be broadcast on this transmitter. The 100 KW MW Transmitter proposed during Crash Programme will be used for 2nd Channel programmes. The present 10 KW MW Transmitter is pretty old and will become obsolete by the time the 1000 KW T/R comes on the air. Moreover, with the rapid increase in industrialisation in Karachi area, man made noise will rise to a level, which the signal strength of the 10 KW MW Transmitter would not be able to overcome. This Transmitter will, therefore, have to be scrapped.

The proposed 1000 KW MW Transmitter, Karachi will give in... coverage in the Industrial areas and provide better quality l... ning to the people of Karachi. It will adequately counter th... propaganda focussed towards this region from across the bord...

ii) Provision of 2nd Channel.

Second Channel transmitter are being proposed at all main stations of P.B.C. for the broadcast of special programmes catering to requirements of different sections of the society in a particular areas. Programmes of special interests and guidance, have to be broadcast for the students, women, children, labourers and farmers, as the single channel does not satisfy the programming needs of all these sections of the society. After the completion of the Crash programme all the main stations of the P.B.C. will have second channel transmitters expepting Rawalpindi station, which is provided under long term plan (1980-85).

It is, therefore, proposed to replace the existing 5 KW MW Transmitter at Lahore with 50 KW MW Transmitter to broadcast 2nd Channel programmes. The 5 KW MW Transmitter, at present at Lahore is very old and has out-lived its useful, life, and as such replacement is necessary. The 50 KW Transmitter has been rigged up locally at Lahore by the PBC staff.

iii) Studio Transmitter Links.

V.H.F. Links are required to supplement the non-exchange programme lines between Receiving Centres, Broadcasting Houses and the transmitters at all the existing stations. The necessity of STLs has arisen because of un-satisfactory performance of programme lines and frequent interruptions in the programme due to faults on these lines. By installing these links we propose to improve the quality of broadcasts and ensure uninterrupted services. After the completion of the Crash Programme, total requirement of 18 numbers of STL would be left over which is propose to be met during the 5th plan.

iv) External Services.

Mediumwave.

Most of the Broadcasting Organisations in the World have already started broadcasting external services on mediumwave transmitters and we should not lag behind in this field.

It is, therefore, proposed to install a 1000 KW MW Transmitter at Gawadar for broadcasting the programme of external services. This super power transmitter will provide better and more extensive coverage both in the day and night time to the border areas in Afghanistan Iran, & persian Gulf.

Shortwave.

After the completion of Crash Programme only two shortwave transmitters of highest power of 250 KW power will be available for external services.

Due to even increasing interferrence and congestion in the SW band we will have to switch over to High power like 250 KW for quite a few of our external services which are presently being served with 50 KW or 100 KW transmitters. The present 50/100 KW transmitters would be used for services to nearer targets which are these days being served on low power transmitters. It is therefore proposed to add 4 Nos. of 250 KW SW Transmitters at Islamabad at the present site, with some addition to the existing building.

A proposal for the installation of two 100 KW SW Transmitters one at Karachi and the other at Islamabad has been included in the 5th Plan on the basis of the recommendations of the publicity and propaganda committee. These two transmitters will be installed at new sites in both the cities and will be utilised both for external and internal coverage in case of any damage to existing no work of shortwave transmitters, at Karachi or Islamabad. These will also be used for extending the field of External Services

v) **F.M. Coverage.**

The sphere of Mediumwave transmission is getting more ... more congested with the coming up of a larger number of high power transmitters. This congestion in the spectrum has resulted in severe interference. F.M. transmission not only provides a refuge from this interference but also provides better quality of reception inherent in F.M. technique. In the Crash Programme provision has already been made for getting up F.M. transmitters at all the main stations of the PBC for providing good quality programmes to the sophisticated listeners on third channel.

During the 5th Plan F.M. coverage is proposed to be increased by installing 5 F.M. Transmitters at Mastung, Murree and Skaser. These transmitters will relay the programmes of Quetta and Rawalpindi F.M. Stations, thereby enlarging the F.M. coverage.

vi) **Equipment for Research.**

Pakistan Broadcasting Corporation is a major user of frequency spectrum. The number of transmitters and services will considerably increase after the completion of Crash Programme.

As such the work of Research Department in the field of frequency determination will accordingly be increased involving the use of the more sophisticated equipment. Thus, equipment for Research is proposed to be procured during the 5th Plan. This is infact an approved scheme of 3rd plan and was deferred to 5th Plan due to paucity of fund.

vii) Extension in Studio Facilities.

A new Broadcasting House is proposed to be constructed at Karachi in placed of the existing one which has become out dated.

The extension of studios and technical facilities at Quetta and Hyderabad stations is also envisaged in the Plan. These are old stations and do not have adequate studio space and technical facilities to cope with the increased requirements of programme production and recording due to the introduction of 2nd channel and 3rd F.M. channel from these stations. A provision has, therefore, been made for the extension of studios and for additional technical facilities at both these stations. An extension programme of studio at Lahore is also being envisaged.

Extension of Broadcasting House, Islamabad is also envisaged during the 5th Plan and it is proposed to add 3 floors and one auditorium to this block. The extension of office block would become necessary due to shortage of office accommodation in the existing five story building. The cost of the auditorium is likely to be shared by the Ministry of Education for which negotiations are in progress. Provision has also been made for the addition of one floor to office block and air conditioning of entire office block at Broadcasting House, Peshawar.

viii) Auditorium.

In keeping with the current policy of the Government to encourage the public participation in the programmes, it is proposed to construct auditoriums at all the main stations of Pakistan Broadcasting Corporation. The auditorium having a capacity of 1000 persons are proposed for Karachi, Lahore and Islamabad stations and

of 500 persons capacity are proposed for Multan, Hyderabad, Quetta and Peshawar stations, with all the essential technical facilities.

ix) Extension in Training Facilities.

With the extension of Broadcasting net work larger number of technical hands would be required in different graders. The new entrants will have to be trained in various fields of operation and maintenance of High Power Transmitters, and studio equipment. As such the training facilities are proposed to be increased during the 5th Plan to cope with the increased requirements. UNDP has shown keen interest in this scheme and has promised to supply the equipment like teaching machines and instructions material for the training purpose.

x) Laboratory and Workshop.

After the completion of Crash Programme the Workshop and laboratory .. is expected to be equipped for carrying out the repairs and renovation of defective equipment lying at various units.

Its field is proposed to be enlagged during the 5th plan to enable it to 1) develop the present equipment and 2) design new equipment keeping in view the future requirements of Pakistan Broadcasting Corporation. In addition, it is planned to expand its working still further to manufacture some of the equipment locally and save foreign exchange spendings. This scheme will also open prospects of employment.

xi) Monitoring Facilities.

The monitoring facilities department is very important organ of a broadcasting net-work and it should be adequately equipped with receivers and other equipment to monitor the largest possible number of services from foreign broadcasting organisations in various languages. For this purpose adequate provision has been made in the plan.

(ii) Modernisation of Equipment.

Since the wear and tear of broadcast equipment is a continous process, its replacement and renovation is required at the same rate. This is done under the scheme of Modernisation of Equipment for which provision has been made in the 5th Plan.

(iii) Low Cost Housing Scheme.

Pakistan Broadcasting Corporation proposes to provide housing accommodation to its employees especially to the low income groups to relieve them from the acute housing problems. The house rent paid to the employees is not sufficient for hiring of a housing with essential amenities.

A scheme for the construction of Low Cost Houses for the staff at the total cost of Rs. 104.80 millions was prepared in Crash Programme but the CDWP has recommended implementation of the first phase of the scheme only costing Rs. 15.00 million for the construction of the low cost housing at Islamabad, Lahore and Karachi only, during the Crash Programme. The remaining expenditure of Rs. 89.80 millions for the construction of low cost houses has therefore been phased out to the 5th Plan.

(iv) List of the schemes included in 5th five year plan (1978-80) is enclosed (Annexure -I). Total cost of the proposed scheme is Rs. 592.638 million with a foreign exchange component of Rs. 176.294 millions.

II. LONG TERM PLAN (1980-1995).

After the completion of 5th Plan (1975-80), the objectives of Development in the Broadcasting will be achieved to a great extent but in order to keep pace with the ever increasing needs in this field of development and to make up for the deficiencies of 5th Plann following schemes are proposed to be completed during the long term plan (1980-95).

i) Medium Wave Coverage.

After the completion of 5th Plan some pockets in the country will still be left without first class MW coverage. It is, therefore, proposed to install three 10 KW MW Transmitters at Fort Sandeman and Naukandi and Rawalpindi Ch # 2. With the installation of these transmitters the population coverage of Pakistan will increase to 99.5% and area 95%. Provision has also been made for a 100 KW MW Transmitter at Quetta to replace the existing 10 KW MW Transmitter in 2nd channel.

ii) External Services.

After the completion of 5th Five year Plan the maximum power of any shortwave transmitter available for external service will be 250 KW. As days roll by, this power would go on getting increasingly inadequate for creating good signal in the target areas. This is due to ever increasing interference and congestion in the shortwave spectrum. It will therefore be necessary to increase the power of our shortwave transmitters. More transmitters are also needed to cover important target areas which we have not been able to do because of inadequate number of transmitters at our disposal. It is, therefore, proposed to install two shortwave transmitters of 500 KW power at each Islamabad and Karachi at new sites with a new aerial system. These transmitters will be utilised particularly for the coverage of European and Middle Eastern countries.

iii) F.M. Coverage and F.M. Links.

After the completion of Crash Programme F.M. Services will be started from all the seven main stations of Radio Pakistan. During the 5th Plan period provision has been made from new F.M. stations at Hunting, Skasor and Murree to enlarge F.M. coverage.

In order to extend F.M. coverage to other areas of Pakistan, It is proposed to install more F.M. stations at various locations. It is proposed to install F.M. Transmitters at each of the 10 stations whic

contd. -

are situated almost alongwith the T&T Department microwave link so that the transmitters could be linked for relaying news and the programme of national importance.

iv) Extension of Production Facilities.

At the end of 5th Plan all the Broadcasting Houses except Multan will have adequate programme production facilities for the programmes of different channels. Extension of the Broadcasting House Multan, has therefore, been proposed in the long term plan.

v) Equipment for Research

With the extension of Research activities the Research Department will need additional equipment. For meeting these requirements provision has been made under the plan.

vi) Training Facilities.

After the implementation of various development schemes of 5th and long term plans additional technical hands will be required for the operation and maintenance of new units. For the training of new entrants added facilities will be required at the training institutions of Pakistan Broadcasting Corporation.

vii) Extension of Laboratory and Workshop.

The sphere of operation of Laboratory and Workshop is proposed to be enlarged in the plan, to make it a productive unit for the production of electronic equipment. This scheme will reduce our dependence on foreign countries, save foreign exchange and increase chances of employment for Pakistani citizens. With the local production of equipment, the pace of development will also be accelerated.

viii) Modernization of Equipment.

Most of the transmitting, studio and Receiving equipment installed at old stations is likely to become obsolete and useless during the long term plan and will have to be replaced with new and modern equipment. This will include the replacement of 10 KW MW Transmitters at Peshawar, Rawalpindi and Quetta, equipment at all the Receiving Centres and at some old broadcasting houses. Provision has been made for the above replacements and renovations of equipment during the long term plan.

contd-9..

ix) Monitoring Facilities.

With the passage of time the requirements of the monitoring Department will increase and the activities will be expanded. In order to cater to the new requirements of the Monitoring Department adequate provision has been made in the plan.

x) Stereo Broadcasting Channel.

The modern technique of Stereo Broadcasting is proposed to be introduced in Pakistan during the long term plan. For this purpose Stereo Broadcasting Units are proposed to be set up at Karachi, Lahore and Islamabad during the Plan.

The Stereo Broadcasting channel is necessary to serve the purpose of sophisticated listeners, particularly in the field of music. It is the latest technique which has already been adopted by most of the advanced Broadcasting Organisations and is the need of the day.

xi) The list of the schemes included in long term plan (1980-95) is enclosed. (Annexure-II). Total requirement under the plan is Rs. 382,500 million with a foreign exchange component of Rs. 157,100 million.

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(Annexture-I)

LIST OF SCHEMES IN 5TH FIVE YEAR PLAN 1978-80

(Rs. in Million)

S.	Name of the schemes	Total Costs	Foreign Exchange Components
1.	10 KW MW Transmitter, Skardu.	15.357	2.291
2.	10 KW MW Transmitter, Gilgit.	15.500	2.700
3.	10 KW MW Transmitter, Gwadar.	15.500	2.700
4.	10 KW MW Transmitter, Chitral.	15.500	2.700
5.	10 KW MW Transmitter, Rahim yar Khan.	7.131	2.700
6.	100 KW MW Transmitter, Muzafarabad.	18.093	7.100
7.	100 KW MW Transmitter, Khuzdar.	23.500	7.500
8.	100/150 KW MW Transmitter, Panjgur	23.500	7.500
9.	2-100 KW SW Transmitter, Karachi & Islamabad.	50.000	20.000
10.	4 x 250 KW SW Transmitter, Islamabad.	70.700	31.000
11.	1000 KW MW Transmitter Gwadar for Extl. service.	60.500	23.500
12.	1000 KW MW Transmitter Karachi.	60.500	23.500
13.	F.M. coverage (2 KW F.M. Transmitter at Murree Kaser and Mastung.)	9.200	3.600
14.	3- Auditorium at Karachi, Lahore and Islamabad (for 1000 persons each).	29.000	8.000
15.	4- Auditorium at Hyderabad, Multan, Peshawar, and Quetta (500 persons each).	11.000	5.000
16.	External services of studio facilities for Balti Service.	2.287	0.953
17.	Extension of Broadcasting House, Lahore.	4.000	2.500
18.	Extension of Broadcasting House, Islamabad (3 floors).	10.000	-
19.	Extension of Broadcasting House, Hyderabad.	2.550	1.000
20.	Extension of Laboratory & Workshop.	2.500	1.800
21.	Extension of Broadcasting House Quetta.	2.550	1.000
22.	Addition of one floor to office block & Airconditioning office Block.	1.500	0.500
23.	Broadcasting House, Karachi.	20.000	6.500
24.	Studio Transmitter Links 18 Nos.	4.500	1.800
25.	Monitoring Facilities.	1.900	1.000
26.	Equipment for Research.	9.500	4.600
27.	Training Facilities.	3.000	1.200
28.	Modernisation of Equipment.	10.000	4.890
29.	Security Works at Receiving Centre Peshawar.	0.570	-
30.	Layout Housing Scheme.	89.800	-
		592.638	176.294

(Annexure-IV)

LIST OF SCHEMES IN LONG TERM PLAN OF DEVELOPMENT IN BROADCASTING (1980-95)

(Rs. in Million)

Sr.No.	Schemes	Rs.	F.Exchange.
1.	10 KW MW Transmitter (3 Nos). Mailsandi, Peshawar and Rawalpindi. Ch. II-2	46.500	8.100
2.	Met. Broadcasting House, Multan.	2.500	1.000
3.	Shortwave Transmitter, (External Services)		
i)	2-500 KW SW Transmitter, Karachi.	105.000	46.500
ii)	2-500 KW SW Transmitter, Islamabad.	105.000	46.500
4.	100 KW MW Transmitter, Quetta Ch-2	23.500	7.500
5.	Equipment for Research.	10.000	5.000
6.	Training Facilities.	5.000	2.000
7.	Extension Laboratory & Workshop.	5.000	2.000
8.	Modernisation of Equipment.	40.000	20.000
9.	Monitoring Facilities.	4.000	2.000
10.	F.M. coverage and F.M. Link.	16.000	6.500
11.	Stereo Broadcasting Channel (3 Nos).	20.000	10.000
		382.500	157.100

TENTATIVE REQUIREMENT OF ELECTRONIC EQUIPMENT FOR THE PERIOD UPTO 1980.

Sr.No.	Article	Quantity
	TRANSMITTERS:	
1.	1000 K.W. M.W. Transmitter freq. range 525-1605 KHz.	2
2.	100 K.W. M.W. Transmitter freq. range 525-1605 KHz.	4
3.	10 K.W. M.W. Transmitter, freq. range 525-1605 KHz.	4
4.	250 K.W. S.W. Transmitter freq. range 1.5 to 30 MHz.	4
5.	100 K.W. S.W. Transmitter freq. range 1.5 to 30 MHz.	3
6.	2 K.W. F.M. Transmitter range 87.5-108 MHz.	3
7.	Radio Telephone Set.	22
8.	Village Broadcaster upto 250 watts.	34
9.	VHF Link (STL).	30
9.	i) Freq. range 300-470 MHz. ii) Freq. range 890-960 MHz.	
10.	Variable Frequency Master Oscillator for M.W. Transmitter range 525-1620 KHz.	17
11.	Walkie/Talkie range upto 5 miles.	3
12.	Master Oscillator for S.W. Transmitter range 1 to 30 MHz.	10
13.	Beat Frequency Oscillator, Diesel generator on trailor & antenna freq. range 20 to 17,000 HZs.	69
14.	Mobile Transmitter 5/10 KW MW Transmitter.	10
	MAST AND AERIAL SYSTEM.	
15.	Self radiating mast for 100 KW MW Transmitter.	4
16.	Self radiating mast for 10 KW MW Transmitter.	5
17.	H.F. Aerial arrange for 250 KW & 100 KW Transmitter.	4
18.	Self radiating Mast for 1000 KW MW Transmitter.	2
19.	Transmitting Aerial for FM Transmitter.	3
20.	F.M. Receiving Aerial.	18
21.	Transmitting & Receiving antennas for STLS.	60
22.	Receiving Aeirals.	6
	STUDIO CONSOLETTES, AMPLIFIERS & TAPE RECORDERS:	
23.	Studio Consolette six microphone channels with usual facilities.	93
24.	Switching Console 12 input, 4 output.	8
25.	Switching Console 12 input & 12 output.	3

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26.	Monitoring Amplifier 10 to 20 watts.	107
27.	Preamplifier.	38
28.	Programme Amplifier.	38
29.	Limiting Amplifier.	18
30.	Booster Amplifier for (Turntable).	212
31.	Line Amplifier.	16
32.	O.B. Amplifier.	30
33.	Public Address Amplifier.	7
34.	Isolation amplifier.	20
35.	Transcription turntables.	190
36.	Professional Tape Recorder(Console type).	170
37.	Tape Recorder Rack mounting type.	53
38.	Portable taperecorder(Mains operated).	53
39.	Portable taperecorder(batter operated).	48
40.	Tape Editing equipment.	9
41.	Bulk Eraser.	39
42.	Cartridge, Tape recorder type RT-17A.	3
43.	Monomulti Cartridge Cassettes Tape system.	3

[redacted]

44.	Recording Van.	3
45.	Sound Projector.	1
46.	Magnate Telephone.	81
47.	Inter-com-unit.	17
48.	Master clock equipment.	11
49.	Slave clock equipment.	430
50.	Speech Rack.	67
51.	Patch Chords.	438
52.	Jack Panel.	197
53.	Head phone.	183
54.	Studio Warning light.	439
55.	Loudspeaker cut off relay.	165
56.	Audio Line Equalisor.	30
57.	Sound effect filter.	23
58.	Fixed pad.	86
59.	Matching Pad.	176
60.	Reverberation plate.	6
61.	Switch IPIT 12 contacts.	100
62.	Switch IPIT 24 contacts.	130
63.	Volume control (remote type).	298
64.	Fuse & Switch pane.	58
65.	Power Terminal block.	54
66.	Audio Terminal block.	180
67.	Telephone Key (12 Contacts).	17
68.	Telephone key (24 contacts).	15
69.	Coaxial connector.	306

TRANSFORMERS:

70.	Isolation transformer for MW light.	5
71.	R.F. Shielded Transformer for Receiving Aeiral Matching.	185
72.	Bridging Transformer.	396
73.	Isolation/Repeater Transformer.	72
74.	Variac.	98
75.	Automatic voltage regulator.	4

MICROPHONES:

76.	Velocity type Microphone freq-range 5 db 30/12,000 HZ.	217
77.	Pressure type Microphone.	193
78.	Talk back Microphone.	51
79.	Microphone stand table type.	143
80.	Microphone stand programme type.	112
81.	Microphone Stand for public address system.	8
82.	Microphone Stand Boom Type.	16
83.	Microphone connector (male).	610
84.	Microphone connector (female).	564
85.	Raccone console type loudspeaker.	65
86.	Cabinet mounted loudspeaker.	219
87.	Ordinary Loudspeaker.	192

RECEIVERS:

88.	High quality Mains operated all wave communication receivers for relay purposes. frequency range 0.2-30 KHz.	83
89.	High quality battery operated allwave receiver.	43
90.	High quality all wave A.M. receivers for general monitoring.	82
91.	All wave receivers for monitoring of clear channel.	12
92.	F.M. Receivers, freq. range 87.5-108 MHz.	81
93.	A.M. Modulation monitor for M.W. range.	8
94.	F.M. Modulation monitor, freq range 88 MHZ to 108 MHz.	87
95.	Automatic modulation recorder.	35

MEASURING INSTRUMENTS:

96.	Cathode Ray Oscilloscope.	20
97.	Substandard voltmeter.	88
98.	Sub-Standard Ammeter, Range 0-30 Amps.	87
99.	Universal Avometer.	191
100.	Megger (1000 V).	22
101.	Megger (500 V).	33
102.	R.F. Bridge with complete oscillator & Detector, range 525-1620 KHz.	22

103.	Noise & Distortion meter.	46
104.	A.F. Power output meter.	81
105.	V.U. meter with alternatore.	44
106.	Vacuum Tube Voltmeter.	86
107.	R.F. Standard signal generator freq. range 10-470 MHz.	10
108.	Signal Generator.	11
109.	Transmission Measuring Set, freq. range 20 HZ to 20 KHz.	29
110.	Precision Frequency measuring equipment, range 1500 KHz to 150 MHz.	18
111.	Frequency Meter.	2
112.	Transistor Tester.	17
113.	Field Intensity Meter. (for M.W.).	13
114.	Field Intensity Meter(S.W.).	6
115.	Tube Tester.	22
116.	Reverberation Measuring Equipment.	2
117.	Ionospheric measuring equipment.	1
118.	F.M. Test Equipment.	6
119.	Transformer Oil testing equipment.	11
120.	Automatic frequency counter meter.	1
121.	Voltmeter.	1
122.	R.F. Ammeter.	2
123.	R.F. Ammeter.	2
124.	Sound level meter.	3
125.	Sound level Caliberator.	1
126.	Power signal generator freq.range 90 MHz to 100 KHz.	1
127.	Automatic Peak Controller.	10
128.	Absorbtion wave meter, freq. range [illegible] to 30 KHz.	2

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ANNEXURE - III

LIST OF ELECTRONIC EQUIPMENT TO BE MANUFACTURED

Item No.	Equipment	Qty per year	Imported cost millions Rs./unit		Local production cost of material million Rs.		Imported cost million rupees/ year.		Local production cost of material million Rs.	
			Total	F.E.	Local	F.E.	Total	F.E.	Local	F.E.
1.	100 KW Transmitter.	1	2.700	1.200	1.400	0.600	2.700	1.200	1.400	0.600
2.	50 K.W. Transmitter.	-	2.630	1.050	1.330	0.500	-	-	-	-
3.	10 K.W. Transmitter.	2	1.000	0.500	0.500	0.250	2.000	1.000	1.000	0.500
4.	Studio Consolettes.	10	0.100	0.050	0.015	0.001	1.000	0.500	0.150	0.010
5.	Master Switching Consoles.	2	1.800	0.882	0.180	0.005	3.600	1.764	0.360	0.010
6.	Preamplifier.	100	0.010	0.005	0.0005	-	1.000	0.500	0.050	-
7.	Programme Amplifier.	20	0.015	0.008	0.0008	-	0.300	0.160	0.016	-
8.	O.B. Amplifier.	20	0.025	0.015	0.0015	-	0.500	0.300	0.030	-
9.	Limiting Amplifier.	5	0.016	0.008	0.0008	-	0.080	0.040	0.004	-
10.	Monitor Amplifier.	30	0.014	0.007	0.0005	-	0.420	0.210	0.015	-

R E M A R K S :

1. Materials represent, raw material components or locally manufactured parts.
2. Materials are evaluated according to sample pilot products.
3. Value of materials represent 26% of the value of product.
4. Antennas to be manufactured locally 1.5 mast/year antenna mast about 400 ft. high, to withstand wind velocity of 120 miles/hour. Import cost=0.315 F.E. + 0.315 local = 0.630 total. cost of local production = 0.210 million rupees.
5. The manufacturing plant has the capacity to produce some minor items needed for replacement and renewal and production of spares parts.
6. Saving of foreign exchange is 4.554 million rupees.

PAKISTAN BROADCASTING CORPORATION

LIST OF TRANSMITTING TUBE ITEMS.

Annexure -IV

S.No.	Valve type	Qty. in Ckt.	Qty.order in 1973-74	Estimated consumption.	Estimated Unit Cost (Rs).	Yearly Cost of valves concerned.	Specification.
1.	[illegible]	10	8	80%	42,092	344,736	Triode, Forced Air cooling, Power Amplifier.
2.	[illegible]	14	10	71.4%	1,827	18,270	Pentrode, Forced Air cooling Driver stage.
3.	[illegible]	16	8	50%	6,153	49,224	Triode, Forbe Air cooling, Power Amplifier.
4.	[illegible]	20	12	60%	4,200	50,400	-do-
5.	[illegible]	12	14	116.7%	14,700	205,800	Triode, Water cooling, Power Amplifier.
6.	[illegible]	10	20	200%	10,710	214,200	Triode, Force Air cooling, Power Amplifier.
7.	[illegible]	8	4	50%	29,781	119,124	Triode, Water cooling, Power Amplifier.
8.	[illegible]	14	10	71.7%	31,710	51,710	Triode, Force Air cooling, power Amplifier.
9.	[illegible]	8	6	75%	97,920	587,520	Triode, Vapour cooling, Power Amplifier.
10.	[illegible]	8	2	62.5%	34,356	68,712	Triode, Vapour cooling, Power Amplifier.
11.	[illegible]	8	44	50%	12,600	50,400	Triode, Forced Air Cooling, Power Amplifier.
12.	[illegible]	2	6	200%	1,512	6,048	Triode, Forced Air Cooling, Driver stage of P.A.
13.	[illegible]	14	15	107.2%	735	11,025	Triode, Forced Air cooling, Driver stage of P.A.
14.	[illegible]	8	2	31.25%	12,851	25,682	-do-
15.	[illegible]	12	6	50%	867	5,402	-do-
16.	[illegible]	10	10	100%	735	7,350	-do-
17.	[illegible]	4	2	50%	2,375	4,746	-do-

1.	2.	3.	4.	5.	6.	7.	8.
8.	4C x 5000A	4	4	100%	10,080	440,320	Triode, Forced Air, cooling Driv stage of P.A.
9.	805	3	5	167%	653	3,265	Triode, Forced Air, colling Driv stage of P.A.
0.	4CX 10,000D	8	4	50%	9,240	36,960	Tetrode " " -do-
1.	BTH-15-1-3-	4	4	100%	9,37,327	549,308	Triode, Vapour cooling Driver st e of P.A.
2.	4BW-5000A	1	1	100%	5,720	5,720	Triode, Forced Air cooling, Driv r stage of P.A.
3.	TT-5B	4	2	50%	8,400	16,800	-do-
4.	813	10	10	55.5%	506	5,060	-do-
5.	845	24	15	62.5%	550	2,250	-do-
6.	888	38	20	52.6%	840	16,800	Pentode, Forced Air cooling, Driver stage of PA.
7.	4E00/300	16	8	50%	460	3,680	Tetrode, Forced Air cooling , Driver stage of PA.
8.	4E x-500A	3	5	166.6%	880	4,300	-do-
9.	TH-5B	4	2	50%	8,400	16,80.	Triode, Forced Air cooling, Driver of P.A.
0.	3 x 300 TH	8	15	187.5%	4,685	69,375	Triode, Vapour cooling, Modulator.
1.	891 R	2	2	100%	11,650	23,300	Triode, Forced Air cooling, Modulator.
2.	833A	2	2	100%	1,512	3,024	Triode, Forced Air cooling, Driver to P.A.
3.	4-250-K	8	4	50%	-	-	-
4.	QB-06/40	12	10	83.3%	250	2,500	-
5.	QB 03/20	9	30	333.3%	-	-	-
6.	802	10	22	220%	550	12,000	Pentode, Beam type, air cooling.
7.	807	68	30	44%	-	-	Pentode air colling.
8.	815	6	10	166.5%	800	6,000	Triode, Forced air colling, Driver to P.A.

1.	2.	3.	4.	5.	6.	7.	8.
39.	857-B	14	10	71.4%	100	1,000	Mecury Vapour Rectifier, Air cooling
40.	872-A	30	30	60%	-	-	Rectifier, Forced Air cooling.
41.	875	30	20	66.6%	-	-	Tetriode, forced Air cooling, Power Amplifier.
42.	4-400A	8	4	50%	450	1,800	-do-
43.	7004	14	20	142.8%	-	-	-
44.	8008	28	25	85.7%	-	-	Rectifier, forced Air cooling.
45.	5560A	12	10	83.3%	-	-	-
46.	QE.5/75	4	10	250%	100	1,000	Tetriode, Air cooling, Power Amplifier.
47.	MR-10	6	1	16.67%	900	900	Rectifier, Air cooling.
48.	MT-14	2	1	50%	1,800	1,500	Triode, Air cooling Driver.
49.	2E26	2	2	100%	40	80	-
50.	4CS-250B	2	1	50%	250	250	-
51.	TY-34G	8	4	50%	300	1,200	Tetrode, Forced air cooling Ist stage.
52.	TY-47G	8	~~28~~	187.5%	900	~~4,500~~ 3,026,021 (In rupees)	Tetrode, Forced Air cooling IInd stage.
	Information regards transmitters under recent installation.						
53.	4C 100 0000	2	-	-	35,000	-	Triode Vapour cooling power Amplifier.
54.	4-400A	6	-	-	450	-	Triode, Forced Air cooling, Power amplifier.
55.	[illegible]	2	-	-	45,000	-	Triode, Vapour cooling, power amplifier.
56.	RS-4041V(1)	1	-	-	115,200	115,200	-
57.	RS-2081 V(2)	2	-	-	60,000	120,000	-
58.	RS-1082 V(1)	1	-	-	38,000	38,000	-

1.	2.	3.	4.	5.	6.	7.	8.
59.	[illegible]	2	-	-	9,000	18,000	-
60.	[illegible]	5	-	-	400	1,200	-
61.	[illegible]	10	-	-	65,000	651,000	-
62.	[illegible]	12	-	-	60	720	-
63.	[illegible]	8	-	-	25,534	142,672	-
64.	[illegible]	16	-	-	11,267	101,502	-
65.	[illegible]	10	-	-	705	12,320	-
66.	[illegible]	20	-	-	5,057	101,502	-
						1,515,574	

[redacted] Annexure I.

LIST OF VACUUM CAPACITOR USED IN RADIO BROADCASTING TRANSMITTERS.

S.No.	Type	Qty in use	Annual Consumption	Unit Cost (Estimated)	Total Cost.
1.	Vacuum Variable 100-200 mmfd 35 KV.	4	1	14,000	14,000
2.	-do- 60-1000 mmfd 35 KV.	4	1	14,000	14,000
3.	-do- 4-250 mmfd 35 KV	2	1	2,000	2,000
4.	-do- 25-1000 mmfd 12 KV.	2	1	4,500	4,500
5.	-do- 100-2000 mmfd 15 KV.	1	1	5,000	5,000
6.	-do- 25-450 mmfd 35 KV.	22	10	14,000	140,000
7.	-do- 10-750 mmfd 15 KV.	4	2	5,000	10,000
8.	-do- 50-5000 mmfd 5 KV.	4	2	3,000	6,000
9.	-do- 12-500 mmfd 15 KV.	2	1	5,000	5,000
10.	-do- 25-450 mmfd750 KV.	6	2	20,000	40,000
11.	Vacuum Fixed 12 mfd 30 KV.	1	1	10,000	10,000
12.	-do- 0.01 mfd 10 KV.	8	5	4,000	12,000
13.	-do- 750 mfd 10 KV.	4	2	5,000	10,000
14.	-do- 2000 mfd 15 K.V.	1	1	5,000	5,000
15.	-do- 1000 mmfd 30 KV.	1	1	12,000	12,000
16.	-do- 250 mmfd 30 KV	6	2	10,000	20,000
17.	-do- 150 mmfd 30 KV.	1	1	5,000	5,000
18.	-do- 60 mmfd 20 KV.	4	2	6,000	12,000
19.	-do- 60 mmfd 30 KV.	2	1	7,000	7,000
20.	-do- 120 mmfd 7.5 KV.	8	5	3,000	9,000
21.	-do- 125 mmfd 35 KV.	4	2	14,000	28,000
22.	-do- 250 mmfd 35 KV.	2	2	14,000	28,000
23.	-do- 200 mmfd 32 KV.	2	1	12,000	12,000

Cont'd.....

1.	2.	3.	4.	5.	6.	7.
24.	Vacuum Pistol	150 mmfd 10 K.V	6	4	6,000	24,000
25.	-do-	1000 mmfd 40 K.V	6	5	18,000	90,000
26.	-do-	2000 mmfd 10 K.V	4	2	6,000	12,000
27.	-do-	100 mmfd 35 K.V	5	2	14,000	28,000
28.	-do-	500 mmfd 30 K.V	3	1	8,000	8,000
29.	-do-	100 mmfd 15 K.V	2	1	4,000	4,000
30.	-do-	1000 mmfd 10 K.V	4	2	6,000	12,000
			135	81	285,000	688,500

PAKISTAN BROADCASTING CORPORATION

ANNEXURE - VI

COMPARATIVE COST STATEMENT OF AUDIO CONSOLETTE
LOCALLY FABRICATED & IMPORTED FROM ABROAD.

Sr. No.	Component	Qty	Imported cost price (including duties & incidental charges.	Total Imported cost C & F Including duties & incidental charges.(in Rs.)	Local Cost per piece. (in Rs.)	Total Local cost. (in Rs.)	Saving (in Rs.)
1.	Amplifiers- a. Booster type 215366 b. Programme type 211006 c. Monitor type 211001 d. Pre-amplifiers	7	92.15 $ Rs. 1831.94	12823.58	260	1400	11423.58
2.	Screened Cable.	-	Not known	-	1000	1000	-
3.	Body fabrication, painting & engraving of front panel of consolette.	-	-	-	-	1500	-
4.	Knob type I.	5	2.87 $ Rs. 57.03	285.15	8.00	40.00	245.15
5.	Knob type II.	7	4.37 $ Rs. 86.87	608.09	15.00	105.00	503.00
6.	VU meter 5M1.	1	115.38 $ Rs. 22.92	2292.00	-	2292.00(Imported)	-
7.	Relays 5 K1	2	19.01 $ Rs.380	760	100.00	200.00	560.00
8.	Transformers audio input.	5	82.72 $ Rs.1654.40	8272.00	-	8272.00 (Imported)	-
9.	Transformers audio output.	1	143.89 $ Rs.2874.00	2874.00	-	2874.00	-
10.	Transformer 5M7 audio output 209281.	1	131.87 $ Rs.2637.40	2637.00	-	2637.00	-
11.	Resister 4R1 A,B.	1	2.19 $ Rs. 43.80	43.80	15.00	15.00	28.80

Contd.....P/

Sr. No.	Component	Qty	Imported cost piece (including duties & incidental charges.	Total Imported cost C & F Including duties & incidental charges. (in Rs.)	Local Cost per piece. (in Rs.)	Total Local Cost. (in Rs.)	Saving ($ in Rs.)
12.	Resistor 4MEA	1	4.39 $ Rs. 87.80	87.80	20.00	20.00	67.80
13.	Power Transformer 4P1,215370	1	178.54 $ Rs.3570.80	3570.80	250.00	250.00	3320.80
14.	Audio Transformer 5E4	1	41 $ Rs. 820.00	820.00	[illegible]	820.00 (Imported)	[illegible]
15.	Faders 100K & 700/300	9	102.94 $ Rs. 2058.80	18529.20	150.00	1350.00	17361.20
16.	Key Switches.	12	40.00 $ Rs. 800.00	9600.00	50.00	600.00	9000.00

1) Estimated cost of one imported consolette (including custom duty & incidental charges.) - Rs. 100,000/-

2) Cost of locally fabricated consolette (including assembly labour) - Rs. 25,000/-

3) Saving - Rs. 75,000/-

*Estimated cost of transistorised version of same type of consolete is likely to be about Rs. 15,000/- (since audio transformers will not be used)

PAKISTAN BROADCASTING CORPORATION

ANNEXURE - II

COMPARATIVE COST STATEMENT OF IMPORTED & LOCALLY FABRICATED 50 K.V. MEDIUM WAVE TRANSMITTER

Locally fabricated Transmitter				Imported transmitter	Difference
Cost of imported items used including custom duty and incidental charges.	Cost of locally fabricated items	Estimated labour charges.	Total expenditure (a+b+c).	Budgetary price quoted by foreign firm including custom duty & incidental charges (in June'73)	
(a)	(b)	(c)	(d)	(e)	(f)
Rs. 1153500/-	Rs. 112600/-	Rs. 60000/-	Rs. 1326100/-	Rs. 2631500/-	Rs. 1305400/-
	*Cost of these items if imported from abroad would have been (112600 x 5.8) = 653080/-.				

*This ratio is on the basis of comparative cost of various items calculated in Annexure - I.

**This project was completed by the staff of the Unit and no extra manpower was provided for this purpose. It is estimated that the separate operating staff working under the supervision of Directorate General could complete this work in one year. Hence provision of Rs. 60000/- has been made for labour charges.

PAKISTAN BROADCASTING CORPORATION

ANNEXURE - II

COMPARATIVE STATEMENT OF COST OF SOME OF THE IMPORTED & LOCALLY FABRICATED EQUIPMENT USED IN 50 K.W. M.W. TRANSMITTER.

Sr. No.	Description of Items	Qty	Imported Unit Cost (including custom duty & devaluation effect etc.).	Total imported cost (including duty & devaluation effect etc)	Unit Cost Locally fabricated.	Total Cost Locally fabricated.	Saving
1.	P.T. Transformer 106 KVA.	3	Rs. 80000/-	Rs. 240000/-	Rs. 12544/-	Rs. 37632/-	Rs. 202368/-
2.	Distribution Transformer 25 KVA 5T4 A/C(8462352-1).	3	Rs. 15000/-	Rs. 45000/-	Rs. 5830/-	Rs. 17490/-	Rs. 27510/-
3.	L.V. Transformer 472.	3	Rs. 9000/-	Rs. 15000/-	Rs. 380/-	Rs. 1140/-	Rs. 13860/-
4.	Bias Transformer (475).	4	Rs. 5500/-	Rs. 22000/-	Rs. 460/-	Rs. 1840/-	Rs. 20160/-
5.	Filament Transformer(2760?)	6	Rs. 4500/-	Rs. 27000/-	Rs. 220/-	Rs. 1320/-	Rs. 25680/-
6.	Power Transformer for pre-amplifier.	1	Rs. 1000/-	Rs. 1000/-	Rs. 230/-	Rs. 230/-	Rs. 770/-
7.	P.A. Valve base.	2	Rs. 4000/-	Rs. 8000/-	Rs. 600/-	Rs. 1200/-	Rs. 6800/-
8.	P.A. Valve ring.	2	Rs. 1500/-	Rs. 3000/-	Rs. 200/-	Rs. 400/-	Rs. 2600/-
9.	P.A. Tank Coils.	2	Rs. 2500/-	Rs. 5000/-	Rs. 490/-	Rs. 980/-	Rs. 4020/-
10.	Harmonic filter coils.	3	Rs. 1300/-	Rs. 3900/-	Rs. 278/-	Rs. 834/-	Rs. 3066/-
11.	Relay 4 K 14.	4	Rs. 450/-	Rs. 1800/-	Rs. 46/-	Rs. 184/-	Rs. 1616/-
				Rs. 371700/-		63250/-	Rs. 308450/-

i) The cost of the locally fabricated various items comes out to be about 20% of the imported cost.

ii) The estimated present cost of various items have been provided by the Procurement Section of Pakistan Broadcasting Corporation after consulting various indents.

LIST OF ELECTRONIC INDUSTRY IN PAKISTAN AND [illegible]

Electronic Industry in Pakistan

S.No.	Name and address	Production Programme	Capacity
1.	Telephone Industries of Pakistan, Khanpur Road Haripur, district Hazara (Phone 225/227).	carbon resistors	3.5 million
		wire-wound resistors	0.2 million
		Paper capacitors	1.0 million
		telephone instruments	60 thousand
		telephone exchanges	30 thousand
		automatic telephone exchanges	lines
		manual	5 thousand lines
		telegraph channels	1 thousand channels
		private telephone exchanges	15 thousand lines
		Long distance telephone and telegraph equipment	
		trunk exchanges	50 positions
		teleprinters	400 Nos.
		typewriters	25 thousand
		telephone set transmitters	
		(carbon granule microphone)	
		telephone set receivers	
		(electromagnet ear phone)	
		Key switch	
		relays	
		transformers	
		railway signalling	
		mechanical compponents	
2.	E B M A C Ltd., 78-Industrial Estate Kotlakhpat, Ferozepur Road, Lahore. (Phone 352990	silicon transistors	8 million
		germanium transistors	4 million
		germanium diodes	0.6 million
		electrolytic capacitors	6 million
		polyester capacitors	1.5 million
		carbon potentiometers	0.8 million
		carbon resistors	42 million

being considerably expanded in manufacture of transistors (30 million) in the next stage they intend to start manufacture of integrated circuits in the near future, they intend to assemble loudspeakers to manufacture AC capacitors for fan industry and to produce ceramic capacitors.

3.	Carrier Telephone Industries, Sector 1-9 Industrial Area, Islamabad (Phone 43773, 4,5)	silicon transistors	2 million
		selenium diodes	5 million
		metallised foil capacitors	30 million
		polystyrene capacitors	3 million
		carrier channels	3 thousands
		ferrite coils	
		channel ends	
		condensers	
		printed circuit plates	
4.	National Radio Telecommunication Corporation, Haripur, district Hazara (Phone 318,794).	radio communication sets	
5.	Precision Industries Ltd Kotlakhpat, Ferozepur Road, Lahore (Phone 83097) .	loudspeakers	300 thousand
		band switches	200 thousand
		T. V. sets	30 thousand
		radio sets	100 thousand
		T.V. antennas	250 thousand
6.	Radio and General Appliances Ltd., 18-Mozlim Town, Lahore (Phone 54056/84080)	Transistor radio sets	300 thousand

Both factories mentioned under 5 and 6 have a radio and T.V. assembly plant in Central Jail, Kotlakhpat, Lahore.

7.	(Electronic Industries Karachi.	otentiometers	90 thousand
		wavoband switches	90 thousand
		trimmers	300 thousand
		coilwinding capacity for	80 thousand radios
		printed circuits	45 thousand
		and dials	
		public address equipment	1.2 thousand

8.	M B G O Mohammad Murshid and Company, Ltd., S/1 S.I.T.E. Nauripur Road, Karachi - 16 (Phone 292196)*	radio sets	125 thousand
		T.V. sets	85 thousand
		Public address equipment	2 thousand
		The factory has a subsidiary at Dhaka assembling transistor radio sets.	
9.	Precision Industries	sets of four I/F transformers and oscillators coil	900 thousand
		telescopic antenna	250 thousand
10.	E. M. M. Industries, Preedy Street, Saddar, Karachi (Phone)	T.V. sets	
		radio sets	
11.	Philips Electrical Industries of Pakistan Ltd., F/54, S.I.T.E. Karachi (Phone 78989)*	T. V. sets	80 thousand
		radio sets	180 thousand
		bulbs	12 million
		fluorescent tubes	0.7 million
		electric chokes	
		glass tubes	1.6 million
12.	E.E.Industries Ltd., E/106 South Avenue, S.I.T.E, Karachi (Phone 291749)* *	T.V. sets	24 thousand
		radio sets	150 thousand
13.	Associated Electronics Ltd 7-Egerton Road, Lahore(Phone 58885)*	T. V. sets	
14.	Electronic Industries E/39, Estate Avenue, S.I.T.E. Karachi - 16 (Phone 291936)	radio receivers	125 thousand
		loudspeakers	90 thousand
15.	Ideal Industries Ltd. L-I-C, Block 21, Federal B Area, Karachi (Phone 682956)	T.V. parts	
		radio parts	
16.	Loyal Radio Corporation G/23 S.I.T.E. Karachi (Phone 291785)	radio sets	10 thousand
17.	Hassan Brothers and Company, 131, Multan Road, Lahore (Phone 64281/66281)	radio sets	

18. Radio and Electronic Industries, 16-The Mall Lahore(Phone 68368)	radio sets	15 thousand
19. Syed Bhais Ltd., 220 Ferozepur Road, Lahore(Phone 52407)*	radio sets	20 thousand (closed)
	electric HMR motors	300 thousand
20. Lahore Radio & Electric Company, S.I.T.E., Karachi - 16 Phone)	radio receivers	
21. Hyderabad Electronic Industries Ltd. (Telefunken), Latifabad, Hyderabad	T.V. sets radio sets	100 thousand 10 thousand
22. Sterling Electronics, Latifabad, Hyderabad. *	radio sets (cottage assembly)	5 thousand
23. Electro Allied Industries 665-M. Samanabad, Lahore	radio sets (cottage assembly)	
24. M. Butt and Company, Moghalpura, Lahore	radio sets (cottage assembly)	
25. Ekcent Electronics Moghalpura, Lahore	radio sets (cottage assembly)	
26. Sh.Zaheer and Sons, Muslim Town, Lahore	radio sets (cottage assembly)	
27. Brothers Electronics Band Road, Lahore	radio sets (cottage assembly)	
28. R. E. C. Traders Grain Market, Sahiwal	radio sets (cottage assembly)	
29. Sano Electronics, Music House, Procdy Street Saddar, Karachi - 3.	radio sets (cottage assembly)	

30.	Ideal Industries L-1/6-21, Federal 'B' Area, Karachi (Phone 682956)	radio sets (cottage assembly)	
31.	Bee Tee Electronics Liaqatabad, Karachi.	radio sets (cottage assembly)	
32.	Iqbal Plastic Industries 10-Mohni Road, Lahore (Phone 55020)	aerials radio aerial wire.	
33.	Radio and Allied Industries, 16-The Mall, Lahore (Phone)	transformers for receivers and electronic equipment	20 thousand
		output and interchoke	20 thousand
		filter chokes	10 thousand
		Chokes for fluorescent lamps	100 thousand
		Chokes for mercury lamps	20 thousand
		T. V. antennas	10 thousand
		trimmers and padders	60 thousand
34.	Linton Industries, P.O. Box-3618, Karachi -- 28. (Phone 291982)	television antennas	300 thousand
35.	Humayun Industrial Corporation C/[illegible], S.I.T.E Karachi (Phone 292047)	flourescent tubes starters condensers electric chokes	0.5 million 0.6 million
36.	Paramount Industrial Ltd., B/12, S.I.T.E. (Phone 292047)	flourescent tubes electric bulbs	0.6 million 5.4 million
37.	Electric Lamp Manufacturers of Pakistan Ltd., University Road, Karachi (Phone 410484)	flourescent tubes miniature lamps glass shells	0.7 million 2.5 million 20 million

* Units visited by experts

[illegible] ELECTRICAL MANUFACTURING UNITS IN PAKISTAN

S.No.	Name and Address	Production programme	Capacity
1.	Karachi Carbon and Ribbon Manufacturing Company, B/65 Estate Avenue, SITE Karachi (Phone 292191)	teloprinter ribbons, rolls and tapes	20000 dozen
2.	Pakistan Press International Ltd., Saifee Building, I. I. Chundrigar Rd. Ziauddin Ahmed Road, Karachi	teloprinter ribbons, rolls and tapes	
3.	E.M.C.O Electric Equipment Manufacturing Company Ltd., 12/3 Sheikhupura Rd, district Sheikhupura (Phone 66614, 54899)*	porcelain insulators iron clad switch fuses	1000 tons 5000
4.	Faisi Industries Ltd., G.T. Road, Gujranwala (Phone 2358)	switchgear switch fuses fittings electric traffic signals	60 thousand
5.	Siemens Pakistan * Engineering Company Ltd., 98-B, S.I.T.E., Karachi - 16(Phone 516061)	single phase KWH motors	60 thousand
		three phase electric motors	12 thousand
		electric meters transformers switchgear switch fuses electric distribution boards and controls	8 thousand
6.	Pak Electron Ltd., Ravenspur Road, Lahore (Phone 399137)*	electric distribution boards and controls	840
		Circuit breakers	350
		transformers	4000
		switchgear	1040
		switch fuses electric meters	8400

7.	E S C P Electric Company of Pakistan Ltd. Multan Road, P.O. Box 1659, Lahore (Phone 65113-4)	Electric distribution boards and controls switch fuses	
8.	Mansoor Glass and Ceramics Ltd.1 C/11, S. I. T. E. Karachi (Phone 291770)	porcelain insulators glass containers amber green glass bottles	
9.	Metalex Corporation Ltd., E/120, S.I.T.E Karachi - 16 (Phone 290904)*	porcelain insulators electric motors, plastic moulding diecasting	5000 Tns aluminium alloys
10.	Standard porcelain Works, 451 Market Road, Garden East, Karachi.	low tension insulators	100 tons
11.	Olympia Electric and plastic Industries Ltd 4th Mile, Multan Road, Lahore (Phone 66066)	Porcelain Insulators switches for telephone and telegraph	
12.	Pakgar Ceramics Ltd., G. T. Road, Lalamusa, district Gujrat (Phone 87)	porcelain insulators	150 tons
13.	Shaigan Electric and Engineering Company Ltd. 1/9 Sector, Industrial Area, Islamabad (Phone 42009)	porcelain Insulators	
14.	A E G Telefunken Pakistan Ltd., E/163, S.I.T.E. Hasanopir Road, Karachi. (Phone 291495)	miniature circuit breakers circuit breakers transformers	100 thousand 400
15.	Electro Service Industries, 81-Temple road, Lahore (Phone 55144)	voltage regulators battery charger transformers	

16.	International Industries Ltd., Hakimsons Building, 99-West Wharf Road, Karachi (Phone 227121,2,3,4,5)	ampere meters volt meters	
17.	Ehsan Electrical Industries, Gondlawala Road, Gujranwala (Phone 3491)	electric motors	1 thousand
18.	Delta Electrical Industries, Karim Manzil Khokharki, Gujranwala (Phone 2827).	electric motors	100
19.	National metal Works Ltd., G. T. Road, Sultanabad, Gujrat (Phone 4765)	electric motors	750
20.	La Electric of Pakistan Ltd., Gondlawala Road, Gujranwala (Phone 4436)	electric motors exhaust fans light fittings monobloc pumps welding transformers	
21.	Ghania Ltd., Manjawal Multan Road, Lahore. (Phone 63982)	electric motors Chokes coils winding	2000 150 thousand 600 thousand
22.	Premier Industries, New Mnajid-e-Khiara, Bambridge Road, Bhimpura, Karachi (Phone 236142)	Electric motors	300
23.	Pakistan Engineering Company Ltd., Kotlakhpat Ferozepur Road, Lahore (Phone 390112,3)*	electric motors steel towers	10000 20000 tons
24.	Ehsan Rehman Ltd., G.T. Road, Lahore Tenab Ehata, Lahore (Phone 58589,58397)	electric motors (2 to 40 HP rating)	5000
25.	The Climax Engineering Works Ltd., Climaxabad, G.T. Road, Gujranwala Phone 3691-4.	electric motors transformers welding transformers centrifugal pumps air compressors electric furnaces fans	7200 12 thousand 1200 1000 600 300 10000

26.	S.Muhammad Din and Sons Ltd. 17-Lawrence Road, Shahdara, district Sheikhupura (Phone 54858, 9)	electric meters transformers	3000 2400
27.	Johnson and Phillips (Pak)Ltd., 8/10 S.I.T.E Manghopir Road Karachi (Phone 292248)*	oil circuit breakers electric distribution boards and controls switchgear transformers switch fuses	150
28.	General Products Group Ltd., S.F.Units 5 & 6 Road No.32 [illegible], Karachi (Phone 291542)	switch fuses switch gear	
29.	Pak Plastic Industries S/40, S.I.T.E, Karachi (Phone 290750)	switchgear	
30.	Electro Technical Industries, 46-Bibi Pak Daman, Karachi (Phone 63569)	transformers	200
31.	Atlas Rubber and Plastic Industries, [illegible]/54, S.I.T.E. E. Karachi - 16 (Phone 291907)*	Low tension cables. conductors copper wire aluminium wire enamelled wire	300 thousand coils 100 yards each 450 tons
32.	Atlas Cables Ltd., SITE Kotri, Distt: Dadu (Phone)	A C S R Conductors all aluminium conductors	
33.	Delite Industries S.I.T.E., Kotri distt: Dadu (Phone)	enamelled wire	

34. Pakistan Cable Ltd B/21- S I T E Karachi (Phone 290166/7)	hard drawn bare copper conductor	8310 tons
	copper cables aluminium cables PVC insulated rubber insulated paper insulated upto 11 KV.	111 million yards 9 million yards
	ACSR and AAC conductors aluminium extrusion press tin coated braid wire antenna wire	8310 tons
35. A. G. E. Industries, 438- Jinnah Road, Saddar Peshawar (Phone 2788)	enamelled copper wire	
36. Indus Glass Works Ltd., Qalimar Road, Hyderabad (Phone 23893,23849)	glass hollow ware	3000 tons
37. Prime Glass Works G.T. Road, Shalum (Phone 2764)	glass hollow ware	
38. Prince Glass Works Ltd 15/H Landhi Industrial Area, Karachi (Phone 40047)	glass hollow ware sheet glass	4000 tons 10000 tons
39. S. M. H. Scientific Glass Works, 26/3 Landhi Industrial Area Karachi (Phone 40010)	Glass hollow ware	750 tons
40. Corning Glass Pakistan Ltd., Plot No.11 and 26 Sector 20, Karachi Industrial Area, Karachi (Phone 40110)	ampules vials neutral glass soft glass tubes	3.6 million 2.4 million interested in manufactureof glass envelopes for TV picture tube.

41. Khanaja Glass Industries, G. T. Road Hasanabdal, district Campbellpur (Phone 9)	sheet glass glass hollow ware	4000 tons
42. B. R. Norman and Mohatta Ltd., Mohatta House, Talpur Road, Karachi (Phone 220631)	steel structures	
43. Heavy Mechanical Complex, Tamila, Distt: Rawalpindi (Phone 67241,2,3)	steel structures	
44. Karachi Shipyard and Engineering Works Ltd., Dockyard Road, West Wharf, Karachi (Phone 224041-7)	steel structures cranes ships	20 thousand tons
45. Pioneer Industries, Mozlagan Road, Lahore	voltmeters galvano-meters resistance boxes potentio-meters	
46. Sind Engineering Ltd., West Wharf, Karachi (Phone)	steel structures	
47. Golden Industries Ltd., C/16, S.I.T.E. Karachi-16(Phone)	electric switches plugs sockets knobs cabinets	
48. Greaves Crompton Pakistan Son Ltd. 9/14, S.I.T.E. Nasiripur Road, Karachi-16, (Phone)	carbon brushes for electric machines	96 thousand
49. Nasiar Industries Ltd., C/20, S.I.T.E., Karachi 16, (Phone)	Switches plugs sockets knobs cabinets	
50. Nasaga Cables Ltd., Sheikhpura Road, Distt: Sheikhpura (Phone 64711)	cables conductors copper wire	

51. Plastiko Industries Ltd, F/39 S.I.T.E. Karachi-16 (Phone 290885)	cabinets plugs sockets	
52. Pak Plastic Industries S.I.T.E.,Manghopir Road, Karachi - 16 (Phone 290750)	switches plugs sockets electrical accessories	
53. Chemical Conting Industries Ltd., 8/29, S.I.T.E., Sunripur Road, Karachi-13 (Phone 290384)	coated and metallised papers, metallised plastic films	
54. Longman Mills, 14/H Ali Muhammad Road, Gulberg, Lahore (Phone 81311,81316)	rubber articles rubbers conting of metals	
55. T I P A C, 322, Ferozepur Road, Lahore - 16 (Phone 81471,81472,83821)	tools dies jigs fixtures training of technicians technical advice	
56. Exide Batteries of Pakistan Ltd., Hill Street, S.I.T.E. Karachi -16 (Phone 292023)	lead acid batteries	60 thousand
57. Indus Battery Industries B/54 S.I.T.E. Karachi - 16, (Phone 292213)	dryground cells	
58. Pakistan Battery Manufacturing Company Estate Avenue, S.I.T.E. Karachi - 16, (Phone 290424)	dry cells	
59. National Tyre and Rubber Company, Queens Road, Karachi (Phone 222511)	lead acid batteries	
60. G.C. Goodwill and Company Ltd. Multan Road, Lahore (Phone 64960).	lead acid batteries	
61. Elastoplast Ltd., 20-Shalimar Town, Lahore (Phone 330477, 330575)	electric cables for domestic and industrial use, 20 pair PVC coated telephone cables	

62.	Grand Batteries (Pakistan) Ltd. Industrial Estate, Multan Road, Lahore (Phone 64960)	lead acid batteries
63.	Forbes, Forbes, Campbell and Company, Tufail Road, Lahore Cantt. (Phone 71704)	lead acid batteries
64.	Atlas Battery Ltd., 21 Link Maleod Road, Lahore (Phone 62715)	lead acid batteries
65.	Frontier Electric Cable Industry, Pajaggi Road, Peshawar (Phone 3680)	wire and cables screened 1200 miles
66.	National Battery Industry, 17-Haidar Road, Behind Data Sahib, Lahore (Phone 66237)	lead acid batteries
67.	Multi Mechanics Industries, Moghalpura, Lahore	electric cables switches and sockets
68.	Eagar Battery Industries Kassi Road, Quetta (Phone 2240, 2522)	lead acid batteries
69.	Lucky Linkers Ltd., Industrial Estate, Multan Road, Lahore (Phone 64960)	dry cells
70.	Asian Electrical Industries, Kabir Street No.13, Tesab Ahata Road, Lahore (Phone 65130)	electric wires and cables.
71.	Amar Cables Industries 108-Ravi Road, Lahore	electric wires and cables
72	Choudhary Wire Rope Industries, G.T.Road, Muridke, Distt: Sheikhupura (Phone 56)	ACSR conductors, all aluminium conductors steel wire ropes

73.	Electric Cable Industries Ltd., 93-Brandreth Road, Lahore (phone 55425, 69223)	electric wires and cables
74.	National Wire and Cable Industries, Ghani Chambers Patiala Ground, Meleod Road, Lahore (Phone 55425)	electric wires and cables
75.	New Pak Cable, Industries Ltd., Shah Miran Road, Chowk Rajputtan, Lahore (Phone 64833)	electric wires and cables
76.	Sadiq Electric Works, 98-Railway Road, Lahore (Phone 64291)	electric wires and cables
77.	Basic Electro Industries Ltd., Ghani Chambers Patiala Ground, Meleod Road, Lahore (Phone 55425)	enamelled copper wire
78.	H. S. Nizamuddin and Sons, Circular Road, Lahore(Phone 65284)	enamelled copper wire
79.	Jamjam Radio and Plastic Industries, S.I.E. Gujranwala (Phone 2997)	plastic radio cabinets, plastic radio parts.

Science and Research Institutes related to Electronics Industry.

S.No.	Name and address	Principal Officer
1.	Telecommunication Research Centre Haripur, distt: Hazara.	Mr. Imadul Islam
2.	Pakistan University of Engineering and Technology, G.T. Road, Moghalpura, Lahore * (Phone 68240, 331662).	Prof. Dr. M.Islam Sheikh
3.	Pakistan Council of Scientific and Industrial Research Laboratories, Ferozepur Road, Lahore (Phone 80486,81120,80026). *	Mir. Dr.N.K.Bhatty Dr. F. A. Paqreequi, Head of Research Division
4.	Pakistan Industrial Technical Assistance Centre, Ferozepur * Road, Lahore(Phone 81471/83021)	Mr. Mustafa Hassan, General Manager
5.	National College of Engineering and Technology, Kaslimabad, * Karachi (Phone 415730)	Miss Nasreen Hussain, Head of Electronics Department
6.	National Science Council of Pakistan, Al-Rafiq, 48-Darul Aman, Drigh Road, Karachi (Phone 415461).	Dr. Muhammad Shafqat Hussain Siddiqui, Chairman.
7.	Pakistan Council of Scientific and Industrial Research, 21/E A, PECHS., Block 6, Karachi (Phone 415796)	Dr. Muhammad Shafqat Hussain Siddiqui, Chairman.
8.	Pakistan Space and Upper Atmosphere Research Committee, 41/1-F/6, PECHS, Karachi (Phone 412061).	Air Commodore K.M. Ahmed, Executive Director.

* institutions visited by the experts.

DESIGN AND DEVELOPMENT

1-Design:

Design is the link between science and technology. It seeks to transform knowledge and idea into economic goods. Design embarces both product design and industrial design.

The design process is set in motion by the following :-

a) the conscious indentification of a need by a customer;

b) the proposal of an engineer or scientist for the application of a new scientific advance;

c) the recognition by an engineer or business man of a requirement for the creation of a new product.

The design process has three basic phases as follows :-

a) Creative thinking and an analysis to vizualize the final product.

b) The conversion of the data available into the proposed design.

c) In the communication phase, the design intent and its solution are transmitted to those who will execute the project. New ideas, new data and information are continually being created during this process.

Virtually every product design cycle involves repeated attampts at a solution through trial and arror. Design problems are often ambigous and open ended which indicate that designers first task is to delineate the project in as specific and quantitative a fashion as possible.

Contd.....2/P.

2-Design Work:

It is possible to break up design work into several discrete steps, Certain intellectual skill and abilities are called for at each stage. First the firm accepts the problem situation and is prepared to undertake to resolve it.

Next, the main problem and related problems are identified. This step can be arduous, requiring careful collection of information from different sources. The problem once identified must be accurately presented, because good engineering design depends upon the specificity of this statement.

The design process continues with the generation of possible alternate solution. Here creative ideas comes fully into play as ideas are brought forward by a team of designers. In this phase of work number of design methods become available that can stimulate freer, unrestricted thinking.

After examination and application of the various approaches the best solution is chosen, and work is begun on detailed design.

Manufacture and the assembly take place as the process continues, and feed back occurs on a continuous basis.

In the testing and inspection phase, the designers have an opportunity to see their creations in operation and to make last minute adjustments.

The most important asset of any organization is its staff. It is essential to select good technical people who not only have adequate qualification but also necessary human qualities.

Contd.....3/P.

3. Product Design:

Product design is a creative activity concerned with the origination on a modification of an industrial article including the accompanying research, development and testing, resulting in specifications, working drawings, pilot models and prototypes, and in data and the instructions to facilitate manufacture. In the end the design must be acceptable to the customer and may need to be modified from time to time to satisfy current market demands.

The products development division handles all aspects of development and design of a variety of products. It prepares the technical documentation (consisting of assembly and the detail drawings, parts lists and specifications). When requested it can construct and test prototypes. Together with the industrial design division it is responsible for aesthetics as well as the functional qualities.

4. Industrial Design:

Industrial design is a creative activity the aim of which is to determine the form of objects produced by industry. "Form" in this sense concerns not external features but principally those structures and functional relationship that convert a system or product into co-herent unit .

Industrial design division handles in close cooperation with the products design division all aspects of creating the form of products designed. Sketches, photographs, models etc. which are prepared in this division help in choosing the best model, thus enabling the products design division to prepare the necessary documentation for further production.

5. Development and Creative Designings

The situation becomes more complex when the stage is reached at which the copying of foreign products no longer suffices and the new designs must be created. Even management must then participate rather than confining itself to administration. It must take great pains to ensure that all factors receive due consideration, and that the optimal design solution is achieved in a specific set of circumstances. New

systematic approaches should probably be adopted, and the staff of designers should be well versed in the latest methodologies.

6-Tool Design:

The tool design division builds up non-standards tools, dies fixtures,gauges etc, and also makes special equipments necessary for production. It takes care of and helps in the production and testing and supervises the initial production together with the planning and processing engineering.

7- Information Centres:

Designers live on information, their appetite for new technical data and related facts are insatiable. Any developing country should set up a library and technical information centre to cope with the inormous and ever increasing amount of published papers. Subscriptions to all pertinent technical publications should be acquired, and it will be helpfull if some sort of regular publication were available. Whenever possible it would particularly advantageous, to have a unified classification system.

The library stores and records necessary technical books and documents and makes them available to the designers.

The technical documentation archive prints, stores, distributes and records technical documents.

8- Standardisation:

A standard may be considered as a single solution to a current problem. Like specifications and codes of practice, standards are among the primary tools of the designers. The design standards adopted by the developing countries must be expressed in meteric units, since standardisation makes possible interchangeability that is vital in all modern design work.

Standardisation can be approached on three different levels-

a) Internation (Internation organisation for standardisation, ISO)

b) National (e.g. British standard, BS; deutsche industric norman DIN).

c) Interprise (Company) standards, which should be develop from the international and national standards.

One of the main task of the standards division is the careful selection and limitation of the lists of standards to those that will be really needed. The same principle holds through for materials classification, stock size and the like.

9- Production Planning and Processing:

The production planning and processing division is responsible to do the following:-

a) Prepares processing sheets for the parts to be produced giving all necessary data needed, such as sequencies of operations for manufacturing and the data concerning equipment and tools.

b) Lists necessary tools and equipment on the basis of data received from the processing sheets and the time study charts.

c) Tools and equipment layout.

d) Projects the organisation of production.

10- Time Study and Cost evaluation:

a) Determines the working time of each phase of production on the basis of technical drawing and processing sheets for each part and the product.

b) Evaluates the cost of production for each operation, part and production on the basis of data about the enterprise where the production is going to take place and documents received from the other divisions.

'ANNEXURE X'

Ref:DP/PAK/73/010/11-01/01

REPORT
MANUFACTURING OF TRANSMITTING TUBES IN PAKISTAN.

1. THE ASSIGNMENT:

The assignment of the experts is to make a feasibility study for broadcasting equipment manufacturing. In addition, after the arrival of the experts, the broadcasting organisation represented by Mr. Irfanullah Director of Engineering asked to make a feasibility study for transmitting tubes and v... condensors manufacturing. The experts studies technical and economic level of local electronic and allied industries in order to assess the extent of assitannce which may be extended by local industries for manufacturing of broadcasting equipment.

2. TRANSMITTING TUBES:

From the first look the manufacturing of transmitting tubes does not seem to be feasible, at least from the point of view that it is not economical to manufacture annually few pieces of the several types of tubes with a limited market to broadcasting only, especially if we can visualise the big efforts needed to introduce such a new field of technique locally. But the broadcasting corporation does not consider the economy of the project as the only decisive factor but they feel that there are other important factors such as the availability of the article, the foreign exchange savings, self sufficiency of the country introduction of new technique and the industralisation of the country. Keeping in view all these aspects, the manufacturing of the transmitting tubes becomes their priority interest.

3. THE TACKLE OF THE SUBJECT:

To tackle the subject of transmitting tubes manufacturing, an attempt was made to try to standardise the transmitting tubes used by Pakistan Broadcasting Corporation. When the study began, it was found that the tubes are of a very big range. They were obtained from various manufacturers from all over the world. They are also using different methods of cooling air cooled, water cooled and vapour cooled.

...2...

4. LOCAL STANDARDISATION:

It was thought that it is possible to reduce the number of types of tubes by studying the tube characteristics making a suitable alteration in the design of the stage circuit and testing the replaced tube in the altered circuit. But it was found that this is not possible, because there are no spare transmitters and the operated transmitters are in service about 20 hours daily. For that reason, there was no time for alteration of circuit and testing, especially if different methods of cooling confronted us.

5. MANUFACTURERS STANDARDIZATION:

Another way to tackle the subject is to try to find if some of the transmitting tube manufacturers had made such a standardisation of tubes. After thinking over the case, it was found that in the developed countries the designer of the transmitter circuit requires a certain tube characteristic and the tube manufacturer develope the required tube. By this we can find in the one country or in the one transmitter manufacturing firm an intergrated family of tubes suitable to her own standards and generally transmitter manufacturer will not be interested to standardize his tubes and other spare parts with the other manufacturer, as he is gaining from selling his spare parts to the purchaser of his transmitter and this is a continuous business because the transmitter will continue to consume spare parts.

THE POINTS INTAND TO STUDY:

Optimum number of types and minimum economic number of transmitting tubes to be manufactured in a developing country.

6. GENERALIZATION OF THE CASE:

Now we come to an interesting case. The representative of Pakistan Broadcasting Corporation said that mostly the prices of spare parts are very much higher than their price in the transmitter as a whole and the manufacturers exploit the developing countries very much in this concern. The price of the manufacturer can be reasonable when selling a transmitter, but the price is much higher when supplying the spare parts. This case does not relate to a Pakistani case only, but this is a general case in supply of such spare parts.

...3..

7. NEEDED STUDIES:

Manufacturing of transmitting tubes, vacuum condensers and transmitter in Pakistan may become a general case of interest to other developing countries. This requires more study and thorough investigations to exhaust all the possibilities of this case before writing the final report. To do this it needs the following:-

a) To visit specialised firms and plants concerned with the manufacturing of transmitters, transmitting tubes and vacuum condensors, electronic and telecommunication equipment such as: AEG Telefunken(Germany), Brown Boveri(Switzerland), Tesla (Czechoslovakia), Philips (Holand), Marconi(England), Electromimpex (Hungary), RCA Gates and Ampex (USA). Those visits can be done within 6 weeks.

b) During those visits, it is necessary to investigate the following:

1- Standardization of transmitting tubes and broadcasting equipment manufacturing.

2- Transfer of technology in the field of transmitting tubes and broadcasting equipment manufacturing.

3- Supply of needed raw materials and components.

4- The new trends in the field.

5- Assessment of feasible alternatives for local production (Minimum economic numbers, optimum number of types to be produced, possibilities of utilising reserve capacities of electronic and allied industries in Pakistan, technique and technology best suitable for local production.

8. PAKISTAN COUNTRY:

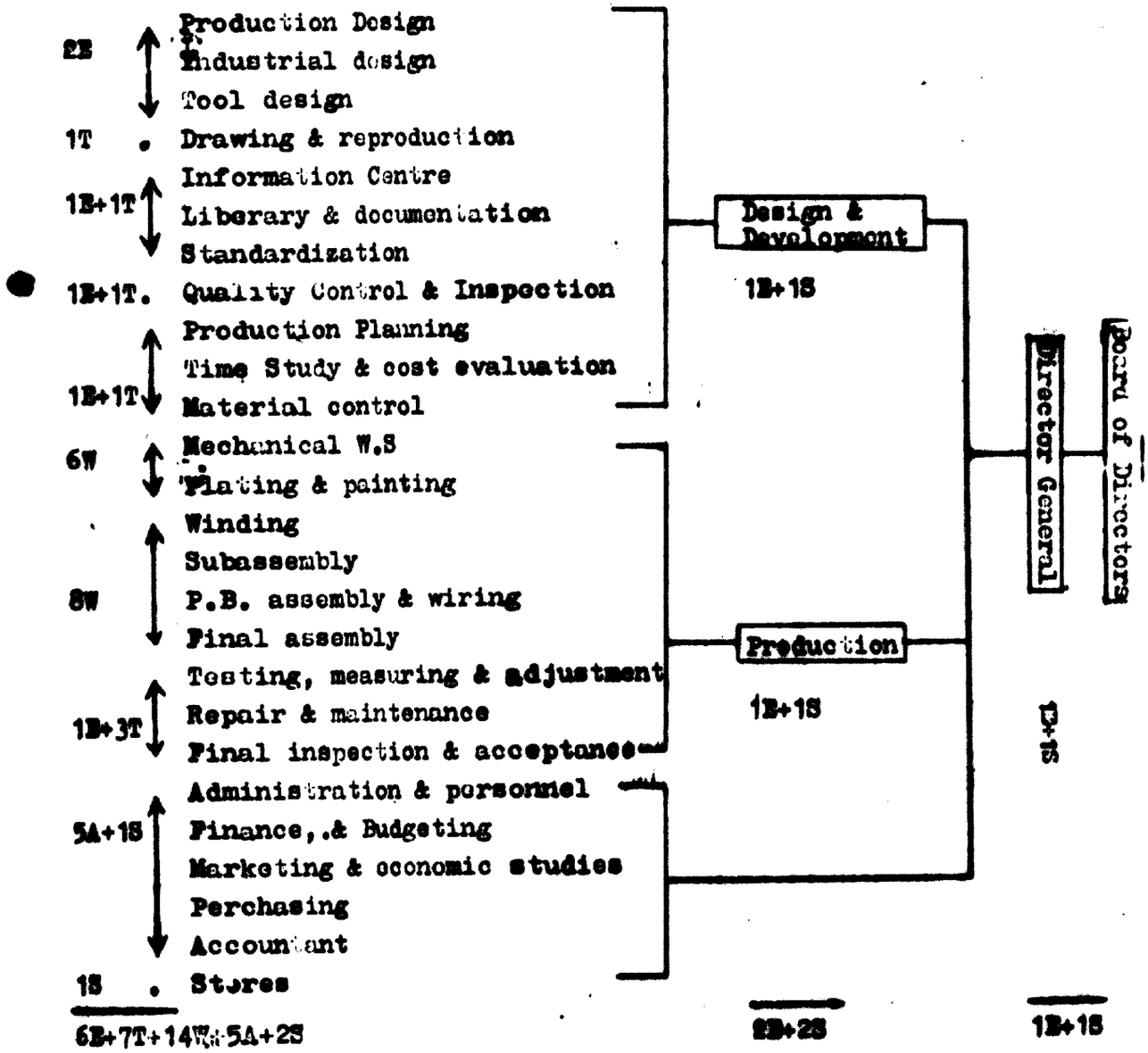
Pakistan Broadcasting Corporation, the initiator of the idea to manufacture the broadcasting equipments and the transmitting tubes and they are very interested to get the thorough study of the case. To combine the manufacturing of transmitting tubes with the T.V. picture tubes manufacturing may help the industry. Also an attempt to find a suitable market for the intended production may improve the economy of the project.

9. THE DEVELOPING COUNTRIES COUNTRY:

As the case is general and of interest to the broadcasting organisations in the developing countries, it is recommended to send copies of the final report to them to enable them to study the case separately or in a conference. The cooperation of the developing countries in this concern will give to them a big chance in manufacturing and marketing of transmitting valves and broadcasting equipments.

ANNEXURE - XI

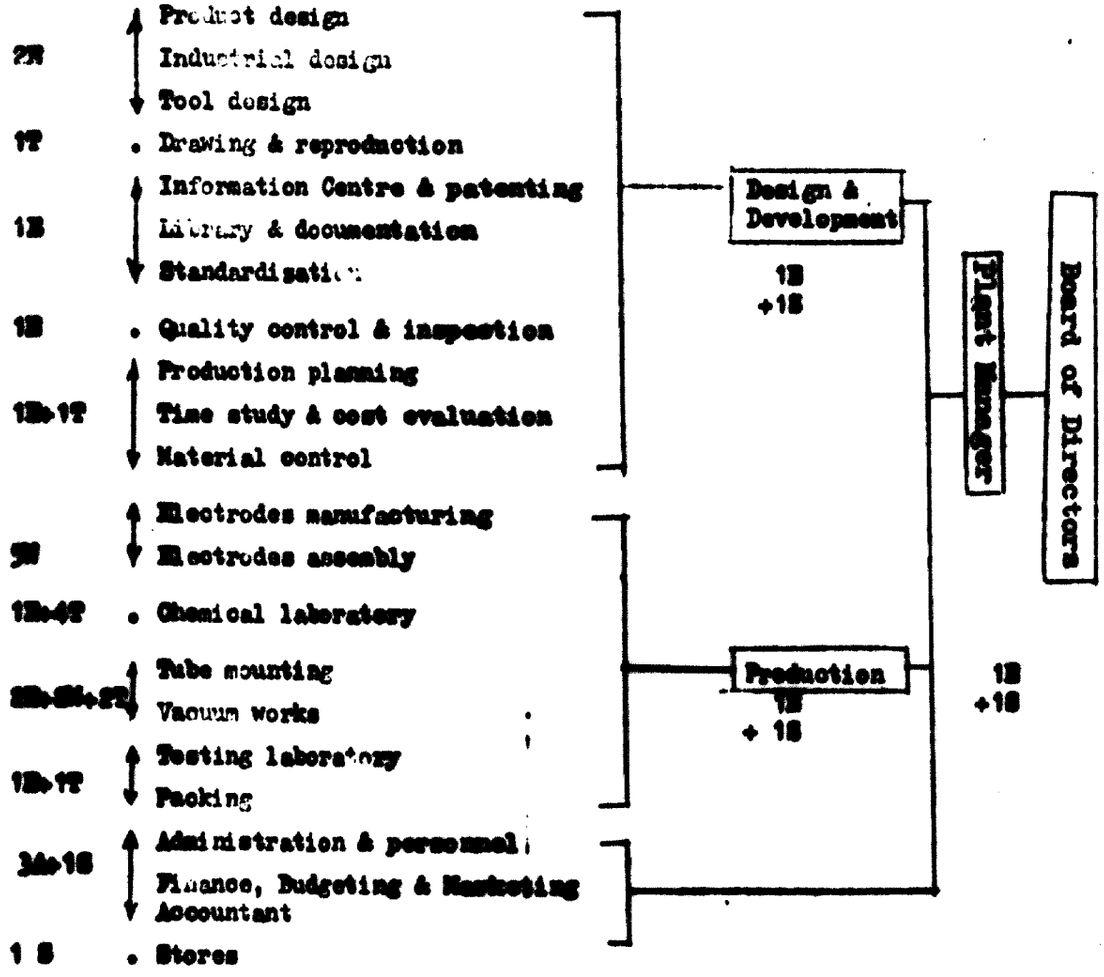
Electronic Equipment Manufacturing
Organization Chart



E	=	Engineer	= 9
T	=	Technician	= 7
W	=	Worker	= 14
A	=	Administrative Finance,... Accountant	= 5
S	=	Secretary,Steno & Storekeeper	= 5
		Chowkidar	= 4
		Peons	= 2
		Sweeper & Parash	= 2
		Total:-	48

ANNEXURE - XII

TRANSMITTING TUBES MANUFACTURING ORGANISATION CHART



9E+7W +9T+ 2A +2S

2E +2S

1E+1S

12E + 7W +9T +3A +3S =36

E = Engineer = 12
W = Worker = 7
T = Technician = 9
A = Administrative=1
A = Finance = 1
A = Accountant = 1
S = Secretary, Store & Storekeeper= 5
Chaukidars = 4
Peons = 2
Sweeper = 2

Total: 44

ECONOMIC STUDY OF ELECTRONIC EQUIPMENT MANUFACTURING

MANUFACTURE OF TRANSMITTING AND STUDIO EQUIPMENT

Cost of the Transmitting and Studio Equipment Project and Financial Plan (Rs. in thousand).

	Local	Foreign	Total
Preliminary expenses	30	-	30
Land (Two acres)	100	-	100
Buildings	665	-	665
Production machinery and equipment imported	-	600	600
Other machinery	75	-	75
Ventillating plant imported	-	200	200
Import duty in-surance, clearance.	400	-	400
Erection and installation	80	-	80
Furniture, fixture and fittings	100	-	100
Interest during construction	135	-	135
Pre-production and start-up expenses	150	-	150
Contingencies	200	-	200
Total fixed cost	1935	800	2735
Working capital requirements	920	-	920
Total Project Cost	2855	800	3655
Way of Financing			
IICIC loan foreign currency	-	800	800
Custom debentures	350	--	350
Rupee debentures	1645	--	1645
Equity	860	--	860
Total:-	2855	800	3655

FACILITIES OF THE TRANSMISSION AND [illegible] PROJECT.

Land	two acres in a developed state worth Rs. 100,000
Buildings	new building with forced ventillation, dust proof worth Rs. 665000 plus Rs.135000 for fencing and contingencies
Power	80 KV from WAPDA.
Water	by pipeline from public supply system
Gas	from pipeline of Sui Northern Gas Transmission Lines
Coverage	main towards sovera/e system
Production machinery and equipment imported	worth Rs. 600 thousand
Other machinery and equipment local	worth Rs. 75 thousand
ventillation plant imported	Rs. 880 thousand
Import duty insurance and clearance	90% of CIF cost
Erection and installation	10% of machinery cost without import duty, insurance and clearance.
Furniture, fixtures and fittings	worth Rs. 100 thousand
Construction schedule	PICIC sanction - December, 1975 L/Cs established - June 1976 Deliver - December, 1976 erection and .. June, 1977 commissioning.
Interest during construction	12% for half of the construction period (1/2 year) - Rs. 135 thousand
Pre-production and start-up expenses	Rs. 150 thousand
Working capital	half year stock of imported material (Rs. 765 thousand) and quarter year stock of local material (Rs. 135 thousand) assuming 75% of raw material imported and 25% local packing material and certain chemicals and auxiliary materials
Equity	30% of total project cost.

PROJECTED INCOME STATEMENT
OF THE TRANSMISSION AND SUBSCRIBER EQUIPMENT PROJECT
(Rs in Thousand)

	1977-78	1978-79	1979-80	1980-81	1981-82
Production	1750	2450	2975	3500	3500
Sales	1135	1836	2300	2975	3150
Cost of Sales					
Raw material	595	840	1150	1470	1465
Subcontracts	350	490	595	700	700
Labour	600	600	786	799	880
Manufacturing overhead	460	510	550	590	600
Depreciation	223	223	223	223	223
Inventory adjustment	250	400	600	600	300
Total cost of manufacture	2478	3093	3844	4322	4168
Sales expenditure	114	184	238	298	315
Total cost of Sales	2592	3277	4082	4620	4483
Gross profit/ loss	-1455	-1439	-1702	-1644	-1333
Other income and expenses					
Other income	20	25	30	35	40
Other expenses:					
Interest on PICIC Loan	80	80	80	80	80
Custom debentures	35	18	-	-	-
Rupee debentures	214	214	214	214	214
Bank borrowing	128	375	630	718	1183
Amortration of preproduction expenses	30	30	30	30	30
Repayment of PICIC Loan	-	-	80	80	80
Redeeming of custom debentures	175	175	-	-	-

Dividend on equity	-	-	-	-	-
Total other expenses	662	898	1034	1116	1587
Net other income and expenses	642	867	1004	1081	1487
Profit/Loss before tax and workers fund	-8097	-8306	-8706	-8785	-8880
Workers fund	-	-	-	-	-
Profit/Loss before tax	-8097	-8306	-8706	-8785	-8880
Tax provision	-	-	-	-	-
Net Profit/Loss	-8097	-8306	-8706	-8785	-8880

Assumptions underlying coming forward of the transmission and studio equipment projects.
(Rs. in thousand)

Production and Sale	Start of commercial operation 1st July, 1977	
Operating efficiency	Output	Wastage
First year	50%	35%
Second year	70%	25%
Third year	85%	20%
Fourth year	100%	15%
Fifth year	100%	10%
Raw material -	45% of production of good pieces, 30% loss of material from wrong pieces.	
Subcontracts	25% of the cost of production	
	the following staff to be employed	
1 plant manager		Rs. 9000/- per month
3 chief engineers	@ Rs. 4000/-	Rs. 12000/- per month
5 engineers	@ Rs. 2000/-	Rs. 10000/- per month
7 technicians	@ Rs. 1000 /-	Rs. 7000/- per month
1 finance manager plus salesman		Rs. 800/- per month
1 accountant		Rs. 800/- per month
1 administrative officer		Rs. 800/- per month
14 workers	@ Rs 700/-	Rs. 9800/- per month
1 store keeper		Rs 600/- per month
4 private secretaries and stenographers	@ Rs. 500/-	Rs. 2000/- per month
3 peons	@ Rs. 300/-	Rs. 900/- per month
1 sweeper	@ Rs. 300/-	Rs. 300/- per month
42	Total	50000/- per month.

Or Rs. 600000/- per year during the first year. With a 10% escalation every year there will be the following labour cost during first five years of the operation :

1977 - 78	1978 - 79	1979- 80	1980- 81	1981- 82
600	660	726	799	880

MANUFACTURING OVERHEADS (Rs. in thousand)

	1977-78	1978-79	1979-80	1980-81	1981-82
Fuel, water and power	55	60	65	70	75
Repair and maintenance.	30	35	40	45	50
Spares	18	18	18	18	18
Rent, rate and taxes	20	20	20	20	20
Insurance	37	37	37	37	37
Know-how	200	200	200	200	200
Royalty	88	122	149	175	175
Other expenses	12	18	21	25	25
Total manufacturing overhead	460	510	550	590	600

Depreciation

Plant and machinery	10%	1705	Rs. 171 thousand
Buildings	5%	930	Rs. 46 thousand
Furniture and fixtures	6%	100	Rs. 6 thousand
		Total:	Rs. 223 thousand

Sales Expenditure - 10% of total sales

Operating expenses -

Financial expenses -

Interest on ICIC Loan	10%	Rs. 80 thousand
Custom debentures	10%	Rs. 35 thousand
Rupee debentures	13%	Rs. 214 thousand
Bank borrowing	13%	Rs. varies from year to year

Amortisation of pre-production expenses 20% during five years

Repayment of loan -estimated two years moratorium, then in 20 half yearly instalments

Redeeming of custom debentures - during two years, 50% each

Redeeming of rupee debentures - during five years starting at the end of fifth year of operation - 20% each

Workers fund 5% on profit before tax

Tax 55% of taxable profits

ANNEXURE - XIV

[redacted] FOR TV PICTURE TUBES & [redacted]

(A) [redacted]

1) Parts of the Envelopes:

Bulbs for the television picture tubes consist of three principal parts:-

i) Front pannel or face plate, where the picture is seen;
ii) Funnel;
iii) The neck, in which the electron gun is mounted.

The tubing (neck), face plates and funnels are formed from a special lead alkali silicate glass. Tubing is sealed to the smaller end of the funnel to form the neck and the face plate is sealed to the larger end by heating. Glasses containing lithium are not considered desirable for parts located near the cathode because of a tendency to poison the cathode material.

2) Glass for Envelopes:

A glass used for television tubes must satisfy the following pre-requisites:-

1) Glass should be slightly tinted to improve picture contrast.
2) One-third of the transmitted light should roughly be absorbed to minimise halation.
3) Ultraviolet rays from the tubes are to be absorbed otherwise, the sensitivity of the observer's vision is affected.
4) Glass should at least absorb X-rays upto 30 KV
5) Glass should have expansion suitable for metal sealing and be easily melted.

Some of the glass compositions conforming with above specifications are given below:-

P/2.

TABLE - I

Glass composition

Compounds	G1	G2	G3	G4
SiO_2	67. 6%	67.00%	66. 8%	67-70%
B_2O_3	3. 6%	3.96%	3.96%	9-12%
Al_2O_3	-	-	-	2-2.5%
Na_2O	8. 7%	8.68%	8.23%	3.0-4.5%
K_2O	6.43%	6.73%	6.85%	3.0-4.0%
CaO	7.09%	6.79%	6.89%	0-2.0%
ZnO	-	-	-	0-3.0%
PbO	3.23%	4.47%	3.50%	2.5- 3%
V_2O_5	0.08%	0. 1%	-	-
CeO_2	-	-	2.63%	-
MnO_2	0.09%	-	-	-
Ni_2O_3	-	0.009%	0.009%	-
Co_2O_3	0.07%	0.09%	0.07%	-
La_2O	-	-	-	-
Ag_2O_3	-	-	-	0-3.0%

The lead oxide content must exceed 3% for sufficient X-ray absorption. Visible colour of the face plates is controlled by the minor additions of the oxides of Mn, Co, Fe, Cr, Ti, and Cu. The V, Ti and Cu oxides are also added to achieve ultraviolet absorption.

The average transmission of the above glass composition mentioned in Table-I is given in Table-II.

TABLE - II

Transmission of TV picture tube glasses.

Wavelength in mμ	% Transmission
350	0 - 3.5
360	0 - 13
370	2 - 31
400	45 - 75
500	50 - 76
600	50 - 71
700	67 - 80

T/3

A typical expansion coefficient of the TV glasses will be $108,3 \times 10^{-7}$ (25-300°C).

3) Melting of the Television Picture Tubes Glasses:

Because of the corrosive nature of these glasses, these are melted in regenerative furnaces lined with cohart zac refractories. The melting temperatures are kept at 1400°C while the temperature of the working end is not more than 1230°C. Stirrers are used in the forehearth to avoid striae (cords) and get bubble free glass with complete colour uniformity.

Stirrers are of propellor type; made of fire clay of 20 cm. dia and arranged in pair. Both stirrers in the pair rotate in the same direction at 10 revolutions per minute at the glass temperature of 1220°C. The homogenity of the glass is checked visually or by using a photographic method.

The face plates are made by pressing and then subsequently rounding of the edges etc. by fire polishing and annealing. The funnel is usually formed by centrifugal casting in a revolving mould which produces a much more uniform thickness. Tubing for forming the neck can also be made from the same glass. All three operations can be conducted in a single furnace using three different feeders.

The PCSIR Laboratories Lahore can undertake development of the glass compositions of international standards for TV picture tubes if the funds are made available.

(B) TRANSMITTING TUBE ENVELOPES:

1) Glass Envelopes:

Many small - and medium-sized low-frequency power tubes having internal-plate construction use simple cylindrical soft-glass envelopes and have the low-voltage electrode leads brought out through the base. "Hard" glasses of the borosilicate type are used for the envelopes of many medium- and high-power radiation-cooled tubes, particularly where compact construction is necessary to meet electrical-design requirements or equipment-space limitations. These glasses have relatively high softening temperatures, low rates of expansion, high electrical resistance, and excellent resistance to abrasion and "weathering".

Aside from the insulating materials employed in envelopes and bases, insulation is used in tube construction for electrode spacers. Spacers must be made of material which is unaffected by heat and can be formed with extreme accuracy. In small, glass-bulb type, low-power tubes, spacers are generally disks or wafers of high-quality mica; in larger tubes, they are usually bars or cross-arms of a low-loss refractory insulating material.

In many cases, insulating spacers are also used for centering the electrode assembly within the envelope. The mica wafers used for this purpose in smaller tubes sometimes incorporate special structural features which absorb vibration and mechanical shocks transmitted through the envelope. Refractory spacers are usually equipped with the shock-absorbing metal springs at the points of contact with the envelope. However, in some power tubes, the cage grids have a cantilever design which eliminates the need for such insulating spacers and results in a simplified construction using fewer parts.

In some high power tubes and tubes designed for operation at very-high and ultra-high frequencies, parts of the electrode structure are utilised in the tube envelope. For example, in metal-glass types, the metal sections of the envelopes, which are extensions of the internal electrodes, provide convenient terminal connections, especially in cavity-type circuits. The intermediate glass sections provide the required interelectrode spacing and insulation.

2) Ceramic Envelopes:

As a result of new processing techniques, high-alumina ceramic is now widely used in tube envelopes and spacers. The

/a

flat surfaces of the ceramic spacers can be economically ground and metalised for use in the assembly of the metal parts. In the metalising process, a finely divided molybdenum powder suspended in a binder is applied to the spacer by an adaptation of the silk-screen printing process and sintered on to the surface. The spacers are then nickel plated to improve the wetting action during brazing. Metalised spacers can be used as part of the tubes envelope.

This type of envelope structure permits realisation of good tube efficiency at ultra-high frequencies by the virtual elimination of objectionable lead resistances and losses in internal insulation. The metal sections of these envelopes are also used as electrode terminals, mounting facilities, heat-radiating surfaces and often interelectrode shields. Pure copper is used for most of these envelope sections because of its high thermal and electrical conductivity and its high ductility, which readily permits the fabrication of special shapes.

In several ceramic-metal tubes, the plate sections of the envelopes are fitted with special radiators which make it possible to obtain substantially increased heat dissipation by the use of forced-air cooling and thus permit the use of relatively small tubes in high-power circuits. The grid-No.2 or screen-grid sections of the envelopes of some ultra-high-frequency metal-glass tubes provide external shielding between the grid-No.1 and plate sections. In the "pencil"-type tubes, the flange-type grid sections of the envelopes act as shields between the plate and cathode sections and thus minimise of feedback when these tubes are used as amplifiers in ultra-high-frequency cathode-drive circuits.

Ref.

Extracts regarding the television tube glass envelops have been taken from the preliminary report of Dr. Ahmad Din of P.C.S.I.R. (Lahore), Pakistan.

ANNEXURE - XV

HISTORY OF DEVELOPMENT FROM 1960-74 AND THE PRESENT STATE OF THE INDUSTRY

1. Most of the typical electronic equipment including radios was being imported upto 1963. However, a start was made in electronic equipment manufacture in Pakistan as early as 1954, with the establishment of a Telephone Factory at Haripur, Hazara. The Government of Pakistan, vide their letter No.DB(III)(v)/65 dated May 19th, 1961, set up an Electronics Committee to assess the requirements of electronic equipment, components and accessories and standardised items. The report of this committee highlighted the importance of electronics for industrial and economic development and for defence. The report emphasised the need for the establishment of "Manufacturing Capacity of Electronic Components and Equipment" in Pakistan.

2. The Government provided fiscal concessions and took protective measures for the encouragement of radio assembly plants in the country. The industry progressed and 18 units with a sanctioned capacity of 1,50,000 radio sets was established by 1962. The manufacturing capacity continued to rise with the local and export demand and it stood at nearly 7,00,000 sets in the year 1973-74. In 1966-67 the industry started assembly of TV sets and built up a capacity of 50,000 sets per year by 1973-74. All the investment in the radio and TV industry came from the private sector. This industry has achieved considerable depth of production, except of course in case of electronic components, which require a more sophisticated industrial capability. Majority of the components for electronic equipment manufacture still imported, while mechanical parts like chassis, switches, knobs etc are manufactured within the country.

3. There are three industries in the public sector - the TIP Haripur, the NRTC Haripur, and CTI Islamabad. TIP is equipped for production of telephones, tele-printers and switching equipment. It also manufactures electronic components like capacitors and resistors of special varieties. The NRTC is primarily engaged in the assembly and testing of radio equipment for Defence Services, and, like the radio and TV manufacture, is dependent upon the import of most electronic components. The CTI Islamabad manufactures transmitter equipment as well as a small range of electronic components required for the assembly of carrier equipment.

Raw Materials

4. There is no capability in the country for the production of electronic raw materials. The production of electronic raw materials is capital intensive entails complex plants and necessitates mass-production economy. Therefore, it has not yet been feasible to set up any plant for production of electronic raw materials - Germanium, Silicon, Ferrites, Ceramics, Special Glass, Plastics etc.

Components

5. There are only two manufacturers of standard electronic components namely ELNAC, Lahore and CTI, Islamabad. The production range and quality of ELNAC is limited and mainly caters for the assembly of commercial radio receivers. CTI, however, is equipped to produce high-quality professional varieties of transistors, capacitors, rectifiers, required mainly for telephone equipment. Although there are sufficient capacities available in both these component plants, yet the range and depth of production in both the plants is small. These industries are backed by the well-known industrial concerns Philips and Siemens and have a potential for both vertical and horizontal expansion.

6. Sizeable potential also exists in distributed units both in the Public and Private Sector for the manufacture of metal-parts, plastic mouldings, printed circuit boards, coils, switches, relays, wires, cables, stampings, glass and ceramics parts. This can be harnessed for the manufacture of electronic equipments. In addition, industries exist wherein tools and plants for electronic industries can be manufactured i.e. PITTP, HIC and PITAC etc.

Overall Assessment

7. The country is lagging far behind in the field of electronics from the points of view of know-how, in materials and components. There is very little research and development work being done in this field. There are a few departmental centres like Telecommunication Research Centre, Pakistan Institute of Nuclear Science and Technology, Defence Science Organisation and SUPARCO, who are carrying out some development work, but this is inadequate and uncoordinated.

8. Moreover, there is a shortage of trained technical manpower, particularly for "high technology" development and production. The educational infrastructure does not provide intensive practical job-oriented technical training for the high technology electronic industry.

9. Detailed evaluation of present production range and capacities of Private and Public Sector Industries in Electronics is as follows:-

National Radio Telecommunication Corporation
(Ministry of Communication)

A. **Investment** 15

B. **Production Capacity** 75

AN/PRC-6	(1000)	5.6
AN/PRC-8-10	(2000)	20.0
AN/GRC-9	(2000)	52.0

C. Export NIL

D. **Personnel** 900

2. Telephone Industries of Pakistan
(Ministry of Communications)

		Rs. (In Millions)
A.	Investment	53.10 upto 1973
B.	Production Capacity	40.00 upto 1973
	Telephones	
	Auto exchanges	
	PBXs	
	Trunk Boards	
	Carrier Channels	
	Telex equipment	
C.	Export	8
D.	Personnel	
	Employees 800	
	Workers 3700	
	Total:- 4500	

3. Carrier Telephone Industries
(Ministry of Communications)

A.	Investment		15.0
B.	Production Capacity		
	Transistors	1.5 Millions	
	ICs/HICs	1.1 Millions	
	Capacitors		15.0
	Selenium	.7 Millions	
	Rectifiers		
	Printed Circuits boards	.06	27.0
	Channel/ends	3000 ends	
		Total:-	42.0
C.	Import		1.0
D.	Personnel	346	

4. Private Sector

A.	Investment		100
B.	Production Capacity		
	Components		300
	Radio Receivers		
	TV Receivers		
C.	Export		10.0

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Annexure - XVI

ELECTRONIC INDUSTRY IN PAKISTAN

UNIDO Experts had a very limited time available for visiting various industrial units dealing with electronics and related fields of industry. They studied various references, participated in meetings on development of electronics and held discussions with people from industry, research, universities and colleges, government, Pakistan Broadcasting Corporation and Pakistan Television Corporation. As a result of all of their activities mentioned above they would like to present the following general notes:

1. The industry requires considerably more care about quality which is frequently neglected, quality control instruments are not being utilized and wages and salaries are not related to quantity and quality of products. Not enough attention is being given to quality, it seems even in the educational institutions. General consumer in Pakistan and-strongely enough-public sector customers are not quality concious. Generally there was more quality in manufacture of electronic components and in certain related industries (e.g. cables, enamelled wire, electro technical porcelain etc) than in electronic industry.

2. There is hardly any scope for illiterate person in a quality consicious electronic industry. There cannot be any progress in quality unless literate workers find their way to electronic industry and unless a functional education system is introduced (may be even during the working time) in order to supplement the inherited skill of a Pakistani worker.

3. In most of the units great efforts are needed in order to establish production technology and industrial organisation of the production process. There is no motion & time study , no work instructions and no measuring of productivity of labour.

4. Co-operation and co-ordination within electronic industry is not enough developed to the detriment of local development and self sufficiency. Local component manufacturers are being neglected by the assemblers and they don't respond to their needs. The results are more imports and higher cost of local production. Individual firms should specialize in manufacture of components on the basis of economic advantage for all of them. Import policy in electronic products should avoid imports of products which are locally assembled and of components which are locally manufactured.

5. Present number and quality of engineers and technical staff in the electronic industry is not sufficient for proper management and for development of electronics and related industry. Product and technology development and industrial organisation of the production process require more attention.

6. In order to absorb foreign technical andeconomic assistance and to benefit from transfer of technology and scientific organization of the production process and to step by step over-come dependence on foreign supply of critical items it is essential to prepare a phased programme of local production of parts and components where such a production starts to be economically viable. Strengthening of technical, economical and commercial management, providing sufficient and experienced technical staff, establishing research and development sections, providing quality, economy and follow-up control for implementation of the phased programme. Such a programme may be implemented best by an association of

electronic industry backed by the assistance of an international independent organization like UNIDO which is going to follow the interests of Pakistan development.

7. There is lack of management in some places.

8. Vast diversity of products and components, and different sources of supply of equipment and components, create difficulties for local production. It also affects supply and storage of spare parts and components and the reliable function of Pakistan Broadcasting Corporation, Pakistan Television Corporation and other major consumers of electronic industry. This can be best over-come by standardisation of components, circuits and technology. This is a very difficult task which needs a solid co-operation from all members of electronic industry association and a powerful coordinating technical and economic institution and intensive design and development efforts.

9. Plant facilities and capacities are not fully utilized. This leads to higher capital outlay and production cost. This is also influenced by the large number of small assembly factories in the organized sector.

10. There is what is called "Cottage Industry". Those are parasitic unlicensed assemblers of radio sets. Improving the electronic industry quality-wise and cost-wise will give no chance for such parasitic industry.

11. Inadequate and late information of the industry about the future programmes of radio and television broadcasting coverage and the introduction of colour television with its possible impact on demand for black and white television sets hinders long term planning and development in local industry.

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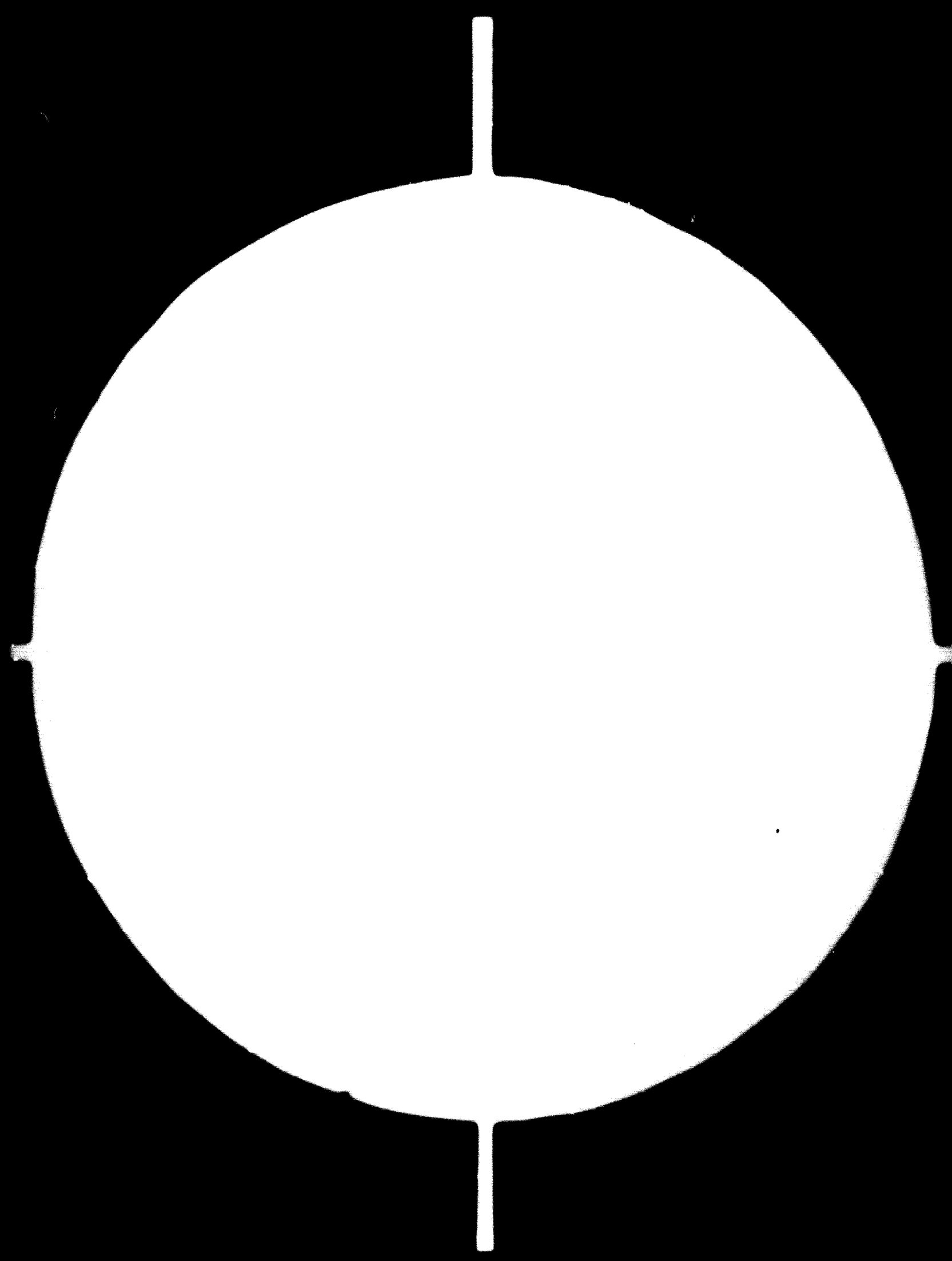

STANDARDISATION OF TV SETS IN PAKISTAN

A) **Need for Standardisation:**

The diversity of TV types as well as different sources of supply of components and equipment create difficulties. This can best be overcome by standardisation of components, circuits and technology.

B) **Circuit Standardisation:**

The beginning can be by standardising the circuit. To make a standard chassis for different picture tube sizes & different T.V. Set features.

C) **Chassis Standardisation:**

1. To decide if the active elements are tubes, transistors or hybrid. May be to transistorise tunner, IF stage, Video stage with AGC & audio stage. To produce required transistors for these stages locally. The synchronisation and deflection stages can be either tubes or transistors, although preferably transistors.
2. To decide the type of tunner mechanical-wise & electric-wise.
3. To decide the type of circuit bounded components such as all kinds of coils and transformers including IF's, frame output transformer, line output transformer & deflection coils.

D) **Distribution of work.**

The manufacture of different components either passive, active or circuit bounded is to be distributed between the manufacturers in a way that there will be one manufacturer for one component only.

E) **New products:**

Besides the above mentioned components, it is possible to manufacture:-

- Picture tubes
- Ferrites
- Ceramic capacitors
- Transmitting tubes

F) **Popular Radio & TV Sets.**

It is a good proposal to introduce a popular cheap radio and cheap TV set for educational purpose and for the customers with limited means. This will help both functional education as well as big series production.

MANUFACTURING T.V. PICTURE TUBE IN PAKISTAN

A) CAPACITY:

Estimated requirement of television sets is about 300,000 sets for the period 1975-80. There are about 250,000 TV sets already in use. Assuming average working life of picture tube to be about 5 years used in TV set under current use pattern, the replacement requirements would be 150,000 picture tubes. The total number is 300,000 +150,000 = 450,000 picture tubes, i.e. about 100,000 picture tubes per year.

It is possible to join manufacturing of CRT's and transmitting tubes in the plant for picture tube manufacturing.

B) PHASES OF MANUFACTURING:

- For the first phase, envelopes, guns and chemicals will be imported.
- For the second phase, to import envelopes in three pieces (screen, cone and neck) and to seal them together.
- In the third phase to manufacture the gun.
- In the fourth phase to manufacture glass.
- Since the second phase to try the possibility of using local chemicals and materials.

C) TRANSMITTING TUBES:

Feasibility study on manufacturing of transmitting tubes is not yet ready. A study on standardization of transmitting tubes used in Pakistan is needed. A provisional report in this concern had been submitted to Pakistan Broadcasting Corporation.

ECONOMIC SIZE OF TRANSMITTING TUBES MANUFACTURING

COST OF THE TRANSMISSION VALVES PROJECT & FINANCIAL PLAN
(Rs. in thousand)

Manufacture of Transmitting Tubes.

	Local	Foreign	Total
Preliminary expenses	25	-	25
Land(two acres)	100	-	100
Buildings	300	-	300
Production machinery and equipment imported	-	300	300
Other machinery	90	-	90
Air-conditioning & ventilating plant imported	-	300	300
Import duty, insurance,clearance	300	-	300
Erection and installation	65	-	65
Furniture, fixtures and fittings.	80	-	80
Interest during construction	105	-	105
Pre-production & start up expenses	100	-	100
Contingencies	190	-	190
Total fixed cost	1475	600	2075
Working Capital requirements	240	-	240
Total project Cost	1715	600	2315

Mode of financing.

IFCI loan - foreign	-	600	600
Custom debentures	250	-	250
Rupee debentures	765	-	765
Equity	700	-	700
Total:-	1715	600	2315

Facilities for the Project.

Land - two acres in a developed estate worth Rs. 100,000 -

Buildings - new building dust proof with air-conditioning and forced ventillation worth Rs. 300,000 plus Rs. 100,000 for fencing and contingencies

Power - 50 KV from W.P.M.

Water - by pipeline from public supply system

Gas - from pipeline of Sui Northern Gas Transmission Lines.

Sewerage - main towards sewerage system

Raw material - 85% imported, 15% local packing material and certain chemicals and auxiliary materials

Production machinery and equipment imported - worth Rs. 300 thousand

Other machinery and equipment - local - worth Rs. 50 thousand

Air-conditioning and ventillation plant

imported - worth Rs. 300 thousand

Import duty, insurance and clearance - 30% of CIF cost

Erection and installation - 10% of machinery cost without import duty, insurance and clearance

Furniture, fixture and fittings - worth Rs. 80 thousand

Construction schedule - PICIC sanction - December, 1975
L/Cs established-June, 1976
delivery - December, 1976
erection and commissioning - June, 1977

Interest during construction - 12% for half of the construction period (½ year) - Rs. 105 thousand

Working capital - half year stock of imported material (Rs. 221 thousand)
- and quarter year stock of local material (Rs. 19 thousand)
- worth Rs. 240 thousand

Equity - 30% of total project cost.

SEPARATE INCOME STATEMENT
OF THE TRANSKRISHNA VALVES PROJECT (Rs. in thousand)

	1977-78	1978-79	1979-80	1980-81	1981-82
Production	580	650	910	1105	1300
Sales	808	385	546	774	975
COST OF SALES.					
Raw material	308	360	364	442	580
Labour	652	717	788	867	954
Manufacturing over head	240	270	300	340	170
Depreciation	192	192	192	192	192
Inventory adjustment	-	-	800	300	400
Total cost of manufacture	1892	1439	1844	2141	2436
Sales expenditure	81	33	55	77	98
Total cost of sales:	1973	1472	1899	2218	2534
GROSS PROFIT	-1165	-1147	-1353	-1444	-1599
Other income and expenses.					
Other income	15	15	15	15	15
Other expenses:					
interest on IFICI Loan	60	60	60	60	60
custom debentures	85	13	-	-	-
rupee debentures	99	99	99	99	99
bank borrowings	95	809	492	703	943
Amortisation of pre-production expenses	80	80	80	80	80
Repayment of IFICI Loan	30	60	60	60	60
Redeeming of custom debentures	185	185	-	-	-
-rupee debentures	-	-	-	-	183
Dividend on equity	-	-	-	-	-
Total other expenses	454	666	731	942	1365
Net other income and expenses	439	651	716	927	1350
Profit/loss before tax and workers fund	-1544	-1798	-2069	-2371	-2909
Workers fund	-	-	-	-	-
Profit/loss before tax	-1544	-1798	-2069	-2371	-2909
Tax provision	-	-	-	-	-
NET PROFIT/LOSS	-1544	-1798	-2069	-2371	-2909

ASSUMPTIONS UNDERLYING EARNING FORECAST

Production and sale -

Start of commercial operation - 1 July, 1977

Operating efficiency	Output	Waste
First year	40%	60%
Second year	50%	50%
Third year	70%	40%
Fourth year	85%	30%
Fifth year	100%	25%

Labour - the following staff to be employed

1	plant manager		Rs. 5000,-per month
3	chief engineers(design, technology, chemical)	@ Rs. 3000,-	Rs. 18000,-per month
8	engineers	@ Rs. 2000,-	Rs. 16000,-per month
9	technicians	@ Rs. 1000,-	Rs. 9000,-per month
1	finance manager		Rs. 800,-per month
1	accountant		Rs. 800,-per month
1	administrative officer		Rs. 800,-per month
7	workers	@ Rs. 700,-	Rs. 4900,-per month
1	store keeper		Rs. 600,-per month
4	private secretaries and stenographers	@ Rs. 500,-	Rs. 2000,-per month
2	peons	@ Rs. 300,-	Rs. 600,-per month
4	watch and ward	@ Rs. 300,-	Rs. 1200,-per month
2	sweepers	@ Rs. 300,-	Rs. 600,-per month
44	Total		Rs. 54300,-per month

or Rs. 651600, per year during the first year. With a 10% escalation every year there will be the following labour cost during first five years of the operation: (Rs. in thousand)

	1977-78	1978-79	1979-80	1980-81	1981-82
Labour	652	717	788	867	954

Manufacturing overheads (Rs. in thousand)

Fuel, water and power	40	45	50	55	60
Repair and maintenance	20	25	30	35	40
Spares	13	13	13	13	13
Rent, rate and taxes	15	15	15	15	15
Insurance	23	23	23	23	23
know-how	100	100	100	100	100
Royalty	21	32	55	77	97
Other expenses	8	17	14	22	22
Total manufacturing overhead (Rs. in thousand)	240	270	300	340	370

Depreciation

Plant and machinery	10%	1510	Rs.	151 thousand
Buildings	5%	725	Rs.	36 thousand
Furniture and fixtures	6%	80	Rs.	5 thousand
		Total:	Rs.	192 thousand

Sales expenditure 10% of total sale

Operating expenses

Financial expenses

on-IICIC loan	10%	Rs. 60 thousand
-custom debentures	10%	Rs. 25 thousand
-rupee debentures	13%	Rs. 99 thousand
-bank borrowing	13%	Rs. varies from year to year.

- amortisation of pre-production expenses - 20% during five years

repayment of loan - estimated five years moratorium, then in 10 half yearly instalments

Redeeming of custom debentures - during two years, 50% each

Redeeming of rupee debentures - during five years starting at the end of fifth year - 20% each

Workers fund - 5% on profit before tax.

Tax - 35% of taxable profits.

[redacted]

JOB DESCRIPTION

[redacted]

[redacted]	Electronic Engineer for Broadcasting Equipment Manufacturing Feasibility Study (Technical Side)
[redacted]	Three months
[redacted]	As soon as possible
[redacted]	Rawalpindi, with travel within the country
[redacted]	The electronic engineer will collaborate with an industrial economist as a team of two attached to the Ministry of Information of Broadcasting and they will jointly undertake a feasibility study for the establishment of Manufacturing Facilities for Broadcasting Equipment. In particular, the team will be expected to:

A) in the technical field: assess the present and future demand for broadcasting equipment including associated studio input equipment, aerial coupling equipment and aerial systems, together with audio equipment for broadcasting studios.

B) In the industrial field:

1. identify existing enterprises which could be expanded to manufacture products or semi-finished products identified above;

2. prepare an integrated and realistic manufacturing proposal taking into account the existing industrial enterprises, labour and managerial resources;

3. on the basis of the above, review and prepare a pre-feasibility study for the manufacture of the equipment identified above, which will include:

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a) the sectoral organization and the project planned in it;

b) criterion used in selecting the size and scope of the project;

c) organization, management, staff and labour requirements;

d) distribution and marketing, including effective demand, prices and required subsidy if any;

e) benefit/cost analysis, internal rate of return, foreign exchange savings, and the contribution to Government revenues;

f) financial plan including projections of annual financial statements and/or capital operating budgets (with the foreign exchange components shown separately) cash flows and back even analysis.

g) institutional support including regulatory and budgetary means and ancillary credit facilities.

QUALIFICATIONS

University degree or equivalent in industrial economics, extensive experience in the preparation of feasibility studies preferably for the manufacture of electronic equipment.

LANGUAGE

English

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ANNEXURE XXI

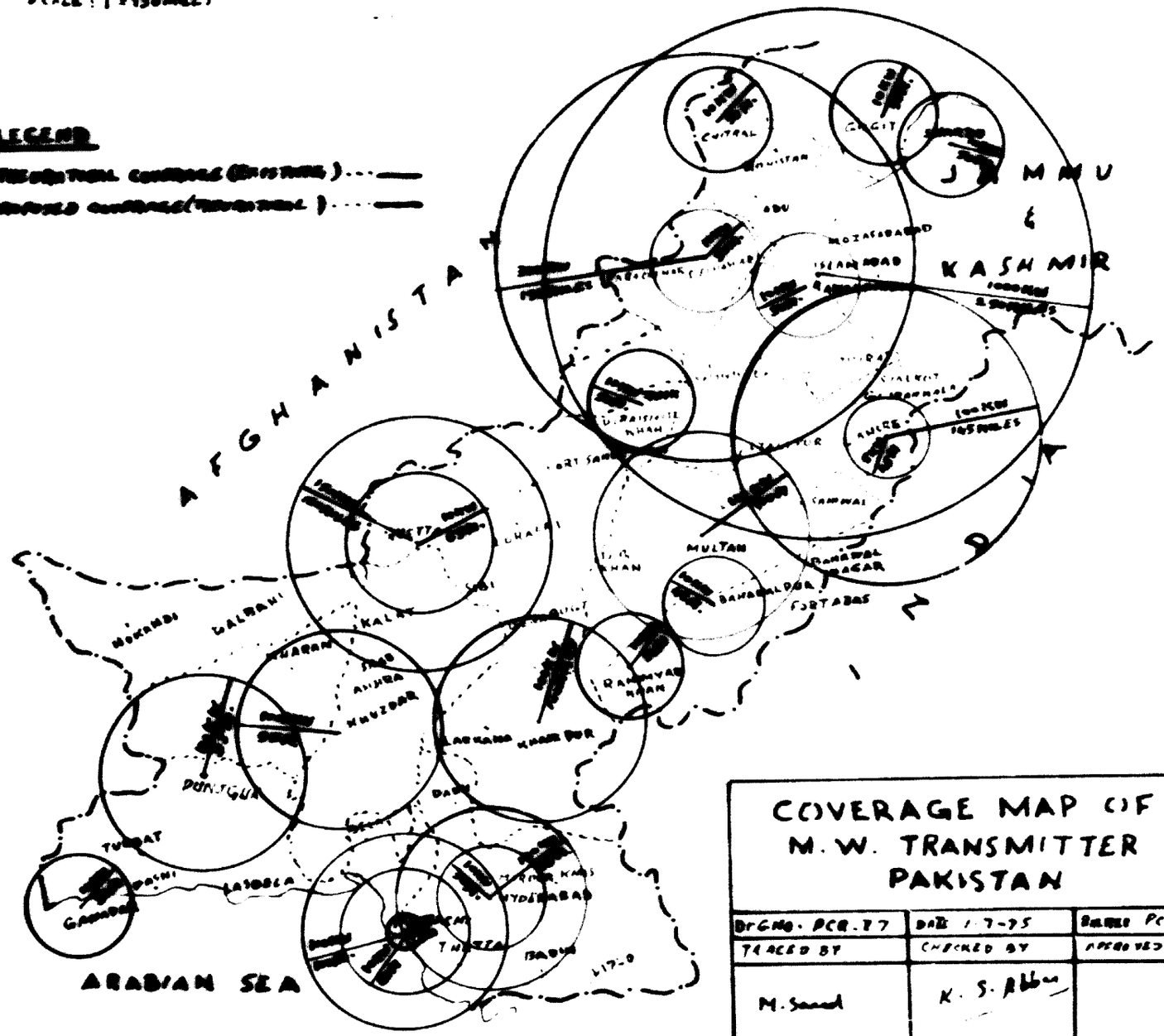
PAKISTAN

SCALE : 1" = 130 MILES

LEGEND

1) TERRITORIAL CONTROLS (EXISTING) ---

2) PROPOSED CONTROLS (TERRITORIAL) ---



COVERAGE MAP OF M.W. TRANSMITTER PAKISTAN

DrGMO. PCR. 77	DATE 1-7-75	SHEET PCR. 1
TRACED BY	CHECKED BY	APPROVED BY
M. Saeed	K. S. Abbasi	

[redacted]

[redacted]
May, 1975

04529
(2 of 2)

Broadcasting Equipment Manufacturing [redacted]
(*Economical Side*)

PAKISTAN

(Dp/Pak/73/040/11-01/01)

by

JIRI PRAZAK
Industrial Economist, United Nations Industrial Development Organization

Draft report

WRITTEN
May, 1978

BROADCASTING EQUIPMENT MANUFACTURING
FEASIBILITY STUDY
(ECONOMIC ASPECTS)

Pakistan
(UNIDO/PAK/73/040/11-01/01)

By

Jiri Prasek, Industrial Economist,
United Nations Industrial Development
Organization

[illegible] OF CONTENTS

11. LIST OF ANNEXURES

I. PRELIMINARY

I(a) INTRODUCTION

This study was sponsored by the United Nations Industrial Development Organization at the request of Pakistan Government based on the requirement of Pakistan Broadcasting Corporation. The purpose was to appraise the current situation in Pakistan electronic industry, to evaluate its prospects and the possibilities for establishment of manufacturing facilities for broadcasting equipment. In particular the experts had to assess the present and future demand for electronics, broadcasting and studio equipment and aerial systems, to identify existing production units which could be expanded to manufacture components for electronics, broadcasting and studio equipments as well as ready products in these categories, to prepare a realistic manufacturing programme taking in mind present capacities, managerial standards and availability of skilled labour, technicians and engineers. On the basis of these activities they were supposed to prepare a pre-feasibility study for manufacture of broadcasting and studio equipment. A copy of job description is in Annexure H. After the arrival of the experts the counterparts from Pakistan Broadcasting Corporation requested them to study the possibility for the local manufacture of transmitting valves as well.

These tasks have been accomplished within the very limited time available and a number of measures relating to the findings of the mission have been recommended which were essential in order to improve the present position of electronic industry in Pakistan.

Electronics in Pakistan is in a very elementary stage and there are very few changes towards improvement since 1968 when a similar exercise was done by a special

Electronics Committee established by the Government of Pakistan. A considerable time will be required to increase local manufacture of components and to diversify the production of basic products of electronics in this country and a lot of efforts at all levels. To analyse prospects for Pakistan electronics industry during next five years was a very complicated task and the authors are aware that a lot more efforts are needed in order to assess in a more accurate way future technical trends of this industrial branch as well as various market factors which could be only touched in this study. This task was very difficult also because of a serious stagnation and slow-down in Pakistan economy, in particular in industry and in investment climate, because of a considerable devaluation of Pakistan rupee, substantial decline in saving rates, inflationary pressures and serious problems in balance of trade due to oil price hike and chain of events derived from this factor. The difficulties are further aggravated by the uncertainty whether the highly mobilising production, investment and consumption rates of the perspective development programme (1978-80) are going to be achieved. Expected economic changes during next few years should be seriously considered by mill managements, electronics association, science and technology institutions and government when dealing with the findings and recommendations of this report and proposing specific actions. In particular any private business decision implementing the recommendations of this report should be based on a full flouged market survey for specific commercial circumstances covering all potential customers for the products.

1(b) Conclusions and Summary of Recommendations

I. Pakistan cannot succesfully develop her economy without a strong and well balanced electronic industry taking far more care about quality of the products.

II. Importance of electronic industry was duly emphasised in the Report on Electronic Industry prepared during 1967-68 by a special committee for Pakistan Government. The report very rightly pointed out basic problems of electronic industry in Pakistan at that time, such as

- distrust of the assemblers to local manufacturers of parts and components;
- absence of well equipped composite units for manufacture of components at economical prices;
- assembled products with a very shallow depth of indigenous parts and components manufacture;
- non-employment of engineers, qualified technicians and trained labour by the mills;
- no initiative for creative work, no emphasis on research and development;
- lack of raw materials, know how and tools.

Very unfortunately very little has happened in Pakistan electronic industry since 1968 and the above mentioned basic problems remain unresolved till now.

III. Report on Electronic Industry made several very important suggestions towards improvement in electronic industry, such as

- to decrease number of radio and TV assemblers, to reduce the variety of products and to encourage indigenous design based on local components manufacturing programme;
- to develop local capacity to manufacture a wide range of good quality non-standard components to meet commercial and professional requirements;

- import of parts and components for radio and TV receivers should be disallowed after due notice is given to the industry and facilities have been established for such production;
- related industries should be prompted to include raw materials for electronics and items in their products;
- new capacities should not be established which cannot be utilized;
- to standardize on 2 or 3 types of radio receivers and television receivers;
- to manufacture a standardized line of transmitters with maximum number of inter-changeable sub-assemblies ;
- to standardize on minimum number of systems and techniques the audio equipment to be produced locally;

and many others.

Very unfortunately for various reasons there is hardly any progress in Pakistan electronic industry since the issue of the Report and hardly any recommendation or any item of a very ambitious development programme in electronics has been implemented in letter and spirit.

It is a considered opinion of the authors that efforts of all industries, of the Electronic Association as well as of all institutions concerned should be guided towards expeditious implementation of previous recommendations and of the agreed development programme of electronic industry instead of recommending a large number of similar measures in this report.

IV. The present study indicates that a modern TV assembling plant (Telefunken, Hyderabad) is lying idle for several years because of liquidity problems. Electronic Association, Pakistan Industrial Credit and Investment Corporation and government agencies concerned should look

into the matter and assure that the operation of the plant is resumed soonest possible.

V. Economic performance of Pakistan electronic industry is non-impressive and a lot of efforts from every-body concerned will be required in order to improve the situation. Very low output per fixed assets in public sector units manufacturing telecommunication equipment is to a considerable part because of wrong organization and management by a government department. In order to improve the situation rapidly it is desirable to incorporate all thepublic sector units within the Board of Industrial Management, best as a part of State Heavy Electrical Corporation to assure business - like management, operation and marketing in these three important units.

VI. There is hardly any standard and quality in most units of electronic industry in Pakistan (and similarly in electronics supporting industry). There cannot be any considerable improvement in any sphere of electronics unless standard and quality receive due attention in all industrial units. Care about quality must start from the educational system. Better quality and more economy in manufacture should help the industry to fight the menace of "cottage industry " in electronics.

VII The Electronics Association should become fully representative and perform basic functions like

- protection of genuine interests of the members;
- to influence the import policy in electronic goods and components that it does not do any harm to the interests of local manufacturers;
- to collect local and foreign marketinginformation;
- to introduce standards in quality, to check quality and standards in production of member units and to protect them against unscrupulous manufacturers and also against dumping imports;

- to establish a feeling of common interests among the members.

VIII. Electronic firms with foreign participation heavily depend on parent corporation in project and technology design and even in marketing programme. A phased development programme should be prepared in each of these units to overcome heavy dependence on the principals and to become technically and financially sound and viable.

IX. Production of professional electronics should not be developed in organizations of major consumers as such an effort would further split very limited technical, managerial and financial resources of the country and retard the progress of electronic industry. Local electronic and supporting industry should be utilized for manufacture of components for broadcasting and studio equipment in those lines where know-how is available and the manufacture is economical; such a cooperation should continue even during the period when local manufacture of sophisticated professional equipment will be justified in the future on technical and economical grounds.

X. There are reasonable prospects for considerable expansion of local manufacture of components and import policy and tariff protection should be used as proper tools to make such an expansion possible.

1(a) SITUATION OF PAKISTAN ECONOMY

Basic Data

According to census of Pakistan conducted in September, 1972, the total area of Pakistan is 307.374 square miles, the total population 64.89 million with an average density 211 persons per square mile. Baluchistan covers the largest area (43.6%) but very scarcely populated (3.7% only). Punjab has the second largest area (25.8%) and has the highest share in population (57.0%). Sind is the third largest area (17.7%) with the second largest population (21.6%) whereas North West Frontier Province is the smallest province (10.5%) with the third highest population (15.0%).

It is estimated that the population of Pakistan increased very considerably since the census and that there are at present about 71.42 million inhabitants with an increase in population of about 2 million per year. The number of Pakistan citizen abroad is estimated to be 0.8 million, about half of this figure in U.K. alone.

There are estimated 19.4 million economically active persons out of whom about 11.1 million work in agriculture and 8.3 million in other sectors than agriculture. There are wide differences in the estimates of unemployed and underemployed persons ranging from one to several millions of persons. There are about five persons dependant on every earning person which creates a heavy burden in income sharing. Most women and girls in urban communities are unemployed because of lack of opportunities and also on account of serious social prejudices.

Whereas there was a constant growth of gross domestic product at a faster rate than population growth since 1965-66 till 1969-70, there was no increase in

gross domestic product during 1970-71 and 1971-72resulting in obvious fall in gross per capita income from Rs. 582 in 1969-70 (pre-devaluation) to Rs. 530 in 1971-72 (after devaluation). Despite two years with better growth of gross domestic product (1972-73 and 1973-74),gross per capita income in 1973-74 was just very slightly above the best year of pre-devaluation (1969-70) which definitely means a considerable decline in per capita consumption.

Pakistan is relatively poor in mineral resources. Energy resources are limited to the hydel potential and to two important deposits of natural gas. Pakistan has in abundance raw materials for cement production (lime stone, gypsum and clay), salt (rock as well as sea) onyx , dolomite, fire-clay and silica sand and less significant deposits of coal, chromite, barytes, fluorite, poor iron ore, magnesite and china clay.

Pakistan has an area of 197 million acres out of which 132 million acres have been surveyed. Out of this area 50.3 million acres are not available for cultivation and 6.4 million acres is under forest (mostly of low intensity with a limited number of trees per acre). Area available for cultivation is 75 million acres of which only 48 million acres is cultivated. Agriculture largely depends on artificial sources of irrigation - an area of 23 million acres is irrigated from world largest system of canals and further 9 million acres are irrigated by the tubewells. One third of the cultivated area depends on rains which are inadequate and scanty. Cropping intensity is very low due to lack of irrigation and scarcity of traction power during the period between one harvest and sowing for another harvest. As a result more area is being left as fallow (11.96 million acres during 1972-73) than sown

more than once (6.28 million acres during the same year). All provinces except for the Punjab have larger area under fallow than more than once sown. In production of principal crops after a considerable increase during the period of "green revolution " (1965-66 upto 1969-70) there is a considerable slow-down till now - rice production in 1973-1974 was slightly lower than during 1969-70 and there was an insignificant increase in wheat production during the same period resulting in very considerable imports of food-grains close to 2 million tons level. Similarly there was a considerable decline in sugar cane production during 1974-75 when compared with 1969-70 resulting in lower per capita consumption of sugar. Increase in cotton lint production continued upto 1971-72 which was the best cotton crop ever, unfortunately there is a decline in cotton in cotton lint production since then accompanied by a severe shortage of cotton seed and edible oil. In order to tackle this problems imports of edible oil had to increase manyfold. Tobacco production during 1973-74 was less than half when compared with 1966-67, 1967-68 and 1968-69.

Present industrial situation is described in the following chapter. There is a considerable slow-down in industrial growth since 1969-70 and reasonable growth in certain industrial branches having compensated by a decline or stagnation in other branches. There is a considerable fall in productivity of labour in industries and in industrial investment activity since 1969_70. There is a slight decline in industrial production per capita since 1969-70 till now a-days.

After a very reasonable price trend since 1966-67 till 1969-70, since 1971 due to large scale deficit financing,

increase in non-productive expenditures, decline in productivity of labour and preferential treatment given to prices of agricultural commodities and products of nationalised industrial units, the price spiral accelerated in a dangerously fast rate as might be seen from the following table :

	Index of wholesale prices (1959-60 = 100)	Consumer price index (1969-70 = 100)
1966-67	124.36	-
1969-70	132.19	100.00
1970-71	137.32	105.70
1971-72	150.31	111.07
1972-73	179.74	121.40
1973-74	229.06	157.64
September	227.91	150.92
December	232.21	157.41
March	224.12	165.84
June	250.89	174.94

Considerable increase in consumer prices was tackled by government subsidies to the lowest income groups. This socially very desirable attitude combined with decline in discipline and productivity of labour and with increases in employment in non-productive sectors considerably deteriorated the competitive position of Pakistan industry in foreign markets.

Pakistan Railways have a network of 8475 route miles and 874 stations and they operate a rolling stock of 29electric locomotives, 401 diesel locomotives, 562 steam locomotives, 66 railcars and 115 trailers, 35727 wagons, 2060 passenger carriages and 1116 other carriages. Not only development but also modernization and reconditioning of the present railway facilities has been seriously neglected since the North western Railway

became Pakistan Western Railways in 1947 with the result that the role of railways in the overall transport went very considerably down. The volume and quality of operation could not comply with the development of Pakistan economy and Pakistan Railways started incurring heavy losses. This situation just started improving and in 1974-75 annual development plan for the first time Pakistan Railways received their due share. Positive results of this change will materialise only if this sound trend is going to continue. Basic data on railway operation may be seen from the following tables (in million)

	1964-65	1969-70	1971-72	1972-73	1973-74
Passengers	182	129	124	135	138
Passenger miles	6257	5967	5914	6824	6968
Freight carried (tons)	15	12	13	12	11
Freight ton miles	4949	4675	4723	5096	4528

The road network in Pakistan consisted at June 30,1973 of 11,919 miles of high type roads and of 8,997 miles of low type roads. At the same time 60.2 thousand motor cars, 9.1 thousand buses, 22.66 thousand trucks and 47.5 thousand motor cycles were plying on the roads. There were all together 160 thousand motor vehicles on the roads. Road transport is taking a constantly increasing share from Pakistan passenger and goods traffic,frequently against the interests of economy. In the light of recent oil price hike there are good reasons to re-assess future role of rail and road transport in Pakistan economy.

Karachi port has 24 berths, two lighterage berths and three oil berths. Works started on addition of

four dry cargo berths at Juna Bunder, on re-modelling and reconstruction of West Wharf railway and of the road bridge serving the seventeen East Wharf berths, in order to increase dry cargo handling capacity of Karachi port upto 7 million tons and Railway marshalling capacity by 50%. Another project envisages expansion of marine oil terminal capacity to 10 million tons. In order to provide port capacity for Karachi Steel Mill works on another port (Port Qasim) and on a railway marshalling yard at Pipri are supposed to start in the near future. Whereas imported cargo handled by Karachi Port has a slowly increasing trend (from 6.8 million tons in 1966-67 over 5.5 million tons during 1968-69 to 7.4 million tons in 1973-74), the amount of export cargo is on a constant slow decline(from 3.4 million tons in 1969-70 to 3.0 million tons in 1973-74). Pakistan shipping fleet consists at present of25 ships of National Shipping Corporation with a total D. W. T. capacity of 287.3 thousand tons and of 27 ships of Pakistan Shipping Corporation with a total D. W. T. capacity of 329.3 thousand tons. Number of vessels as well as their capacity went significantly down since 1970 due to war losses and scrapping of old vessels.

The fleet of Pakistan International Airlines consists at present of three DC -10-30, eight Boeing 707 two on lease to [redacted] , three Boeing 720-B (two on lease to Air Malta) and six Fokker 27 (two on lease to Libyan Arab Airlines). The airline is operating 30 frequencies per week on international routes between New York and Tokyo and 123 frequencies per week on domestic lines. The operations of P I A have been seriously affected by the separation of East Pakistan in 1971. Despite very considerable efforts of P I A which deserve appreciation, during 1973-74 PIA carried less

passengers than during 1969-70 and 1970-71 and had a lower load factor than during those years.

There was a very positive trend in exports from Pakistan after the devaluation of rupee and after transferring a considerable part of commodities sold earlier in East Pakistan into the world market. High exports during 1972-73 combined with a considerable upward trend in prices of primary commodities, cotton yarn and cotton cloth, made it possible to have an active balance of trade in 1972-73. Unfortunately the positive impact of devaluation did not last long because of constant rise in prices of agricultural commodities and increase in labour cost, non-productive expenses and decline in productivity of labour. Moreover oil price hike and its side effects hit Pakistan balance of trade very considerably and a combination of less exports in quantity, decline in export prices, higher imports of wheat, edible oil, crude oil, petroleum products and fertilizers lead towards a serious deficit in balance of trade 1973-74 (about minus 340 million dollars) and the same negative trend continues even more intensively during 1974-75 (during first six months there is a deficiti in balance of trade to the extent of about 385 milli n dollars). Major exports from Pakistan during 1973-74 consisted of rice (about 210 milli n $), cotton yarn (about 180 million $ cotton cloth (about 140 million $)
and carpets and rugs (about 45 million $). Pakistan major imports during 1973-74 consisted of foodgrains (about 155 million $), crude oil (about 150 million $), non-electrical machinery (about 120 milli n $) , transport equipment (about 110 milli on $), iron and steel (about 110 million $), edible oil (about 80 million $) and fertilizers (about 90 million $). Territorial directions of Pakistan trade during 1973-74 were characterised by considerable exports to Hongkong

(about 115 million $), Indonesia (about 95 million $) U.K. (about 70 million $) Japan (about 65 million $), U.S.A. (about 55 million $), Italy (about 50 million $), and Germany (about 45 million $). On the import side, there was a heavy concentration in imports from U S A (about 345 million $), from Japan (about 115 million $) from West Germany (about 105 million $), from U.K. (about 95 million $) and from Saudi Arabia (about 90 million $). Largest balance of trade surplus was with Hongkong, Indonesia, Italy and Switzerland, largest deficit with U. S. A., West Germany, Saudi Arabia, Japan and Holland.

Pakistan has one of the world highest percentages of illiteracy (about 85% of the population, still higher in the case of women) and despite of a very progressive education policy adopted by the government real functional education oriented towards the most essential needs like hygiene, improvement in agriculture and industries is just at the beginning. A lot of prejudice is still prevailing in the educational process (white collar superiority, lack of tolerance, low position of technical subjects and biology in curricula , seggregation of boys and girls since grade 1 etc).

BRIEF REVIEW OF 1974-75

Pakistan is facing during 1974-75 a chain of internal and external crises which together represent a serious constrain to economic growth and to implementation of basic economic objectives. Tarbela mishap caused a serious shortage of irrigation water for summer and winter crops and a need to spend dozens of millions of dollars on repairs of the dam. Worst river flows recorded so far during autumn and first half of winter, 1974-75 cut further considerably water availability for irrigation resulting in decline in agricultural production and short supply of foodstuffs, agricultural commodities forexport and for local processing industry. Recession in world textile trade, serious increase in oil import bill and in prices of wheat, edible oil, fertilizers, and other commodities related to fuels and energy had serious impact on balance of payments as well as on capital and recurring budget and necessitated heavy borrowings for balance of payments support. Revised estimates for agricltural production during 1974-75 indicate that there was a considerable decline inproducti n of wheat and sugarcane when compared with 1973-74, a decline in production of rice and a stagnation in maize and cotton production; estimated crop of all five commodities is very considerably lower than the targets for1974-75. Decline in agricultural production brought already down the ration for sugar by one quarter and created need for additional wheat and edible oil imports. Growth in industrial production is estimated to be about 3%, considerably less than the planned target (10%). There will be a substantial increase in production of cement and vegetable ghee (based on imported edible oil), a reasonable increase in several commodities but on the other hand a considerable fall in sugar production, cotton yarn, cotton cloth and art silk cloth production

Industries do not export the quantities of commodities envisaged by the plan but they consume more imported fuels and raw materials due to the price hike. Also there is loss revenue for the budget from export duties because of the fall in world prices in yarn and cloth, wool, leather and leather products. The excise duty on cotton yarn had to be reduced to provide relief to the industry. Subsidy for foodstuffs increased considerably due to increased imports of wheat and edible oil at higher prices.

In order to preserve budget resources for development, the government raised with the budget prices of petroleum products, vegetable ghee and sugar. In February, 1975 import duties on 21 items were increased by 25% ad valorem and in April, 1975 the prices of wheat, vegetable ghee and sugar were considerably increased as well as rates for gas and electricity.

Interest rates were raised during 1974-75 in order to restrain credit demand. Inflationary pressure continues and wholesale prices are increasing by 2.2 per cent per month.

Development expenditures were made possible by a much larger aid programme than envisaged. Balance of payments deteriorated considerably during 1974-75 and Pakistan is facing a huge current account deficit on account of lower exports of cotton products, large wheat and edible oil imports, crude oil and petroleum products imports and on account of higher prices of most imported commodities. Estimated gross domestic product growth during 1974-75 is 2.2% only with a decline in agriculture by 1.5%.

This development during 1974-75 is going to have a considerable impact on production targets, development programme and consumption levels during 1975-76 annual plan as well as on development perspective upto 1980.

Sources

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1 a) PRESENT INDUSTRIAL SITUATION

After a very impressive rate of industrial growth during the sixtieth a considerable slow-down occured in Pakistan industrial development during 1970-75. Several reasons of this slow-down originate from the period of high growth rate in the sixties when some serious mistakes occured. First of all the growth was generated by fiscal policies favouring import of machinery and equipment for finished products with high immediate profitability for the businessmen. Very little has been done for development of indigenous raw material base for industry, namely in mining and mineral processing, metallurgy, chemistry, manufacture of plastics and fibres but also in forestry, animal husbandry, agriculture and elsewhere where high capital cost is involved, there is a long gestation period and lower rates of return. As a result, Pakistan industry generates low value added and consumes too much imported raw material which has a very serious impact on balance of payment. Most industrial projects in the sixtiath represented a stereo-type copy of the neighbours cotton spinning mill and other three or four popular investment lines without the slightest care about improvement in production technology, technical progress in machinery and equipment installed, management, productivity of labour, proper marketing research, quality, standard and design of products, scientific organization

of industrial branches, specialisation and cooperation among individual units etc.

Nobody studied complex problems like location of industrial plants with the result that hundred textile units which might have improved location model of Pakistan industry have been located at Karachi where they create an obstacle for rational location of such industries which require location at Karachi but for whom there will be no drinking or industrial water available, no gas and electricity, lack of housing facilities, transport capacities etc due to irrational location of too many textile mills in this city.

Many industrial capacities installed during this period are heavily over-invested, working considerably below their rated capacity, have very out-dated production technology, do not have a standard well selling product etc. In order to accommodate more applicants for new projects it became a fashion during this period to approve too small capacities to be installed by too many parties with the result that these units can never reach reasonable efficiency, productivity, technical and commercial standard. This has a serious retarding impact on growth of industrial production and on industrial investment.

Poor utilisation of capital is in most cases accompanied by heavy excess staff employed by the companies, low productivity of labour, lack of qualified and responsible supervisors and by poor qualification, quality and performance of managers at all levels. Output per worker in Pakistan is usually between ten to twenty per cent of the output per worker in Europe.

Pakistan industry has been operating in a highly protected sellers' market where quality and reliability of

the product, sales management and marketing are not needed. The situation is even more serious because Pakistani customer, private as well as public,(including government agencies), is price conscious and is not quality conscious at all. Tragically poor radio sets manufactured by the cottage industries but also by regular electronics units which are being sold without difficulties clearly indicate this feature of industrial climate in Pakistan. A typical industrialist does not care about the customer, he has a very limited knowledge of market teends, his standard and quality are poor, design of products outdated and sales depending on how many customers came to him and ordered his products. In hotels in Lahore, Rawalpindi, Multan, Lyallpur and Peshawar one can find more businessmen and agents from Europe, Japan United States and other countries than businessmen from Karachi or managers of public sector industrial units from Pakistan, offering their products.

Industrialists these days have no stimulation to expand their business or to introduce new products, new technologies or better standards. Lack of quality, design, salesmanship and knowledge of markets was No. 1 internal reason of the recent textile crisis in Pakistan and similar crisis are bound to come on other industrial branches as well.

Cheapest raw materials, least challenging production technology and poor finish and packing of products are presently the rules for most products to be sold in local market and for very many exported products. Gulf area Libya, East Africa, Indonesia, and other countrieswith low standard products in their markets are the export targets of too many industrialists from Pakistan.

Because of lack of local product design and technology design, Pakistan becomes too dependent on foreign collaboration and technical assistance. Because

of lack of standard and quality and mistrust among units of the same industrial branch which are supposed to cooperate, subcontracting among engineering units is unknown, every unit tries to produce as much as possible itself which results in notorious under-utilization of smaller engineering units, lack of standard, quality and high cost of production. Without introduction of rigid standards and independent quality control there seems to be no way out from this vicious circle in engineering, electrotechnical and transport engineering industry.

Industry in Pakistan suffers from inadequate infrastructure, namely from poor performance of very outdated Pakistan Railways, from poor power and natural gas supply, from inadequate post, telephone and telegraph facilities and last but not least from non-functional orientation of the education process at all levels. Because of commercial or agricultural origin of most mill owners, technical and managerial qualities are very low and the owner usually does not seem to see the need to improve technical and managerial capabilities of the people who are running his mill. He does not think about utilisation of capacity on several shift basis, about productivity of labour, standards, scientific organization of production process, cost accounting etc. Lack of qualified personnel starting from workers category is so typical for Pakistan industry and many mill owners proudly announce to the visitor that all people inthis section/ department of my mill are illiterate.

Although there is a mashroom growth of consulting firms in Pakistan during last five years, there are very few who have enough experience in industrial management, technology, equipment, organisation of production process, design of products, cost accounting, marketing etc.

Associations of individual industrial branches do not perform most of the duties which similar associations perform abroad and they have hardly any impact on improvement in performance of their member-mills.

Finally there are several policy measures which have a serious negative impact on industrial development like :

- too heavy emphasis on immediate increase in consumption of the masses without their larger contribution in the production process;
- unnecessary nationalization of vegetable ghee which established the atmosphere of non-confidence among private businessmen and delayed the improvement in investment climate;
- atmosphere of suspicion towards big business which resulted in a large scale out-flow of industrial managers, engineers, technicians and economist from the country;
- preferencial treatment of public industries in imports andin fixation of prices for their products, constant increase in prices for public utilities (gas, power) without deeper analysis of the economy of the concerned public sector agencies;
- unbalanced labour policy and hegemony of trade unions in the mills lead by outsiders which destroyed discipline, authority of managers and productivity of labour; 25-30% workers absent from the factories without any reason contribute to the scarcity of goods and inflation;
- too liberal import policy in this protectionist world of 1975 goes to the detriment of local industry, industrialisation and self-reliance concept; import of capital goods in most cases contains items locally produced and sometimes of equally good standard;
- Export Promotion Bureau, Trading Corporation of Pakistan and commercial sections of Pakistan embassies are very far from actual needs of Pakistan industry inexports as well in imports.

Improvement of the present situation in Pakistan industry will take a considerable time and it will require a lot of efforts from all concerned.

II. Importance of Electronic Industry.

In electronics human beings got a major new technology uniquely capable of serving individual needs. Advancements in electronics will radically change economic prospects till the end of twentieth century. A new industrial revolution is expected to take place based on technology of electronics and the remarkable capacities implicit in Solid-state materials and devices. Electronics present now a days a turbulent activity with great achievements in satellite communications, laser technology, information processing and display. Recent research in solid state electronics has led to a large-scale integration, towards supply of sophisticated electronics circuits mass produced and very cheap. Their great assets is that they require very little materials and power. Large-scale integration touches every function of sensing, control, communications and information processing.

The electronics revolution will encourage flexibility and decentralisation oforganised activities and will shape electronics into a personal tool of universal application. It promises to enhance the status of the individual by amplifying the power of the human mind and the precision of human control.

The electronics revolution has also a special premise for the developing world - it reduces the cost and complexity of handling large volumes and varied forms of information and brings them closer to the reach of developing nations - their schools, agencies, business and individuals as well and in this way it assists them in forming a firm base for economic and social development. Earth resources technology satellites are providing them cheaply a wide range of economic data about their countries and most valuable tools to help economists, geologists map makers,hydrologists.

national and urban planners, highway and railway builders, farmers and forest cultivators, fisher men and many other professions, fast expansion in use of telephones, telprinters, radio, TV and satellites is going to enhance communication within and between developing countries, improve educational standards and fight backwardness, conservative societies and various prejudices.

In order to broaden the industrial structure and to achieve a higher degree of industrial independence Pakistan will have to develop to a considerable extent her electronic industry without further delay. It is even more important as applications of electronic technology have spread outside the traditional areas of broadcasting and communication into other industries and as their impact on other industries is constantly increasing. Through applications of electronic technology as a service to other industrial branches, electronics have their impact on application and modification of many technologies and industrial processes. This makes it possible to create new products with new utility values, new markets and new business. A well developed electronic industry is a very forceful factor of industrial-isation, economic and social development, progress of man and his society. For all these reasons a strong electronic industry is very essential for Pakistan development.

Electronics are characterised by high quality requirements, modest capital requirements, labour intensity and in well managed units by high productivity of labour, high value added and considerable import substitution. Product and technology design, management of plants but also sales and repair and maintenance of electronics require a considerable qualification and a lot of intellectual activity. In this way electronics in Pakistan may help to

settle the serious problem of unemployment of qualified people. Beyond that several technologies of electronic industry require high level of concentration, accuracy and reliability as well as good eyes and handy fingers and they are very suitable for employment of women. There is already an evidence in electronic plants and supporting industries at Karachi.

IV. PRESENT SITUATION

Pakistan electronic industry consists of 38 firms identified during the present research and of 79 firms in electronics supporting industries. Most of the units of the proper electronics industry are located in Karachi and in Lahore, two units are located at Haripur in Hazara district of North West Frontier Province (these are public sector units where the location is based on other than economic reasons), one at Islamabad. One unit located in Hyderabad became insolvent during 1971 and lies closed since then, out of the cottage radio assembly units again most of the units are located in the centres of consumption - Lahore and Karachi - with the exception of one unit each located at Hyderabad and at Sahiwal. There is also one unit producing fluorescent tubes located at Hyderabad. In total out of 37units 17 units are located at Karachi, 14 units at Lahore, 2 units at Hyderabad, 2 units at Haripur, 1 unit at Islamabad and 1 unit at Sahiwal. Regarding production programme, two units manufacture standard radio and TV components, one manufactures telephone instruments, telephone exchanges, long distance telephone and telegraph equipment, teleprinters and components, one produces carrier channels and components. Two produce radio communication sets. There are six firms engaged in assembly of TV sets (the seventh unit is closed) and in manufacture of non-standard components for radio and TV, eleven in assembly of radio sets (two units more are closed) and in manufacture of non-standard components, ten very small units are assembling radio sets in a cottage way, four small units manufacture non-standard radio and TV parts and four units produce bulbs and fluorescent tubes.

These 37 electronic firms work on a very diverse scale of operation - the largest unit, Telephone Industries of Pakistan, Haripur employing about 5 thousand people, one unit over 500 people, several units more than 100 people but most of the units upto 50 and between 50 to 100 people. All the ten cottage radio assemblers employ less than 10 people each. The average size of an electronics plant in Pakistan is between 50 and 100 employees.

There are 79 industrial units supporting electronics industry in Pakistan identified during the present research. Out of these units 31 plants are located at Karachi, 26 at Lahore, 4 in district Shaikhupura, 6 at Gujranwala, 2 in district Gujrat, 2 in Ketri, district Dadu, one at Islamabad, one at Taxila, district Rawalpindi, one at Hasanabdal, district Campbellpur, one at Jhelum, one at Hyderabad, one at Quetta and two at Peshawar. The location of this supporting industry is much more diversified with a considerable concentration at Karachi, Lahore and in the Punjab. Six of these units produce steel structures and various engineering and metal products and tools, seven are glass factories, seven manufacture porcelain insulators and relatedproducts, thirty of them manufacture electro-technical products, seventeen are specialised in cables, conductors and enamelled wire, three produce various instruments, two of them manufacture accessories for teleprinters and eleven produce lead acid batteries and dry cells.

All 79 electronic industry supporting firms have a very diverse scale of operation - two of the units, namely Pakistan Engineering Company Ltd., Lahore and Karachi Shipyard and Engineering works, Karachi have more than 5000 employees, there are few units within

the group of 1000 upto 5000 employees, several between 500 and 1000 employees, a few between 100 and 500 employees and the majority below 100 employees. The average size of an industrial plant supporting electronics industry will be between 100 and 250 employees.

The latest census of manufacturing industries in Pakistan for 1969-70 indicates that there were 18 mills in electronic industry covered by the census (details in Annexure - G).

Electronic industry is classified under two sub-groups:

- electrical lamps and
- communication equipment etc.

Six of the reporting mills belong to electrical lamps group and twelve to communication equipment etc. Electrical lamps industry employed in the average 696 people and communication equipment industry 7140 people which makes a total employment in electronics of 7836 employees. Value of fixed assets in electrical lamps industry was Rs. 3.6 million and in communication equipment industry Rs. 73.7 million which means Rs. 77.3 million for electronics. Electrical lamps industry had an output of Rs. 24.6 million during 1969-70 and communication equipment industry an output of Rs. 89.1 million which means for electronics together Rs. 113.7 million. Cost of production was Rs. 9.0 million for electrical lamps industry and Rs. 49.6 million for communication equipment industry which means Rs. 58.6 million for electronics. Gross value added during the year was Rs. 15.6 million in electrical lamps industry and Rs. 39.5 million in communication equipment industry which means a gross value added in electronics of Rs. 55.1 million. Labour cost during the year was Rs. 1.7 million in electrical lamps industry and Rs. 22.1 million in communication equipment industry,

million
together Rs. 23.8 in electronics.

Indirect taxes for electrical lamps industry totalled Rs. 4.6 million and for communic tion equipment Rs. 15 .7 million, together for electronics Rs. 20.3 million. Overhead and other charges were Rs. 1.1 for electrical lamps industry and Rs. 4.7 million for communication equipment industry or Rs. 5.8 million for electronics together. Depreciation of fixed assets was Rs. 0.3 million for electrical lamps industry, Rs. 5.3 million for communication equipment industry and Rs. 5.6 million for electronics together. After deduction of labour cost, net value added comes to Rs. 7.9 million for electrical lamps industry (32.1 %) but it is negative by Rs. 8.3 million for communication equipment industry (-9.3%) and negative by Rs. 0.4 million for electronics together (-0.04%).

Keeping in mind that imported components were priced below their actual market level (5 Rs.-4.76 plus bonus vouchers for about Rs. 8.50 per $) and that most imported machinery and equipment was priced at about half of the market value, these basic figures inuicating economic performance of electronics five years ago are far from impressive, in particular very poor for units manufacturing communication equipment. Very low output per fixed assets in communication equipment group clearly indicates heavy over-capitalization and low extensive utilisation of fixed assets in both public corporations - TIW, Naripur and NRTC, Naripur.

More uptodate census is unfortunately not available but there will be hardly any substantial progress at present in electronics performance (technical as well as economical).

Any feasibility study or investment proposal for new capacities or expansion of present capacities in electronics will very urgently require an uptodate census of electronic industries covering all basic technical as well as economic data and in particular utilization of present capacities, use of locally made standard and non-standard components as well as data on profitability after the devaluation, oil price hike and world-wide inflation including detailed price comparison with similar products manufactured in the Far East, in India, in European and American markets. Due to severe shortage of time the experts had no possibility to fill this very essential gap in general information on present electronics in Pakistan.

Standard and quality are said to be the method of electronics. With due respect to the exceptions whose efforts to maintain high quality are very much appreciated by the authors, there is hardly any standard and quality available in proper electronics industry and the situation is not better in industries supporting electronics either. The authors were impressed by the quality of products of Carrier Telephone Industries, Islamabad and of Elmec Ltd. Lahore in proper electronics and in Pakistan Cable Ltd; Karachi, Dolito Industries, Kotri, PITAC Lahore and in EMCO, Lahore within industries supporting electronics. There cannot be a considerable improvement in any sphere of electronics unless standard and quality receive due attention in all industrial units. The industry requires considerably more care about quality which is frequently neglected, quality control instruments are not being utilised and wages and salaries are not related to quantity and quality of products. Even in educational

Telephone Industries of Pakistan Limited Mariaur/Hazara

Balance sheet as at 31st March 1973

1971/72 Rs.			1972/73 Rs.
	Fixed Capital Expenditure		
3,36,66,860	At Cost, less accumulated Depreciation		2,91,40,624
	Capital Expenditure Charged to Revenue:		
3,31,670	At Cost.	3,67,737	
3,31,670	Less : Charged to Revenue	3,67,737	-
1,12,61,880	Investments		1,33,01,880
	Current Assets:		
8,33,31,208	Stocks and Stores	8,93,08,048	
4,90,30,438	Sundry Debtors	4,87,88,123	
98,69,413	Advances, Deposits & Prepayments	46,18,746	
43,11,599	Cash and Bank Balances	11,24,918	14,08,39,835
14,62,42,659			
18.11.71.358			183.281.808

Sources:

1. Government sponsored Corporations 1973-74 Government of Pakistan, Finance Division, Economic Adviser's wing, Islamabad.
2. Pakistan Basic Facts 1973-74, Government of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad.

of unfair competition from the cottage assemblers who do not pay any taxes and do not operate according to the labour laws but also from certain so-called assemblers who import each and everything from abroad and with a handful of employees " assemble " thousands of T. V. and radio sets from complete imported sub-assemblies. There is no chance to develop electronics in Pakistan without bringing them on a very sound financial footing. At the time when most of the public sector industries are being run on commercial principals by various federal corporations under the Board of Industrial Management it is an anomaly that three important public sector plants in electronics, namely Telephone Industries of Pakistan, Haripur, National Radio Tele-communication Corporation, Haripur and Carrier Telephone Industries, Islamabad are being run in a non-commercial and non-business like way by a government department (Telephone and Telegraph Department). Lack of product and technology development, poor capacity utilisation, no dynamic marketing of products , top-heavy organisation and diminishing profits of these units are a logical result of a wrong system of management.

There is an electronics association in Pakistan consisting of four to five units located at Karachi and of two units located at Lahore. The association is non-representative as all three public sector plants are not the members and same is the case with about two dozen existing electronics industries. It does not perform several basic functions very essential for fast development of this elsewhere very rapidly expanding branch. First of all the association does not act as a bridge between electronics industry and the government and it does not protect genuine interest of the industrial units for

instances during formulation of import policy, it does not collect data on imports of electronics and components for the government, semi-government institutions and other public sector bodies. The association does not study local and foreign market mechanisms and does not provide proper feed back of information to the industries. Inadequate and late information of the industry about future programmes of television and broadcasting coverage hinders long term planning in local industry. The association does not formulate standards, does not check the quality of products of its members and does not protect them before unscrupulous people supplying poor quality substandard products for local market neither it protects local market before dumping imports from the Far East and from Eastern Europe. It does not establish a feeling of common interests among its members As a result, the cooperation and coordination within electronic industry is not enough developed to the detriment of local development and self-reliance. Local component manufacturers are being neglected by the assemblers and they do not respond sufficiently to their needs. The results are higher cost of local production. Individual firms should specialised in manufacture of particular components on the basis of economic advantage for all of them.

Import policy does not protect the interests of local electronic industry and even radio sets and more than 20 thousand T. V. sets are being imported from various second and third class sources to the detriment of electronic industry in Pakistan. Details on actual imports and on exports and taxation policy may be seen from Annexure I. In our opinion import policy 1975-76 in electronics products should avoid imports of goods which are locally assembled and of components which are locally manufactured. The association should prepare a phased programme for replacement

of imports of ready products as well as components as soon as adequate local production or assembly capacity has been commissioned. The association together with government agencies concerned should study the conditions under which exports of tele-communication equipment and semi-conductors materialised during the recent past, the reasons why exports have been discontinued and production, cost and marketing conditions necessary for continuation of Pakistan exports in the same products and for introduction of more products of electronic industry in exports.

Several electronic plants with foreign participation and foreign know-how even after 15 to 20 years of operation depend heavily on the parent corporation. In order to absorb better foreign technical and economic assistance and to fully benefit from transfer of technology and scientific organisation of the production process and to step-by-step overcome dependence on foreign supply of critical items is essential to prepare a phased development programme. Such a programme should cover local production of parts and components as well as consumer and professional products where such a production starts to be economically viable. Strengthening of technical, economic and commercial management, providing sufficient and well experienced technical staff, financial specialists, accountants and salesmen, establishment of research and development sections, providing quality, economy and follow-up control for implementation of the phased programme are most necessary. Such a programme may be implemented best by an association of manufacturers in electronics in collaboration with similar bodies in electronics supporting industries in collaboration with concerned Chambers of Commerce and Industries and backed by the assistance of an international independent organisation like UNIDO which is going to follow the interests of

Pakistan development. Any attempt to bye-pass electronics industry and to manufacture this type of equipment in the organisations of major consumers of electronic equipment would retard the process of modernization and consolidation of electronic industry and involve unnecessary heavy losses.

Vast diversity of imported professional as well as consumer goodsand components and different sources of supply create difficulties for local manufacture and affect supply and storage of spare parts and reliable function of Pakistan Broadcasting Corporation, Pakistan Television Corporation and of other major users of electronics. This can best be overcome by standardization of components, circuits and technology. It is a very difficult task which needs a solid cooperation from all member units of electronic industry and a powerful technical and economic institution as well as intensive design and development efforts in Pakistan electronics.

As a rule plant capacities are very poorly utilised. This leads to higher capital outlay per unit of production and to higher production cost. One of the reasons is a too large number of small assembly factories in the mill sector. Another reason is so called " Cottage Industry " - parasitic unlicensed assemblers of radio sets. They do not pay taxes and do not follow labour laws and on this basis they compete with specially poor quality radio sets in local market. Improving of electronics industry in Pakistan quality-wise and cost-wise will give no chance to such parasitic units.

Because of non-cooperation and lack of confidence among individual firms in electronics a typical unit in Pakistan has a vertical structure while similar companies

in the developed world and also in developing countries with strong electronics (Taiwan, Korea, Singapore, Israel) have a horizontal structure. In Pakistan a considerable part of investment usually goes into manufacture of mechnical non-standard components and it remains largely underutilized. This attitude and investment practice weakness the development possibilities in proper electronics. In the consumer sector with one or two exceptions there is no wholesale and distribution trade for Electronics with the result that the producing companies have to finance stores and sales of their products and funds are lacking for improvement inskill, production technology and product design. This is one of the basic reasons why the production units remain small and weak. Similarly in standard components and telecommunication equipment manufacture th firms invest excessively into metal working and components making activities which should become the role of electronics supporting industries and funds relieved in this way should be better utilised for development of proper electronics.

With one or two honourable exceptions a marketing system for electronics is non-available. This facts is particularly clear in the case of both public sector capital goods manufacturers namely Telephone Industries of Pakistan Haripur and National Radio Telecommunication Corporation, Haripur but it is also the weakest point in performance of both components manufacturing units - Carrier Telephone Industries, Islamabad in the public sector and E L M A C Ltd., Lahore in the private sector. As a result the companies are giving poor commercial returns. Lack of marketing information was very typical in the government departments visited by the experts. Central procurement cell of Pakistan Broadcasting Corporation for instance does not have a business man or a financial or transports specialist

and they are just about the technical aiue of procurement. Prices and terms of the contract are based on commercial offers of about 45 agents of various foreign manufacturers who obviously capitalise on the fact that nobody in the cell systematically studies the changing prices and terms of sale of electronic. does not have the information how to save on transport, insurance, clearance and other charges and who over and above charge considerably commission which as a rule will be not less than 20% of the landed cost. Under these circumstances obviously any non-economical proposal for local production seems to be to Pakistan Broadcasting Corporation a great source of foreign exchange savings and considerable overall saving. This all is based on a shear misunderstanding. There are two ways which might bring a considerable savings in foreign exchange and increase the share of locally purchased equipment by Pakistan Broadcasting Corporation, the first is to provide specialists in the economical line to their central procurement cell and the second to collect systematic information (including price information) on locally manufactured equipment such as antennas, power transformers, switchgear, panels, cables, instruments and electronic components

Lack of interest in the financial side of procurement activity may be clearly seen from the fact that the managers of the central procurement cell could not answer the question what is the total amount of imported equipment and spare parts in their stores. Similar is the situation in other government departments as well. Wide-spread corruption in public sector institution makes even a greater jungle from the entire procurement and marketing system of electronics in Pakistan. Pakistan Broadcasting Corporation in their efforts to start local manufacture of capital

goods did not even contact other government agencies concerned (Pakistan Television Corporation, Telegraph and Telephone Department, Directorate of Civil Aviation, Director General, Ports and Shipment, Customs, Pakistan Railways, Water and Power Development Authority and others/and ask them about their needs in the same equipment which they intend to manufacture. Such a non-commercial attitude is bound to further deteriorate the chances of local manufacture within reasonable limits of economy. Other agencies, as a rule, during informal discussions expressed their doubts about design and R development capacity, production technology, management, business like organisation of the production process, marketing and business capabilities of the sponsors in Pakistan Broadcasting Corporation. After a short experience in this field the industrial economist cannot but endorse these views. It is a too sophisticated proposal for whose success there are hardly any conditions in the present set up of Pakistan Broadcasting Corporation and because of the department like organisation and procedures many of the necessary pre-requisites for successful industrial production of such item just cannot be arranged.

There is a very low number of radios in the families in Pakistan (about 1.5 million sets in the whole country) and radio sales at present go through a deep slump. When asking for the reasons many people expressed the following opinions about serious weaknesses in the present radio programme as the basic reason why people are not interested in listening radio (and obviously in buying a radio set). The most important reasons mentioned were -

- radio broadcasting does not offer anything attractive for the young generation;
- poor quality local music programme performed by illiterate musicians not knowing notes and theory of music are the only source of entertainment in the programme;
- there are no news in the real sense Pakistan Broadcasting Corporation just presents who said yesterday this and that and these programmes are always strictly official, world coverage is much poorer than from radio stations in the neighbourhood,
- there is a heavy share of religious programmes in broadcasting;
- educational broadcasting is mostly non-existant, in particular in subjects where the standard of teaching is the lowest in Pakistan schools (mathematics, physics, chemistry, descriptive geometry, biology, modern world languages;

This situation coupled with a recent considerable deterioration in quality of radio sets assembled locally (basically due to the activities of cottage industry) is going to endorse the tendency of declining sales of radio sets in Pakistan during next five year. Pakistan Broadcasting Corporation investment programme during 1975-80 is not going to boost sales of radio sets either. In 1969 Pakistan Broadcasting Corporation got a considerable portion of 9th ~~yen~~ credit for purchase of broadcasting and studio equipment. Under this credit seven 10 KW MW transmitters were purchased long time ago on the basis of vaguely identified needs. Only one of them is expected to be commisioned during 1974-75 or in early 1975-76 and the remaining six are lying idle since the time of

purchase. In order to utilise them Pakistan Broadcasting corporation prepared a crash programme based on a principle of decentralised broadcasting from many places with very low population, technical andcultural level. As a rule those transmitters are going to serve a very limited area with low upto negligible concentration of population, high illiteracy and low income and consumption level. As those transmittors are being erected with studios the level of programme is bound to be low and non-attractive. It is my considered opinion that coverage of many territories covered by the crush propgramme should come from strong transmittors in three first grade centres of technical skill, cultural and educational standards from Karachi, Lahore and Islamabad. The decentralised model is bound to deteriorate financial viability of Pakistan Broadcasting Corporation and tend toward higher government subsidies for non-profitable (in fact highly loosing) operation of stations like Bahawalpur, Rahim Yar Khan, Khairpur, Skardu, Gilgit, Chitral, Gwadar, Khuzdar, Panjgur etc.

Marketing services need immediate considerable improvement in industrial units as well as in government departments. Existing facilities like Federation of Pakistan Chambers of commerce and Industries, Electronics Association, Export Promotion Bureau, directories of industrial and commercial establishments, statistics on imports and exports and other sources should be utilised for this purpose.

Pakistan labour is very considerably cheaper than labour in developed countries and frequently also than in other developing countries. Our visits in electronic industry in particular in assembling plants indicated that organisation of the production process

was much poorer than in many developed and developing countries and so was quality and standard of the products. Higher development charges on smaller numbers of units manufactured, heavy overstaffingand high over-heads usually more than compensate the advantage of cheap labour.

Management of Pakistan electronics has several clear cut features. The small and lower medium sized units are mostly owner-managed. The owner is usually an enthusiast-engineer devoting most of the time towards technical problems and day-by-day trouble shooting. There is usually no clear-cut separation of managerial responsibilities and authority. The marketing, cost accounting and financial operations are usually being done in a non-professional way.

Few large and large medium scale units have some symptoms of introduction of a modern management system covering all spheres of management activities . Introduction of such an efficient management system is most important for financial soundness of the companies in electronics. Mostly there is hardly any policy in the companies regarding new products orientation and attracting/considerable part of the market for these products.

Foreign companies in Pakistan electronics are remarkably better in quality of their products, marketing and servicing and they are doing their best in exploiting local market. In a situation when there is no investment activity in local electronics both Philips and ELMAC come with a considerable expansion programme They transfer know-how, product design and technology

design to their units in Pakistan and in the case of ELMAC they import a considerable part of ELMAC's output in semi-conductors. They train systemically local staff at all levels.

Their dominance in telephones, carrier equipment and in standard components has several negative impacts on local electronics industry as well. These units after years and decades of operation still largely depend on imports of parts and components from parent companies, on their product and technology design, research and marketing network.

In my opinion foreign companies are going to play a very significant role in development of Pakistan electronics during next five years.

3(a) IMPORT POLICY AND TARIFF PROTECTION.

Electronic industry enjoys together with other sectors of economy a very liberal import policy. There are no quantum restrictions and most of imported items for electronics are on free list which means that an importer in Pakistan can import them against cash from world-wide sources or under loans, credits or barters from the respective sources. A limited tied list specifies items which are importable exclusively from tied sources under tied credits, loans, barters or US PL- 480. Provided that some generic item on the tied list is not available from the sources concerned, licence may be issued to the industrial consumer against cash on production of evidence on non-availability of the item from the tied sources concerned.

All imports should be at the most competitive rates. This provision in certain cases does not protect local electronic industry from dumping imports of consumer goods from Eastern Europe and from dumping imports of components from the Far East.

Certain specific items may be imported through Trading Corporation of Pakistan only except when they are imported against US AID loan. Imports of industrial plants and machinery for setting up of new units, for expansion of present capacity or for balancing, modernization and replacement of existing units are liberal and maximum C & F values for which licences may be issued are for

Cash imports	upto Rs. 0.5 million
Credits/loans	upto Rs. 1 million
barters	upto Rs. 2 million

List of components for electronics which are importable by industrial consumers only is attached in Appendix 'A' List of components for assembly or manufacture of TV sets which are importable by industrial consumers only is attached in Appendix 'B'. With a bit of a better cooperation among various units of electronic industry and with a bit broader manufacturing programme of both units manufacturing components, both lists could be reduced considerably.

Local manufacture of components has been upto April 30, 1975 enjoying protective duty which should compensate the disadvantage of smaller scale operation than the competitors in the Far East, Europe and America.

Silicon transistors and diodes used to have 100% ad valorem protective duty in addition to normal 62.5% custom duty for imports of competing products. Germanium transistors and diodes used to have protective duty of 10% in addition to 62.5% normal custom duty for imports of competing products.

In addition manufacture of silicon transistors and diodes, germanium transistors and diodes and of potentiometers are entitled to get refund of custom

duty levied on imports of raw materials used in indigenous product subject to the condition that they produce a certificate stating that imported raw materials were actually used for manufacture of transistors, diodes and potentiometers.

Detailed list of custom tariffs may be seen in Pakistan Customs Tariff - a publication issued by Manager of Publications, Customs at Karachi. An amendment covering levy of additional custom duties imposed during the current financial year was published in Gazette.

Appendix A

COMPONENTS FOR ELECTRONIC INDUSTRY

S.No.	Item	I.T.C. Schedule Number
1.	Aluminium wire anode cut to size and preformed	76-01 I
2.	Base plates	Respective numbers
3.	Bearing pins	Respective numbers
4.	Bushes	84-63 V
5.	Cans	85-21
6.	Cathode tube	85-21
7.	Centre contacts	85-19 III
8.	Contact springs	73-35 IV, 85-19 III
9.	Cranks	84-63 V
10.	Crystal plates and combs	85-21
11.	Electrolytic foil	Respective numbers
12.	Fixed bushes	84-63 V
13.	Fixing bushes	84-63 V
14.	Glass tube cut to size	70-63 III
15.	Headers	85-21
16.	Housing	Respective numbers
17.	Lacquered mounts	85-21
18.	Mounting plates	Respective numbers
19.	Nickel chrome wire	75-02 I
20.	Nickel-iron wire copper coated preformed	75-02 I
21.	Nickel-iron wire cut to size	75-02 I
22.	Polystyrene glue	39-02 I

23.	Nickel-iron wire sealed in glass tube	75-02 I,85-19 III
24.	Protecting cap	85-21
25.	Protected mounts	85-21
26.	Rotor plates	Respective numbers
27.	Rubber faced resin bounded paper disc	40-15 IV
28.	Solder tags	85-21
29.	Spindles	85-19 III
30.	Stops arms	85-19 III
31.	Switch arms	85-19 III
32.	Switch plates	85-19 III
33.	Switch springs	73-35 IV,74-16 II
34.	Tinned copper wire preformed	74-03 I-I
35.	Tracks	Respective numbers

COMPONENTS FOR ASSEMBLY/MANUFACTURE OF T.V. SETS

Sr.No.	Description	ITC Schedule No.
I.	Capacitors (Condensers)	
1.	Electrolytic condenser	85-10 IV
2.	Film mica condensers	85-10 IV
3.	Mylar condensers	85-10 IV
4.	Polyester and ceramic condensers	85-10 IV
5.	Polystyrene condensers	85-10 IV
6.	Trimmers (trimming capacitors)	85-10 IV
7.	Variable condensers	85-10 IV
II.	Coils	
1.	Deflection coils/yokes	85-01 III, 4
III.	Metal Components	
	Solder wire	81-04 III, 83-06 I
IV.	Resistors	
1.	Potentiometers	85-10 III, 4
2.	Variable resistors and fixed resistors	85-10 III, 4
V.	Rubber, Plastic, wood, Hardboard, Insulating Board and Glass components	
1.	Fibre and nylon spacers, wire and cord holders and insulation clamps	Respective numbers
2.	Insulation material such as boards, paper, board, varnishes, waxes, tapes and glues	Respective numbers
3.	Nylon, PVC and fibre sleevings, cords and shouts	39-01 IV 39-02 IV 2, 39-07 v&i 39-04 II

4. Sockets and multiple plugs	85-19 III, 4
5. Valve bases, fibre and ceramic	Respective numbers

VI. Transformers.

1. Fly-back transformers/line transformers	85-01 III 4

VII. Valves, Tubes and Transistors

(a) For mains-cum-transistorised TV sets

1. Diodes	85-21 I
2. Picture tubes	85-21 I
3. Transistors	85-21 I
4. Tubes	85-21 I

(b) For completely transistorised TV sets

1. Diodes	85-21 I
2. Picture tubes	85-21 I
3. Transistors	85-21 I
4. Tubes	85-21 I

VIII. Other miscellaneous components

1. H. T. and screened wiring	Respective numbers
2. Magnets for picture tubes (only ceramic/sintered metals pieces)	Respective numbers
3. Magnet unmagnised, paper cone	48-21 V, 85-01 IV
4. Pilot lamps and neon lamps	85-20
5. Bar ms, cores, and insert cores	Respective numbers
6. Tuner unit (only components)	Respective numbers

IV. MARKET FOR ELECTRONICS

Forecast of demand for electronics in Pakistan upto 1980 is based on known past spending per capita on electronics in the recent past and at present and keeping in view all basic facts on economic development, growth of gross national product and per capita income as described in the previous chapters and allowance was made for continously increasing share of electronic products in personal spending.

Consumption levels during 1969-70 may be determined on the basis of the following data:

West Pakistan electrical lamps industry produced goods worth 24.6 million Rs. and consumed imported components and raw materials worth Rs. 6.0 million. If we assume because of lack of detailed information a 50:50 ratio between components and raw materials in imports, then the remaining imports of electrical lamps for West Pakistan during 1969-70 totaled U.S. $ 0.66 million which was Rs. 3.15 million of 1970 parity, with no exports that means a total consumption of electrical lamps of Rs. 27.75 million for 60 million inhabitants or Rs. 0.45 per capita per year.

West Pakistan communication equipment industry produced goods worth Rs. 1 million Rs. and consumed imported components and raw materials worth Rs. 35.6 million. If we assume a 35:65 ratio between components and raw materials on the basis of the structure of imports/as indicated/ then the remaining imports of communication equipment during 1969-70 totaled U.S. $ 2.65 million which was Rs. 12.6 million. On this basis and with no export total consumption of communication equipment was Rs. 101.7 millions for 60 million inhabitants or Rs. 1.70 per capita per year.

This would mean a total consumption of electronics during 1969-70 in East Pakistan worth Rs. 129.45 million or Rs. 2.15 per capita per year.

In East Pakistan imports of electronics in the category of electric lamps during 1969-70 out of total imports of Rs. 3.15 million the most important were imports of bulbs for automobiles (Rs. 0.7 million). In west Pakistan imports of electronics in the category of communication equipment out of total imports worth Rs. 24.1 million about Rs. 12.6 million were imports of professional equipment and about Rs. 11.5 million were imports of consumer goods. The most important from capital goods imports were electronic computers (Rs. 5.6 million) and teleprinters and wireless (Rs. 1.1 million), from consumer goods complete T V sets (Rs. 5.5 million), parts of television (Rs. 2.5 million) and parts of radios (Rs. 3.2 million).

Because of devaluation of rupee, oil price hike and inflation and because of creation of Bangla Desh it is very difficult to maintain statistically comparable row of information on electronics consumption till now especially in the absence of census of manufacturing industries and relevant data on production and prices.

In order to come at least to approximate figures we have to start from imports where the data are reliable (detail may be seen in annexure I - Imports and Exports of Electronics).

During 1972-73 Pakistan imports of electrical lamps were Rs 0.510 million which increased to Rs 0.765 million during 1973-74 and there was a further increase in imports during first six months of 1974-75 to Rs 0.877 million which in rupees means 5.1 million during 1972-73,

7.65 million during 1973-74 and Rs. 5.77 million during first six months of 1974-75. Keeping in mind that the rupee prices increased at least three times since 1969-70 it means that imports of electrical lamps in physical units are considerably lower at present than during 1969-70. Supposing that the ratio between imported components and raw materials changedupto 25:75 in favour of raw materials during 1973-74 than 2.5 million Rs. worth imported components have been consumed by local electric lamps industry. With a consumption of raw materials worth 7.5 million Rs. we may assess that Pakistan produced during 1973-74 electrical lamps worth about Rs. 40 million. If we add imports of electrical lamps worth 3.3 million then total consumption of electrical lamps during 1973-74 (with negligible exports) may be estimated at Rs. 43.3 million for 69 million people or Rs. 0.63 per capita per year which is less in real terms than during 1969-70.

During 1972-73 Pakistan imports of transistors, valves etc were worth $ 0.377 million, during 1973-74 $ 0.580 million and during first six months of 1974-75 worth $ 0.495 million which in rupees means for 1972-73 Rs. 3.77 million, for 1973-74 Rs. 5.58 million and for first six months of 1974-75 Rs. 4.95 million. Exports of transistors during 1972-73 were worth $ 37 thousand or 370 thousand Rs. and during 1973-74 they were insignificant.

Local manufacture and sales of components by the leading firm in this line - Elmes Limited, Lahore, may be seen from the following tables

Quantity in thousands

1972	Production	Sales: Home	Sales: Export	Total
Transistors	4,600.0	1,781.6	3,307.0	5,168.6
Diodes	97.0	275.3	-	275.3
Potentiometers	401.2	490.0	276.6	766.0
Electrolytic capacitors	3,000.0	1,235.9	600.0	1,835.9
Carbon resistors	17,484.0	3,010.0	10300.0	14,118.0
1973				
Transistors	7,677.0	1,439.1	6,449.0	7,888.1
Diodes	197.1	233.4	-	233.4
Potentiometers	709.6	535.0	301.0	836.0
Electrolytic capacitors	4,573.6	1,503.2	4,130.9	5,634.1
Carbon resistors	36,744.6	4,847.0	31830.1	36,677.9
1974				
Transistors	6,755.4	1,351.0	5,905.4	6,987.3
Diodes	90.2	279.0	-	279.0
Potentiometers	407.4	375.5	-	375.5
Electrolytic capacitors	3,303.9	1,420.2	2,592.2	4,010.4
Carbon resistors	31,819.0	6,145.6	25167.0	31,312.6

The table indicates that after a low production and sales during 1972 there was a considerable increase in exports of transistors (combined with decline in local sales), in exports of electrolytic capacitors and carbon resistors which made it possible to considerably increase production of transistors, diodes, potentiometers, electrolytic capacitors

and carbon resistors during 1973. Other positive features of this year were considerably higher local sales of electrolytic capacitors and carbon resistors and higher sales of all basic components than production which means that some of the excess stocks were disposed of during the year.

Unfortunately during 1974 the trends went mostly in the other direction, there was a decline in production of all types of basic components because of labour troubles in the factory and due to decline in sales of all types of components except for diodes. Exports of potentiometers were discontinued and there was a considerable cut in exports of carbon resistors, electrolytic capacitors and transistors. Even more seriously there was a decline in local sales of transistors, potentiometers and electrolytic capacitors. Local sales of transistors were the lowest during the three years and under review and same was the case of potentiometers.

Strangely enough, imports of transistors increased considerably during the same period due to the liberal import policy which in this case is typically ruining local industrial unit which due to less production become even less competitive in the world market as well as in Pakistan local market. Imports of transistors increased from 26 thousand dollars during 1972-73 to 130 thousand dollars during 1973-74 and during first six months of 1974-75 (215 thousand dollars within six months). Obviously large imports lead towards further cuts in production and to accumulation of stock in the manufacturing plant. As soon as the deal between Limca Ltd. and Philips is approved by the Government of Pakistan and Limca borrows from Philips a considerable quality of machinery in order to

increase manyfold exports of transistors, the assortiment of transistors produced in Pakistan will be enhanced and there will be little excuse left with local assemblers why they cannot use locally made transistors in their radio and TV sets. The change in attitude may be considerably accelerated provided that import policy 1975-76 is going to protect local manufacture before dumping imports of components and consumer goods and to reduce unnecessary imports of components which are locally available.

As all the components produced by Elmec Ltd. are consumed by the assemblers (except those being exported) they have not any impact on consumption of electronics.

Similarly in the case of the output of components of Carrier Telephone Industries, Islamabad. This firm is producing professional type of transistors (NPN, PNP as well as NPN high frequency transistors, medium power-medium frequency capacitors, ferrite coils, switching diodes, condensers, electrolytic capacitors and printed circuit plates which are mostly being incorporated in the equipment produced by the firm like channel units for microwave system, small channel VHF system and 30 channels PCM equipment. Only a small part of their components which do not fulfill the professional standards is being offered to the assemblers.

Consumer Electronics :

Demand for consumer electronics was assessed from various assemblers of radio and TV sets as well as from import statistics. On the basis of a comprehensive survey undertaken by Philips in 60 towns in Pakistan the market for radios during 1974 was about 475 thousand sets out of which about 150 thousand sets were assembled by cottage industry and 325 thousand by electronic factories (Philips - 90.6 thousand, A. B. Industries - 50.3 thousand, MECO - 52.1 thousand etc). With an estimated average price per set of Rs. 150/- from the factories and Rs. 110/- from cottage industry the market for radios during 1974 was about Rs. 85.25 million for locally assembled sets and about Rs. 4.75 million for imported radio sets, together Rs. 90.00 million for radios, which is slightly less than 1 rupee per capita. Most of the radio market at present is in rural areas and the following are approximately the shares for various sizes of radios:

45% - single band radios
25% - two band radios
23% - three band radios
7% - four band radios.

Province-wise the share of Punjab from total radio set market is about 45%, Sind about 30%, N.W.F.P about 18% and Baluchistan about 2% only.

On the basis of a similar market research, market for T.V. sets during 1974 was about 30 thousand - out of which about 23 thousand was imported from Eastern Europe. With an estimated average price per set of Rs. 2500 for locally assembled T.V. set and about 1900 for imported T. V. set the market for T.V. sets during

£110

£83

1974 was about Rs. 178.2 million. As during 1974 a serious backlog in demand for T. V. sets to the extent of about 32 thousand sets was filled, there is a decline in market for T. V. sets estimated for 1975 and 1976 with the expectation that during 1977 the market is going to reach again the size of market for T. V. sets as during 1974. Market for T. V. sets during 1974 represents a per capita consumption of Rs. 2.40. This meant that per capita market for electronic consumer goods was slightly less than Rs. 3.50 in the recent past.

PROFESSIONAL EQUIPMENT :

Demand for professional equipment consists from local manufacture in Telephone Industries of Pakistan during 1973-74 estimated at Rs. 46 million (including subcontracts from Carrier Telephone Industries, Islamabad) and from imports of professional equipment (excluding components for TIP Haripur and CTI, Islamabad) which totalled about Rs. 7.116 million) or Rs. 71.2 million. Main imported communication equipment consists of transmitters of radio and T. V. (Rs. 539 thousand), radar apparatus and equipment (Rs. 414 thousand) and radio apparatus for telegraph and telephone (Rs. 292 thousand).

Professional equipment from local production and from imports totals Rs. 117.2 million or Rs. 1.65 per capita during the recent past.

This brings us to an estimated per capita consumption for electronics of about Rs. 0.63 in electrical lamps, of about Rs. 3.50 in consumer electronics and of about Rs. 1.65 for professional electronic equipment, together of Rs. 5.78 per capita per year during 1973-74 (or 1974 in the case of local manufacture). This figure compares favourably with Rs. 1.79 per capita estimated consumption of electronics

during 1969-70 from the face value point of view only. After due provision for price escalation, rupee devaluation, etc. there will be not only any increase in per capita consumption of electronics but most probably a slight decline during last five years. There is no data available for 1974-75 production and consumption in electronics but the prospects according to the reports of mills visited by the experts do not look bright at all. In particular there is hardly any work going on in National Radio Telecommunication Corporation, Haripur, there is a serious labour trouble in Elmec Ltd., MCR Lahore and Precision Industries, Lahore report a decline in capacity utilization and similar is the position in several other major capacities in electronics. There is a definite slump in sales of radio sets but there is also a decline in demand for T. V. sets.

BROADCASTING AND STUDIO EQUIPMENTS

As there was no local manufacture of broadcasting and studio equipment the entire demand relates to imports. During 1973-74 imports of transmitters of radio and T. V. (covering the entire demand, not only Pakistan Broadcasting Corporation and Pakistan Television Corporation) were s 539 thousand or s 5.4 million and imports of microphones etc were 236 thousand or Rs. 2.36 million for all consumers That means that imports of broadcasting and studio equipment totalled about s. 7.70 million for the whole Pakistan economy. Imports during first six months of 1974-75 indicate bout 30% increase in value in radio and T. V. transmitters and about 20% increase in value in microphones and studio equipment. Actual demand for broadcasting equipment in future years is going to be slightly lower because of accumulated stock of imported transmitters with Pakistan Broadcasting Corporation.

MARKET FOR ELECTRONICS UPTO 1980 CONSUMER GOODS, CONSUMER GOODS

In the absence of a well-knit, internally balanced perspective plan any attempt to assess the demand for electronics during next five years is bound to be very tentative and there is a considerable scope for error in both directions. Because of the recent slow-down in GNP growth, in domestic savings, and capital investment, of a very ambitious first draft of the five year plan with exceptionally high GNP growth, increase in both agricultural and industrial production, non-realistic saving rates and growth in capital investment in particular in the public sector, the author is of the opinion that there might be a more acute risk in overestimating the size of the market, based on estimated present market level, market research of the firms dealing with the entertainment business and on the study group for the perspective development programme in electronics the following trends in market for electronic consumption goods are envisaged:

Product	1975	1980
Radio sets-thousand	400	375
million Rs.	55	60
Other sound entertainment thousand	-	25
million Rs.	-	10
TV sets-black and white - thousand	75	110
Million Rs.	107.5	275
T.V. sets-colour - thousand	-	10
million Rs.	-	70
Total million Rs.	243.5	415
Electrical lamps	46.1	60.7

It is estimated that by 1980 local electronic industry

is going to take care about the entire market in radio and T. V. sets (black and white and colour as well) and that about 50% of other sound entertainment (car radios and radios with cassette tape-records) will be of domestic origin.

Consumer market in Pakistan is and will be dominated by demand for television sets. This tendency will be highlighted by better attractiveness of a T. V. programme than of radio programme in particular for the young listener.

Slow decline in sales of radio sets is in a clear contradiction with a very ambitious programme for new radio transmitters and it puts a question mark behind the proposed concept of de-centralised broadcasting from too many second and third grade studios.

A colour T.V. assembling plant was recently sanctioned by NICIC for PHILIPS. We assume that the production will start during 1973.

Both radio and T. V. sales are expected to oscillate upto 25% of the mean level.

Consumer electronics market is an important sector of Pakistan electronic industry. Its success is in attractive design, mass production technology, factory management, production planning and availability of repair facilities in the proximity of the customer. Introduction of educational radio and T. V. sets in schools may further expedite the sales of consumer electronics.

COMMUNICATION EQUIPMENT

The share of communication equipment within the category of professional equipment during 1978 is assumed to be about Rs. 60 million. The demand for the

development perspective is estimated in the following way for 1980 (Rs. in million):

improvement in railway signalling	25
improvement in railway telecommunications	60
equipment for telephone, telegraph and posts	125
communication equipment for others	25
Total :	235

The demands were calculated on the basis of the targets formulated in the first draft of perspective development programme and they are bound to be revised when a balanced five year plan will be approved. The market relates to 125 thousand new telephones, 1150 new automatic exchanges, new telex exchanges, 120 new trunk positions, 750 new STD channels, expansion of 960 channels microwave system and considerable improvement in railway signalling and communications as well as communications in other sectors of the economy.

Communication equipment is expected to be the fastest developing part of electronics during next five years. This may lead towards considerable improvement in capacity utilisation of all three public sector factories, TIP, Haripur, WRTC, Haripur and CTI, Islamabad.

COMPUTERS AND INSTRUMENTS

Imports of electronic computers and business devices as well as of electronic instruments during 1978 are insignificant. Mini computers mostly brought like personal baggage become more and more popular among professionals. We may assume that market for this group

group of electronics is going to develop by 1980 in the following way : (Rs. in million)

mini - computers	10
electronic instruments	10
electro-medical instruments	5
Total :	25

Because of the limited demand and lack of know-how and production technology in Pakistan it is supposed that the entire market is going to be supplied from imports.

A very considerable increase in use (and demand) of mini-computers seems to be an essential condition for improved management industry, better performance in bankand in administration, research and development institutions, in railways, air transport etc. In the decade between 1981 and 1990 there might be a reasonable scope for one of the leading firms in this line to start local assembly and later on manufacture of mini-computers.

Introduction of local manufacture of electro-medical instruments will require establishment of a medium - large industrial unit at Sialkot having product and technology development section and running medical instruments production in an industry like way. The cottage and small scale units with outdated products, poor technology, factory management based on owner's skills and poor marketing is going to face similar type of problems being faced by small power loom sector of cotton textiles these days.

For next five year, may be with the exception of Karachi Steel Mills and one or two largest industrial

sector projects there will be hardly any market for industrial electronics in Pakistan (process control, electronics used in manufacture of intermediate and finished products, industrial computers and electronic sub-assemblies applied for control functions in various industrial branches). If any market for this type of equipment arises during the decade 1981 - 1990 because of the nature of the products and because of the level of Pakistan electronics they will have to be improved.

Broadcasting and Studio Equipment

In this field first estimates for demand of equipment are derived from the very ambitious targets laid in the first draft of the perspective development programme, namely - to increase area coverage in television upto 65% and in broadcasting upto 85% - to increase population coverage in television upto 87% and in broadcasting up 95%. The economy of the way how the increase in coverage in broadcasting is supposed to be achieved seems to be very expensive from the capital as well as operational point of view decentralised installation of a chain of transmitters with studios in places with less than 10 thousand inhabitants sorrounded by a very low concentration of population.

In order to achieve these targets the development perspective is proposing to spend Rs. 400 million on broadcasting (compared with 148 millions during the last five years) and Rs. 265 million for television (compared with Rs.162 million during the previous five years). The figures indicate that there is no relation between the estimated sales in radio and TV sets and between the investment proposed in the development of technical facilities for television and broadcasting. It is only realistic to assume a considerable reduction in size of the development

programme in particular for broadcasting, during the next round of works on the development perspective upto 1980.

Paper on the development perspective prepared by Pakistan Broadcasting Corporation is enclosed to the Electronic Expert's Report (See Annexure I).

There are several reasons why this proposal cannot serve as a basis for demand in broadcasting and studio equipment:

- first of all it is not any more a proposal of Pakistan Broadcasting Corporation as they have submitted another draft with about 100 millions less capital cost and with a considerable change in structure between civil works and equipment (practically the entire carry over from the Fourth Five Year Plan is in other expenditures than for equipment and the size of the carry-over Rs. 221 million Rs. is going to take care about at least one half of the perspective development programme); the size of the proposal quoted in the Annexure I is more than four times higher than the actual development which took place during 1970-75 and even the revised proposal of Pakistan Broadcasting Corporation represent more than three times increase in development programme, mostly on no-return and negative return basis;

- list of requirements of electronic equipment for the period upto 1980 (Annexure II of Electronic Expert's Report) covers not only actual demands but also equipment which was imported several years ago under 9th Yen Credit and which is lying in Pakistan Broadcasting Corporation stores (e.g. six transmitters).

- the same list incorporates a lot of equipment which can and should be procured from local engineering units (the entire mast and aerial system, amplifiers, switch-boards, fuse and switch panels, telephone keys, the entire list of transformers, microphones, microphone stands and connectors, several instruments etc);

- the entire list of electronic equipment to be manufactured (Annexure III of Electronics Expert's Report) is based on basic errors in economics, imported cost is not based on a competitive international tender basis (directly between Pakistan Broadcasting Corporation and foreign manufacturer); the entire table is based on an assumption that locally purchased raw materials from imports are cheaper than directly imported by Pakistan Broadcasting Corporation which as a rule is not thecase; the authors do not present any basis for their calculations which as a rule indicate that things are being produced by Pakistan engineering for 1/2 or even 1/3 when compared with competitive world prices which just is not true. In Annexure III the authors indicate world price of a 50 KW MW transmitter as practically identical to world price for a 100 KW MW transmitter which is doubtful. On such an inflated price for a 50 kw transmitter they build in Annexure VII their high profitability of local manufacture. Equipment produced in a do it. yourself-way doesnot provide any basis for calculation of cost for the same product to be manufactured in an industrial way;

- competitive prices of imported transformers (to quote one example from the table in Annexure VIII are in no way three to six times higher than locally manufactured ones and WAPDA importing considerable quantities of transformers may provide proper data;

- the entire concept of tables describing economy of production lacks professional approach and they do not indicate the sources on which splendid results of local manufacture are based. It seems to me that the authors do not incorporate import duty and sales tax in their calculations; such an attitude is going to immediately reduce their sources for development in broadcasting and other sectors of the economy.

The errors mentioned above are always in one direction and they obviously distort the structure of the investment proposal.

The authors were unable to get even preliminary data on demand for transmitting and studio equipment for other users which might improve the economy of local manufacture as and when such a production becomes feasible from the know-how and technology point of view as well as economically.

Keeping in mind various estimates prepared in connection with the perspective development programme, demand for electronic hardware like transmitters and studio equipment may reach by 1981 the following levels (Rs. in million):

transmitters	25
studio equipment	10
Total :	35

with the assumption that non-electronic equipment will be procured by all customers from existing units of electronics supporting industry. With an estimated population in Pakistan by 1980 of 81 million person the per capita consumption of electronics is expected to be Rs. 5.12 for consumer goods, Rs. 0.75 for electrical lamps Rs. 2.90 for communication equipment, Rs. 0.31 for electronic computers and instruments and Rs. 0.43 for broadcasting and studio equipment, together Rs. 3.64 for professional electronics and Rs. 9.51 for all electronics.

If the proposed demand for electronics is going to materialise by 1980 there will be a very considerable increase in per capita consumption from Rs. 5.70 during 1973-74 to Rs. 9.51 estimated at the end of development perspective programme which is even more mobilizing because of a very considerable growth of population.

When compared with 1969-70 consumption level of Rs. 2.15 per capita the figure for 1980 represents a very impressive growth if one does not take into account devaluation of rupee, inflation and other factors. In real terms the increase in demand is going to be between 50 and 65% which in itself is impressive in a society with a very low per capita income and with a considerable increase in cost of basic commodities.

Demand for components is not going to have an impact on per capita consumption as components are being consumed by the assemblers of consumer goods and of professional equipment as well.

There seem to be good prospects for considerable expansion in manufacture of standard components during next five years. First of all fast growth in demand for communication equipment will require a considerable increase in manufacture of subassemblies and components in Carrier Telephone Industries Islamabad which might be working on two shift basis by 1980. Similarly there is a very goodpotential for development of standard components in Elmac Ltd., Lahore. After broadening of their production programme in silico transistors they will be able to take care about a considerable demand of consumer goods assemblers and bring down unit price for transistors on account of a considerable increase in manufacture of transistors (more than 10 times) from a very considerable part for exports to their parent company Philips of Holland. A considerable expansion of Elmac capacity in silicon transistors may be available by June, 1976 and in the next stage Elmac Ltd. intends to instal capacity for manufacture of intograted circuits in the near future. Beyond that they intend to manufacture A C capacitors for fan industry and ceramic capacitors. They intend to assemble loud-speakers.

A considerable demand for TV sets (110 thousand now estimated in 1980) together with a substantial demand for replacement of picture tubes in the present TV sets in use (about 40 thousand picture tubes to be replaced yearly by 1980) create a sufficient market to start with local assembly and later on manufacture of T V picture tubes which may considerably enhance the scope of operations Elmac Ltd.

Two of the proposed new component programmes in Elmac Ltd. are going to generate a need for expansion and broadening of production programm of two units supporting electronic industry, namely

- introduction of manufacture of TV picture tube envelopes in Corning Class Pakistan Ltd., Karachi and
- introduction of manufacture of electro-technical porcelain suitable for electronics in EMCO Ltd., Sheikhupura Road.

Market for components is directly related to the output of assembled equipment and to the needs of repairs and servicing.

EXPORT POTENTIAL.

Present chances for Pakistan electronics to export their products are very slim basically because of poor quality of most entertainment equipment and high cost of production in components and telecommunication equipment. Soon after devaluation exports of standard components and of telecommunication equipment materialised and a thorough analysis should be undertaken in the reasons why the exports either deminished or disappeared all together. This situation may improve as this industrial branch becomes more mature and competitive - Afghanistan, Persian Gulf countries and Northern and East African countries should become basic field of aggressive export marketing by Pakistan electronics. Establishment of personal contacts with firms in these areas dealing in electronics is the first pre-requisite for any commercial success. Possibilities of export subcontracting for the parent factories (Philips,Siemens etc) should be thoroughly investigated.This is one of the few hopes how to improve utilization of radio assembling plants in Pakistan.

V. Estimates of Growth.

To estimate future share of Pakistan electronic industry from the estimated demand for electronics in the country is a very complicated and difficult task and there can't be anything better than a qualified guess to be offered at this stage.

Estimates of the production level at present and during the recent past are based on census of manufacturing industries, imports of parts and components and on information obtained from visits to individual industrial firms verified subsequently in the institutions dealing with the development of this industrial branch.

Estimates for 1980 are based on analysis of present situation in Pakistan economy and industry in particular, on present investment climate, commercial and technical tendencies found in Pakistan electronic industry and trade, on assessment of technical and financial resources, availability of foreign know-how for design and technology, willingness of parent companies to invest in Pakistan and to expand business in this country, on present labour-management relations, productivity of labour, discipline and quality. The estimates keep in mind the fact that there are no ongoing projects in electronics and that just recently two projects have been approved for expansion of components manufacture and of assembly of black and white TV sets and introduction of assembly of coloured TV sets. The author is aware that there is a great uncertainty about the development of market, sales and service facilities for coloured TV. The estimates take into consideration possible exports of standard components and telecommunication equipment.

In consumer goods sector it is assumed that local electrical lamps industry is going to take care about most of the demand, 57.7 million. Rs. during 1980 (95%) with

only special lamps being imported. Local electronic industry is supposed to take care about the entire market in radio and TV sets (black and white as well as colour) - Rs. 60 million, Rs. 275 million and Rs. 70 million respectively and for about 50% of other sound entertainment market (car radios and radios with cassette, tape-records) - about Rs. 5 million. Consumer sector will remain the largest sector of electronic industry contributing substantially towards development of mass production skills and scientific organization of production process in Pakistan electronics. Consumers sector's contribution towards development of technology in electronics will remain very limited. It gives the opportunity to employ labour with lower qualification, technical and technology levels and it has direct impact on social life, education and entertainment of the people.

Communication sector seems to be the most promissing sector of Pakistan electronics for the next five year period, especially for the development of high quality components and of technological expertise in manufacture of professional equipment. Considerable spare capacities in all three public factories which may be mobilized after a more efficient organization of this public sector branch within the Board of Industrial Management as strongly recommended by us, gives a promise of moest investment requirements for a commercially viable sector with a considerable increase in market not only in telephone, telegraph and post but also in railway signalling and telecommunications as well as in other sectors of economy. It is assumed that the entire demand of Rs. 235 million including a considerable amount of professional components will be produced locally.

Moreover a considerable part of professional studio equipment should be manufactured by 1988 in National Radio Telecommunication Corporation at Haripur.

In mini-computers, electronic instruments and electro-medical instruments the entire market by 1988 is supposed to be supplied from abroad because of the very limited demand, lack of know-how and production technology in Pakistan electronics and because of a considerable split-up of the production of medical and surgical instruments at Sialkot lacking product and technology development, industrial organization of the production process, management and marketing. All these lines are supposed to be developed in Pakistan electronics during the decade 1981-1990.

Industrial electronics and business aids represent high demand on investment and managerial skills. It is a highly intellectually oriented sector employing high numbers of engineers and salesman when compared with the number of workers and technicians in the plant. As there is going to be hardly any market for this type of equipment in Pakistan till 1988 and because of present level of Pakistan electronics c. production of such equipment in Pakistan will not start before the next decade.

Assembly of end-items from imported components does not lead to self-reliance in technological process in electronics, due emphasis should be given during the development perspective programme to component manufacture and to component standardization in Pakistan electronic industry. Fast growth envisaged in manufacture of telecommunication equipment will require a considerable increase in manufacture of professional components and subassemblies in Carrier Telephone Industries, Islamabad. A scheme is underway to multiply manufacture of consumer type transistors at Ebrahim Ltd (mostly for exports to parent company), for

manufacture of integrated circuits, AC capacitors for fan industry, ceramic capacitors and for assembly of loud-speakers at Elmac Ltd. The same firm is interested in introduction of local manufacture of T.V. picture tubes. Development of new components will require introduction of new products in the supporting industry as well, namely of picture tube envelopes in Corning Glass Pakistan Ltd. at Karachi and of electrotechnical porcelain suitable for electronics in Emco Ltd. on Sheikhupura Road.

The size of the market for electronic raw materials does not justify establishment of local industry in the near future.

Expansion of indigenous production in electronics will depend on expertise and know-how in various fields which in the first stage will have to be purchased or acquired. Development of local know-how will have to start from technical universities, factories and from various development institutions. It is most essential to properly coordinate research and development activities on the national level.

Manufacture of broadcasting equipment in an industrial way seems to be a too challenging task from the technical point of view for the present stage of Pakistan electronic industry and the market is too small for any economy in such a manufacture. With due respect to the technical initiative of Pakistan Broadcasting Corporation engineers at Lahore transmitter as well as in Islamabad central repair workshop of Pakistan Broadcasting Corporation who assembled and partly produced a 50 KW MW transmitter respectively a studio console in a non-industrial way, Pakistan Broadcasting Corporation in my opinion is not the organization which should enter the field of industrial manufacture of such equipment neither it possesses the know-how, technology, management and organization of production process needed

for successful manufacture of such equipment. In order to avoid hiddon subsidy by the public sector, a feasibility study for a private industry, manufacturing studio and broadcasting equipment was prepared which process that this is not an economic proposition. The authors are aware that a considerable part of broadcasting and studio equipment may be locally manufactured in several existing industrial units.

Manufacture of transmitting tubes is too much of a technically and technologically demanding job when measured with the present level of Pakistan electronic industry. There is a very wide variety of different transmitting tubes required and a feasibility study to arrange such a manufacture by a private firm proved that such a unit would not be financially viable. Something should be done about standardization of transmitting tubes.

There was not enough time and data available to assess financial viability of local manufacture of T. V. picture tubes in sufficient detail. The proposal seems to be technically feasible and economically viable and it deserves a thorough investigation in next stage of the works.

At this stage there is not enough data available to assess the level of investment in electronic industry upto 1980 and the two recently sanctioned expansion projects can be hardly of any guidance for such an exercise. There is going to be hardly any need for new investment in consumer electronics especially if production of T. V. sets in Telefunken factory in Hydorabad is going to be resumed during the near future.

A lot of additional work will be needed in order to assess the proposed increase in employment in electronic industry upto 1980. Keeping in view a very low productivity of lavour in most of the units combined with considerable absence from work, there will be a very limited increase in employment in workers category. There should be a considerable

increase in qualification and skill level in this category and an increase in employment of engineers, technicians, economists and salesmen in electronic industry during the near future.

VI - Manufacture of Studio and Transmitting Equipment

Efforts in the Past

West Pakistan Industrial Development Corporation was asked by the Government of Pakistan in April, 1966 to carry out a feasibility study for setting up of an electronics complex to manufacture sophisticated transmitting and studio equipment and components. In 1967 the Government of Pakistan decided to set up a committee to examine the entire electronics industry in Pakistan. This committee prepared a paper on the electronics industry based on the findings of the electonics sub-committee with representation from all public sector agencies concerned, electronics industry, research organisations and the major consuming sectors.

Electronics sub-committee formed the following three groups

- requirements group
- survey group and
- research and development group

Requirements group collected and consolidated on users requirements, evolved a methodology for uniform reporting and summarised the requirements in physical as well as financial terms.

Survey group inspected all electronics manufacturing plants, determined present capacities and capacities under implementation and elaborated the need for new capacities resulting from the work of requirements group.

Research and development group assessed the present research and development resources for electronics, determined research and development needs related to the proposed manufacturing programme and

suggested measures for creation of a pool of trained specialists for electronics research, development and production. In January, 1968 data collected by requirements, survey and research groups were consolidated and processed into a form which should serve as a base for formulating development plan of electronic industry. Manufacturers of electonics provided relevant data on requirements of raw materials and components, on capital investment required to develop particular production capacities based on minimum economical quantities.

On the basis of the facts mentioned above, electronics sub-committee issued a "Report on Electronics Industry " in January, 1968."Report on Electronics Industry" described the state of electronics industry, investment activity in this industrial sector, position in local manufacture of standard and non-standard components, recommended establishment of more production capacities and mentioned basic problems of electronics industry by that time, namely- distrust of the assemblers towards local manufacturers of parts and components (related mainly to substandard products):

- absence of a well-equipped composite capacity for manufacture of components at economical prices;
- assembled products with a very shallow depth in indigenous parts and components manufacture;
- non-employment of engineers, qualified technicians and trained labour
- no initiative for creative work, no emphasis on research and development;
- lack of raw materials know-how and tools.

"Report on Electronics Industry " made the following suggestions:

- to decrease the number of radio and TV assemblers, to reduce the variety of their products and to encourage indigenous design

based on local components manufacturing programme;

- to develop local capacity to manufacture a wide range of good quality non-standard components to meet commercial and professional requirement;

- import of parts and components for radio and TV receivers should be disallowed after due notice is given to the industry and facilities have been established for such production;

- related industries should be prompted to include electronic raw materials and items in their products;

- new capacities should not be established which cannot be fully utilised.

In another part the " Report on Electronics Industry " indicates the requirements of various sectors of the economy for electronics upto the Fifth Five Year Plan, inter-alia (Rs in million):

Radio and TV receivers	824
transmitters-high frequency and medium frequency	135
audio equipment	96
telephones exchanges etc	985
telegraph instruments	71
carrier equipment and repeaters	235
computers	176
electro-medical equipment	58
test equipment and instruments	73

In the context of the above mentioned requirements the "Report " recommended:

- to standardize on 2 or 3 types of radio receivers and television receivers;
- to manufacture a standardized line of transmitters with maximum number of interchangeable subassemblies;

500 watt

10 kilowatt

100 kilowatt;

- to standardize on minimum number of systems and techniques the audio equipment to be produced locally ;
- to standardize telephones and telephone exchanges equipment on basic types of advanced design based on components planned for local production ;
- to standardize local production of teleprinters;
- to standardize on 12 channels carrier equipment with the use of additional equipment; similar standardization will be necessary for repeaters and voice frequency telegraph equipment ;
- to standardize on the following basic types of computers;

  a) electronic calculating machines for shops and small business organisations,

  b) desk computers for larger commercial enterprises;

  c) universal types of computers with facilities for multiple access and remote data transmission for government, industrial, commercial and scientific needs;

- to standardize on certain basic types of test equipment, namely two types of multimeters, one type of signal generator, frequency meter and output meter in each range, using standard components programmed for local production.

In the chapter on component requirement the " Report on Electronics Industry " indicates the following needs in commercial type and in precision components (Nos. in million) :

	Commercial type	Precision type	Total
Resisters and capacitors	530	290	820
Transisters and diodes	150	170	320
Vacum tubes all types	67	113	180
Picture tubes	330	-	330
Electrical non-standard components	192	308	500
Mechanical non-standard components	200	300	500
Total :	1469	1181	2650

It recommends that resisters, capacitors, semi-conductor devices and vacuum tubes as well as integrated circuits should be standardized to meet the overall requirements of equipment manufacture. It is essential that types are reduced to the minimum commensurate with requirements and economy of production.

In chapter on investments the " Report on Electronics Industry " recommended total investment for manufacture of end products of Rs. 345 million, for manufacture of components and accessories of Rs. 131 million and for manufacture of raw materials for electronics of Rs. 44 million which makes a total investment programme in electronics industry in the order of Rs. 520 million by 1980.

When designing the development programme of electronics industry, the " Report" formulated the following basic principles of the development plan :

1. maximum effective utilisation of existing capacities, know-how and experience;

2. augmentation of the depth, variety and quality of production ;

3. mutual utilisation of production, research and development facilities ;

4. encouragement of private sector to attain accelerated growth;

5. utilisation of experienced groups of industrialists to undertake industries involving larger capital outlays, longer gestation periods, advanced technical know-how and managerial skills;

6. phasing-out of foreign assistance and attainment of self-sufficiency in the shortest possible period;

7. avoiding monopolistic tendencies resulting from economies of production; and

8. development of export potential.

In section on manpower for electronic industry the " Rupert " estimated by 1980 the requirements of manpower as follows:

scientists and engineers	1500
supervisory staff (technically qualified)	8000
skilled and semi-skilled workers	50000
Total :	58000

at least 10 000 initial

The report formulated the need for electronic industry to be located in the proximity of educational and research centres and centres of population like Lahore, Karachi, Hyderabad, Lyallpur, Islamabad, Sargodha and Multan to simplify flow of qualified personnel in electronic industry and for industry to benefit from close association with educational institutions and research centres. Subsequently the " Rupert " formulated measures for

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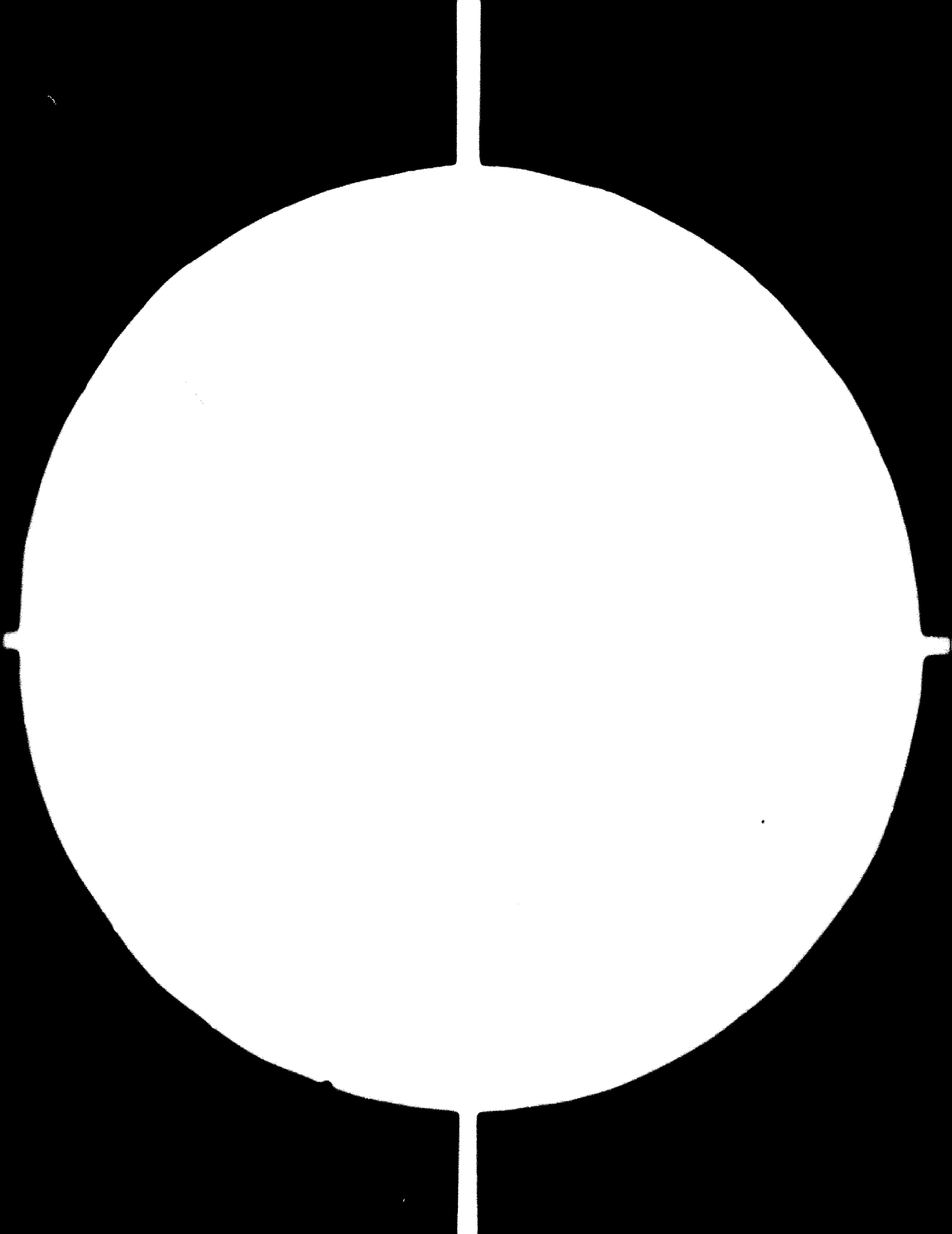

accelerated development of electronic industry and of research and development base of electronic industry.

It may be seen that a very considerable work was done on evaluation of the stage of electronic industry and that a very ambitious development programme was prepared covering all important areas of electronics. Very unfortunately for various reasons there is hardly any progress in Pakistan electronic industry eight years after the issue of the document and hardly any item of the development programme was implemented in letter and spirit.

This all happened despite the fact that the "Report on Electronics Industry" was in detail considered by the highest economic bodies of the country including the Economic Coordination Committee of the cabinet (in March, 1969) and that several dozens of specific recommendations have been accepted in this meeting.

Electronic Industry in Pakistan

S.No. Name and address	Production programme	Capacity
1. Telephone Industries of Pakistan, Khanpur Road Haripur, district Hazara (Phone 226/227) e	carbon resistors	3.6 million
	wire-wound resistors	0.2 million
	paper capacitors	1.0 million
	telephone instruments	60 thousand
	telephone exchanges automatic telephone exchanges manual	30 thousand lines 5 thousand lines
	telegraph channels	1 thousand channels
	private telephone exchanges	15 thousand lines
	Long distance telephone and telegraph equipment	
	trunk exchanges	20 positions
	teleprinters	400 Nos.
	typewriters	25 thousand
	telephone set transmitters	
	(carbon granule microphone)	
	telephone set receivers	
	(electromagnet ear phone)	
	key switch	
	relays	
	transformers	
	railway signalling	
	mechanical components	
2. E L M A C Ltd., 72-Industrial Estate Kotlakhpat, Ferozepur Road, Lahore e (Phone 382190	silicon transistors	8 million
	germanium transistors	4 million
	germanium diodes	0.6 million
	electrolytic capacitors	6 million
	polyester capacitors	1.5 million
	carbon potentiometers	0.8 million
	carbon resistors	42 million

being considerably expanded in manufacture of transistors (80 million) in the next stage they intend to start manufacture of integrated circuits in the near future, they intend to assemble loudspeakers to manufacture AC capacitors for fan industry and to produce ceramic capacitors.

3. Carrier Telephone Industries, Sector 1-9 Industrial Area, Islamabad (Phone 43773, 4,5)	silicon transistors	2 million
	selenium diodes	5 million
	metallised foil capacitors	30 million
	polystprene capacitors	3 million
	carrier channels	3 thousand
	ferrite coils	
	channel onds	
	condensers	
	printed circuit plates	
4. National Radio Telecommunication Corporation, Haripur, district Hazara (Phone 318,794)	radio communication sets	
5. Precision Industries Ltd Kotlakhpat, Ferozepur Road, Lahore (Phone 83087)	loudspeakers	300 thousand
	Band switches	200 thousand
	T. V. sets	30 thousand
	radio sets	100 thousand
	T.V. channels	200 thousand
6. Radio and General Appliances Ltd., 18-Muslim Town, Lahore (Phone 54856/84028)	Transistor radio sets	300 thousand

Both factories mentioned under 5 and 6 have a radio and T.V. assembly plant in Central Jail, Kotlakhpat, Lahore.

7. (Electronic Industries Karachi.	otentiometers	90 thousand
	waveband switches	90 thousand
	trimmers	300 thousand
	coilwinding capacity for printed circuits	80 thousand radios 45 thousand
	and dials	
	public address equipment	1.2 thousand

12.	M E C O Mohammad Ebrahim and Company, Ltd, 8/1 S.I.T.E. Mauripur Road, Karachi - 16 (Phone 292196)	radio sets	196 thousand
		T.V. sets	25 thousand
		public address equipment	2 thousand
		The factory has a subsidiary at Dhaka assembling transistor radio sets.	
13.	Premium Industries	sets of four I/F transformers and oscillators coil	900 thousand
		telescopic aerials	300 thousand
14.	S. N. N. Industries, Freedy Street, Sadar, Karachi (Phone)	T.V. sets	
		radio sets	
15.	Philips Electrical Industries of Pakistan Ltd., F/84, S.I.T.E. Karachi (Phone 73006)	T. V. sets	20 thousand
		radio sets	100 thousand
		bulbs	12 million
		fluorescent tubes	4.5 million
		electric chokes	
		glass tubes	1.6 million
16.	N.S. Industries Ltd., 8/126 South Avenue, S.I.T.E, Karachi (Phone 291749)	T. V. sets	24 thousand
		radio sets	100 thousand
17.	Associated Electronics Ltd 7-Egerton Road, Lahore (Phone 62065)	T. V. sets	
18.	Electronic Industries E/39, Estate Avenue, S.I.T.E. Karachi - 16 (Phone 291936)	radio receivers	195 thousand
		loudspeakers	80 thousand
19.	Ideal Industries Ltd. L-I-C, Block 21, Federal B Area, Karachi (Phone 682956)	T. V parts	
		radio parts	
20.	Loyal Radio Corporation C/23 S.I.T.E. Karachi (Phone 291795)	radio sets	10 thousand
21.	Naseem Brothers and Company, 131 Sultan Road, Lahore (Phone 64281/66281)	radio sets	

18.	Radio and Electronic Industries, 16-The Mall Lahore (Phone 68368)	radio sets	15 thousand
19.	Syed Bhais Ltd., 200 Ferozepur Road, Lahore (Phone 52407)	radio sets electric HWM motors	60 thousand (about) 200 thousand
20.	Lahore Radio & Electric Company, S.I.T.E., Karachi - 16 (Phone)	radio receivers	
21.	Hyderabad Electronic Industries Ltd. (Telefunken), Latifabad, Hyderabad	T.V. sets radio sets	100 thousand 10 thousand
22.	Sterling Electronics, Latifabad, Hyderabad	radio sets (cottage assembly)	5 thousand
23.	Electro Allied Industries 666-K Samanabad, Lahore	radio sets (cottage assembly)	
24.	E. Butt and Company, Moghalpura, Lahore	radio sets (cottage assembly)	
25.	Decent Electronics Moghalpura, Lahore	radio sets (cottage assembly)	
26.	Sh. Zahoor and Sons, Gualia Town, Lahore	radio sets (cottage assembly)	
27.	Southern Electronics Gund Road, Lahore	radio sets (cottage assembly)	
28.	A. E. C. Traders, Grain Market, Sahiwal	radio sets (cottage assembly)	
29.	Sons Electronics, Music House, Freedy Street Saddar, Karachi - 3	radio sets (cottage assembly)	

30. Ideal Industries L-1/6-21, Federal 'B' Area, Karachi (Phone 682956)	radio sets (cottage assembly)		
31. Cee Tee Electronics Liaqatabad, Karachi	radio sets (cottage assembly)		
32. Iqbal Plastic Industries 10-Mehni Road, Lahore (Phone 55020)	aerials radio aerial wire		
33. Radio and Allied Industries, 16-The Mall, Lahore (Phone)	transformers for receivers and electronic equipment	20 thousand	
	output and interstage	20 thousand	
	filter chokes	60 thousand	
	chokes for fluorescent lamps	600 thousand	
	chokes for mercury lamps	20 thousand	
	T. V. antennas	10 thousand	
	trimmers and padders	60 thousand	
34. Limtex Industries, P.O. Box 3618, Karachi - 28 (Phone 291982)	television antennas	300 thousand	
35. Humayun Industrial Corporation, C/14, S.I.T.E. Karachi (Phone 292047)	fluorescent tubes	0.8 million	
	starters		
	condensers		
	electric chokes	0.8 million	
36. Paramount Industrial Ltd., B/12, S.I.T. E. Phone 292047)	fluorescent tubes	0.6 million	
	electric bulbs	5.4 million	
37. Electric Lamp Manufacturers of Pakistan Ltd., University Road, Karachi (Phone 410484)	fluorescent tubes	0.7 million	
	miniature lamps	2.5 million	
	glass shells	20 million	

* units visited by experts

INDUSTRY MANUFACTURING ELECTRONIC INDUSTRY IN PAKISTAN

S.No.	Name and Address	Production Programme	Capacity
1.	Karachi Carbon and Ribbon Manufacturing Company, 8/65 Estate Avenue, SITE Karachi (Phone 292191)	teleprinter ribbons, rolls and tapes	20000 dozen
2.	Pakistan Wrose International Ltd., Saifee Building, I. I. Chundrigar Dr. Ziauddin Ahmad Road, Karachi	teleprinter ribbons, rolls and tapes	
3.	E M C O Electric Equipment Manufacturing Company Ltd, 12/3 Sheikhupura Road district Sheikhupura (Phone 66614, 54209) *	porcelain insulators	1200 tons
		iron clad switch fuses	8000
4.	Faizi Industries Ltd., G. T. Road, Gujranwala (Phone 2368)	switchgear switch fuses fittings electric traffic signals	60 thousand
5.	Siemens Pakistan Engineering Company Ltd., 98-D, S. I. T. E, Karachi - 16(Phone 516061)	single phase KWH meters	60 thousand
		three phase electric meters	12 thousand
		electric motors transformers switchgear switch fuses electric distribution boards and controls	8 thousand
6.	Pak Electron Ltd., Ferozepur Road, Lahore (Phone 359137, 353032)*	electric distribution boards and controls	840
		circuit breakers	300
		transformers	4800
		switchgear	1240
		switch fuses electric meters	8400

7. E C O P Electric Company of Pakistan Ltd Multan Road, P.O. Box 1659, Lahore (Phone 66113-4)	Electric distribution boards and controls switch fuses	
8. Manzoor Glass and Ceramics Ltd., C/11, S. I. T. E. Karachi (Phone 291770)	porcelain insulators glass containers amber green glass bottles	
9. Metalux Corporation Ltd., E/120, S.I.T.E Karachi - 16 (Phone 290904)	porcelain insulators electric meters, plasticmoulding diecasting	5400 lbs aluminium alloys
10. Standard Porcelain Works, 451 Market Road, Garden East, Karachi.	Low tension insulators	100 tons
11. Olympia Electric and Plastic Industries Ltd 4th Mile, Multan Road, Lahore (Phone 66066)	porcelain Insulators switches for telephone and telegraph	
12. Pakper Ceramics Ltd., G. T. Road, Lalamusa, district Gujrat (Phone 87)	porcelain insulators	150 tons
13. Shalgan Electric and Engineering Company Ltd 1/9 Sector, Industrial Area, Islamabad (Phone 42009)	porcelain insulators	
14. A E G Telefunken Pakistan Ltd., D/163, S. I. T. E. Manghopir Road, Karachi (Phone 291495)	miniature circuit breakers	120 thousand
	circuit breakers transformers	400
15. Electro Service Industries, 81-Temple Road, Lahore (Phone 55144)	voltage regulators battery chargers transformers	

16.	International Industries Ltd., Hakimsons Building, 19-west Wharf Road, Karachi (Phone 227121,2,3,4,5	ampere motors volt motors	
17.	Qasmi Electrical Industries, Gondlawala Road, Gujranwala (Phone 3491)	electric motors	1 thousand
18.	Delta Electrical Industries, Karim Manzil Khokharki, Gujranwala Phone 2827.	electric motors	100
19.	National Metal Works Ltd., G. T. Road, Sultanabad, Gujrat (Phone 4765)	electric motors	700
20.	La Electric of Pakistan Ltd, Gondlawala Road, Gujranwala (Phone 4436)	electric motors exhaust fans light fittings monobloc pumps welding transformers	
21.	Oksela Ltd., Manjorwal Multan Road, Lahore. (Phone 63982)	electric motors chokes coils winding	9000 150 thousand 600 thousand
22.	Premier Industries, New Masjid-e-Khizra, Wembridge Road, Shimpura, Karachi (Phone 236142)	Electric motors	300
23.	Pakistan Engineering Company Ltd., Ketlakhpat Ferozepur Road, Lahore (Phone 350112,3)	electric motors steel towers	16000 20000 tons
24.	Brush Rahman Ltd., 9-G.T. Road, Lahore Tezab Ehata, Lahore (phone 58589, 58397)	electric motors (2 to 40 H P rating)	9000
25.	The Climax Engineering Works Ltd., Climaxabad, G.T. Road, Gujranwala Phone 3691-4	electric motors transformers welding transformers centrifugal pumps air compressors electric furnaces fans	7500 12 thousand 1500 1200 600 300 30000

26.	S.Muhammad Din and Sons Ltd. 17-Lawrence Road, Shahdara, district Sheikhupura (Phone 54858, 9)	electric motors	3000
		transformers	2400
27.	Johnson and Phillips (Pak)Ltd., C/10 S.I.T.E Manghopir Road, Karachi (Phone 292248, 9)*	oil circuit breakers	150
		electric distribution boards and controls switchgear transformers switch fuses	
28.	General Products Group Ltd., S.F.Units 5 & 6 Road No.32 Opp.Hub River, Karachi (Phone 291542)	switch fuses switch gear	
29.	Pak Plastic Industries C/18, S.I.T.E. Karachi (Phone 290750)	switchgear	
30.	Electro Technical Industries, 46-Bibi Pak Daman, Karachi (Phone 63569)	transformers	200
31.	Atlas Rubber and Plastic Industries , A/54, S.I.T.E. Karachi - 16 (Phone 291907) *	Low tension cable*	300 thousand coils
		conductors	100 yards each
		copper wire aluminium wire enamelled wire	450 tons
32.	Atlas Cables Ltd., SITE Ketri, Distt.Dadu. (Phone)	A C S R conductors all aluminium conductors	
33.	Oclite Industries S.I.T.E., Ketri Distt. Dadu (Phone)	enamelled wire	

34. Pakistan Cable Ltd 8/21- S I T E Karachi (Phone 290166/7)	hard drawn bare copper conductor	8310 tons
	copper cables aluminium cables PVC insulated rubber insulated paper insulated upto 11 kv	111 million yards 9 million yards
	ACSR and AAC conductors aluminium extrusion press tin coated braid wire antenna wire	8310 tons
35. A. G. E. Industries, 430- Jinnah Road, Saddar Peshawar (Phone 2730)	enamelled copper wire	
36. Indus Glass Works Ltd., Golimar Road, Hydorabad (Phone 23293,23645)	glass hollow ware	3000 tons
37. Prime Glass works, G. T. Road, Jhelum (Phone 2784)	glass hollow ware	
38. Prince Glass Works Ltd 15/H Landhi Industrial Area, Karachi (Phone 40047)	glass hollow ware sheet glass	4800 tons 10000 tons
39. S. W. M. Scientific Glass works, 26/8 Landhi Industrial Area Karachi (Phone 48010)	glass hollow ware	780 tons
40. Corning Glass Pakistan Ltd., Plot No. 11 and 26 Sector 20, Karachi Industrial Area, Karachi (Phone 48110)	ampules vials neutral glass soft glass tubes	3.6 million 2.4 million interested in manufacture of glass envelopes for TV picture tubes

41.	Khawaja Glass Industries, G. T. Road Hasanabdal, district Campbellpur (Phone 9	sheet glass glass hollow ware	4800 tons
42.	B. H. Norman and Mehatta Ltd., Mehatta House, Talpur Road, Karachi (Phone 228631)	steel structures	
43.	Heavy Mechanical Complex, Taxila, dist. Rawalpindi (Phone 67241, 2, 3)	steel structures	
44.	Karachi Shipyard and Engineering Works Ltd., Dockyard Road, West Wharf, Karachi (Phone 224041-7	steel structures engine ships	10 thousand tons
45.	Hafit Industries, Bastagan Road, Lahore	voltmeters galvano-meters resistance boxes Potentio-meters	
46.	Sind Engineering Ltd., West Wharf, Karachi (Phone)	steel structures	
47.	Seldon Industries Ltd., C/16, S.I.T.E. Karachi-16 (Phone)	electric switches plugs sockets knobs cabinets	
48.	Greaves Crompton Perkinson Ltd. C/14, S.I.T.E. Mauripur Road, Karachi-16, (Phone)	carbon brushes for electric machines	96 thousand
49.	Manjar Industries Ltd., C/20, S.I.T.E., Karachi 16, (Phone)	switches plugs sockets knobs cabinets	
50.	Nowaga Cables Ltd., Sheikhupura Road, Distt. Sheikhupura (Phone 64711)	cables conductres copper wire	

51.	Plastika Industries Ltd, F/39 S.I.T.E. Karachi -16 (Phone 290865)	cabinets plugs sockets	
52.	Pak Plastic Industries S.I.T.E., Manghopir Road, Karachi - 16 (Phone 290760)	switches plugs sockets electrical accessories	
53.	Chemical Coating Industries Ltd., S/29, S.I.T.E., Mauripur Road, Karachi-13 (Phone 290384)	coated and metallised papers, metallised plastic films	
54.	Longman Mills, 14/N Gil Muhammad Road, Gulberg, Lahore (Phone 81311, 81316)	rubber articles rubbers coating of metals	
55.	P I T A C, 322, Ferozepur Road, Lahore - 16 (Phone 81471,81472,83821)	tools dies jigs fixtures training of technicians technical advice	
56.	Exide Batteries of Pakistan Ltd., Mill Street, S.I.T.E. Karachi -16 (Phone 292023))	lead acid batteries	60 thousand
57.	Indus Battery Industries S/84 S.I.T.E. Karachi - 16, (Phone 292213)	dryround cells	
58.	Pakistan Battery Manufacturing Company 1st Ave Avenue, S.I.T.E. Karachi - 16 (Phone 290424)	dry cells	
59.	National Tyre and Rubber Company, Queens Road, Karachi (Phone 222811)	lead acid batteries	
60.	G.C.Goodwill and Company Ltd,Multan Road, Lahore (Phone 64960)	lead acid batteries	
61.	Elastoplast Ltd., 20-Shalimar Town, Lahore (Phone 330477,330575)	electric cables for domestic and industrial use, 20 pair PVC coated telephone cables	

62	Grand Batteries (Pakistan) Ltd. Industrial Estate, Multan Road, Lahore (Phone 64960)	lead acid batteries	
63.	Forbes, Forbes, Campbell and Company, Tufail Road, Lahore Cantt. (Phone 71704)	lead acid batteries	
64.	Atlas Battery Ltd., 21 Link McLeod Road, Lahore (Phone 62715)	lead acid batteries	
65.	Frontier Electric Cable Industry, Pajjagi Road, Peshawar (Phone 3628)	wire and cables armoured cables	1500 miles
66.	National Battery Industry, 17-Zaildar Road, Muhind Dete Sahib, Lahore (Phone 66237)	lead acid batteries	
67.	Multi Mechanics Industries, Moghalpura, Lahore	electric cables switches and sockets	
68.	Eagar Battery Industries Konsi Road, Quetta (Phone 2240, 2522)	lead acid batteries	
69.	Lucky Linkers Ltd., Industrial Estate, Multan Road, Lahore (Phone 64960)	dry cells	
70.	Asian Electrical Industries, Kabir Street No.13, Tozab Khata Road, Lahore (Phone 65330)	electric wires and cables	
71.	Amar Cables Industries 102-Ravi Road, Lahore	electric wires and cables	
72.	Choudhry Wire Rope Industries, G.T. Road, Muridke, Distt. Sheikhupura (Phone 86)	ACSR conductors, all aluminium conductors steel wire ropes	

73.	Electric Cable Industries Ltd/ 13-Brandreth Road, Lahore (Phone 55425, 69223)	electric wires and cables
74.	National Wire and Cable Industries, Ghani Chambers Patiala Ground, Mcleod Road, Lahore (Phone 55425)	electric wires and cables
75.	New Pak Cable Industries Ltd., Chah Miran Road, Chowk Nawaiutta, Lahore (Phone 54833)	electric wires and cables
76.	Sadiq Electric Works, 10-Railway Road, Lahore (Phone 64291)	electric wires and cables
77.	Sonic Electro Industries Ltd., Ghani Chambers Patiala Ground, Mcleod Road, Lahore (Phone 55425)	enamelled copper wire
78.	M. b. Nizamuddin and Sons, Circular Road, Lahore (Phone 65204)	enamelled copper wire
79.	Jamjua Radio and Plastic Industries, S.I.E. Gujranwala (Phone 2597)	plastic radio cabinets, plastic radio parts

ANNEXURE C

PAKISTAN TELEVISION CORPORATION

In October 1963, the Government decided to introduce a general purpose television service in the country. The Nippon Electric Company of Japan entered into an agreement with Pakistan to operate two pilot television centres on an experimental basis. As a result, two pilot TV centres were set up in 1964. These centres were taken over by a private limited company in 1965.

The Pakistan Television Corporation was established as a public limited company on June 29, 1967 with foreign private participation. Government of Pakistan, N. E. C and Kanematsu-Gosho Company of Japan are the shareholders of the present company. The Government holds the controlling share.

Management.

The management of the Corporation is entrusted to a board of 10 directors, 7 of whom including the chairman, the managing director, director programme, administration, finance director, director engineering and director news are nominated by the Government. The remaining three directors are nominated by the Nippon Electric Company.

Capital Structure

The Corporation had an authorised capital of Rs. 50 million and paid-up capital of Rs. 31.9 million as on March 31,1974. The Government investment is Rs. 25.5 million and private investment is Rs. 6.4 million of which the share of K. Gosho Ltd. is Rs. 1.05 million and of N.E.C. Japan Rs.5.35 million. The Government have also advanced Rs. 63.4 million as a loan to the Corporation. According to a decision, Government shareholding in the Corporation

will eventually be 51 percent of the total authorised share capital.

During the 9 months ending March, 1974 the Corporation obtained loans of Rs. 45.8 million compared to Rs. 5 million obtained in the preceding year. Total loans provided to the Corporation upto March 1974 amounted to Rs. 159.1 million.

Programme

Although the Corporation earns its revenue through telecasting commercial advertisements and television licence fees, its programmes are formulated with the objective of promoting an enlightened awareness of the world as well as a consciousness of Pakistan's own heritage, the social and economic compulsion of national life and actions necessary to ensure the nation's progress and prosperity both material and spiritual.

Television is being used as a mass medium to motivate people for the development of the country, as a medium of mass education, in particular of functional education (farmers, workers, education in health and hygiene, care of child etc). As on April 30,1975 the Corporation has two main television centres at Karachi and Lahore, four broadcasting centres at Rawalpindi, Peshawar, Quetta and Multan and three re-broadcast centres at Cherat, Sakesar and Thana Bulla Khan.

In November, 1973 the Corporation submitted a scheme to the Government envisaging setting up of colour television centres at Peshawar, Quetta and Islamabad, expansion of technical and production facilities and conversion of TV centres at Lahore and Karachi for colour telecast. Nine new rebelecast

centres, five translator centres and twelve super high frequency links are also planned to be set up. Total capital cost of the project is Rs. 621.5 million. The main television centres will also be linked by T & T microwave relay system by the middle of 1975. By the completion of this scheme, 87% of the population and 65% of the area will be covered by TV signals. By the end of June, 1976, the Corporation will be broadcasting for 10 hours daily from all the centres out of which 3.5 hours will be used for educational and other publicservice programmes.

Each television station telecasts over 6.3 hours of programme daily. Since March, 1973, the Corporation has introduced a special transmission on every Sunday morning. All stations are equipped with VTR machines and OB Vans for recording and direct breadcast of sports and other events taking place in and around TV towns.

All the television centres are being modernised with a view to facilitating smooth and uninterrupted presentation. A standby power supply generator has been installed at the federal transmitting station situated at Pindi-Point Murree, for ensuring continuous power supply to the transmitter. For the Karachi and Lahore centres, all the equipment for airconditioning has been received and installed. Plans are under consideration forthe expansion of telecasting and television reception facilities for the people in the rural areas.

The Corporation has now made arrangements with some foreign agencies to telecast in Pakistan live programmes from foreign countries through satellite transmission.

Pakistan doesnot have enough technical facilities to produce all the films required for broadcasting. It is becausoof this that some of the films are being imported from abroad. During July,1967 to March 1974, the Corporation spent Rs. 4.754 million on the import of foreign films for broadcasting. The year-wise break up of such imports is as under:

(Rupees in thousand)

1967-68	.. ..	554
1968-69	.. ..	362
1969-70	.. ..	390
1970-71	.. ..	398
1971-72	.. ..	592
1972-73	.. ..	1213
1973-74	(upto March 1974)	1245
	Total : ..	4754

The Corporation has not exported any film during the period and as such has earned no foreign exchange. However, the Corporation as well as its subsidiary (Asian Television Service) are sending films, both news and documentaries, to different countries.

Financial Analysis 1972-73

The capital resource position of the Corporation during 1972-73 showed that 10,000 ordinary shares of Rs. 100 each were issued to Government in consideration of the amount deposited with the Corporation.

The net worth of Corporation as a percentage of paid-up capital in 1972-73 dropped to 9 as against 38 in the corresponding period last year.

Business Operations

The gross earning of the Corporation during the year under review amounted to Rs. 22.307 million and total expenses Rs. 31.065 million resulting in a deficit of Rs. 8.758 million.

The net loss for the year 1972-73 was Rs. 8,758 million. This amount was transferred to the accumulated loss account which showed a balance of Rs. 29.8 million as on June 30,1973. In 1971-72, the Corporation has suffered a loss of Rs. 7.495 million and the Government subsidy amounted to Rs. 5.556 million.

Sources:

1. Government Sponsored Corporations 1973-74, Government of Pakistan, Finance Division, Economic Advisors wing, Islamabad.

2. Pakistan Basic Facts 1973-74, Government of Pakistan, Finance Division, Economic Adviser's wing, Islamabad.

Annexure D

PAKISTAN BROADCASTING CORPORATION

Pakistan Broadcasting Corporation was established on December 20, 1972 under Pakistan Broadcasting Corporation Act, 1972 to ensure effective and efficient operation and growth of broadcasting as function-oriented public service medium. Radio should be used for economic and social change, provide motivation to the people and to assist in functional education. The world service of Pakistan Broadcasting Corporation was introduced during 1973.

Management

The Corporation is managed by a board of directors comprising a chairman, a director general, and five directors of whom one is finance director. All members of the board including the chairman are appointed by the Government.

Capital Structure

Equity composition of the Corporation has not been fixed. All assets and liabilities of Radio Pakistan as on December 19, 1972, have been trasferred to Pakistan Broadcasting Corporation.

Financial Arrangements

Sources of cash receipts of the Pakistan Broadcasting Corporation are the following :

a) Grants-in-aid for approved projects and subsidies from the Federal Government.

b) Moneys received from the Federal Government for external service and other services performed by the Corporation at the instance and on behalf of that Government.

c) Broadcasting receiving licence fees.

d) Income from sale of programmes and broadcast time from advertising.

e) Income from other sources.

The Corporation since its inception in December 1972 to June 1973 received Rs. 14.6 million as grants-in-aid from the Federal Government and Rs. 2.06 million for services rendered by it. The revenues of the Corporation during this period amounted to Rs. 10.6 million. During the first nine months of 1973-74 ending March 1974, the Corporation received Rs. 18.1 million as grants-in-aid and Rs. 1.7 million for services from the Federal Government. During the same period, its own revenue amounted to Rs. 12.7 million.

Operational activities

During the first six months of its operation ending June 30,1973, two 250 Kw short-wave transmitters and two 100 Kw short-wave transmitters at Islamabad were brought into commission. The most powerful transmitters used so far in the Corporation were 100 Kw transmitters, so the commissioning of these transmitters brought in their wake a new phase in the techniques employed for high power broadcasting. The total radiated power on short-wave transmitters of the Corporation more than doubled itself. At the same time the transmission hours of other short-wave transmitters were also increased. The net result was considerable expansion of external services not only in terms of power radiated but also in number and duration of services, channels of transmissions and targets. The total transmission hours on short-wave transmitters employed for external services increased from 5,240 hours in the first half of 1972-73 to 7,573 hours in the second half of the year.

In the first 9 months of 1973-74 ending March 1974, the transmission hours on short-wave transmitter employed for external services increased to 18,068 hours which means an average of twice as many hours per day over pre-Corporation period.

Besides these, certain other facilities were added like establishment of a fullfledged central production unit at Lahore, high quality 2 KW F.M. programme relay link between the receiving centre, Rawalpindi and Broadcasting House, Rawalpindi during the period under report. Laboratory and workshop has also been established in Islamabad which helps save foreign exchange on purchase of spares and components.

Developmental Activities

The development programme of broadcasting has been divided into " Crash Programme " and " Perspective Programme ".

The Crash programme aims at extension of medium wave coverage through Pakistan, at provision of second channel at all major stations, at introduction of a sophisticated third channel F.M. broadcasting from major stations, at completion of a 100 KW MW medium -wave transmitter for Islamabad and of national broadcasting house at Islamabad. Crash programme further envisages setting up a 300 KW MW medium wave transmitter at Peshawar, of a 100 KW MW medium wave transmitter at Karachi and setting up of two 10 KW MW medium wave transmitters at D.I.Khan and Khairpur.

A receiving centre was established at Hyderabad to improve relay and facilitate technical monitoring.

A 150 KW MW transmitting station was completed at Quetta. This transmitter has now provided much needed coverage of 1st class medium wave service to the Baluchistan area. The transmitter has also been provided with an emergency generator and studio to transmitter link on UHF in order to

establish the feeding of the programmes to the transmitter. This increased the coverage of Quetta station from a radius of 50 miles to a radius of about 150 miles, increasing its coverage from 7,000 square miles to about 60,000 square miles. This transmitter increased the total radiated power of all MW transmitters of the Corporation put together from 396 KW to 546 KW i.e. 40 per cent increase. A 10 KW MW medium-wave transmitter is under commissioning at Bahawalpur.

For 1973-74 an allocation of Rs. 21.7 million was made for the development works of the Corporation The number of transmitters has increased by the end of June 1974, to 24 (11 medium-wave and 13 short-wave) and Bahawalpur is going to become the twenty fifth transmitter of the Corporation. Radiating power reached by the end of June, 1974, 1506 KW.

At present, Pakistan Broadcasting Corporation covers about 33 % of the area and 78% of the population. After completion of the crash programme the Corporation will be able to cover 60% of the area and 93% of the population.

Work on the national broadcasting house, Islamabad is slowly progressing; installation of the 1000 KW MW medium-wave station for Islamabad is expected to be completed by September, 1975.

Programmes

Programmes on nation-building themes have been the major activity of the Corporation. Through these the Corporation identified itself with the progress and development of the country.

Central production service has been set up at Rawalpindi, at Lahore and Karachi to undertake production of such programmes as are to be broadcast from all

regional stations. World service is of a duration of 11.30 hours daily.

PAKISTAN BROADCASTING CORPORATION

BALANCE SHEET AS AT 30th JUNE, 1973

Assets :		
Current Assets		
Cash and Bank Balances:		
Revenue Account	51,43,340	
Capital Account	49,96,922	
	1,01,40,262	
Stores and Spares	17,00,000	
Advances to Staff	51,503	
Advance to Contractors	35,00,000	
Security Deposits	27,500	
Sundry Receivables	79,288	
	53,358,302	
Total current assets		1,54,98,564
Investments		1,00,000
Fixed Assets		10,08,46,442
	Rs.	11,64,545.006
Liabilities:		
Current Liabilities		
Accrued Expenses	11,15,540	
Income Tax	24,541	
Benevolent Fund	87,197	
Group Insurance	7,518	
G.P. Fund	4,71,434	
Pension Fund	3,87,427	
	28,43,657	
Cordless system	14,42,000	
Total Current Liabilities		39,85,657
Capital Account Federal Government		11,24,68,486
Surplus from Profit & Loss Account		80,861
		11,64,545.006

Sources a) Government sponsored Corporation 1973-74, Government of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad.

b) Pakistan Basic Facts, 1973-74, Government of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad.

Annexure E

TELEPHONE INDUSTRIES OF PAKISTAN

The telephone facilities inherited by Pakistan at the time of independence were utterly inadequate. At the time of independence, there were 3542 post offices in Pakistan, total number of post offices in the country increased upto 8149 as on June 30, 1974. Similarly number of telephones increased from 31200 in 1955 upto 182000 as on June 30, 1973. The number of telegraph offices increased from 531 upto 764 as on June 30,1973. The demand for such facilities for the expanding trade, industry and administration was very pressing and could only be met by importing telephone equipment from abroad. In view of the importance of telecommunications and the desirability of reducing dependence on foreign markets for such essential equipment and spares, itwas decided to establish a telephone factory in the country. An agreement was signed between the Government of Pakistan and Messrs Siemens and Halske, west Germany, for establishing a telephone factory. As a result of this agreement, the Telephone Industries of Pakistan was established as a private limited company, under the guarantee of the Government in 1952.

Management

The company is managed by a board of seven directors, including the chairman. Five of the directors including the chairman are nominated by the Government while two are nominated by M/s Siemens of west Germany.

Capital Structure

The authorised share capital of the company is Rs. 100 million consisting of 1,00,000 shares of Rs. 1,000 each. The issued and paid-up capital in March, 1973, stood at Rs. 73.2 million, the share of the

Government and Messrs Siemens being Rs. 60.6 million and Rs. 12.6 million, respectively.

Operations

The factory has a capacity of 50,000 lines of telephone exchange equipment and similar number of subscriber telephone instruments. The present manufacturing capacity has been geared to meet the requirements of Telegraph and Telephone Department for long distance telecommunication equipment, trunk exchange, carrier telephone systems, subscribers trunk dialling and nation-wide dialing and manufacture of teleprinter and railway signalling equipment for the Pakistan Railways. It also caters to the growing demand for inter-office equipment and exports.

Production

During 1973-74, the T I P remained engaged in the production of various items. The production of some of the items during 1972-73 and 1973-74 is given in the following table :

Production of Equipment

(Quality in Nos)

Items	April - March	
	1972-73	1973-74 @
1. Telephone instruments	70,150	41,500
2. Exchange Lines		
a) Auto EMD lines	20,000	15,000
b) Auto F-I lines	6,200	2,400
c) C.B. exchange lines	2,000	-
d) Magneto exchange lines	1,600	1,700
e) Private branch exchange lines	2,700	3,400
3. Trunk exchanges (Boards)	117	12
4. Carrier channels	1,026	72
5. Telex/Gentex lines	400	-
6. Teleprinters Units	244	236
7. Spares, installation material and N.W.D. equipment (In million Rs)	4,273	8,200

@ Provisional.

The table indicates a considerable decline in capacity utilisation during 1973-74.

Exports

In order to improve capacity utilization the Company was also exporting some of its products to Italy, Iran, Indonesia, France, Sri Lanka, Afghanistan, Kuwait and Jordan.

During 1973-74 (April-March), the provisional export figures amounted to Rs. 7.2 million, compared to Rs. 7.984 million during 1972-73 (April-March), or a decline of 10.9 per cent.

Financial Analysis

During 1972-73, the company increased its share capital by Rs. 1.07 million. The Company earned comparatively lower profits during the period under review, as a result the level of the reserve funds with the company declined by Rs. 1.426 million to Rs. 21.1 million. The net worth declined by Rs. 0.356 million to Rs. 94.3 million in the reporting year.

Profitability - The T I P's total earnings during 1972-73, at the level of Rs. 51.3 million, were up by Rs. 12.5 million when compared to the previous year. However, the pre-tax net profit declined by Rs. 0.413 million to Rs. 0.248 million. In the preceding year, the net profit stood at Rs. 0.661 million.

The rate of return on share-holders equity was 0.26 per cent in the reporting year compared to 0.7 per cent in the previous year.

Telephone Industries of Pakistan

	(Rs. in million)
1. Authorised capital	100.00
2. Issued capital	75.10
3. Paid-up Capital	
4. Central Government Investments	
a) Total liability	-
b) Actual payment upto 30th June, 1973	-
	60.05
5. Loans obtained from Government:	
a) Cumulative upto 30th June, 1973	
b) During 1973/74 ...	
i) Actual	
ii) Anticipated	NIL
iii) Total	
c) Anticipated during 1974-75	
d) Total loans upto 30th June, 1975 (a+b(iii)+c)	
6. Cumulative net profit (+)/of the Industries upto 30th June, 1973 ..	1.069
7. Refund of Central Government's investments:	
a) Total refunds upto 30th June, 1973	
b) Refunds during 1973/74	
i) Actuals	
ii) Anticipated	Nil
iii) Total	
c) Anticipated refunds during 1973-74	
8. Payment of Central Government's loans:	
a) Total payments upto 30th June, 1973	
b) Repayments upto 1973/74	
i) Actual	
ii) Anticipated	Nil
iii) Total	
c) Anticipated Repayments during 1973/74	
d) Total repayments upto 30th June, 1974 (a+b(iii)+c)	

9. Other payments to Central Government

a) Dividends/Profits on investments

i) Actuals upto 30th June, 1973 — Nil
ii) During 1973/74
iii) Anticipated during 1974/75

b) Interest on loans

i) Calculated for the year 1972/73 Rs. 1.182 million on loans from T&T Department

ii) Anticipated during 1973-74 Rs. 0.880 million.

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Telephone Industries of Pakistan Limited Hattar/Hazara

Balance sheet as at 31st March 1973

1971/72 Rs.			1972/73 Rs.
	Fixed Capital Expenditure		
3,36,66,850	At Cost, less accumulated Depreciation		2,91,40,624
	Capital Expenditure Charged to Revenue:		
3,31,670	At Cost.	3,67,737	
3,31,670	Less : Charged to Revenue	3,67,737	-
1,12,61,850	Investments		1,33,01,080
	Current Assets:		
8,33,31,208	Stocks and Stores	8,93,08,048	
4,90,30,439	Sundry Debtors	4,87,88,123	
96,69,413	Advances, Deposits & Prepayments	46,18,746	
43,11,599	Cash and Bank Balances	1,24,218	14,08,39,085
14,62,42,669			
19.11.71.358			183.281.509

Sources:

1. Government sponsored Corporations 1973-74 Government of Pakistan, Finance Division, Economic Adviser's wing, Islamabad.
2. Pakistan Basic Facts 1973-74, Government of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad.

TELEPHONE INDUSTRIES OF PAKISTAN LIMITED
HARIPUR/HAZARA

Balance sheet as at 31st March, 1973

Capital and Liabilities

1971-72 Rs.			1972/73 Rs.
	Capital		
	Authorised:		
10,00,00,000	1,00,000 Shares of Rs.1,000 each		10,00,00,000
	Issued, Subscribed and Fully Paid:		
5,60,30,000	61,230 Shares of Rs. 1,000 each issued for Cash.	61,230,000	
96,37,000	11,732 Shares of Rs.1,000 each issued for consideration other than Cash.	11,732,000	
			7,29,62,000
	Advances(against shares to be allotted):		
42,00,000	Telephone and Telegraph Department -		
23,47,803	Messrs Siemens A.G.	2,18,129	2,18,129
65,47,803			
11,72,801	Reserve and Surplus		10,69,388
86,05,671	Specific Reserves and Provisions		6,823,334
6,08,05,364	Employees Provident Fund(Less Advances)		129,94,159
86,562	Workers' profit participation fund		1,45,365
	Current Liabilities:		
7,18,64,249	For Goods	5,58,36,652	
44,69,686	For Expenses	64,01,184	
2,16,69,804	For other Finance	2,63,14,880	
71,616	Security Deposits	49,635	
6,07,803	Payable to Siemens for Return on Investment	7,86,963	893,69,164
9,83,83,150			
	Contingent Liability		
19,11,71,359			18,32,01,809

Science and Research Institutes related to Electronics Industry.

S.No.	Name and address	Principal Officer	
1.	Telecommunication Research Centre Haripur, distt. Hazara.	Mr. Imadul Islam	
2.	Pakistan University of Engineering and Technology, G. T. Road, Moghalpura, Lahore * (Phone 68240, 331662).	Prof.Dr.M.Islam Shaikh	
3.	Pakistan Council of Scientific and Industrial Research Laboratories, Ferozepur Road, Lahore (Phone 80486, 81120,80826).	Dir. Dr.M.K.Bhatty Dr. F. A. Faqrooqui, Head of Research Division	PCSIR
4.	Pakistan Industrial Technical Assistance Centre, Ferozepur * Road,Lahore(Phone 81471/83021)	Mr. Mustafa Hassan, General Manager	PITAC
5.	National College of Engineering and Technology, Muslimabad, * Karachi(Phone 415730)	Miss Nasreen Hussain, Head of Electronics Department	
6.	National Science Council of Pakistan, Al-Rafiq, 48-Barul Aman, Drigh Road,Karachi (Phone 415461).	Dr. Muhammad Shafqat Hussain Siddiqui, Chairman.	
7.	Pakistan Council of Scientific and Industrial Research, 21/E A, PECHS., Block 6, Karachi. (Phone 415796)	Dr. Muhammad Shafqat Hussain Siddiqi, Chairman.	PCSIR
8.	Pakistan Space and Upper Atmosphere Research Committee, 43/1-P/6,PECHS, Karachi (Phone 412081).	Air Commodore K.M. Ahmed, Executive Director.	

* institutions visited by the experts.

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

U N I D O

ANNEX 6

PROJECT IN PAKISTAN

JOB DESCRIPTION

DP/PAK/73/040/11-02/01

POST TITLE	Industrial Economist for Broadcasting Equipment Manufacturing Feasibility Study (Industrial Side)
DURATION	Three months
DATE REQUIRED	As soon as possible
DUTY STATION	Rawalpindi, with travel within the country
DUTIES	The Industrial Economist will collaborate with an Electronic Engineer as a team of two attached to the Ministry of Information of Broadcasting and they will jointly undertake a feasibility study for the establishment of Manufacturing Facilities for Broadcasting Equipment. In particular, the team will be expected to :

A) in the technical fields assess the present and future demand for broadcasting equipment including associated studio input equipment aerial coupling equipment and aerial systems, together with audio equipment for broadcasting studios.

B) In the industrial field :

1. Identify existing enterprises which could be expanded to manufacture products or semi-finished products identified above ;

2. prepare an integrated and realistic manufacturing proposal taking into account the existing industrial enterprises, labour and managerial resources;

3. on the basis of the above, review and prepare a pre-feasibility study for the manufacture of the equipment identified above, which will include:

(a) the sectoral organisation and the project placed in it;

(b) criterion used in selecting the size and scope of the project;

(c) organisation, management, staff and labour requirements;

(d) distribution and marketing, including effective demand, prices and required subsidy if any;

(e) benefit/cost analysis, internal rate of return, foreign exchange savings, and the contribution to Government revenues;

(f) financial plan including projections of annual financial statements and/or capital operating budgets (with the foreign exchange components shown separately) cash flows and break even analysis.

Qualifications: University degree or equivalent in industrial economics, extensive experience in the preparation of feasibility studies preferably for the manufacture of electronic equipment.

Language: English

Local Manufacture of Electronics — ANNEXURE H

In census of manufacturing industries in Pakistan 1969-70 (the latest published so far) electronic industry is classified under the following sub-groups:

- electrical lamps and
- communication equipment etc

The census gives the following basic data on electronics industry at that time:

(values Rs. in million)

Pakistan	Electrical lamps	Communi-cation equipment	Electrical machinery total	All industries
Number of reporting establishments	6	12	137	3887
Value of fixed assets	3.6	73.7	140.7	4852.9
Average daily employment	696	7140	16197	418360
Labour cost during the year.	1.7	22.1	48.3	997.0
Cost of production during the year	9.0	49.6	179.0	6999.2
Value of production during the year	24.6	89.1	339.4	11999.5
Gross value added during the year	15.6	39.5	160.4	4811.3
Units with employment upto 9 persons			39	539
10 to 19 persons			36	885
20 to 49 persons			36	1219
50 to 99 persons			16	388
100 to 249 persons			11	259
200 to 499 persons			12	122
500 to 999 persons				67
1000 to 1999 persons			6	44
2000 to 4999 persons				29
5000 persons and above				5

Fixed assets in units upto 9 persons	0.9	43.1
10 to 19 persons	2.4	104.9
20 to 49 persons	5.1	310.9
50 to 99 persons	6.3	289.3
100 to 249 persons	21.4	439.9
250 to 499 persons	39.0	696.4
500 to 999 persons		1292.3
1000 to 1999 persons	66.8	762.1
2000 to 4999 persons		780.6
5000 persons and above		163.4
Employment in units upto 9 persons	130	3188
from 10 to 19 persons	496	12823
from 20 to 49 persons	1117	30163
from 50 to 99 persons	1143	26688
from 100 to 249 persons	1808	41880
from 250 to 499 persons	4108	42878
from 500 to 999 persons		52365
from 1000 to 1999 persons	7386	53833
from 2000 to 4999 persons		91360
from 5000 persons and above		38718
Labour cost in units upto 9 persons	0.2	7.8
from 10 to 19 persons	0.7	25.2
from 20 to 49 persons	2.1	84.2
from 50 to 99 persons	2.4	72.4
from 100 to 249 persons	6.2	119.8
from 250 to 499 persons	14.7	112.3
from 500 to 999 persons		161.4
from 1000 to 1999 persons	21.7	148.3
from 2000 to 4999 persons		196.8
5000 persons and above		65.1
Cost of production in units upto 9 persons	0.7	192.8
from 10 to 19 persons	3.9	276.5
from 20 to 49 persons	7.5	1006.3
from 50 to 99 persons	21.0	777.9

from 100 to 249 persons	26.4	1227.9
from 250 to 499 persons	50.6	934.2
from 500 to 999 persons		1047.3
from 1000 to 1999 persons	67.0	806.1
from 2000 to 4999 persons		971.2
5000 persons and above		149.3
Value of production in units upto 9 persons	3.1	284.9
from 10 to 19 persons	5.6	388.2
from 20 to 49 persons	15.6	1308.6
from 50 to 99 persons	35.0	1155.3
from 100 to 249 persons	39.4	1739.9
from 250 to 499 persons	96.4	1497.5
from 500 to 999 persons		1891.4
from 1000 to 1999 persons	142.4	1884.0
from 2000 to 4999 persons		1360.4
5000 persons and above		323.2
Gross value addedof units upto 9 persons	2.4	92.4
from 10 to 19 persons	1.7	78.6
from 20 to 49 persons	8.1	382.4
from 50 to 99 persons	14.0	377.4
from 100 to 249 persons	11.0	512.0
from 250 to 499 persons	47.8	563.3
from 500 to 999 persons		844.2
from 1000 to 1999 persons	75.4	1077.9
from 2000 to 4999 persons		789.2
5000 persons and above		173.9

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Fixed Assets Statistics

Group of Industries	No. of reporting setts	Total fixed assets (4+5+6)	Book value of fixed assets at the end of the year. Land and building	Plant and machinery	Other fixed assets	Annual rent or premium paid
1	2	3	4	5	6	7
All Industries.	3587	4852.9	1437.3	3104.5	311.2	64.3
Electrical machinery total	137	140.7	48.1	55.2	37.4	0.3
Electrical lamps	6	3.6	0.7	2.0	0.9	0.0
Communication equipment etc.	12	73.7	22.8	20.9	30.0	0.0
Electrical lamps and communication equipment together	18	77.3	23.5	22.9	30.9	0.0
As percent of electrical machinery	13.1	54.9	48.9	41.5	82.6	-
As percent of all industries	0.5	1.6	1.6	0.7	9.9	-

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Employment and Employment cost statistics

Group of industries	No. of reporting units	Employment	Employment Cost: Total	Cash benefits	Non-cash benefits	Paid to contract labour
1	2	3	4	5	6	7
All industries	3587	418360	987.0	903.4	31.5	52.1
Electrical machinery total	137	16197	46.3	45.3	2.3	0.7
Electrical lamps	6	686	1.7	1.7	-	-
Communication equipment nte.	12	7140	22.1	20.3	1.8	-
Electrical lamps and communication equipment together	18	7826	23.8	22.0	1.8	-
As percent of electrical machinery	13.1	48.4	48.3	48.6	78.3	-
As percent of all industries	0.5	1.9	2.4	2.4	5.8	-

Industrial cost statistics

Group of Industries	No. of reporting cases	Industrial Cost during the year: Total fuel and electricity	Fuel	Electricity	Total materials	Locally available	Imported	Payments to others
1	2	3	4	5	6	7	8	9
All industries	3587	389.7	216.8	172.9	6870.3	5806.4	1355.9	29.2
Electrical machinery total	137	4.2	1.5	2.7	174.7	84.7	189.1	-
Electric lamps	6	0.8	0.4	0.1	8.8	2.4	6.8	-
Communication equipment etc.	12	1.2	0.1	1.1	48.3	18.7	36.6	-
Electric lamps and communication equipment together	18	1.7	0.5	1.2	86.8	15.1	41.6	-
As percent of electrical machinery	13.1	40.8	38.3	44.4	38.8	21.6	28.6	-
As percent of all industries	0.5	0.4	0.2	0.7	0.8	0.3	3.1	-

Value of production statistics

Group of Industries	No. of reporting units	Gross value of production during the year: Total	Products	By Products	Electricity generated	Industrial waste	Receipts from others	Net change of work in progress
1	2	3	4	5	6	7	8	9
All industries	3587	1800.5	10 702.3	707.8	16.9	34.3	328.3	11.0
Electrical machinery total	137	339.4	296.1	28.8	-	-	13.2	2.1
Electrical lamps	6	24.6	24.6	-	-	-	-	-
Communication equipment etc.	12	89.1	82.7	0.3	-	-	4.4	1.7
Electrical lamps and communication equipment together	18	113.7	107.3	0.3	-	-	4.4	1.7
As percent of electrical machinery	13.1	33.5	36.2	1.1	-	-	33.3	80.9
As percent of all industries	0.5	1.0	1.0	-	-	-	1.3	15.5

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Other cost statistics

Group of Industries	No. of reporting estts	Total	Indirect taxes			
			Excise duty	Sales tax	Other indirect taxes	Overhead and other charges
1	2	3	4	5	6	7
All industries	3587	989.4	779.6	111.1	98.7	861.1
Electrical machinery total	137	47.6	24.3	19.6	3.7	20.0
Electrical lamps	6	4.6	4.4	0.2	-	1.1
Communication equipment etc	12	18.7	0.9	12.9	1.9	4.9
Electric lamps and communication equipment together	18	23.3	5.3	13.1	1.9	5.8
As percentage of electrical machinery	13.1	48.6	21.8	66.8	51.8	29.9
As percentage of all industry	0.5	2.8	0.7	11.8	1.9	1.8

Source: Central Statistical Office, Karachi
Census of Manufacturing Industries 1969-70.

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Imports and Exports of Electronics

Annexure I

From usually very reliable data on imports statistictics the following picture arises for Pakistan imports of electronics during the financial years 1972-73 1973-74 and during first half of financial year 1974-75 (July - December, 1974) - in US $ thousands

Commodity	Imports 1972-73	Imports 1973-74	Imports July-December, 1974	Imports July-December 1973
Telecommunication apparatus	9,082	21,853	15,777	8,184
Television receivers	1,309	4,968	6,148	1,374
Television sets complete	228	1,527	915	476
Parts of television	1,081	3,442	5,233	898
Radio broadcast receivers	957	3,350	688	1,239
Radios	10	455	3	454
Radio phonographs	1	6	12	2
Transistors radios	11	21	6	-
Radio parts	934	2867	687	782
Telecommunication equipment N. E. S.	6,816	13,535	8,942	5,571
Exchanges	2	5	-	4
Head phones	-	16	1	15
Receivers	-	8	84	8
Signalling devices telephone	-	-	-	-
Telotype and print machines	2	7	-	-
Telephones N.S.	10	28	-	428
Teleprinters not wireless	3	217	-	3
Telephone, telegraph line equipment N.S.	508	83	204	65
Microphones etc.	174	238	143	91
Radar apparatus & equipment	13	414	101	4
Radio apparatus for telegraph and telephone	2	292	127	37

Radio apparatus N. S	1	113	8	-
Transmitters of Radio and TV	449	539	350	-
Telecommunication equipment N. S.	5,652	11,575	7,923	5,316
<u>Beyond this main group</u>				
Electric lamps & bulbs	510	765	577	296
Bulbs for automobiles	112	126	62	49
Bulbs for flash light	62	220	46	113
Bulbs for flood light	-	5	-	1
Bulbs for lighting	112	118	133	28
Bulbs photo flash	2	2	-	1
Bulbs or lamp for medical and laboratory use	7	13	-	1
Electric arc lamps	-	3	-	-
Fluorescent tubes	24	25	66	1
Neon signs	6	8	1	2
Electric lamps N. S	183	249	249	89
Transistors, valves etc	377	588	495	174
Cathod ray tubes	11	14	10	6
Photo cells	-	1	-	1
Transistors not radios	26	138	215	7
Tubes of wireless radios etc	14	81	59	42
Tubes electric N. S.	116	174	40	63
Valves of wireless radios etc	26	57	72	25
Valves electronic N. S	62	42	98	11
Thermionic etc N. S.	123	52	1	19
Total imports of electronics	9,969	23,176	16,849	8,654

When compared with the above mentioned imports of electronics, the following exports of electronic equipment materialised during the same period US $ in thousands:

Commodity	Exports 1972-73	Exports 1973-74	Exports July-Dec'74	Exports July-Dec'73
Telecommunication apparatus	386	6,646	416	163
Television receivers	-	22	-	2
Television sets complete	-	3	-	-
parts of television	-	19	-	2
Radio broadcast receivers	149	493	396	85
Radios	1	31	9	18
Radio phonographs	-	48	-	-
Transistor radios	182	46	4	22
Radio parts	47	367	383	45
Telecommunication equipment N.E.S	236	6,131	28	69
Receivers	-	48	3	-
Keyboards	-	-	-	-
Teletype and print machines	-	5	-	-
Telephones N.S	-	12	-	11
Telephone telegraph line equipment	-	13	-	13
Microphones etc.	1	-	2	-
Radio Apparatus N.S	-	361	4	-
Telecommunication equipment NS	236	5,699	18	46
Electrical machinery				
Electric lamps and bulbs	6	17	1	6
Bulbs for lighting	-	-	-	-
Bulb and lamp for medical and laboratory use	-	1	-	-
Fluorescent tubes	1	-	-	1
Neon signs	1	4	-	-
Electric lamps N.S	5	11	-	4

Transistor valves etc	37	-	1	-
Transistors not radios	37	-	-	-
Valves electronic NS	-	-	1	-
Total exports of electronics	429	6,663	418	188
Exports as % of imports	4.3	28.7	2.8	1.8

Source: Statistical Division, Ministry of Finance, Planning and Development, Government of Pakistan - Foreign Trade, June, 1974 and December 1974.

Annexure I

MANUFACTURE OF TRANSMITTING AND STUDIO EQUIPMENT

Cost of the Transmitting and Studio Equipment Project and Financial Plan (Rs. in Thousand).

	Local	Foreign	Total
Preliminary expenses	30	-	30
Land (Two acres)	100	-	100
Buildings	665	-	665
Production machinery and equipment imported	-	600	600
Other machinery	75	-	75
Ventillating plant imported	-	200	200
Import duty in surance, clearance	400	-	400
Eruction and installation	80	-	80
Furniture, fixture and fittings	100	-	100
Interest during construction	135	-	135
Pre-production and start-up expenses	150	-	150
Contingencies	200	-	200
Total fixed cost	1935	800	2735
working capital requirements	920	-	920
Total Project Cost	2855	800	3655
Way of financing			
PICIC Loan foreign currency	-	800	800
Custom debentures	350	-	350
Rupee debentures	1645	-	1645
Equity	860	-	860
Total :	2855	800	3655

FACILITIES OF THE TRANSMISSION AND STUDIO EQUIPMENT PROJECT

Land	two acres in a developed state worth Rs. 100,000
Buildings	new building with forced ventillation, dust proof worth Rs. 665000 plus Rs.135000 for fencing and contingencies
Power	80 KW from WAPDA
water	by pipeline from public supply system
Gas	from pipeline of Sui Northern Gas Transmission Lines
Sewerage	main towards sewerage system
Production machinary and equipment imported	worth Rs. 600 thousand
Other machinary and equipment local	worth Rs. 75 thousand
ventillation plant imported	Rs. 200 thousand
Import duty insurance and clearance	50% of C I F cost
Erection and installation	10% of machinery cost without import duty, insurance and clearance.
Furniture, fixtures and fittings	worth Rs. 100 thousand
Construction schedule	PICIC sanction - December, 1975 L/Cs established - June 1976 Deliver - December, 1976 erection and - June, 1977 commissioning-
Interest during construction	12% for half of the construction period (1/2 year) - Rs. 135 thousand
Pre-production and start-up expenses	Rs. 150 thousand
working capital	half year stock of imported material (Rs. 705 thousand) and quarter year stock of local material (Rs. 135 thousand) assuming 75% of raw material imported and 25% local packing material and certain chemicals and auxiliary materials
Equity	30% of total project cost.

ESTIMATE INCOME STATEMENT

OF THE TRANSMISSION AND STUDIO EQUIPMENT PROJECT

(Rs. in Thousand)

	1977-78	1978-79	1979-80	1980-81	1981-82
Production	1750	2450	2975	3500	3500
Sales	1135	1838	2380	2975	3150
Cost of Sales					
Raw material	595	810	1150	1410	1465
Subcontracts	350	490	595	700	700
Labour	600	600	726	799	880
Manufacturing overhead	460	510	550	590	600
Depreciation	223	223	223	223	223
Inventory adjustment	250	400	600	600	300
Total cost of manufacture	2478	3093	3844	4322	4168
Sales expenditure	114	184	238	298	315
Total cost of Sales	2592	3277	4082	4620	4483
Gross profit/ loss	-1456	-1439	- 1702	-1644	-1333
Other income and expenses					
Other income	20	25	30	35	40
Other expenses:					
Interest on PICIC Loan	80	80	80	80	80
Custom debentures	35	18	-	-	-
Rupee debentures	214	214	214	214	214
Bank borrowing	120	378	630	712	1123
Amortration of preproduction expenses	30	30	30	30	30
Repayment of PICIC Loan	-	-	80	80	80
Redeeming of custom debentures	175	175	-	-	-

Dividend on equity	-	-	-	-	-
Total other expenses	662	892	1034	1116	1527
Net other income and expenses	642	867	1004	1081	1487
Profit/Loss before tax and workers fund	-2097	-2306	-2706	-2726	-2928
Workers fund	-	-	-	-	-
Profit/Loss before tax	-2097	-2306	-2706	-2726	-2928
Tax provision	-	-	-	-	-
Net Profit/Loss	-2097	-2306	-2706	-2726	-2928

Assumptions underlying earning forecast of the transmission and studio equipment project
(Rs. in thousand)

Production and Sale — Start of commercial operation 1st July, 1977

Operating efficiency	Output	Waste
First year	50%	35%
Second year	70%	25%
Third year	85%	20%
Fourth year	100%	15%
Fifth year	100%	10%

Raw material - 45% of production of good pieces, 30% less of material from wrong pieces.

Subcontracts — 20% of the cost of production

Labour — the following staff to be employed

1 plant manager		Rs.5000/- per month
3 chief engineers	@ Rs.4000/-	Rs. 12000/- per month
5 engineers	@ Rs.2000/-	Rs. 10000/- per month
7 technicians	@ Rs.1000/-	Rs. 7000/- per month
1 finance manager plus salesman		Rs. 800/- per month
1 accountant		Rs. 800/- per month
1 administrative officer		Rs. 800/- per month
14 workers	@ Rs.700/-	Rs. 9800/- per month
1 store-keeper		Rs. 600/- per month
4 private secretaries and stenographers	@ Rs.800/-	Rs. 2000/- per month
3 peons	@ Rs. 300/-	Rs. 900/- per month
1 swapour	@ Rs. 300/-	Rs. 300/- per month
42	Total (	50000/- per month

Or Rs. 600000/- per year during the first year, with a 10% escalation every year there will be the following labour cost during first five years of the operation :

	1977-78	1978-79	1979-80	1980-81	1981-82
Labour	600	660	726	799	800

MANUFACTURING OVERHEADS (Rs. in thousand)

	1977-78	1978-79	1979-80	1980-81	1981-82
Fuel, water and power	55	60	65	70	75
Repair and maintenance	30	35	40	45	50
Spares	18	18	18	18	18
Rent, rate and taxes	20	20	20	20	20
Insurance	39	39	39	39	39
Know-how	200	200	200	200	200
Royalty	88	122	148	175	198
Other expenses	12	16	21	25	26
Total manufacturing overhead	460	510	550	590	600

Depreciation

Plant and machinery	10%	1705	Rs. 171 thousand
Buildings	5%	930	Rs. 46 thousand
Furniture and fixtures	6%	100	Rs. 6 thousand
	Total :		Rs. 223 thousand

Sales expenditure - 10% of total sales

Operating expenses -

Financial expenses -

Interest on HICIC loan	10%	Rs. 80 thousand
Custom debentures	10%	Rs. 35 thousand
Rupee debentures	13%	Rs. 214 thousand
Bank borrowing	13%	Rs. varies from year to year

Amortisation of pre-production expenses - 20% during five years

Repayment of loan - estimated two years moratorium, then in 20 half yearly instalments

Redeeming of custom debentures - during two years, 50% each

Redeeming of rupee debentures - during five years starting at the end of fifth year of operation - 20% each

Workers fund - 5% on profit before tax

Tax - 55% of taxable profits

COST OF THE PROJECT - ISOTOP VALVES PRIVATE LIMITED

(Rs. in thousand)

MANUFACTURE OF TRANSMISSION VALVES	Annexure X		
	Local	Foreign	Total
Preliminary expenses	25	-	25
Land(two acres)	100	-	100
Buildings	500	-	500
Production machinery and equipment imported	-	800	800
Other machinery	50	-	50
Air-conditioning and ventilating plant imported	-	200	200
Import duty,insurance,clearance	300	-	300
Erection and installation	65	-	65
Furniture, fixtures and fittings	80	-	80
Interest during construction	105	-	105
Preproduction and start up expenses	100	-	100
Contingencies	150	-	150
Total fixed cost	1675	800	2475
Working capital requirements	240	-	240
Total project Cost	1915	800	2715
Mode of financing.			
FBSIC loan - foreign currency	-	600	600
Custom debentures	250	-	250
Rupee debentures	765	-	765
Equity	700	-	700
Total	1715	600	2315

Facilities for the Project.

Land - two acres in a developed estate worth Rs. 100,000 -

Buildings - new building dust proof/with air-conditioning and forced ventillation worth Rs.500,000 plus Rs.100,000 for fencing and contingencies

Power - 50 kW from WAPDA

Water - by pipeline from public supply system

Gas - from pipeline of Sui Northern Gas Transmission Lines

Severage - main towards severage system

Raw material-85% imported, 15% local packing material and certain chemicals and auxiliary materials

Production machinery and equipment imported - worth Rs.300 thousand

Other machinery/and equipment - local - worth Rs. 50 thousand

Air-conditioning and ventillation plant

imported - worth Rs. 300 thousand

Import duty, insurance and clearance - 50% of CIF cost

Erection and installation -10% of machinery cost without import duty, insurance and clearance

Furniture, fixtures and fittings - worth Rs. 80 thousand

Construction schedule - PICIC sanction - December, 1975
L/Cs established-June, 1976
delivery - December, 1976
erection and commissioning - June, 1977

Interest during construction - 12% for half of the construction period (½ year) - Rs.105 thousand

Working capital - half year stock of imported material (Rs.221 thousand) and quarter year stock of local material (Rs.19 thousand)

- worth Rs. 240 thousand

Equity - 30% of total project cost

ESTIMATED INCOME STATEMENT
OF THE TRANSMISSION VALVES PROJECT (Rs. in thousand)

	1977-78	1978-79	1979-80	1980-81	1981-82
Production	520	650	910	1105	1300
Sales	208	325	546	774	975
COST OF SALES					
Raw material	200	250	364	442	520
Labour	652	797	788	967	954
Manufacturing over head	240	270	300	340	370
Depreciation	192	192	192	192	192
Inventory adjustment	-	-	200	300	400
Total cost of manufacture	1292	1459	1844	2141	2456
Sales expenditure	21	33	55	77	98
Total cost of sales	1313	1472	1899	2218	2554
GROSS PROFIT	- 1105	-1147	-1353	- 1444	-1599
Other income and expenses					
Other income	15	15	15	15	15
Other expenses:					
interest on PICIC loan	60	60	60	60	60
custom debentures	25	15	-	-	-
rupee debentures	99	99	99	99	99
bank borrowings	95	289	492	705	965
Amortisation of pre-production expenses	20	20	20	20	20
Repayment of PICIC loan	30	60	60	60	60
Redeeming of custom debentures	125	125	-	-	-
rupee debentures	-	-	-	-	125
Dividend on equity	-	-	-	-	-
Total other expenses	454	668	731	942	1329
Net other income and expenses	439	651	716	927	1350
Profit/loss before tax and workers fund	-1544	-1798	-2069	-2371	-2909
Workers fund	-	-	-	-	-
Profit/loss before tax	-1544	-1798	-2069	-2371	-2909
Tax provision	-	-	-	-	-
NET PROFIT/LOSS	- 4544	-1798	-2069	-2371	-2909

Production and sale -

Start of commercial operation - 1 July, 1977

Operating efficiency	Output	Waste
First year	40%	60%
Second year	50%	50%
Third year	70%	40%
Fourth year	85%	30%
Fifth year	100%	25%

Labour - the following staff to be employed

1	plant manager		Rs. 5000,- per month
3	chief engineers(design, technology, chemical)	@ Rs. 4000,-	Rs. 12000,- per month
8	engineers	@ Rs. 2000,-	Rs. 16000,- per month
9	technicians	@ Rs. 1000,-	Rs. 9000,- per month
1	finance manager		Rs. 800,- per month
1	accountant		Rs. 800,- per month
1	administrative officer		Rs. 800,- per month
7	workers	@ Rs. 700,-	Rs. 4900,- per month
1	store keeper		Rs. 600,- per month
4	private secretaries and stenographers	@ Rs. 500,-	Rs. 2000,- per month
2	peons	@ Rs. 300,-	Rs. 600,- per month
4	watch and ward	@ Rs. 300,-	Rs. 1200,- per month
2	sweepers	@ Rs. 300,-	Rs. 600,- per month
44	Total		Rs. 54300,- per month

or Rs. 651600 per year during the first year. With a 10% escalation every year there will be the following labour cost during first five years of the operation: (Rs. in thousand)

	1977-78	1978-79	1979-80	1980-81	1981-82
Labour	652	717	788	867	954

Manufacturing overheads (Rs. in thousand)

Fuel, water and power	40	45	50	55	60
Repair and maintenance	20	25	30	35	40
Spares	13	13	13	13	13
Rent, rate and taxes	15	15	15	15	15
Insurance	23	23	23	23	23
Know-how	100	100	100	100	100
Royalty	21	32	55	77	97
Other expences	8	17	14	22	22
Total manufacturing overhead (Rs. in thousand)	240	270	300	340	370

Depreciation

Plant and machinery	10%	1510	Rs. 151 thousand
Buildings	5%	725	Rs. 36 thousand
Furniture and fixtures	6%	80	Rs. 5 thousand
		Total :	Rs. 192 thousand

Sales expenditure 10% of total sale

Operating expenses

Financial expenses

on-PICIC loan	10%	Rs. 60 thousand
custom debentures	10%	Rs. 85 thousand
-rupee debentures	15%	Rs. 90 thousand
-bank borrowing	15%	Rs. varies from year to year

Amortisation of pre-production expenses - 20% during five years

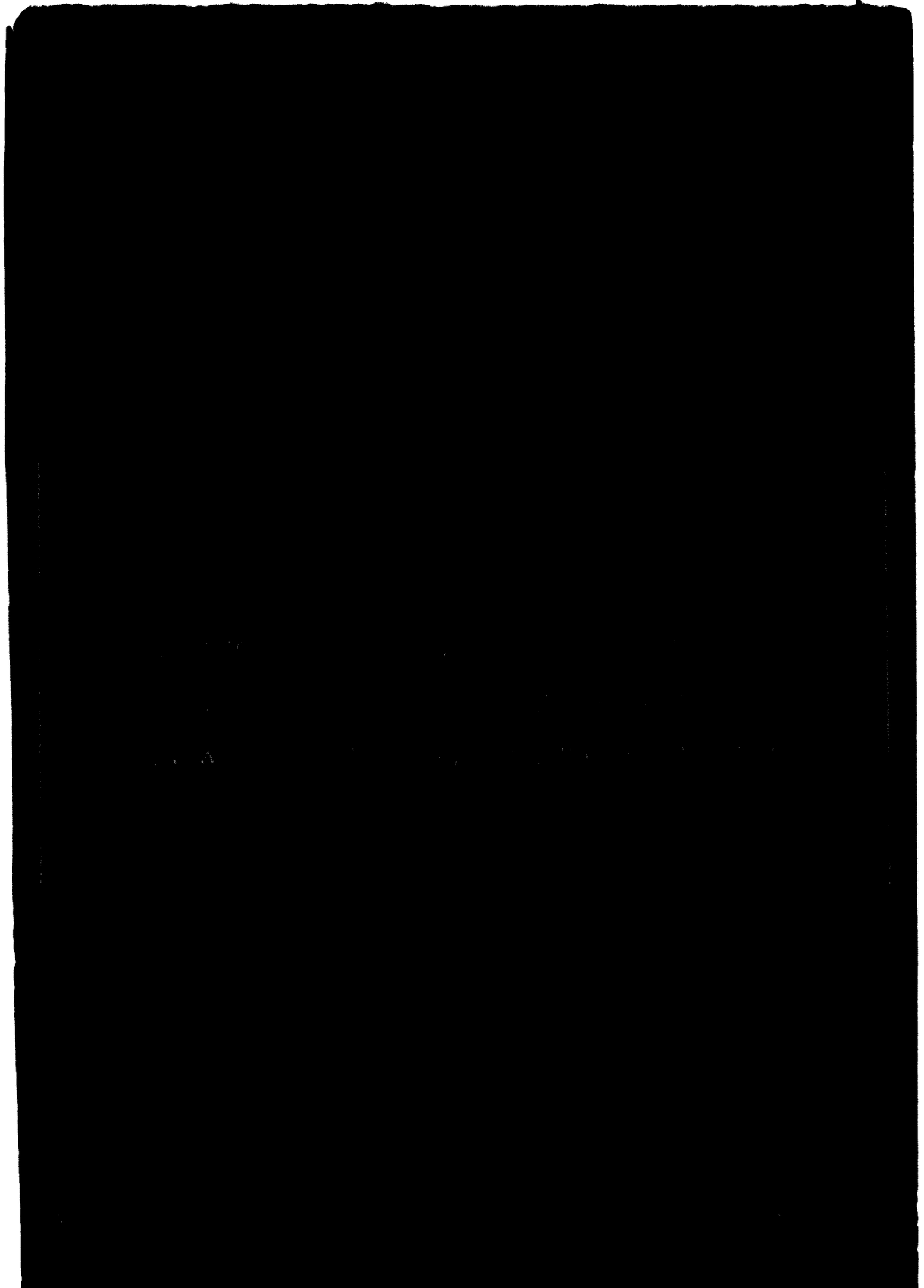
Repayment of loan - estimated five years moratorium, then in 20 half yearly instalments

Redeeming of custom debentures - during two years, 50% each

Redeeming of rupee debentures — during five years starting at the end of fifth year - 20% each

Workers fund - 5% on profit before tax.

Tax- 55% of taxable profits.



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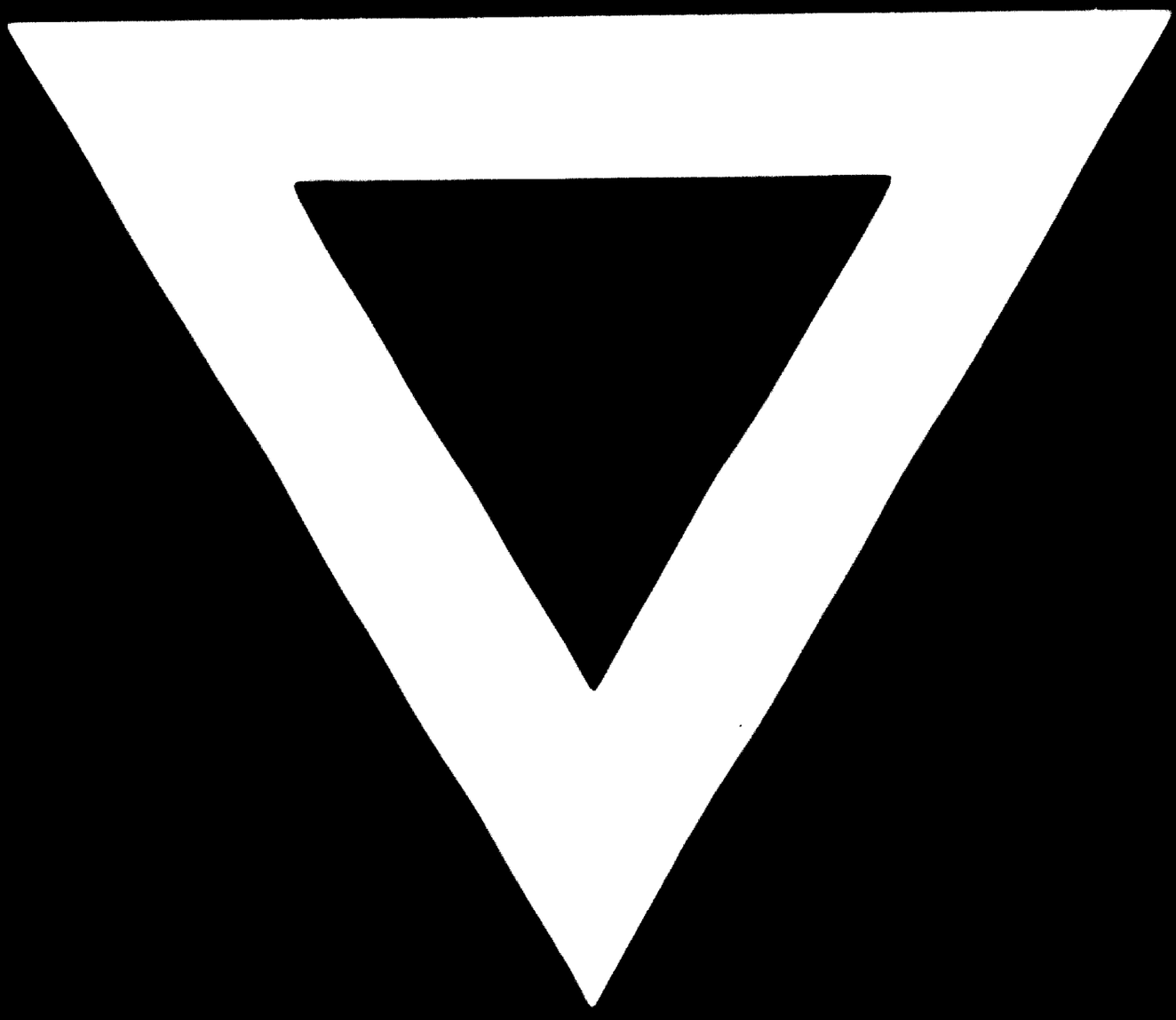

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