REPORT OF THE COMPTROLLER & AUDITOR GENERAL OF INDIA : UNION GOVT. (COMMERCIAL) PART XI 1982

REPORT OF THE

COMPTROLLER AND AUDITOR GENERAL OF INDIA

UNION GOVERNMENT (COMMERCIAL)

1982

PART XI

BHARAT ELECTRONICS LIMITED

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(i)	Table of contents		The words 'Prefatory Remarks' may be read against pages (iii)-(iv)
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45	2nd and 3rd line from bottom	83	82
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94	20th line of the page	33 Nos.	39 Nos.
103	5th line of the page	each in 1979-80 and 1980-81	in 1979-80 and Rs. 102.17 lakhs in 1980-81
108	Heading of the 1st column of the table	Delete the word	'liabilities'
109	9th and 10th line of 1st column of the table	Value added Conversion cost	4. Value added 5. Conversion cost
115	10th line below the table	Directorate General of Supply and Disposal's orders and also	to Rs. 13.94 lakhs and Rs. 9.10 lakhs respectively. The loss
116	2nd line below the table	to 1963-64 to 1975-76	to the years 1963-64 to 1975-76
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PART XI

BHARAT ELECTRONICS LIMITED

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Prefatory Remarks

PREFATORY REMARKS

A reference is invited to paragraph 5 of the Prefatory Remarks contained in Part I of the Report of the Comptroller and Auditor General of India—Union Government (Commercial)—1982, wherein it was *inter alia* mentioned that the Report on the working of Bharat Electronics Limited, an undertaking selected for appraisal by the Audit Board, was under finalisation.

2. In this case the Audit Board consisted of the following members :

1. Shri P.P. Dhir . . .	Chairman, Audit Board and Ex-officio Additional Deputy Comptroller and Auditor General (Commercial) upto 9th June, 1982.
2. Shri R.C. Suri . . .	Chairman, Audit Board and Ex-officio Additional Deputy Comptroller and Auditor General (Commercial) with effect from 10th June, 1982.
3. Shri K.S. Murthy . .	Member, Audit Board and Ex-officio Director of Commercial Audit, Bangalore upto 30th April, 1982.
4. Shri K.N. Murthi . .	Member, Audit Board and Ex-officio Director of Commercial Audit, Bangalore with effect from 18th June, 1982.
5. Shri K.J. Kuriyan . .	Accountant General-I, Karnataka Bangalore and formerly Member, Audit Board and Ex-officio Director of Commercial Audit, Bombay.
6. Dr. N. Seshagiri* . .	Director, Electronics Commission (IPAG), Government of India, New Delhi-Part-time Member.
7. Shri B. Majumdar** . .	Industrial Adviser (Electronics) Office of the Development Commissioner (Small Scale Industries), Ministry of Industry, New Delhi-Part-time Member.

* Dr. N. Seshagiri did not attend the meetings held on 15th and 16th March and 7th and 8th April, 1983.

** Shri B. Majumdar did not attend the meetings held on 7th and 8th April, 1983.

3. The Report was finalised by the Audit Board after taking into account :

(a) The comments furnished by the Ministry of Defence (Department of Defence Production) in March 1983,

(b) The result of the discussions held with the representatives of the Ministry and the Company on 14th, 15th and 16th March and 7th and 8th April 1983 and

(c) The additional information furnished by the Ministry and the Company in March and April 1983.

4. The Comptroller and Auditor General of India wishes to place on record his appreciation of the work done by the Audit Board and acknowledges with thanks the contribution, in particular, of the Part-time Members, who are not the Officers of the Indian Audit and Accounts Department.

1. Introduction

1.01 The Bharat Electronics Limited was established as a fully owned Government of India undertaking in the year 1954 under the administrative control of the Ministry of Defence. The role assigned to the Company was to meet the requirements of Defence Services and Civil Government Departments for professional electronic equipment, through indigenous production. The Company was also charged with the production of specialised components for the entertainment electronics industry in the country.

1.02 The Company's authorised capital, which was initially Rs. 1,000 lakhs, was raised to Rs. 1,500 lakhs in 1979-80. The paid-up capital as on 31st March 1982 was Rs. 1,350 lakhs contributed entirely by the Government of India.

1.03 The activities of the Company were reviewed by the Estimates Committee (Thirtyninth Report—First Lok Sabha 1956-57 and Fiftyninth Report—Second Lok Sabha 1958-59), by the Comptroller and Auditor General of India (Audit Report—Commercial 1969) and by the Committee on Public Undertakings (Third Report—Fifth Lok Sabha 1971-72).

2. Objectives

2.01 The Memorandum of Association of the Company lays down that the main objects of the Company are to design, develop and manufacture :

(a) Electronic equipment such as Transmitters, Transreceivers, Oscillators, Amplifiers and Radar equipments, X-ray machines, Surgical and Medical appliances, Testing instruments, etc.

(b) Specialised electronic components such as Electron Tubes, Magnetrons, Klystrons, Semi-conductors, Resistors, Condensers, Coils, Chokes, Transformers, Switches, etc.

2.02 The Administrative Reforms Commission (ARC) in their Report on Public Sector Undertakings (October 1967) had recommended that the Government should make a comprehensive statement on the objectives and obligations of Public Undertakings. The Bureau of Public Enterprises (BPE) while communicating the acceptance of the above mentioned recommendation of the ARC, requested (November 1970) the Ministries concerned to initiate action to have the objectives and obligations of the individual Public Enterprises laid down, in consultation with the Ministry of Finance. No action in pursuance of the above directives was taken by the Company till November 1979.

2.03 In May 1979 the BPE issued instructions to the Ministries to advise the Public Enterprises under their control to spell out their Micro objectives consistent with the broad objectives spelt out in the Industrial Policy Statement of December 1977 to facilitate the realistic and meaningful evaluation by the Committee on Public Undertakings and the Government. In pursuance of these instructions the Company forwarded to the BPE in November 1979 with a copy to the Ministry of of Defence (Department of Defence Production), a note detailing the Corporate (Policy) objectives and Micro-objectives framed in pursuance thereof alongwith a Corporate Plan for the coming 7 to 8 years (without the approval of the Board). Details of the Corporate/Micro objectives laid down were as under :

Corporate objectives	Micro objectives to achieve the Corporate objectives
1	2
(a) To broad base the production activities to enable the production and supply of important and strategic electronic equipment and components required by Defence Services and other Government Departments.	(i) To update the product-mix to develop, engineer and produce modern equipment of latest designs conforming to the 'state-of-art' abroad, to strengthen the operations in specific equipment areas such as Sonar systems, High Power medium/short wave broadcast equipments, Communication systems for P&T, Satellite Terminals, Laser systems for communication and other applications Antenna systems, etc.

1	2
	(ii) To concentrate further efforts in active components and specifically enlarge the activities in products like New devices in Germanium/Silicon Semi-conductors, IC technology including C-Mos and Solar Cells, New thick and thin film Micro-circuits, X-ray Tubes, Vacuum Switches, Display Tubes, Mg Mno_2 Batteries, High Power Transmitting Tubes, Klystrons, Imaging Devices, Glass Shells for Picture Tubes.
	Action for the development/acquisition of technology in respect of many items indicated above was reported to have already been initiated by the Company.
(b) To aim for a growth rate of 10 to 12 *per cent* per annum with the diversified product and technology base and to strengthen necessary organisational structure to support the planned growth.	To create additional production capacities for equipment and comment production by setting up 2 new factories and by establishing facilities for production of Glass Shells for TV Picture Tubes. (These factories were Sanctioned by the Government in September/ October 1982).
	After the above production facilities are set up the turnover is estimated to increase from Rs. 85 crores in 1979-80 to Rs. 178 crores in 1985-86.
(c) To preserve the leadership in Electronics which the Company had acquired and achieve international standards in production technology and design of equipment. To strengthen the R&D effort to the extent possible by internal resources and also to acquire know-how especially with respect to export programmes.	(i) To accept the existing norm of 5 *per cent* of the turnover for investment in R&D activities. To strengthen the capital investment in R&D further by means of Test Equipment, Proto-type facilities and further invest periodically to keep abreast with the 'State-of-art' in electronics technology.
	(ii) To acquire technology from others in specialised fields, where necessary in consultation with and approval of Government.

1	2
(d) To achieve a rate of return on Net worth as prescribed by the Government for public sector.	(i) To make a capital investment of Rs. 100 crores in the next 7 to 8 years for setting up of new projects and for expansion of existing projects (Rs. 55 crores to be met from internal resources and Rs. 45 crores from long-term credits with Government support).
	(ii) To follow a sound and rational pricing policy for its products to ensure that the customer obtains a quality product to international standards and specifications at a reasonable price.
(e) To increase the employment from the present level of 16,000 personnel about 23,000 personnel in the period of 7 to 8 years and in different locations without undue concentration.	To induct 7000 additional personnel required for the growth envisaged (Ghaziabad Unit—1000, Pune Unit—400, 2 new equipment factories—5000, Glass Bulbs factory-400 and supporting personnel for expansion programme—300; a significant portion will comprise of well-qualified engineers and specialists in the field and nearly 15-20 *per cent* of the additional work force will be educated women.
(f) To give full and maximum support to the development of ancillaries and small-scale sector.	To continue to pursue the policy of encouragement to ancillary units and small-scale sector units (The Company has already set up an ancillary estate at Bangalore Unit with 14 industries engaged in activities such as plastic moulding, copper moulding, sheet metal work, machining, industrial tailoring, painting, printing, etc. A number of small-scale industries received the patronage of the Company both for sub-contract and purchases). With the establishment of new units further impetus to the development of small-scale and ancillary industries will be given.

1	2
(g) To increase the export efforts-a target of 10 *per cent* of turnover towards exports to be aimed at.	(i) To give a thrust on the export front and aim at a target of 10% of the total turnover towards exports as soon as the production capacity is augumented with the setting up of 2 new factories planned. (ii) To enter the field of project exports and collaborate with certain countries in the setting up of electronic factories in their areas.

2.04 The Department of Defence Production Communicated their observations on the above Corporate Plans/Objectives to the Company in December 1979 which included *inter alia* the following :

(a) The Corporate Plan prepared was largely based on the Five Year Corporate Plan it had prepared on the basis of the requirements of the Services for various types of electronic equipments during the Defence Plan period 1979—84 and suffered from the following defects :

(i) The Plan did not base itself on a long-range policy of equipments required by the Services. It sought to expand capacity during 1979—84, *i.e.*, during the plan period itself. This was not logically possible, as apart from procedural aspects of sanctions, etc., the Company would requiire time for planning the capacity. By the time it was ready to supply the equipments required in the Defence Plan 1979—84, three years of this plan period would have been spent in capacity planning. The requirements for the entire plan period would, therefore, be supplied only towards the end, leaving the requirements of the first three years either to be postponed or met by imports.

(ii) The product-mix of the Company over a long period would shift in accordance with the product-mix required by the Services, which itself would be based on a long-range conception

by the Services of the equipments required by them. In the field of electronics, most of the equipments were related to weapon system and unless the long-range requirements of specific weapon systems were determined, it would not be possible to identify the associated electronics required for the same.

(iii) The Plan based itself on the existing R&D facilities and did not have a proper strategy for linking production of new equipment with a phased policy of developing the existing R&D capacity to meet the emergent requirements.

(iv) The Corporate Plan apparently had been prepared in isolation from the totality of the Electronic Plans and projections of the rest of the country. Even though the Company was engaged in meeting the requirements of major Civil users like Police, AIR, P&T and Civil Aviation, the Plan did not take care of their increasing requirements. The Plan also did not visualise any strategy for using the capacities built in the electronics field in the Indian Industry for supplying items to the Company on contractual basis.

(b) In the last 25 years, the Company had grown substantially but mainly as a result of *ad hoc* responses to the needs of Defence, Principal Civilian Users and keeping abreast with development of technology. This had resulted in a wide variety of product-mix and equipments and components. The product-mix needs to be rationalised which would help in defining the long-term project goals with consequent implications for the Company and the Electronics sector of industry and assuming with some degree of precision the size and volume of transactions, the corporate structure and the organisation required to meet the same over a period of say, 10 to 15 years.

In order to carry out this exercise, the following steps were suggested by the Ministry :

— Identification of Defence requirements over a long-range period.

— Identification of projects which could appropriately be executed by the Company. For the equipments which could not/should not be handled by the Company, creation of additional capacities, either in the public or private sector, would have to be considered, after taking into consideration the capacities built over the years in the Indian Industry.

— Identification of equipment required by Principal Civilian Users, viz., Railways, Civil Aviation, AIR and Doordarshan, P&T, Police, Petro-Chemicals, etc. Here again the areas left by the Company have to be catered through the existing or additional capacities to be created in the rest of the industry.

(c) Eversince the inception of the Company in 1954, it had been taking a lead in introducing high technology items both for Defence and Civil uses. While identifying new as well as parallel technologies and also identifying the product-mix for the Company, it would be essential to find the areas where the Company had a future in providing technology lead; areas of less complicated technology, where competence had been developed elsewhere, have to be left out of the Company's long-range plans.

(d) Commensurate with the requirements of achieving self-reliance in the technology required for Defence, Principal Civilian Users and to maintain the technology lead by the Company, an R&D plan would have to be evolved. After identifying the long range gauges of the R&D plan, a strategy would have to be evolved to implement the plan with adequate resources, both financial as well as manpower.

(e) Over the years, the Company had succeeded in developing technologies in various fields. However, as of today, the policy had been by and large, with a few exceptions like T.V. technology for the small sector, to use the technology for

production within the Company's establishments. For a company of BEL's size and importance it was essential, over a long-range period, to have a policy of providing technology to other units in the industry which were not capable of investing funds in R&D and generating their own technology. This process could be enlarged by having a clearly defined role of R&D projects where the technology developed need not necessarily be used for production within the Company, but could be sold through licensing arrangements to other units.

(f) The Company should have in their Corporate plan a long-range strategy for developing both export as well as transfer of technologies to third world countries by taking advantage of Government's policy of entering into joint collaborative ventures with firms of developed nations for providing technology transfer to third world countries.

(g) According to the Company's experience, fulfilling the role of providing technology lead and meeting essential requirements of military and civil users for sophisticated equipments, did not provide an adequate profit base to generate internal resources. It would, therefore, be necessary for the Company to evolve a plan for undertaking projects where profit earning capacities were higher than in projects which otherwise legitimately come within its field.

(h) The Company would be well advised to set up immediately a high-powered perspective planning cell directly answerable to the Chief Executive for working out a more scientific perspective plan.

2.05 The Corporate Objectives/Plan, as sent to the Ministry and the BPE in November 1979, were put up to the Board in April 1982 for ratification indicating that a revised Plan would be worked out as soon as the Government decision on 3 new projects were available. The remarks of the Ministry received in December 1979 were not reported to the Board. The Board,

while ratifying the action of the Company, noted that a revised Corporate Plan would be submitted by the Company taking into account the Government's decisions on the new projects and the Defence needs as recently finalised. No action had so far been taken (April 1983) by the Company to prepare a revised Corporate Plan as desired by the Board, in the light of the remarks of the Ministry though Government's sanction for setting up of 3 new projects had been received in September/ October, 1982.

2.06 The actual achievements for the 3 years upto 1981-82 for some of the financial projections made in the Corporate Plan are summarised below :

	1979-80		1980-81		1981-82	
	Planned	Actual	Planned	Actual	Planned	Actual
			(Rupees. in lakhs)			
Sales . . .	10,000	8,295	11,400	6,891	12,000	12,844
Profit before tax .	734	851	1,129	893	917	2,013
Dividend payment .	132	125	162	142	243	158
Capital Expenditure .	1,000	634	1,693	861	3,015	838
Debt-Equity Position :						
Equity . . .	1,190	1,150	1,520	1,300	2,540	1,350
Loans outstanding .	1,539	1,586	1,857	1,569	2,855	1,623

The Board had not been kept informed of the performance with reference to various targets set in the Corporate Plan and reasons for variations.

2.07 When it was pointed out that the Corporate objectives were only the short-term objectives for the period 1979—86 and did not cover the objectives and obligations envisaged in the BPE circular of November 1970 the Ministry stated (April 1983) :

> "A considerable part of the operations of BEL is related to Defence Plans of the Government. Secondly, realistic projection of the Company's Plans beyond 1986 would be possible only when the Defence Plan beyond 1986 is finalised.

Recently certain major project investment proposals of the Company have been approved. Taking these into account the Company is revising its Corporate Plan projections for the next 3 years. The Company is also reframing its objectives setting out the Company's long-terms goals.

Both the revised set of Objectives and the revised Corporate Plan are expected to be placed before the Company's Board of Directors in about 3 months time."

It will thus be seen that while no action was taken by the Company in pursuance of the BPE's instructions issued in November 1970 to formulate a statement of objectives and obligations, the Corporate and Micro-objectives formulated in November 1979 in pursuance of BPE's instructions issued in May 1979 are yet (April 1983) to be got approved by Government. No report indicating the actual performance in fulfilment of the Objectives formulated for the period 1979—86 has yet (April 1983) been submitted to the Board and the Government.

The performance of the Company in fulfilment of the various objectives has been examined and the points noticed are dealt with in subsequent chapters.

3. Sanctioning and Implementation of Projects

3.01 One of the Policy objectives set before itself by the Company is to broad-base its production activities to enable the production and supply of important and strategic electronic equipment and components required by the Defence Services and other Government Departments. The Company had so far established 3 production units at Bangalore, Ghaziabad and Pune. The Bangalore Unit went into production in 1956, the Ghaziabad Unit in 1973 and the Pune Unit in 1980. The

Government had sanctioned (September 1982) setting up of 2 more Units for the production of Defence related electronic equipment to be located at Panchkula in Haryana and in the Garhwal district of Uttar Pradesh. In addition Government also sanctioned (October 1982) the establishment of a plant for the manufacture of Glass Shells for T.V. Picture tubes to be located at Taloja near Greater Bombay.

3.02 The total capital expenditure incurred by the Company since inception to 31st March 1982 was Rs. 8,386 lakhs (including the expenditure on capital works-in-progress). This included Rs. 1356.19 lakhs incurred upto 31st March 1982 on the setting up of the Ghaziabad Unit and Rs. 138.90 lakhs on the setting up of the Pune Unit. Some of the major projects taken up at Bangalore during 1966 to 1978 included 7 new projects at an estimated cost of Rs. 403.10 lakhs and 7 expansion/diversification projects at an estimated cost of Rs. 647.28 lakhs.

3.03 Upto July 1978, the proposals for taking up new/expansion projects submitted to the Board/Government gave only broad outlines regarding the products proposed to be taken up, estimated capital cost, justification based on rough demand forecast and did not comply with several important guidelines relating to demand study, technical feature, phasing of construction, profitability, cash flow analysis, cost benefit analysis, etc. as laid down in the BPE guidelines of April 1968 and December 1969.

3.04 There was a system of submitting to the Board half-yearly progress reports on major schemes under implementation which was discontinued in December 1972. In December 1979, an appraisal on the investment made in 4 components, *viz.*, Receiving Valves, Germanium Semi-conductors, Silicon Devices and Integrated Circuits was submitted to the Board with a promise to put up similar reviews in respect of other components; this had not been done so far (April 1983). In

regard to equipment schemes taken up, no appraisal on investment had so far been conducted (April 1983). Only in April 1982 the Company introduced a system of regular monitoring of the progress in the implementation of projects and collecting the expenditure incurred thereon. As a result, the Company did not have ready and up to date details of the actual expenditure incurred on each of the projects implemented earlier.

The Ministry stated (March 1983) :

"As stated by the Audit, all project proposals made in the last 4 years contained the requisite details mentioned in BPE guidelines. As regard the submission to the Board of progress reports on major projects, no major projects had been sanctioned for BEL after setting up of the Ghaziabad Unit. Now that 3 major projects have been sanctioned (Glass Bulbs Project and two Equipment factories), periodical progress reports giving component-wise expenditure will be submitted to the Board as well as reported to the Government keeping in view the requirements of the integrated reporting system suggested by the BPE.

Regarding the submission to the Board of Appraisal Reports on other Components and Equipments Divisions, action is on hand and they are expected to be submitted shortly.

As regards reporting to the management of the actual expenditure against individual schemes, a monthly Divisionwise Capital expenditure Statement and a monthly individual project-wise report have been introduced and implemented from 1982-83. As the capital expenditure is recorded in the documents maintained by the Fixed Assets and Works Sections, the expenditure incurred is collected from such documents to prepare these reports".

3.05 Some of the salient points noticed in the implementation of the projects are discussed below :

3.05.1 In the followning cases, the gestation period in achieving the levels of production envisaged was long :

Details of Project	Date of Board's sanction	Capacity to be achieved	Projected date of achievement of capacity	Actual date of achievement
1	2	3	4	5
1. T.V. Picture tubes	November 1967 -do- December 1972	30,000 tubes 1,00,000 tubes 2,00,000 tubes	January 1971 1973-74 February 1976	1972-73 1978-79 Production of 1,95,000 in 1982-83
2. Integrated Circuits				
Linear Devices CMOS Digitals	December 1969 September 1971	1 million Expansion to 2 millions	1973-74 Not given	Not achieved upto April 1983. Production level of only 6.74 lakhs achieved in 1981-82
Augumentation of Mask design and fabrication facilities for generating mask sets of MSI and ISI complexity	March 1973	—	1975-76	Mask design capability only upto MSI complexity achieved by September 1981
Facilities for Ion implantation and Polysilicon process	January 1978	—	16 months from placing order for Ion implantor	Ion implantation facility commissioned in November 1980 and Polysilicon process in January 1982.

1	2	3	4	5
3. Microwave tubes of 7008 type : Stage I—Assembly from imported components	January 1966	300 Nos.	April 1969 to March 1970	March 1971
Stage II—Production out of manufactured components			April 1970 to March 1971	1971-72
4. Silicon Semi conductors—Plastic encapsulation devices	January 1978	Expansion from 20 millions to 25 milllions	Within 2 yers from placement of orders for equipment (orders placed during August 1979 to July 1980)	Production level of 22.6 millions reached in 1981-82
5. Indicator tubes	September 1971	1.5 lakhs	Not given	Not achieved upto April 1983
6. Germanium Semi-conductors	June 1970	Expansion from 10.3 millions to 20.3 millions	Not given	1974-75
Diodes	July 1974	3 millions	Not given	1978-79
7. Silicon Semi-conductors	June 1970	Expansion from 4 millions to 10 millions	Not given	1979-80
8. Silicon Power devices	September 1971	2 millions	Not given	1981-82

It may be seen that there had been delays in implementation of the projects and the gestation period had also been too long.

3.05.2 Setting up of Ghaziabad Unit

(a) Mention was made in para 6 of Chapter 2 of the Report of the Comptroller and Auditor General of India for the year 1974-75 of Union Government (Defence Services) regarding the setting up of this Unit for the manufacture of equipment as envisaged in a Defence plan and consequent under-utilisation of facilities and redundency of materials as a result of reassessment of the requirements. The unit went into Commercial production in September 1973 and the expenditure incurred for setting up of the Unit upto 31st March 1982 was Rs. 1356.19 lakhs (including the expenditure on diversification programme).

The equipment and facilities set up initially were designed to achieve an annual production of Rs. 1,790 lakhs entirely for the Defence. The bulk of the requirements (59 per cent) related to the manufacture of a particular equipment for which major portion of the facilities set up were to be utilised. There was a drastic cut in the Defence plan due to which the expected orders did not materialise and raw-materials and components valued at Rs. 894 lakhs imported from the collaborators became surplus to requirements (value of surplus materials as on 31st December 1982 was reported to Rs. 86,65 lakhs).

(b) In June 1975 the Company preferred a claim with Government for compensation as under :

	Amount (Rupees in lakhs)
Compensation for capital facilities special to certain equipment. .	227.45
Compensation for factory set up costs and non-utilisation of surplus capacity (for at least 2 more years)	450.00
Storage and maintenance charges for surplus inventory . .	8.40

The Government, however, turned down the claim in February 1977 on the ground that there was no firm commitment for placement of orders on the new factory and that the Company was making profits as an entity though one of its Units incurred losses.

(c) As against the expected production of Rs. 1,790 lakhs under the Defence plan, the actual turnover, in respect of supplies to Defence was Rs. 478 lakhs in 1978-79, Rs. 756 lakhs in 1979-80, Rs. 1,084 lakhs in 1980-81 and Rs. 1,051 lakhs in 1981-82.

(d) Diversification Programme

In July 1975 the Board of Directors approved a scheme for balancing the Ghaziabad plant 'in order to achieve diversified production and profitability in the shortest possible time'. The scheme which involved an investment of Rs. 100 lakhs to be treated as a new project, was approved by Government in May 1976. Under this scheme certain items of equipment, which were under development at Bangalore Unit, were to be transferred to Ghaziabad for productionisation, *viz.*, UHF Radio Relay (LUS 751), VHF Sets for Police/Mobile Equipment (GH 301/351 and LVP 313/315) and 2 more items of equipment meant for Defence. Further, 5 more tems of equipment *viz.*, 2 items relating to Defence, Micro-wave equipment, Multiplex equipment and Telemetry/Telecontrol equipment, being developed by several agencies (including the Bangalore Unit of the Company) were also to be productionised by this Unit.

The actual expenditure incurred on Diversification programme upto 31st March 1982 was Rs. 93.33 lakhs in addition to the test equipment valued at Rs. 12.52 lakhs transferred from Bangalore Unit. The items of equipment to be productionsed under Diversification Programme were expected to contribute to a turnover of Rs. 1,272 lakhs from 1978-79

onwards. As against this expectation, the actual turnover upto 1981-82 was as under :

Year	Amount (Rupees in lakhs)
1978-79	84
1979-80	238
1980-81	728
1981-82	1525

The reasons for not achieving the expected turnover were as follows :

(i) Though the Diversification scheme was to be launched in 1975-76, to achieve diversified production and profitability in the 'shortest possible time', only a beginning was made in 1976-77 and the Unit could not make any headway in achieving increased production. This was because none of the items transferred from the Bangalore Unit had been firmly established in the regular production line prior to transfer, with the result that the Unit had to tackle many problems relating to design, development, Users' clearance before commencement of regular production, re-engineering, restart, rework, etc. The expenditure incurred towards further developmental effort by this Unit upto 31st March 1982 was Rs. 43.63 lakhs.

(ii) In regard to productionisation of items developed by other agencies (including the Bangalore Unit) out of 5 items planned one item meant for Defence did not reach the production stage as the development project itself was abandoned on the ground that the expected orders did not materialise and another item *viz.*, 4/7 GHz Microwave Equipment, under development at Bangalore, was not transferred but productionised there itself. In respect of the other three items, the production itself commenced in 1978-79.

As a result, the Unit incurred heavy losses upto 1979-80 which accumulated to Rs. 1,420 lakhs upto that period. However, from 1980-81 onwards the Unit started earning profits, which brought down the cumulative loss to Rs. 509 lakhs to end of 1981-82.

The Ministry stated (March 1983) :

> "Since the Company had made an investment of Rs. 31.96 lakhs only to the end of 31st March 1979 towards Diversification plan and full complement of plant and machinery and test equipments envisaged in the Diversification plan could be made only by end of 31st March 1981, the actual turnover for the year 1980-81 (amounting to Rs. 18.12 crores including approximately Rs. 566 lakhs of diversification products) was comparable to the projected turnover of Rs. 18.22 crores after implementation of the Diversification plan reported to the Board".

The fact, however, remained that there was delay in the implementation of the Diversification programme by about 2 years.

3.05.3 T.V. Picture Tubes

(a) With the advent of television broadcasting in India, the Board approved (November 1967) the proposal for the manufacture of black and white T.V. Picture Tubes at a total cost of Rs. 57 lakhs (FE : Rs. 24.01 lakhs) based on fixed type equipment, in technical collaboration with Nippon Electric Company (NEC) of Japan, which was sanctioned by the Government in June 1968. The Government sanction contemplated an initial production of 30,000 tubes on single shift basis from January 1971 to be increased to 1 lakh tubes in 1973-74, based on a rough forecast of demand expected to be generated with reference to the only T.V. station then existing (1967) at Delhi. The production of tubes commenced in 1970-71.

(b) In December 1972, the Board took note of the considerable increase in the expected demand as a result of new T.V. Stations coming up at Calcutta, Madras, Lucknow, Kanpur, etc. Considering that it would be advantageous to establish automatic equipment in certain areas, the Board approved a revised project estimate for Rs. 178 lakhs (FE : Rs. 44.01 lakhs) for increasing the production to 2 lakh tubes per annum on 3 shifts ; which was sanctioned by the Government in April 1974. This estimate was further revised (August 1980) to Rs. 210 lakhs, without giving any reasons for increase in cost of each component of the Project estimate, and forwarded to Government in September 1980 for which sanction of the Government was awaited (April 1983). The expenditure incurred upto 31st March 1982 was Rs. 212.25 lakhs which was yet to be reported to the Board. The Board approved (February 1982) further increase of capacity to 3 lakh tubes involving an additional investment of Rs. 96 lakhs (FE : Rs. 5 lakhs) for which Government sanction was also awaited (April 1983).

(c) The time schedule for implementation of the project for increasing the production capacity to 2,00,000 tubes per annum laid down in May 1974 and actual dates of implementation were follows :

Particulars of system	Target	Actual	Reasons for dalay
Bulb processing	July 1975	Juiy 1977	Tiem taken to make the first model and modifying it.
Sealing machine	September 1975	November 1976	Import formalities.
Ageing equipment	December 1975	March 1978	Changeover to conveyorised ageing system from static system.
In-line baking oven	January 1976	July 1978	Commissioning of in-line exhaust system (on which this was dependent) only in middle of 1977 and one year needed thereafter to design and complete baking system.
In-line exhausing system	February 1976	June 1977	Design problems of dollies and availability of adequate number of dollies only by June 1977.

It may thus be seen that the expansion project approved by the Board in December 1972 and sanctioned by the Government in April 1974 (after a delay of 16 months) was ultimately implemented after a delay of more than 4 years from the date of Government sanction.

(d) The following table gives the build-up of capacity and actual production of tubes upto 1982-83 together with reasons for shortfall in utilisation of capacity (as furnished by the Company in April 1983) :

Year	Installed capacity	Actual production	Reasons for shortfall
1970-71	30,000	6,400	—
1971-72	30,000	11,000	—
1972-73	60,000	38,000	—
1973-74	60,000	57,000	Achieved with partial working on Seond shift.
1974-75	1,00,000	61,000	—
1975-76	1,00,000	59,000	—
1976-77	1,00,000	47,000	Disruption due to conveyorisation. There were also labour troubles.
1977-78	1,00,000	71,000	
1978-79	1,50,000	1,34,000	Design of the dollies fabricated by 1977, was found to be defective. The modification of all dollies taken up in 1977, was completed by 1980. As a consequence only the first in-line Exhaust (A Fine) was operational. Hence, built-up capacity was only around 1.5 lakhs tubes.
1979-80	1,50,000	1,68,000	Extra quantity achieved with partial working on third shift.
1980-81	2,00,000	1,42,000	Entire fourth quarter was lost due to the strike which started on 26th December 1980.
1981-82	2,00,000	1,70,000	First quarter was affected by disturbed conditions and lock-out and normalcy restored only in the 2nd half of June 1981.
1982-83	2,00,000	1,95,000	—

In this connection, an extract from the Annual Report (1978-79) of the Department of Electronics (DOE) is given below :

> ".....local availability of TV picture tubes has remained much below the demand largely because of the slow implementation of production plans by Bharat Electronics Limited".

(e) Thus owing to delay in completing major systems/ build-up of capacity and under-utilisation of built-up capacity by the Company, as well as apparent inability to implement the projects by 6 other firms licensed by DOE for production of 3.20 lakh tubes per annum, the gap between indigenous production and demand, which rose from 0.27 lakh tubes in 1975 to 1.86 lakhs in 1981, was met by imports. A part of this gap could have been met by the Company by implementing the expansion Programme expeditiously and also by producing the tubes to the full extent of the capacity established. As per available figures, imports during 1974-75 to 1977-78 alone amounted to 3.45 lakh tubes valued at Rs. 459.02 lakhs

3.05.4 Integrated Circuits

(a) The proposal to undertake the manufacture of Integrated Circuits (ICs) on grounds of rapid technological strides in ICs, was submitted to the Board in February 1968. The Board was also informed that a collaboration agreement would enable "economic commercial production practicable within the shortest possible time" and that firms in U.S.A. had taken nearly 4-5 years to overcome various production snags. The Board constituted a Committee (February 1968) to study the matter in all aspects and based on suggestions of the Committee, which took into account *inter alia* demand assessment of 1.156 million ICs over the next 3-7 years and considering that, for both professional and consumer applications ICs were finding widespread use, the project for production of 1 million ICs was approved (December 1969) at a cost of Rs. 65 lakhs (FE : Rs. 50 lakhs); this was revised (June 1970) to Rs. 122.00 lakhs,

mainly to provide for a separate building with service facilities. The Government approved the project in January 1971. The estimate was further revised (September 1971) providing for an additional investment of Rs. 46.50 lakhs (FE : Rs. 15 lakhs) on plant and machinery and also on air-conditioning and other service facilities needed in MOS techniques since it would be possible not only to increase annual capacity from 1 million to 2 million ICs but also to establish manufacture of a range of Digital ICs including CMOS type of chips incorporating latest techniques, in addition to linear ICs. This was approved by Government in November 1971.

(b) A technical collaboration agreement was concluded in March 1971 (to be in operation for a 10 year period) with Radio Corporation of America (RCA) for the supply of design and production information in respect of all the families of ICs which were under their range of manufacture. Before concluding this agreement, the Board was informed that there was general reluctance on the part of the firms in USA to agree for collaboration and only RCA agreed to collaborate with the Company. The collaboration agreement expired in April 1981.

(c) A amount of Rs. 17.04 lakhs was paid to RCA during March 1971 to March 1974 : Rs. 16.60 lakhs towards minimum compensation in consideration of the information and services, licences, rights and privileges made available and Rs. 0.44 lakh for supply of drawings. In addition royalty of Rs. 26.25 lakhs was also paid at 5 *per cent* of the net sale value of ICs during the period June 1979 to April 1981. The Company actually obtained design information only for 177 and production information only for 146 out of 348 types of ICs covered as per RCA catalogue.

The Ministry stated (March 1983) that :

> "The production information, *i.e.*, the IC diffusion and assembly operation, is common to families of

devices and the information has been obtained for all and technologies in the RCA product range, of interest to BEL. The collaboration agreement and the fee paid covered not only the range of products being produced by RCA at the time the collaboration was entered into but also those produced by RCA during the currency (10 years) of the agreement. This was extremely necessary as the IC technology was/is progressing by leaps and bounds with a high risk of obsolescence of products at any given point of time."

(d) The table below gives the details of the component-wise break-up of original and revised estimates and actual expenditure upto 31st March 1982 :

Description	Estimate of		Actual Expenditure
	June 1970 (for 1 million ICs)	September 1971 (for 2 million ICs)	
	(Rupees in lakhs)		
Plant, Machinery and Equipment (including customs duty)	65.00	84.50	79.50
Building, Installation and Services	40.00	55.00	46.31
Air-conditioning and clean room facilities	15.00	25.00	37.62
Industrial furniture and contingencies	2.00	4.00	13.30
TOTAL	122.00	168.50	176.73

It may be seen that the actual expenditure against Air-conditioning and clean room facilities and Industrial furniture and contingencies exceeded the revised estimate by 50.5 per cent and 232.5 per cent respectively. The estimate was not revised and got ratified by the Board explaining the reasons for cost over-runs.

(e) The Board also approved during September 1971 to March 1979, 5 other proposals as detailed below :

Particulars	Date of sanction	Sanctioned amount	Actual expenditure upto 31st March 1982
		(Rupees in lakhs)	
Addition of Mask Fabrication facility of Development Laboratory	September 1971	25.00	57.97
Augmentation of Mask Design and Fabrication facilities for development of Semi-conductor Devices including complex ICs	March 1973	81.85	79.23
Facilities for development of Ion implantation technology	January 1978	51.00	58.29 (upto March 1981)
Equipment for developing Trimetal process in manufacture of ICs.	January 1978	29.50	11.90
Augmentation of Mask centre by installing additional facilities *viz.*, photorepeater, contact printer, electronic measuring system, mask-to-mask comparator, etc.	March 1979	85.00	107.58 (including enhanced customs duty of Rs. 33 lakhs)

The Company stated (April 1983) that there were 5 distinct phases in which investment decisions were taken consequent on technology needs, *viz.* advent of ICs in USA in Sixties and CMOS ICs in 1971, CMOS diversification in 1974, Ion implantation in 1974-75, Mask centre development (1971—75) and Trimetal process in 1975.

The project for Trimetal process sanctioned in January 1978 and implemented at a cost of Rs. 11.90 lakhs was short-closed (January 1983) on account of steep rise in the price of precious metals *viz.*, Titanium, Platinum and Gold since beginning of 1979 which made the process uneconomic. The Company stated (April 1983) that the plant obtained was being used in the passivation technique in IC manufacture.

(f) No time schedule was laid down for completion of the projects while they were approved by the Board. Taking into account the lead time of 18 months from the date of the collaboration agreement required for establishing production, (as indicated to the Technical Committee in July 1968), production should have commenced by August 1972 (18 months from March 1971). Even according to the phased manufacturing programme indicated to Government in December 1969, production of ICs, at the rate of 0.5 million and 1 million, should have commenced from 1972-73 and 1973-74 respectively. But pilot production started only in 1973-74 and regular production in 1974-75 in a temporary location. The building for the project was completed and taken over only in August 1974 and the air-conditioning of the building, which was an essential facility for the production of ICs, was undertaken during the period September 1975 to January 1977. Production had not yet reached even 1.0 million Nos. per annum (actual production during 1981-82 being 0.674 million) although the matched capacity was 1.5 millions. This would indicate the serious handicaps suffered by the project due to omission to fix a time schedule for achieving the rated capacity, absence of a monitoring/reporting system on project execution, etc.

The Board was informed in December 1979 that 'while a capacity of 2 million ICs was installed in the diffusion stage for 2 technologies (Bi-polar and CMOS), assembly capacity was restricted to 0.5 million level to start with pending the build-up of demand'. The Ministry stated (March 1983) that as diffusion capacity could not be easily augmented, a greater diffusion capacity was built into the initial investment and the assembly investment limited to immediate likely needs.

(g) According to the Company (June 1982) the matched capacity was 0.5 million ICs upto 1978-79 and 1.5 million from 1979-80. The table below indicates the matched capacity, actual

production and loss incurred by the project during the period 1977-78 to 1981-82 :

Year	Matched capacity	Actual production	Percentage of utilisation of capacity	Loss during the years (Rupees in lakh)
	(in lakh numbers)			
1977-78	5.00	3.93	78.6	80.81
1978-79	5.00	4.29	85.8	46.86
1979-80	15.00	7.02	46.8	27.58
1980-81	15.00	6.86	45.7	78.55
1981-82	15.00	6.74	44.9	186.10

It may be seen that the utilisation of capacity had steadily declined from 1979-80 and the losses had increased from 1980-81. The reasons for the heavy shortfall in production compared to rated capacity have not been analysed by the Company nor have they been reported to the Board.

According to the Company (September 1981) low indigenous demand due to availability of far cheaper imported ICs was the main reason for the shortfall in production. This situation had, however, arisen due to the meagre capacity and small output of only a few types of linear ICs, of mainly SSI complexity, compared to the larger indigenous requirements of various types as well as the price competition from mass produced foreign ICs.

(h) In this connection, the following observations are made :

(i) Out of 177 types for which design information was obtained and 146 types for which production information was obtained, the Company had brought into production 34 types of linear ICs and 35 types of digital ICs ; of these the RCA types were 27 linears and 18 CMOS digitals and balance 7 types of linears and 17 types of TTL series digitals were developed by the Company.

In this connection the Company stated (September 1981), "The process capabilities in BEL are limited. In bi-polar technology, BEL cannot make ECL devices or schottky TTLs. Introduction of Isoplanar technology or injection logic is not possible with present equipment. It is, therefore, obvious that BEL will not be in a position to handle a large number of types. Reduction in the number of types is essential to improve yield and productivity." The Company further stated (December 1982) that taking into view the devices which have a long-term prospect in the market and popularity, it had standarised on the production of one radio type IC, 5 T.V. receiver types, one audio type and 13 other types. Besides these standarised types, the Company also manufactured during the period upto 1981-82, 49 other types, many of which were being used for in-house consumption. All these devices were, however, of only SSI/MSI complexity except for mask for a few LSI devices.

(ii) There had been heavy accumulation of stocks of Linear, CMOS and TTL Digital ICs and the stock to end of March 1982 amounted to 7.97 lakhs (Linear : 5.94 lakhs, CMOS : 1.19 lakhs, and TTL : 0.84 lakhs). The main stress was being given on the production of Linear ICs which accounted for 91 *per cent* to 96 *per cent* of the total production during the 3 years ending 1981-82.

(iii) Regarding CMOS digital ICs the items produced related to obsolete CD 4000 A series and there was accumulation of stock of 1.19 lakhs valued at Rs. 9.00 lakhs (manufacturing cost) as on 31st March 1982. At the same time the ICs actually needed for in-house requirement were being imported. Such imports amounted to 1.35 lakhs valued at Rs. 7.12 lakhs during 1978-79 to 1981-82. It is not, therefore, clear why the Company was producing ICs of obsolete design, not actually needed and having established capacities, why ICs were not being produced to the extent of actual requirements, instead of importing them.

The Company stated (April 1983) that the ICs imported were of 34 types of which only 14 types have the quantity potential to warrant manufacture. In respect of these 14 types

approval for productionsing 6 types had been obtained so far (April 1983).

(iv) Regarding digital TTL devices, they were developed by the Company over a 2-year period in cooperation with the Tata Institute of Fundamental Research, Bombay at a cost of Rs. 14 lakhs "as it was thought that TTL range may have a large market as they are standard devices used all over the world". However, as the Company's costs were far higher compared to international prices and as an import ban did not materialise, the Company stopped production of TTL series in 1978-79 after producing 3.14 lakh ICs valued at Rs. 42.05 lakhs from 1972-73. As on 31st March 1982 the Company held an inventory of 84,268 TTL devices (cost : Rs. 3.32 lakhs), which were moving very slowly even after special reduction in prices.

(v) Thus, the object of the project proposal of September 1971 *viz.*, establishing the manufacture of a range of digital ICs including CMOS types, had not materialised to any appreciable degree so far as CMOS devices are concerned, whereas the venture into the digital TTLS, which even European manufacturers had given up in 1968 itself in the face of American competition, did not fructify.

(vi) Although the proposal for the manufacture ICs was initially projected by the Company (February 1968) as capable of commercial viability within the shortest possible time, the project had failed to achieve break even so far (April 1983). The cumulative losses of the project upto 1981-82 amounted to Rs. 401.52 lakhs. The Company was also not able to achieve the rated annual production of 2 million ICs per annum, the maximum production achieved so far being 7.02 lakhs in 1979-80. The sales of the ICs made by the Company have also been poor and consequently unsold stocks have accumulated to the tune of 7.97 lakhs valued at Rs. 90.29 lakhs as on 31st March 1982.

3.05.5 *Classification of Components Produced*

The Company had generally classified the products belonging to professional and entertainment grade components, as under :

Professional	Entertainment
Transmitting Tubes	Receiving valves
X-Ray Tubes	T.V. Picture Tubes
Microwave Tubes	Germanium Semi-conductors
Cathode Ray Tubes	Silicon Small Signal Devices
Crystals	Silicon Power Transistors/Diodes
Hybrid Micro-circuits	Integrated Circuits
Transformers/Coils	Ceramic Capcitors
Printed Circuit Boards	Mica Capacitors
Magnesium Manganese Dioxide Batteries	

Though there was no classification into professional and entertainment grades on the basis of specification the Company was of the view (December 1981) that its own classification of professional and entertainment grade components was 'approximate' in view of possible different end uses for some components in both professional and entertainment equipments.

The Review Committee of Electronics observed in its Report (September 1979) that "in most electronic industries the world over, production of consumer grade components is regarded as a large volume by-product from the production of professional grade components, which otherwise remain uneconomical to produce". Even according to the classification made by the Company the production of professional and entertainment grade

components during the period 1978-79 to 1981-82 was as follows :

	1979-80	1979-80	1980-81	1981-82
	(Rupees in lakhs)			
Professional grade components	454.65 (18.2%)	521.13 (17.9%)	438.77 (18.2%)	743.04 (22.6%)
Entertainment grade components	2046.34 (81.8%)	2385.69 (82.1%)	1970.42 (81.8%)	2552.29 (77.4%)
Total	2500.99	2906.82	2409.19	3295.33

Note : Figures in brackets indicate the percentage to total production.

It may be seen that the production of professional grade components in the Company was only about 22 per cent of the total production in 1981-82 while the rest of the production was of entertainment grade.

To meet the requirements of professional grade components imports were being resorted to. The c.i.f. value of such imports cleared for public sector electronics units alone amounted to Rs. 30 crores and Rs. 33 crores in 1976-77 and 1977-78 respectively ; figures for subsequent years were not available. It is, therefore, no clear why the Company, being a leading public sector electronics industry, did not so far give enough emphasis on production of professional grade components.

3.05.6 *Silicon materials project*

(a) In the important field of silicon materials manufacture, the Company's capability was restricted both in range and volume. It produced only single Crystal material. Large scale requirements of Monocrystal Bars, Polished/Lapped Slices and Eepitaxial Silices and Multilayer variety for Power Devices and Integrated Circuits were beyond the Company's capacity at present and these are being imported. Other important gap

areas in the Company's capability were the ultra pure materials of Gallium and Selenium required for Semi-conductors and the Ceremic material of Ferrites required for high frequency Circuits, etc.

(b) The capacity for manufacture of silicon materials installed in the Company upto 1973-74 was for conversion out of imported Polycrystalline Bars. As it was adequate only to support the production of small Signal Silicon Semi-conductors, the Company had been importing its additional requirements of silicon materials for the production of Integrated Circuits and Power Devices since 1974-75 and 1976-77 respectively. Information regarding the actual value of imports of silicon materials (for want of production facilities) during these years was not furnished by the Company. But the imports during the period 1980—85 were estimated at Rs. 127.00 lakhs per annum (December 1980).

(c) In January 1978, the Board of Directors approved a proposal for expanding the capacity for the manufacture of silicon materials by introducing higher diameter Monocrystal Bars (out of imported Polycrystalline Bars) and certain types of Silicon Epitaxial Slices required for silicon small Signal Devices, Power Devices and Integrated Circuits with an investment of Rs. 176 lakhs (FE : Rs. 104 lakhs) to achieve the following objectives and benefits :

— Processing of large diameter Wafers upto 75 mm in keeping with international trends and in order to obtain improved yield of diffused chips and reduce manufacturing cost ;

— a net profit of Rs. 296.62 lakhs was anticipated over the payback period of 7 years with an annual average return of 22.5 per cent on the investment on straightline method or over 8 per cent on discounted cash flow method ;

— foreign exchange savings of Rs. 213 lakhs over 5 years (1980-81 to 1984-85);

— avoidance of unnecessary build-up of inventory of assorted materials required in various resistivity ranges and of import of substandard materials;

— flexibiilty for change of product-mix in tune with fluctuating market demand of types and quantities; and

— timely and correct materials support for development programmes.

Though Government sanctioned the project in September 1978, and foreign exchange and licence for import of capital equipment were released in 1979, the project which was to have become operative by January 1980 was deferred (December 1980) for want of finance. In this connection, the Chairman of the Company expressed concern during the meeting of the Board of Directors held in December 1980 that 'a critical project from national angle should have to be deferred for want of finance'.

As the project was originally intended to be financed from internal resources and as the generation of internal resources was satisfactory, it is not clear how funds were not earmarked for implementing this critical and highly productive project. In this connection, it is interesting to note that while the Company deferred this project, 3 new firms in the private sector were implementing the schemes and several other manufacturers have expanded their in-house facilities for single crystal products.

The Company stated (May 1982) that problems of logistics of supply and transportation as well as high purification in respect of the critical input material of Argon gas (which is a by-product of fertiliser plants) led to investigation of the possibility of locating the polysilicon project in the campus of one of the

Fertiliser corporations. Though the issue of availability of Argon gas was stated to have been resolved in 1981, with the availabiilty of Argon gas and transporting the gas to Bangalore at economic costs, the project was ultimately given up in October 1982.

The Ministry stated (March 1983) :

> "The Project for manufacture of silicon materials was envisaged, as in 1977-78 the international market trends showed that a serious shortage situation was likely to develop in respect of polysilicon which is the raw material for Semi-conductors line. The fears about the likely silicon shortage which persisted right upto 1980 eased by early 1981 when the picture began to change rapidly. New supply sources and expansion of existing facilities coupled with the non-fructification of the expected boom in demand abroad reduced the urgency for the Project. In the meantime some other Indian parties also set up manufacturing facilities for single crystal silicon and saved BEL from investing heavily in avoidable vertical integration. The delay in proceeding with the project due to the reasons mentioned above has turned out to be advantageous to the Company."

The reply of the Ministry is not convincing because the Company deferred the project in December 1980 on grounds of want of finance though it had all along been importing the materials for its own use.

3.05.7 *Marine Navigational Radars*

The Project for the manufacture of Marine Navigational Radars was approved by the Board in February 1968 on the basis of an estimated requirement of certain Radars over the next 4 to 5 years for Defence and Civilian users. The Ministry

of Defence indicated that 2 latest types of Radars manufactured by a foreign firm would meet the requirements and accordingly a collaboration agreement was concluded in June 1970, for the licensed production of 2 types of Radars 'A' and 'B'. Technical assistance fee of Rs. 2.68 lakhs was paid in 3 instalments during January 1971 to June 1974.

The orders from the Defence as well as from the Civilian users did not materialise as expected. For Radar 'A' initially order for only 2 Nos. were received in 1971-72 followed by 1 in 1973-74, 8 in 1974-75, 3 in 1975-76 and 1976-77 and 7 in 1977-78 from Civil and Defence users. In respect of Radar 'B order for only 1 No. was received from a Civil customer (year not known).

In respect of Radar 'A', 2 Nos. were supplied by import against the first order of 1971-72 and production of first batch of 10 Radars, though planned for in February 1971, was taken up during 1975-76 due to non receipt of sufficient orders. Production of this batch was completed during 1976-77. Production of further batch of 10 Radars though planned as early as January 1973, was taken up and completed in 1981-82. In respect of Radar 'B' the production was given up in April 1980 after incurring an expenditure of Rs. 5.36 lakhs and no supplies were effected against the order received. In the supply of Radars 'A' the Company incured a loss of Rs. 13.77 lakhs. The loss of orders for Radars 'A' and 'B' and discontinuance of their production were due to the following reasons :

— High prices of BEL's Radars compared to foreign radars as customs duty was payable on imported materials while shipping companies could buy radars while at foreign ports from foreign suppliers without paying customs duty.

— Inability of BEL to provide a world-wide service network required by Merchant Navy.

In addition, the following specific reasons were also applicable :

(a) Radar 'A'

— It was an obsolete Radar.

— It was difficult to obtain components from collaborators.

— Though the Defence Ministry indicated the suitability of Radar of a foreign firm, they were found to be not rugged enough for use in operational conditions.

— Lack of orders caused by imports for Merchant marine communications.

(b) Radar 'B'

— Non-receipt of orders due to the desire of the Navy to standardise on the variety of Navigational Radars.

The above factors could have been foreseen and considered by the Company before taking up the production of these Radars thus saving itself of a loss of Rs. 19.13 lakhs.

3.05.8 *Cyclone Warning Radars*

The Company developed these Radars (cost of development not available) on the basis of an indication of the Meteorological Department (1969) for a requirement of 32 Radars over a 10-year period. The order received in March 1972, however, was only for 4 Radars. There were delays in supply of Radars by the Company ranging from 14 to 60 months as under :

	Contracted delivery date	Actual delivery date	Period of dealy (in months)
Radar—1	December 1973	March 1975	14
Radar—2	December 1974	April 1978	40
Radar—3	December 1974	July 1979	55
Radar—4	December 1974	January 1980	60

The Company did not receive any more orders. In this connection, the Ministry stated (March 1983) :

> "According to BEL's information Meteorological Department has not imported any Cyclone Warning Radars after BEL started supply."

Information as to whether any imports were made by Mateorological Department before the Company started supply of Radars in March 1975 was not available.

4. RESEARCH AND DEVELOPMENT

4.01 *Collaboration Agreements*

The Company entered into 43 agreements since inception with 22 Collaborators, for manufacture, under licence, various equipments and components. The currency of all the agreements had expired excepting for 2 agreements concluded in February 1981, one with Siemens of West Germany for the manufacture of Biangulix X-Ray Tubes and the other with Corning Glass Works, U.S.A. for the manufacture of Black and White T.V. Glass Bulbs. The total licence fee and royalty paid up to 31st March 1982 on all the agreements amounted to about Rs. 550 lakhs.

4.01.1 In respect of 2 collaboration agreements, the currency of which had already expired, the following points deserve mention :

4.01.2 *Agreement with M/s. 'S' of country 'X'*

(a) In February 1969, Government concluded a collaboration agreement with M/s. 'S' for the manufacture in the Company, of equipment required for certain Defence equipment under construction in a factory ; the agreement was entrusted to the Company in April 1969. The manufacture of the equipment was to be undertaken in 3 phases by importing from the Collaborators/other sources fully assembled and tested equip-

ment, major assemblies and ancillaries and sub-assemblies and components depending on the extent of progressive indigenisation envisaged in each phase.

A price list of the complete licensed products, major assemblies and ancillaries was attached to the agreement as Appendix VI, based on the wage levels prevailing in March 1968 which was subject to increase in terms of a price variation formula. The agreement also stipulated that an itemised price list of sub-assemblies and major parts, based on March 1968 wage levels and subject to the price variation clause, should be furnished within 4 months from the date of the agreement (for 2 items the time limit was 24 months) which was to form part of the agreement as Appendix VII thereto.

The purpose of Appendix VII was *inter alia* to ensure the supply of sub-assemblies/major parts at reasonable prices by M/s. 'S'. This list was not supplied by M/s. 'S' though called for by the Company. Due to absence of Appendix VII, the Company obtained individual quotations for sub-assemblies and major parts and placed orders on M/s. 'S' as under :

Production Phase	Date of orders	Value of the orders		Remarks
		(in Hfls.)	(Rupees in lakhs)	
I	January 1970	2,142,673	72.85	Subject to escalation
II	June-December 1972	3,842,041	130.63	-do-
III	November 1974	5,292.820	181.52	Fixed price basis

As Appendix VII indicating the prices of sub-assemblies and major parts was not supplied, the overall reasonableness of prices, in respect of orders placed for Phase I production, was assessed by comparison of prices paid to M/s. 'S' (inclusive of escalation

and labour cost), with the total manufacturing cost of the products in the Company. As regards orders for Phase II production, reasonableness of prices for items valued Hfls. 19.6 lakhs (being common to Phase I) was ensured and the prices as claimed by the Collaborators were fully paid.

As regards orders for Phase III, M/s. 'S' quoted fixed prices for the items which were accepted in full. A comparison of prices for 80 major items out of 146 items in one order (value Hfls. 43.88 lakhs) indicated increase of 30 to 80 per cent over Phase II prices as against 24.5 per cent actually applicable as per the pricing formula in the Agreement upto the date of placement of orders; these increases were, however, considered reasonable in view of long delivery period involved. In certain individual cases involving abnormal price increases of 71 per cent to 253 *per cent*, however, the Company took up the matter regarding high prices with the Collaborators, but they did not agree to reduce the prices on the ground *inter alia* that the quantities ordered were much smaller as compared to Phase II. Thus, the Company had to pay the increased prices as claimed by M/s. 'S' due to the absence of Appendix VII. The increase in prices claimed in these orders was not assessed by the Company.

The Company stated (April 1983) : "It may be incidentally pointed out that between the Phase II and Phase III orders, the oil crisis of 1973-74 intervened which resulted in considerable disarray in the world trade. Even fixed price contracts had to be reopened by many buyers including Government, and extra-contractual increases had to be agreed to in many cases. The price increases of Phase III over Phase II may be seen keeping this perspective also in the background".

(b) In addition, there were also delays in supply of materials by M/s. 'S' resulting in slippages in production and delivery of equipment to the factory which attracted payment of liquidated damages by the Company. Out of Rs. 6.72 lakhs deducted from the Company's bills towards liquidated damages in respect of Phase II supplies, the factory finally retained a token sum of

Rs. 0.67 lakh and refunded the balance amount. In respect of Phase III supplies the liquidated damages recovered from the Company's bills amounted to Rs. 11.40 lakhs and the Company expects that this amount would also be refunded either completely or with a token retention of 10%. Though liquidated damages were payable under the collaboration agreement by M/s. 'S' upto a maximum of 5 per cent of invoice value on delayed supplies, the Company did not recover any amount from M/s. 'S' (though it had to pay liquidated damages to the factory because of delayed supplies by M/s. 'S') and inspite of M/s. S's failure to notify *force majoure* conditions in support of delayed supplies within the stipulated time.

4.01.3 *Agreement with M/s. 'T' of country 'Y'*

The agreement concluded in February 1971 with the above Collaborators *inter alia* provided an option for initial development in the Collaborator's works and final development in the Company, of a particular Defence equipment on payment of a fee of Rs. 56.16 lakhs. This option was not exercised by the Government as indigenous development of this type of equipment was taken up in July 1976. The equipment is expected to be productionised in 1985. Due to delay in the indigenous development of the equipment and also due to non-opting for Collaborator's assistance in the development/production of this item in the Company, equipment valued at Rs. 994.13 lakhs had so for been imported to meet urgent requirements of the Defence Services.

4.02 *R&D Activities undertaken*

4.02.1 The Research and Development (R&D) activities commenced at Bangalore in 1956 for which a separate department was constituted; these were further augmented in 1966. The R&D work at Ghaziabad Unit commenced in 1974. To cope up with the expanding R&D programmes, separate departments were formed at Bangalore in 1979 for work relating to communication receivers, composite communication systems for Naval ships and new high power broadcast transmitters for All India

Radio. In addition, R&D work on components was also done in small cells attached to the production lines. Besides design and development of new products, R&D efforts were also directed towards modifications and improvements of products of Collaborators' design. In 1966, the Board agreed to an expenditure of 3 per cent of turnover on R&D, which was increased to 5 per cent from 1971-72.

In order to examine in depth, delays in design finalisation/ modification, difficulties encountered in translating the design to production, technical problems to be resolved at the production stage based on trial report from Users, initial teething troubles, etc., the Board constituted a Sepcial Committee of Directors in March 1977 to examine and report on all aspects of the problems relating to development, engineering, prototype fabrication and transfer of technology to production. In August 1977, the Board also constituted an R&D Committee to examine from all angles, including commercial, all the projects costing over Rs. 10 lakhs to be taken up for development, before submission to the Board for approval.

4.02.2 The Special Committee of Directors, in their report submitted to the Board in May 1978 poined out, *inter alia* the following deficiencies in the R&D organisation :

(a) Incompleteness of design due to lack of detailed analysis of the sub-systems and specifications, leading to delays in understanding and rectifying the problems in production.

(b) Hustled submission of project reports before in-depth study.

(c) Communication gap amongst the various R&D groups in sharing the benefits or lessons of achievements or failure.

(d) Poorly equipped proto-type shop in terms of machines and manpower and its use more as a jobbing shop.

(e) Manpower shortages and turnover of R&D engineers.

The Ministry stated (March 1983) as under :

> "Points (a), (b), (c) and (e) above need only changes in the methods of functioning and necessary action has been taken in these matters. As regards point (d), the prototype shops for both BG Complex and GAD Unit have been sanctioned and the setting up of BG Complex prototype shop has already been completed. Design Manual & Quality Manual have been issued and brought into operation".

4.02.3 Only in April 1982, the Board had laid down a detailed policy on the R&D activities to be undertaken in the Company. During discussions in the above meeting the Chairman emphasised the need for adequate development of components and appointment of outside Consultants for creating necessary R&D atmosphere as well as for helping in specific assignments. He also stated that a detailed R&D projects profile for next 7—10 years would be submitted to the Board. In addition, the Committee on Public Undertakings (1971-72—Fifth Lok Sabha) in their Third Report (Para 7.17—Recommendation 23) suggested "that a perspective plan for R&D be drawn up for next 10—15 years. This plan should be reviewed every year in the light of performance and demand/projections. In particular, concerted efforts should be made to achieve break-through in know-how and manufacture of electronic components of vital importance in achieving self-reliance in Defence supplies and of meeting indigenously as far as possible the requirements of industry".

No action had been taken so far (April 1983) either to prepare a 10—15 years perspective plan as suggested by the Committee on Public Undertakings or to submit to the Board a 7—10 years detailed R&D projects profile.

4.03 *Achievements*

4.03.1 The following are the details of capital and revenue expenditure incurred, the value of production of developed products and other particulars relating to R&D activities in the Company since inception upto 31st March 1982 :

	Bangalore Unit	Ghaziabad Unit
	(Rupees in lakhs)	
Capital expenditure	*730.09	46.56
Revenue expenditure	*3768.87	1000.02**
Value of production of :		
Wholly Company-developed products	19,962.00	5,075.00
Partially Company-developed products	7,861.00	868.00
Total	27,823.00	5,943.00
Total including Collaborators' products	73,663.00	7,810.00
Percentage of value of production of wholly/ partially Company developed products to total production	37.77	76.10
Staff engaged on R&D as on 31st March 1982	859	214

It may be seen that in the production at Ghaziabad Unit, the share of products wholly and partially developed by the Company was much more than at Bangalore. Regarding Bangalore, in the Components Division this share was only 23.53 per cent of the cumulative production upto March 1982 while in respect of Euipments the percentage was 45.54. The production of Company developed equipments was reported to have shown an increase during 1980-81 (52.44 *per cent*) and 1981-82 (57.18 *per cent*). As against the envisaged expenditure on R&D of 5 *per cent* on turnover, the gross expenditure actually incurred during 1976-77 to 1980-81 ranged from 5.4 to 7.4 *per cent.*

NOTE : *Includes capital expenditure of Rs. 180.00 lakhs and revenue expenditure of Rs. 39.71 lakhs financed by Department of Electronics.
**Includes Rs. 576.23 lakhs financed by the Ministry of Defence.

4.03.2 Complete information regarding the total number of R&D projects taken up since inception and the number of products successfully developed and productionised was not readily available from the records furnished to Audit. The products developed and productionised were broadly as under:

(i) *Equipments*: Apart from several equipments required for Defence purposes, some of the high value equipments developed and productionised for civilian purposes included HF and VHF communication equipment and Control/Portable Tape Recorders and other studio equipment for All India Radio, TV transmitters for Doordarshan, VHF omni-range system for Civil Aviation Department, UHF Radio Relay equipment for Posts and Telegraph Department/Railways, etc., and Multimet/ Cyclone Warning Radars for Meteorological Department.

(ii) In the Components area, the overwhelming R&D emphasis was on active devices comprising some types of professional grade Vacuum discs and entertainment grade Semi-conductors. In the area of passive components, the R&D efforts had been restricted to a few types of Vacuum Capacitors, Crystals/TCXOs, feed-through/high voltage/reactive power Ceramic Capacitors, etc.

As regards components for the professional equipment market, the Board was informed in April 1982, while laying down the detailed R&D policy, that "BEL is the only organisation in the country today which is meeting at least part of the active components requirements albeit a very small part of the professional equipment market". It is, therefore, not clear why the Company did not further extend its R&D activities to this area as its own requirements were being met through imports. As stated earlier the professional grade components cleared for import for public sector units during 1976-77 and 1977-78 alone were of the order of Rs. 30 crores (c.i.f.) and Rs. 33 crores (c.i.f.) respectively.

The Company won import substitution awards thrice during 1978-79, 1979-80 and 1981.

4.04 *Projects given up*

According to the Company, 34 projects taken up for development upto 31st March 1982 on which an expenditure of Rs. 68.20 lakhs was incurred, were abandoned for reasons such as non-materialisation of expected orders, lack of conformity to specifications, changes in requirements by users, etc., and 29 projects although successfully developed, on which an expenditure of Rs. 44.49 lakhs was incurred, were not productionised at all or only small batches of equipment were produced, for which reasons were not available.

In addition to the above, 5 more equipments successfully developed at a cost of Rs. 156.53 lakhs (Development expenditure—Rs. 66.01 lakhs, Pre-production expenditure—Rs. 4.23 lakhs, value of materials/work-in-progress/finished goods and overheads—Rs. 86.29 lakhs) were abandoned for various reasons given below :

Particulars of equipment	Expenditure incurred (Rupees in lakhs)	Reasons for abandonment as furnished by the Ministry in March 1983
BEL CAL Desk Calculator	41.20	Not taken up for production due to competition from equipments produced through imported kits by other manufacturers.
BEL COM Mini-computer (civil version)	58.46	
Computer Peripherals		
GH 351 VHF Trans receiver LVP 315 VHF Trans receiver	56.87	Marketing decision by the Company to give up the line as cheaper sets with foreign know-how, though with lower specifications, were offered by other undertakings.
TOTAL	156.53	

In the case of BELCOM Mini Computer (civil version) and Computer Peripherals the Ministry stated (March 1983) that "the development has been the first step enabling BEL to develop and manufacture the ruggedised versions". Regarding

Computer Peripherals, the Company further stated (April 1983 as follows :

> "The Company will place before the Board of Directors its latest assessments regarding the demand potential, competitive situation etc., for deciding whether to take up production for the civilian market. The possibilities for transferring the know-how to other suitable companies in India will also be explored in case the Company decides not to enter the civilian lines."

4.05 *Delays in development*

4.05.1 The Committee on Public Undertakings (1971-72—Fifth Lok Sabha) in their Third Report stated that :

> "In an industry like electronics, where the pace of obsolesence is faster than the pace for acceptance, time is the essence of the matter" (*vide* Para 7.17, Recommendation No. 23).

In the course of deliberations of the R&D Committee's meeting held in August 1982, it was stated *inter alia* that while the normal R&D cycle for a state-of-art communication equipment would be about 4 years, some simple equipment like HF Receivers and HS-419 were developed in lesser periods. It was also stated that there was considerable scope for reducing the cycle time if the User trials were planned, organised and conducted in a better way.

As on 31st March 1982, there were 139 projects which were under development (100 in Bangalore and 39 in Ghaziabad). An anlysis of the progress of the projects revealed the following :

(i) Out of 139 cases, there were cost over-runs of more than 10 per cent in 83 cases.

(ii) Out of 83 cases in which cost over-run was in excess of 10 per cent, in 35 cases involving large

amounts, the cost over-run was upto 967 per cent involving an amount of Rs. 220.69 lakhs. It was stated by the Ministry (March 1983) that reasons for cost over-runs were reported to Management and additional sanctions taken only after completion of development work.

(iii) In 14 out of the 35 cases there were also time over-runs of more than 4 years, the work having been taken up during October 1973 to October 1977, in respect of which an expenditure of Rs. 436.64 lakhs had been incurred upto 31st March 1982. In view of the inordinate time over-runs that have already taken place, the utility of the equipment under development would appear to be doubtful in view of the high obsolescense rate in the Electronics Industry.

4.05.2 A detailed analysis of the sequence of events from the time of 'go-ahead' till bulk production clearance was obtained, in respect of 4 equipments developed for Defence, revealed the following position :

	Product A	Product B	Product C	Product D
Date of go-ahead	January 1973	January 1973	May 1975	August 1970
Issue of Bulk production clearance.	November 1979	November 1979	September 1979	May 1980
Total time taken	82 months	82 months	52 months	116 months
Time taken by the Company in finalisation of specifications, submission of prototypes, modifications, etc.	36 months	36 months	39 months	57 months
Time taken by the Users for approval of specifications, conducting of trials, etc.	46 months	46 months	13 months	59 months

It may be seen that there were inordinate delays on the part of the Company as well as the Users which contributed

to overall delays in the commencement of bulk production for the equipment.

5. Utilisation of Capacity

5.01 *Product range*

The Company's present product range consisted of 50 types of equipment and 400 types of components, mostly meant for Defence and other Government Departments and to a small extent for the open market. Some of the major products manufactured by the Company in its various Units during 1977-78 to 1981-82 were as under :

(a) Bangalore Unit

(i) Low Power and High Power Equipment Divisions : Diverse types of communication equipment in HF and UHF spectrum, Sound and Television Broadcasting Equipment, etc.

(ii) Components Division : Entertainment and Professional components such as Receiving Valves, Transmitting Tubes, T.V. Picture Tubes, Microwave Tubes, X-ray Tubes, Vapotron and Ceramic Tubes, Vacuum Capacitors, Semi-conductors such as Germanium and Silicon Devices and Integrated Circuits, Passive components such as Ceramic Capacitors, Mica Capacitors and Crystals, etc.

(iii) Radars Divsion : Various Radars for Defence, Marine Navigational Radars, Multimet and Cyclone warning Radars, etc.

(b) Ghaziabad Unit

Various Radars communication equipment for Defence, UHF Radio Relay and Mobile equipment, UHF sets for Police, Multiplex and Telemetry/ Tele-control equipment, etc.

(c) Pune Unit

Opto-electronic devices.

5.02 *Fixation of Capacity*

5.02.1 The Company had fixed production capacities in terms of physical output for the products manufactured in the Components and the Radar Divisions at Bangalore and for the opto-electronic devices produced at Pune Unit. In respect of the equipment manufactured at Ghaziabad Unit, the production capacity had been fixed only in terms of value. In respect of the products manufactured at the Low Power and High Power Equipment Divisions at Bangalore, however, the rated capacity had not been fixed either in terms of physical output or in terms of value. In regard to non-fixation of capacities in terms of physical output in the above 2 Divisions the Ministry stated (March 1983) as under :

> "The manufacturing facilities established are general facilities which can be used for many types of products and the production is of diverse equipments with the product-mix continuously changing. Assessment of rated capacity in terms of single physical output in these circumstances is fraught with the inherent difficulty of establishing equivalent for various products. While considering the question of assessing the rated capacity in terms of physical output in these Divisions of the Bangalore Unit, the following salient features of the production operations in these Divisions have to be borne in mind :
>
> (i) Products manufactured range from a tiny 'walkietalkie' to sophisticated and complex professional equipments like Radars and Broadcast Transmitters. The pattern of production is, therefore, essentially diversified batch production.

(ii) The production quantities of a type may vary from 1 to 5,000 nos. per annum.

(iii) Most equipments go out of the producton line in a period of 5 years or so.

(iv) Even in cases like Radars, considerable modifications are involved from one model to another with the result that ability to handle a number of modifications to an existing product line must also be catered for.

(v) The recent strides/rapid advancements in Electronics technology render the manufacturing process constantly obsolete over the years. This phenomenon considerably influences the requirement of manufacturing facilities like machines, equipments, etc.

(vi) In some cases, special purpose machines require to be installed although there may not be full load all the year round for these machines. This is mainly because sub-contractors, both in private and Public Sectors, do not find it possible to take up such loads.

(vii) Modernisation of facilities, particularly at the time of replacement, is necessary from the point of view of increasing technological efficiency as well as productivity."

5.02.2 It may, however, be mentioned in this connection that the Committee on Public Undertakings (1971-72—Fifth Lok Sabha) in their Third Report on the working of the Company observed as under :

> "The Committee think that the rated capacity of the plant should be fixed in terms of physical output as the value of production was liable to change. If the rated capacity of the plant was not indicated to them by the supplier of the plant or Collaborator, BEL, it is suggested, would undertake an assessment of the ultimate and rated capacity on their own and then keep a watch over the progress made to achieve that capacity" (*Vide* Recommendation 4.13).

Further in their Twentyfifth Report (1972-73) on the action taken by the Government, the Committee while reiterating their earlier recommendation, observed as under :

> "The Committee are not convinced with the Government reply. They are still of the view that the rated capacity should be fixed in terms of physical output and not in terms of value of production as the latter is liable to change. The Committee, therefore, reiterate their earlier recommendation and stress that BEL should undertake an assessment of the rated capacity on their own and keep a watch over the progress made to achieve that capacity."

5.02.3 In response to the instructions of the Ministry to define production capacity in terms of "available standard hours output", the Company worked out and submitted in a Note to the Board in April 1982, that the production capacity of Equipment and Components Divisions (based on optimum standard hour clearance) worked out to 34,00,800 hours and 43,58,818 hours respectively. These capacities were communicated to the BPE and the Government. It was also reported to the Board that on this basis, the capacity utilisation during 1981-82 worked out to 72 per cent and 76 per cent respectively in Equipment and Components Divisions.

While estimating the above capacity, only 1200 standard hours per worker per annum were taken into account as against 2400 effective hours (excluding Sundays and General holidays) available in a year. The reasons for excluding the remaining 1200 hours as given in the Board Note were as under:

	Hours per annum per operator
Absenteeism at 15 per cent	360
Design and modification problems requiring fresh allocation of resources	120
Variations in actual operating conditions, viz. work organisation, work flow and materials flow, compared to conditions orginally envisaged	120
Quality management problems, conformance to altered specifications at Customers' requests, and associated rework/restart on jobs	120
Reduction in capability arising from change in age mix of men and machines	120
Minimum mismatch between fabrication, assembly and testing arising from customer commitments	120
Other allied problems like industrial relations, welfare, seasonal peak absenteeism, production engineering, power cut, machine breakdowns, etc.	240
TOTAL	1200

The reduction of 50 per cent of the total effective hours for purposes of working out the available standard hours per operator per annum is *prima facie* on the high side and the allowances given above are also not based on any detailed

and independent work studies. It is not, therefore, clear how far they could be relied upon to indicate a meaningful comparison of the utilisation of production capacities.

The Company stated in reply (April 1983) as under :

> "Audit have commented that estimation of capacity in standard hours is not very reliable and not meaningful for comparison with actual production in standard hours in view of the fact that allowances made for various general and intangible reasons, from available working hours of 2,400 hours per operator per annum, are as much as 50 per cent thereof, of which only a small portion in respect of absenteeism would be substantiated and the rest were purely *ad hoc* considering the large element of approximation inherent therein.
>
> It may be mentioned in this context that the figure of 1200 standard hours per annum per direct worker is only a bench-mark for production planning and cannot be treated as a norm for rated capacity. Achievement of 1200 hours in any particular year depends upon the specific circumstances of that year, viz., whether the product-mix of the year consists primarily of stabilised products or new products, etc. Factors such as learning curve, development problems, product-mix factors, etc., if they are pronouncedly adverse in a year, will make it difficult to achieve the 1200 hours bench-mark."
>
> It was further stated that the figure of 1200 standard hours being adopted by the Company is only a parameter for micro-production planning and control and not as a norm for rated capacity.

It may be mentioned, however, that the above statement is not borne out by the facts as reported in the Board paper of April 1982.

5.03 *Utilisation*

The actual utilisation of capacity in the Components and Radar Divisions at Bangalore and in Ghaziabad Unit during the 5 years upto 1981-82 was as under :

(a) Components Division

Sl. No.	Particulars of Components	Year	Rated Capacity	Target	Production	Utilisation of capacity	
						Planned	Actual
1	2	3	4	5	6	7	8
			(In millions)			(Per cent)	
1.	Mica Capacitors	1977–78	6.00	2.50	1.31	41.7	21.8
		1978–79	6.00	Not fixed	1.20	..	20.0
		1979–80	0.50	Not fixed	0.14	—	28.0
		1980–81	0.50	Not fixed	0.12	—	24.0
		1981–82	0.50	Not fixed	Negligible (7812 Nos)	—	—
			(In numbers)				
2.	Hybrid Micro-circuits	1977–78	60,000	80,000	23,196	133.3	38.7
		1978–79	60,000	50,000	19,846	83.3	33.1
		1979–80	60,000	22,500	19,321	37.5	32.2
		1980–81	60,000	31,000	22,052	51.7	36.8
		1981–82	60,000	33,000	43,000	55.0	71.7
			(In millions)				
3.	Integrated Circuits	1977–78	0.5	0.47	0.39	93.0	78.0
		1978–79	0.5	0.65	0.43	130.0	86.0
		1979–80	1.5	0.99	0.70	66.0	46.7
		1980–81	1.5	0.92	0.69	61.0	45.7
		1981–82	1.5	0.76	0.67	50.8	44.9
			(In numbers)				
4.	Quartz Crystals	1977–78	260,000	170,000	150,000	65.4	57.7
		1978–79	260,000	Not fixed in numbers	170,000	—	65.4
		1979–80	280,000	157,000	161,000	56.1	57.5
		1980–81	280,000	104,000	115,000	37.1	41.1
		1981–82	280,000	186,000	160,000	66.4	57.1
			(In Numbers)				
5.	Transmitting Tubes, vapotron and Ceramic Tubes	1977–78	18,000	Not fixed	10,596	—	58.9
		1978–79	18,000	Not fixed	10,133	—	56.3
		1979–80	18,000	13,701	8,878	76.1	49.3
		1980–81	18,000	15,600	7,282	86.7	40.5
		1981–82	18,000	13,095	9,862	72.7	54.8

1	2	3	4	5	6	7	8
			(In numbers)				
6.	Cathode Ray Tubes	1977–78	1,800	1,500	1,200	83.3	66.7
		1978–79	1,800	1,500	1,596	83.3	88.7
		1979–80	1,800	1,360	1,446	75.5	80.3
		1980–81	1,800	1,600	1,099	88.9	61.1
		1981–82	1,800	1,180	1,277	65.5	70.9
			(In millions)				
7.	Receiving Valves	1977–78	5	5.10	4.00	102.0	80.0
		1978–79	5	4.63	3.81	92.6	76.2
		1979–80	5	3.85	2.98	77.0	59.6
		1980–81	5	3.20	2.02	64.0	40.4
		1981–82	5	2.26	2.21	45.2	44.2
			(In numbers)				
8.	X-Ray Tubes.	1977–78	1,800	Not fixed in numbers	1,471	—	81.7
		1978–79	1,800	—do—	1,360	—	75.6
		1979–80	1,800	2,345	1,545	130.3	85.8
		1980–81	1,800	1,700	1,277	94.4	70.9
		1981–82	1,800	2,010	2,047	111.7	113.7
			(In millions)				
9.	Silicon Semi-Conductors	1977–78	20	19.70	17.29	98.5	86.5
		1978–79	20	18.50	17.41	92.5	87.1
		1979–80	23	19.60	20.27	85.2	88.1
		1980–81	23	24.40	17.24	106.1	75.0
		1981–82	23	25.52	22.58	110.9	98.2
			(In numbers)				
10.	Magnetrons or Microwave Tubes	1977–78	250	Not fixed	243	—	97.2
		1978–79	300	290	245	96.7	81.7
		1979–80	300	375	273	125.0	91.0
		1980–81	300	320	147	106.7	49.0
		1981–82	300	385	232	128.3	77.3
			(In millions)				
11.	Power Devices	1977–78	2	3.80	1.99	190.0	99.5
		1978–79	2	0.42	1.86	21.0	93.0
		1979–80	2	1.99	1.77	99.5	88.3
		1980–81	2	2.15	1.53	107.5	76.4
		1981–82	2	1.99	1.97	99.5	98.6
			(In numbers)				
12.	T.V. Picture Tubes	1977–78	100,000	120,000	70,912	120.0	70.9
		1978–79	150,000	100,000	134,221	66.6	89.5
		1979–80	150,000	180,000	168,434	120.0	112.3
		1980–81	200,000	180,000	141,669	90.0	70.8
		1981–82	200,000	200,000	170,000	100.0	85.0

1	2	3	4	5	6	7	8
				(In millions)			
13.	Ceramic Capacitors	1977–78	30.00	36.00	34.06	120.0	113.5
		1978–79	30.00	40.00	33.01	133.3	110.0
		1979–80	40.00	46.50	32.04	116.2	80.1
		1980–81	40.00	40.00	25.31	100.0	63.3
		1981–82	40.00	34.00	33.52	85.0	83.8
				(In millions)			
14.	Germanium Semiconductors	1977–78	20	18.00	18.18	90.0	90.9
		1978–79	20	20.00	17.42	100.0	87.2
		1979–80	20	21.00	20.37	105.0	101.8
		1980–81	20	21.00	16.22	105.0	81.1
		1981–82	20	21.00	21.17	105.0	105.8

It may be seen that targets set were lower than the capacities established and in respect of 7 out of 14 products lines (item 1 to 7 in the table above), capacities were being under-utilised. In this connection, the Company furnished the following remarks (April 1983):

(i) Mica Capacitors: These capacitors have become technologically obsolete, except for some very special purpose applications and the product line has more or less been closed in 1980-81; only a few special purpose in-house requirements are being made now.

(ii) Hybrid Micro-circuits: This is not a commercial product line. It has been set up, more or less entirely, to meet in-house needs of the Equipment Divisions and the actual requirements have been met in all the years. Targets are set assuming bulk production clearances, etc., and hence are always higher, and as such comparison with capacity/target are not relevant.

(iii) Integrated Circuits: The under-utilisation is primarily due to the market situation.

(iv) Quartz Crystals : Excess capacity has been deliberately created for strategic reasons since high outputs of Crystals are needed in times of emergencies.

(v) Transmitting Tubes : The production is primarily meant to meet the needs of the Equipment Divisions for incorporation in the equipment for Defence/ AIR, etc. Some tubes are also sold as spares. In all the years, the actual requirements have been met. Targets are often set higher on optimistic projection of demands.

(vi) Cathode Ray Tubes : Turn over-wise, this a very minor line, accounting for hardly Rs. 10 lakhs of sales per year. There are also other firms in the country competing for the modest market. In the circumstances, the Company has decided to close down this line by June 1983.

(vii) Receiving Valves : The line has become technologically obsolete and has been closed down by most of the manufacturers. BEL has also closed down the line in phases. The manufacture of T.V. types was closed down in March 1982 and the rest of the line (Radio and Industrial types) is also being closed down during March-June 1983.

(b) Radar Division

In addition to 3 main types of Radars covered under the Collaboration agreements, the Company developed 12 types of Radars for Defence application and 2 for Civilian application, based either partially on Collabarator's designs or entirely on its own designs. The capacity of Radar division has been expressed in physical terms equivalent to main Radar 'X'.

The capacity set up initially in 1967-68 was for production of a certain quantity of 'X' type Radars, which was increased to 1½ times in 1970-71. At the instance of the Government, the capacity was further insreased to double the original quantity in 1971-72 by installing additional facilities at an estimated cost of Rs. 58.00 lakhs (details of actual expenditure incurred are not available with the Company). However, as the expected orders for 'X' type Radars did not materialise, the additional man power required for Production of Radars was not deployed and the production capacity was restricted to 1½ times the original quantity annually.

The particulars of utilisation of capacity for Radars (including the spare parts produced) during the 5 years upto 1979-80 (as evaluated and furnished by the Company in April 1983) were as follows :

Year	Utilisation (per cent)
1975–76	75.9
1976–77	83.3
1977–78	81.5
1978–79	94.4
1979–80	96.3
1980–81	N.A.
1981–82	N.A.

The Company stated (April 1983) that for utilising the general purpose capabilities available in the Division, apart from continuing the existing production lines, 5 non-radar items required for Defence, are proposed to be taken up for production in this Division from 1983-84 onwards ; while this would fully engaged the Assembly capacity in the Division, some fabrication capacity, say upto 25 *per cent* might not be utilised since it would not be possible to use some of high cost machinery specially meant for production of 'X' type Radars. It was further stated that the Company could not take up the development of a successor to Radar 'X' as the issue was engaging the attention of the Defence Services since 1968.

(c) Ghaziabad Unit

The facilities established in the Unit were designed to achieve an annual production of certain Defence equipment of the average value of Rs. 1790 lakhs (at 1975 price level); 59 per cent of this capacity related to a particular type of equipment. There was a drastic curtailment in the orders for this equipment resulting in lot of idle capacity. To utilise the idle capacity, a diversification programme was taken up for balancing the plant which were reported by the Company (June 1982) to have resulted in increase of the annual production capacity to Rs. 2,000 lakhs at 1978 price level). Details of utilisation of capacity during the 5 years upto 1981-82 were as follows:

Year	Capacity	Target fixed	Actuals	Utilisation of capacity	
				Planned	Actual
	(Rupees in lakhs)			(Per cent)	
1977-78. .	2000	1228	756	61.4	37.8
1978-79. .	2000	1204	856	60.2	42.8
1979-80. . .	2000	1610	1229	80.5	61.5
1980-81. . .	2000	2077	1934	103.8	96.7
1981-82. . .	2000	2309	2319	115.5	115.9

It may be seen that the capacity had been underutilised upto 1979-80. Further while the production capacity of Rs. 2,000 lakhs was at 1978 price level, the targets and achievements for various years indicated above were in terms of the sale value for the respective years and hence the figures were not comparable. Allowing for price escalation after 1978, the capacity utilisation appeared to be low even during 1981-82.

(d) In respect of Low Power and High Power Equipment Divisions at Bangalore, the extent of utilisation of capacity could not be analysed as the rated capacity had not been fixed either in terms of physical output or in terms of value. During 1981-82, however, the utilisation of capacity, in terms of standard hours fixed by the Company in April 1982, worked out to 61 *per cent* in Low Power Equipment Division and 75 *per cent* in High Power Equipment Division.

6. PRODUCTION PLANNING AND PERFORMANCE

6.01 *Production Planning*

The production planning obtaining in the Company was as under :

(i) A rolling plan for a period of 3 years in respect of the equipment to be manufactured was being drawn up with reference to a 5-year outline plan. A firm and a detailed annual production plan was being prepared a few months before the commencement of each year.

(ii) An annual production plan was being drawn up in respect of components.

Thus there was no long-term futuristic production planning in the Company so that action for provisioning of materials, especially involving long lead time, could be taken on the basis of firm production forecasts.

The Company stated (April 1983) in reply as under :

"Long-term production planning in BEL is beset with difficulties due to the nature of the market which BEL caters to. BEL's market profile comprises three broad segments : (i) Equipments for Defence, (ii) Equipments for Civilian Government Users and (iii) Components for Consumer Electronics and

Professional Applications". The present situation in respect of each of these segments is given below :

(i) Equipment for Defence

In respect of Defence Equipments, while broad indications of the requirements of major equipment systems can be arrived at for the medium-term if not the long-term, the actual demand projections of the Services depend upon the geo-political situations and strategic considerations from time to time. Technology changes taking place in the world also get reflected in the demand projections. It has been possible for the Defence Users like the Army and the Air Force to Project and place their firm requirements only for the next 3 to 4 years. (As on 31st March 1982, BEL, Bangalore had orders pending execution to the tune of Rs. 230 crores from Defence customers).

With the long range indications, through tentative, available with the Users, it has, however, been possible for BEL to envisage the broad capacity requirements needed beyond the next 3/4 years and to process investment proposals for setting up two new equipment factories.

(ii) Equipment for Civilian Government departments

Civilian Government Users have been finding it difficult to give clear indications of their long-term requirements to BEL as they are subject to clearances from the Planning Commission on a Five Year Plan basis which also gets changed from year to year in the financial allocations. Consequently long range planning for these customers has been found to be very difficult. Even medium-term needs indicated by these departments have been found to be very optimistic in relation to the financially backed actual indenting received later. Even where provisions in the Five Year Plan are available, close contact with the User has been found necessary to get the projections converted into firm orders. In the net result, BEL's plans for Civilian Government requiremnts have to go only by the firm orders placed by

them and not on the indications or their own plans given from time to time since they are found to be subject to violent changes.

(iii) Components for consumer electronics and professional applications

In the case of items made for the consumer electronics market, the projections made by several organisations like the DOE, and the TV and Radio Manufacturer's Associations have enabled BEL to have a perspective of the growth trends, though many of these projections have also been wide off the mark. BEL also keep a close watch on world trends in components technology and usage for their possible impact on the Indian market. Plans for augmenting capacity or updating technology where necessary are based on these. In respect of components made for the professional market like the Transmitting Tubes, X-ray Tubes, Microwave Tubes and Vacuum Interruptors, close contract with the specific Users is maintained and production programmed accordingly. Long range plans in these cases have to depend on the extent to which the Users can project their requirements.

Because of the technology situation, in the professional area as represented by BEL, it would be extremely difficult to project or forecast the market trends realistically beyond say "4 or 5 years."

The difficulties mentioned by the Company for drawing up only annual production plans in respect of components, which are mostly meant for Civil Government departments/open market could have been overcome by having greater coordination with Government departments, market survey, etc.

It may also be mentioned in this connection that during the period 1977-78 to 1981-82, raw materials and components and stores and spares valued at Rs. 416.75 lakhs were written off in the accounts due to obsolescence and redundancy of which about 42 *per cent* was attributed to lack of demand for Company's products.

6.02 *Production Performance*

6.02.1 *Targets and Achievements*

Details regarding the value-wise targets and achievement in the Bangalore and Ghaziabad Units along with the reasons for shortfalls, for the 5 years upto 1981-82 are indicated below :

(a) Bangalore Unit

(i) Equipment Divisions

Year	Low Power Equipment		Percentage of shortfall	High Power Equipment		Percentage of shortfall	Radars		Percentage of shortfall
	Target	Actuals		Target	Actuals		Target	Actuals	
	(Rupees in lakhs)			(Rupees in lakhs)			(Rupees in lakhs)		
1977–78 . . .	1947	1193	38.8	1554	835	46.3	2340	1712	26.8
1978–79 . . .	1401	1201	14.3	1360	883	35.1	2064	2134	..
1979–80 . . .	1500	1452	3.2	1278	1161	9.1	1810	1643	9.2
1980–81 . . .	1868	911	51.2	1321	766	42.0	1762	927	47.4
1981–82 . . .	2743	1652	39.8	1968	1590	19.2	1931	1956	..

It may be seen that the targets fixed for the years 1978-79 to 1980-81 were less than the target fixed for 1977-78, leaving lot of unutilised capacity. Even these derated targets could not be achieved. Some of the important reasons for shortfall in production compared to targets as reported to the Board during various years were as under :

1977-78

— Non-materialisation of expected improvement in efficiency.

— Labour unrest on shop-floors, absenteeism and industrial relations problems.

— Delays in development of products, delays in obtaining bulk production clearance, initial teething troubles in productionisation of newly developed products.

— Shifting of priorities to other equipments.

1978-79

— Static overall productivity due to uneven loading of production.

— Delays and initial teething troubles in productionisation of newly developed products.

— Giving priority to exports.

1979-80

— Downward trend in productivity *inter alia* due to uneven loading of production, delays in obtaining supplies of materials from indigenous/foreign suppliers.

— Delays in development of products, delays in obtaining bulk production clearance, initial teething troubles in productionisation of newly developed products.

— Power cut ranging from 40 to 70 per cent.

— Marginal utilisation of overtime.

1980-81

— Labour unrest and strike from 26th December 1980 to 15th March 1981.

— Delays in obtaining supply of components from indigenous/foreign suppliers and delay in finding substitutes therefor.

— Delays in development of products, delays in obtaining bulk production clearance, initial teething troubles in productionisation of newly developed products.

1981-82

— Lock out in the factory from 6th May to 2nd June 1981.

— Delay in obtaining supply of components from indigenous/foreign suppliers.

— Delays in development of products, delays in obtaining bulk production clearance, initial teething troubles in productionisation of newly developed products.

(ii) Components Division

Year	Target	Actuals	Percentage of shortfall
	(Rupees in lakhs)		
1977-78	2445	2166	11.4
1978-79	2576	2488	3.4
1979-80	2991	2890	3.4
1980-81	3256	2409	26.0
1981-82	3420	3295	3.6

Reasons for shortfall with refrence to targets as reported to the Board were as follows :

1977-78

— Delays in internal re-transfers of 100 operators, conversion of 250 part-time operators to full-time and recruitment of fresh batch of 100 operators.

— Relocation of T.V. Picture Tube Plant.

1979-80

— Periodical adjustments taking into account the off-take by Radio and T.V. industry, inventory levels, direct/canalised imports by other organisations, etc.

— Reduced demand for Receiving Valves.

— Slump in the market for T.V. Picture Tubes for certain period and similar scaling down of production of Integrated Circuits.

1980-81

— Strike in the factory.

(b) Ghaziabad Unit

Year	Target	Actuals	Percentage of shortfall
	(Rupees in lakhs)		
1977-78	1228.00	756.00	38
1978-79	1204.00	856.33	29
1979-80	1610.00	1228.57	24
1980-81	2077.50	1934.03	7
1981-82	2309.00	2319.33	—

Reasons for shortfall as reported to the Board were as under :

1977-78

— Labour unrest and power failures.

1978-79

— Unprecedented floods, continued agitation of labour culminating in lockout from 9th March 1979.

1979-80

— Continued lockout till May 1979 and abnormal conditions till July 1979, Power supply difficulties and technical problems relating to newly-designed equipment.

6.03 *Rejection and rework*

The following points noticed in rejections and rework in various Divisions of the Company deserve mention.

6.03.1 *Rejections*

(i) Equipment divisions

No norms were laid down for rejections to assess the quality of performance, fix responsibility for abnormal defective work and initiate remedial measures. The quality levels were ascertained on a monthly basis and compared with past performance and only abnormalities were investigated. No monthly reports were submitted to higher Management on the quantum of rejections in each of the Divisions duly analysing the reasons alongwith the labour and material costs involved therein.

(ii) Components Division

Norms were fixed in respect of 6 out of 14 components that too only for the assembly stage of manufacture. In respect of fabrication of parts required for the assembly of components, no norms were fixed. An analysis of assembly rejections in

T.V. Picture Tubes, Germanium Semi-conductors and Ceramic Capacitors revealed the following :

1. T.V. Picture Tubes

(a) The process rejections of raw bulbs from 1977-78 to 1981-82 in respect of the main product viz. 20″ tube were as follows :

Year	Total consumption	Good output	Rejections	Percentage of rejection
		(In numbers)		
1977–78 . . .	77330	70273	7057	9.12
1978–79 . . .	150197	133580	16617	11.06
1979–80 . . .	176409	166862	9547	5.41
1980–81 . . .	150445	140116	10329	6.87
1981–82 . . .	177994	167412	10582	5.94

It may be seen that the rejection percentage of raw bulbs had been high and varying. Though the Company introduced mechanical handling by means of an integrated conveyorisation system the processes for dispensing chemicals were being manually operated.

(b) The comparative position of rejection levels at the Japanese Collaborator's works (as intimated by them in June 1971), rejection norms fixed by the Company and actual process rejections during 1979-80 to 1981-82 were as follows :

Operation	Rejection levels in Collaborator's works	Norm fixed by the Company	Actual rejections		
			1979-80	1980-81	1981-82
		(*Per cent*)			
(*i*) *Bulb Processing :*					
Screen coating	0.1	5	11	15	16
Lacquaring—0.2 Aluminising—0.8 Baking—1.5	2.5	15	21	21	22
(*ii*) *Tube Processing :*					
Sealing . .	0.6	1	—	2	1
Exhausting	2.9	3	6	4	6
Ageing . .	0.5	1	4	5	7
(*iii*) *Quality Inspection :*					
First Inspection	2.9	12	16	17	17
Final Inspection	0.9	4	4	4	4

The Company intimated (May 1982) that the higher process rejections compared to the levels in Collaborator's works were due to the following :

(i) Bulb processing :

— Quality problems in indigenised chemicals.

— Inefficient manual method of dispensing chemicals in the Company compared to automated process at Collaborator's plant.

— Manual handling of jobs in the Company as against the automatic handling at Collaborator's plant.

(ii) Tube processing :

— Manual processing adopted as against automated processing in the Collaborator's works.

(iii) Quality Inspection :

— Adoption of higher quality levels whereby the Company markets only 'A' quality tubes as against lower 'B' and 'C' grades which were also passed and marketed by Collaborators.

As norms fixed by the Company took into account all relevant factors like experience, low production volume compared to international procedures, and passing of only 'A' grade tubes it was not clear why the actual rejection rates were higher (except in final testing) than the norms fixed.

2. The table below gives particulars of 2 components *viz.*, Germanium Semi-conductors and Ceramic capacitors when the scale of rejections during 1979-80 to 1981-82 was more than

the standards fixed (information as furnished by the Company in April 1983) :

Year	Input Quantity	Standard rejections		Actual rejections	
		Percentage	Quantity	Percentage	Quantity
1	2	3	4	5	6
(i) Germanium Semiconductors					
Power Transistors (Cans)					
1979–80 . .	5,38,826	6.08	32,761	6.91	37,214
1980–81 . .	4,60,001	5.05	23,230	6.40	29,425
1981–82 . .	7,53,521	4.06	30,593	5.94	44,772
Weighted average for three years	17,52,348	4.94	86,584	6.36	1,11,411
Diodes (Whiskers)					
1979–80 . .	70,52,498	20.62	14,54,225	18.40	12,97,350
1980–81 . .	55,54,613	22.19	12,32,569	25.97	14,42,542
1981–82 . .	83,89,152	20.00	16,77,830	35.70	29,94,672
Weighted average for three years .	2,09,96,263	20.79	43,64,624	27.31	57,34,564
Diodes (Semi-sealed)					
1979–80 . .	76,74,738	21.02	16,13,230	25.01	19,19,590
1980–81 . .	52,74,013	21.82	11,50,790	22.03	11,61,942
1981–82 . .	70,13,202	20.63	14,46,824	23.08	16,18,722
Weighted average for three years .	1,99,61,953	21.09	42,10,844	23.55	47,00,254
(ii) Ceramic Capacitors					
Discs					
1979–80 . .	1,45,98,190	3.09	4,52,340	3.67	5,36,464
1980–81 . .	1,24,10,205	3.13	3,88,826	6.59	8,18,103
1981–82 . .	1,80,59,290	3.01	5,43,249	3.69	6,66,608
Weighted average for three years .	4,50,67,685	3.07	13,84,415	4.48	20,21,175

1	2	3	4	5	6
Barrier Layers (GFO)					
1979–80 . .	1,41,06,000	2.70	3,81,561	3.10	4,37,920
1980–81 . .	1,03,92,800	2.77	2,88,101	10.16	10,55,800
1981–82 . .	1,19,70,400	2.76	3,29,818	2.68	3,21,050
Weighted average for three years .	3,64,69,200	2.74	9,99,480	4.98	18,14,770
Plaquettes (High-K)					
1979–80 . .	94,98,100	4.13	3,92,350	10.11	9,60,660
1980–81 . .	79,13,000	4.16	3,29,285	14.81	11,71,650
1981–82 . .	92,38,050	4.19	3,86,811	10.72	9,90,090
Weighted average for three years .	2,66,49,150	4.16	11,08,446	11.72	31,22,400

In the periodical reports, the Company generally mentioned the following major reasons for the excessive rejections :

— Poor quality of materials, use of substitute materials due to non-availability of specified ones, non-stabilisation/low volume of production (Germanium Semiconductors).

— Gradual change-over from imported to indigenous materials (Ceramic Capacitors).

6.03.2 *Rework*

(i) Equipment

The monthly reports on rework submitted to the Management contained only a Division-wise statistical data. No analysis of the reasons for rework was made. The cost of rework in the Divisions during 1977-78 to 1980-81 worked out to 15,78,994 hours valued at Rs. 463.69 lakhs.

(ii) Components

A major rework activity related to in-process rejections of T.V. Picture Tubes including reclamation of parts from defective T.V. guns. This was done alongwith the regular production on grounds of convenience and smooth operation. The extent of expenditure on rework was not assessed and reported to higher Management.

7. Man Power Analysis and Labour Utilisation

7.01 *General*

The particulars of total number of employees in the Company, Sales, Value of production, Value added, expenditure on salaries and net welfare subsidy for the 5 years upto 1981-82 are furnished below :

Particulars	1977-78	1978-79	1979-80	1980-81	1981-82
(*i*) Total number of employees at the end of the year	16,298	16,644	17,229	17,351	17,306
		(Rupees in lakhs)			
(*ii*) Expenditure on salaries and other benefits	2,096.66	2,303.50	2,420.75	2,215.04	3,132.33
(*iii*) Value of production . .	7,407.41	7,862.94	8,032.96	7,721.75	12,497.22
(*iv*) Value added .	4,216.67	4,360.02	4,209.19	4,314.65	7,373.89
(*v*) Net amount spent on welfare subsidies to staff :					
Canteen . .	..	..	102.60	110.43	193.59
Transport .	..	..	101.11	102.03	189.55
Medical facilities	..	..	48.77	57.48	79.39
Township .	..	..	23.04	15.45	20.45
Other subsidies	..	..	3.98	8.01	10.34
Total . .			279.50	293.40	493.32
(*vi*) Per employee per annum :		(Rupees)			
Salaries and other benefits .	12,865	13,840	14,050	12,766	18,100
Welfare subsidies	..	..	1,622	1,691	2,851
Value of production . .	45,450	47,242	46,625	44,503	72,213
Value added .	25,872	26,196	24,431	24,867	42,609

It may be seen that there had been an induction of 931 employees during the period 1977-78 to 1979-80. The Pune Unit went into production in January 1980 and induction in Bangalore and Ghaziabad Units during these 2 years was 309 Executives and 524 non-Executives. While the increase in salaries per employee in 1979-80 compared to 1977-78 was Rs. 1,185, the increase in Value of production per employee during this period was only Rs. 1,175 whereas the value added had decreased by Rs. 1,441 in the same period. The expenditure on welfare subsidies had been increasing year to year from 1979-80 onwards.

7.02 *Composition of Manpower*

The following table gives the break-up of employees under Direct and Indirect labour and Executives in Bangalore and Ghaziabad Units at the end of each of the 5 years upto 1981-82 :

As on 31st March	Unit	Direct labour	Indirect labour	Executives	Total
1978 . . .	Bangalore	8,574	3,979	1,260	13,813
	Ghaziabad	1,142	808	304	2,254
1979 . . .	Bangalore	8,555	3,900	1,376	13,831
	Ghaziabad	1,254	942	339	2,535
1980 . . .	Bangalore	8,619	3,882	1,524	14,025
	Ghaziabad	1,482	944	349	2,775
1981 . . .	Bangalore	8,528	3,882	1,623	14,033
	Ghaziabad	1,602	973	365	2,940
1982 . . .	Bangalore	8,531	3,853	1,554	13,938
	Ghaziabad	1,653	917	364	2,934

It may seen that there had been a steady increase in the strength of Executives upto 1980-81 in Bangalore Unit. The Company stated (March 1981) :

> "Addition to Executives strength has arisen mostly in Development Engineering areas where the work is predominently Executive oriented".

7.03 *Labour Utilisation*

(a) Bangalore Unit

Though information regarding the total hours utilised for productive jobs in respect of the direct workers engaged was available, reconciliation between the total hours paid for and the hours actually booked to productive jobs showing also the unaccounted hours was not being done. The ascertainment of total unaccounted hours and analysis of the reasons for the same was necessary to ensure that the direct workers engaged were being utilised only for productive jobs and to control idle time due to controllable factors.

The Ministry stated (March 1983) : "The Company has evolved other more effective control reports in recent times like absenteeism on the shop floor, day-to-day output records, etc., which are regarded more useful than the reconciliation procedure".

It may, however, be stated that a consolidated monthly report on the utilisation of direct workers would help the top Management to have a better appreciation of the causative factors relating to non-utilisation of direct workers for other than productive jobs.

(b) Ghaziabad Unit

In this Unit, the direct workers were being engaged in Operators Time Ticket (OTT) jobs, Shop Orders and Monthly Time Sheets. The hours booked in respect of OTT jobs were

only being ascertained by the Unit. The number of direct workers engaged on OTT jobs formed only a small portion of the total direct workers as indicated below :

Year	Direct workers	
	Total	Engaged on OTT jobs
1977–78	1142	369
1978–79	1254	476
1979–80	1482	560
1980–81	1602	573
1981–82	1653	581

In addition, reconciliation between the total hours paid for and the hours actually booked to productive jobs showing also the unaccounted hours was not being done. The Ministry stated (March 1983) as under :

> "Some difference between the hours paid for and the hours accounted for is inevitable since the former has been worked out on a theoretical basis only. Besides, the actual percentage of absenteeism, both authorised and unauthorised among direct workers in BELGAD has varied from 13.5 per cent to 18 per cent in various years as against theoretical 13.3 per cent".

7.04 *Idle Time*

The cost of idle time in the Equipment Divisions of the Bangalore Unit and in the Ghaziabad Unit during the 3 years upto 1981-82 was as under :

Year	Cost
	(Rupees in lakhs)
1979–80	35.82
1980–81	27.37
1981–82	30.99
TOTAL	94.18

7.05 *Labour Efficiency*

The following table indicates the overall labour efficiency in Bangalore and Ghaziabad Units for the 5 years upto 1981-82 :

Division/Major components	1977-78	1978-79	1979-80	1980-81	1981-82
			(*Per cent*)		
(a) *Bangalore Unit* Overall	62	63	64	62	65
Equipment Divisions					
Low Power Equipment Division	53	53	49	46	47
High Power Equipment Division	53	45	46	42	50
Radar Division	48	49	56	49	52
Components Division					
Receiving Valves	79	81	79	75	75
Germanium Semiconductors	93	99	101	100	104
Silicon Semi-conductors	89	80	85	76	84
Capacitors	92	88	79	82	88
(b) Ghaziabad Unit	61	61	58	60	60

It may be seen that the labour efficiency in the Equipment Divisions at Bangalore and in the Ghaziabad Unit had been low.

The Ministry stated (March 1983), "The most important reasons for the seeming decline in labour efficiency are the continous change in product-mix and new projects undertaken, etc. Introduction of new products in the production line places the worker every time on a learning curve with effects on his efficiency".

8. MACHINE UTILISATION

The particulars of percentage of utilisation of machinery in the Equipment Divisions at Bangalore and in the Ghaziabad Unit for the 5 years upto 1981-82 are indicated below :

	1977-78	1978-79	1979-80	1980-81	1981-82
			(*Per cent*)		
(a) *Bangalore Unit*					
Low Power Equipment Division .	63	65	71	68	70
High Power Equipment Division .	66	59	51	55	60
Radar Division .	66	66	61	59	62
(b) Ghaziabad Unit	57	63	65	65	68

In this connection, the following observations are made :

(i) The utilisation of machinery in the Components Division at Bangalore had not been ascertained. It was stated by the Company (October 1979) that as most of the plant and machinery held in the Division were special and Process equipment designed for the production of various products, "it would not meaningful if the utilisation of these quipment is sought to be measured".

(ii) The idleness of the machinery in the Company ranged from 30 to 40 *per cent* in 1981-82, the main reasons for idleness being want of work, want of operator and electrical/mechanical break-downs.

(iii) To end of March 1982, 84 machines costing Rs. 57.97 lakhs were idle for varying periods of 6 months and above in Bangalore and Ghaziabad Units.

9. COSTING SYSTEM

9.01 *General*

The Committee on Public Undertakings (1971-72—Fifth Lok Sabha), which examined the working of the Company, in their Third Report made the following recommendation (Recommendation No. 26—Para 8.18) :

> "The Committee reiterate that BEL should take urgent steps to introduce standard costing so that performance could be watched against standards. If BEL still face certain accounting difficulties in this connection, the matter should be thrashed out in consultation with Accounts and Audit authorities".

The above recommendation was accepted by the Government in December 1972 and the Committee was informed that the Company intended to introduce standard costing in the first instance in respect of 2 products, *viz.*, Receiving Valves and Germanium Semi-conductors from April 1973 with eventual extension of the system to other items, to be considered after assessing the results, by which time computer facility would have also been introduced. Accordingly, standard costing was introduced for the above 2 items in 1973-74 and discontinued from 1974-75 "temporarily till the prices returned to reasonably stable levels". The standard costing system had neither been reintroduced nor the approval of Government obtained for its permanent discontinuance. A computer facility was also introduced by the Company from November 1975.

The Company explained (December 1979) that practical utility of standard costing was doubtful in an environment of erratically changing prices and that a cautious approach was necessary in introducing standard costing in monetary terms in the Components Division. This argument is not acceptable as the environment of erratically changing price is a universal phenomenon and other undertakings have not given up standard

costing on grounds of changing prices. Moreover, standard costing is not vitiated by large price variances, which could be explained as such, on the other hand the system of standard costing brings out other controllable variances which are useful for Management control. In addition, Government's approval has not also been obtained for the discontinuance of the system introduced earlier at their instance.

9.02 *Costing procedure*

9.02.1 The Company was following the system of batch costing for equipment and multiple costing in respect of components. The finalisation of cost reports was being taken up after the close of the years' accounts as adjustment entries regarding material, actual computation of man hour rates and overhead rates were available only then. The actual costs so compiled in the case of equipments were being compared with the estimates and the previous batch costs. In the case of components, the actual costs were being compared with the previous quantity/batch costs.

9.02.2 The costing system obtaining in the Company suffers from the following deficiencies :

(i) The actual costs compiled are only of historical value as it is not possible to ascertain during the year to determine the actual cost of a closed batch or the cost trends of a running batch.

(ii) Analysis of cost variances only in respect of equipments was being reported to the higher Management. In the case of components, the analysis of variances was being sent quarterly to the Production department/responsibility centres by the Costing department. Further action taken on these reports is not known.

(iii) Analysis of quantity variances in respect of materials was not being done and reported to the higher management, inspite of availability of a computer.

(iv) In the case of many batches of equipments, the cost reports were not prepared promptly. For example, out of 26 batches of equipment completed in 1979-80, reports for 13 batches were prepared and submitted to the Management in 1980-81 and the balance only in 1981-82.

(v) In the Ghaziabad Unit, there was delay in closing of work orders, on which work was completed during the years, to the extent of 57 *per cent* of the work orders in 1980-81 and 25 *per cent* in 1981-82. As a result, an amount of Rs. 56.74 lakhs could not be collected from the customers on the equipments supplied. The Unit had absorbed this amount as loss. In addition review of the actual expenditure in respect of completed turnkey projects *vis-a-vis* the estimates and analysis of reasons for variations had not been made. An integrated cost accounting system had not been introduced in the Unit so far (April 1983).

9.03 *Consumption of precious metals*

In the manufacture of various components, the Company used precious metals like Gold, Platinum, Silver, Nickel, Tungsten, Molybdenum, Palladium, Rhodium and Rhenium either in a pure form or in the form of alloys, powder, suspensions, solutions, salts, wires, strips, foils and crucibles, etc. Gold Potassium Cyanide, used in gold plating, was being manufactured and supplied by sub-contractors out of the gold issued by the Reserve Bank of India on Gold Control permits as well as out of gold recovered by the Company from waste solution/scrap and issued

to sub-contractors. The Company had also established processes for recovery of Gold, Platinum and Silver from waste solution and scrap. Information regarding the value of the precious metals used in the manufacture of components in each of the years was not readily available. In respect of gold plating of Semi-conductors alone, the value of Gold content in the Gold Potassium Cyanide used during 1980-81 and 1981-82 worked out to Rs. 232.45 lakhs (at the average price of Rs. 185 per gram).

In addition reconciliation of input of precious metals issued for production with the output, *i.e.*, content in parts produced/ plated and the quantity recovered, if any, was not also being done.

10. SALES MANAGEMENT AND PRICING POLICY

10.01 *Pricing Policy*

According to the objectives of the Company, a sound and rational pricing policy was to be followed for its products so as to ensure that the customer obtains a quality product to International standards and specifications at a reasonable price. The Company was also to play an important stabilising role in rational control of market prices for such items where competition was involved, in close and active consultation of the Government agencies where relevant. Some of the major items of equipment manufactured by the Company was sold to Defence and other Government departments, in which the Company enjoyed almost a monopoly. In the case of components, the Company effected sales also in the open market and had to face stiff competition from the private sector/imports. The Board of Directors or the Management did not formulate any pricing policy for the products keeping in view the different classes of customers or the products to be sold.

In the case of equipment, the Company generally quoted fixed prices, based on estimates/actual cost experience as available at the time of quoting, which included an *ad hoc* provision towards escalation in the cost of materials and labour during the projected delivery period. Only in respect of contracts for certain major equipments supplied in bulk to Defence, All India Radio and Doordarshan, the Company included escalation clauses towards exchange rate variation, wage escalation, etc. In the case of Defence, the prices and terms were generally fixed after negotiations.

In the case of components, the prices were fixed from time to time on the basis of cost of production, capacity of the market to bear, competition from the private sector, imports, etc. There was, however, no set periodicity for review and revision of prices.

The Ministry stated (March 1983) that "It is not advisible to lay down that prices of components should be revised at regular periodical intervals. Business conditions do not change with regularity. Prices of imported equipments are kept in view while fixing the prices of components.....".

The above reply is not convincing as keeping in view the actual costs of production, a periodical review of selling prices is certainly necessary in order to ensure that Company is not underselling the products and wherever possible, the selling prices could be suitably readjusted to cover the additional costs.

10.02 *Sales Performance*

10.02.1 The particulars regarding the order book position at the beginning of the year, the targetted as well as actual sales in respect of Banglore and Ghaziabad Units and the percentage

of achievement during the 5 years upto 1981-82 are indicated below :

Year/Unit	Order book position at the beginning of the year	Sales (excluding income from services)			Export sales included in sales	Percentage of	
		Original target	Revised target	Actuals		actual sales to original targets	Exports Sales to sales
		(Rupees in lakhs)					
1977–78							
Bangalore .	12471	7440	7161	5997	1590	80.6	21.4
Ghaziabad .	6649	1600	1365	1448	..	90.5	
1978–79							
Bangalore .	14792	7000	7000	7066	2080	100.9	27.5
Ghaziabad .	6021	1762	1000	562	..	31.9	
1979–80							
Bangalore .	13647	8054	7994	7271	449	90.3	5.4
Ghaziabad .	6478	1463	1396	994	—	67.9	
1980–81							
Bangalore .	15881	8388	8388	5061	612	60.3	8.9
Ghaziabad .	7716	1779	..	1812	..	101.9	
1981–82							
Bangalore .	21447	9623	9623	10196	1102	106.0	8.6
Ghaziabad .	11395	2406	2544	2576	..	107.1	

The shortfall in sales in Ghaziabad Unit was significant in 1978-79 and 1979-80. The Company stated (March 1981) : "Somewhat optimistic targets were set hoping that development and production of various items would progress as per expectations; since the products taken up were new and being

manufactured for the first time in the country, they involved considerable development and engineering work. In order to meet the high quality standards of Defence the First Article Testing (FAT) lasted several months in respect of some equipments; the factory went into production in September 1973 and the manufacturing activity during the gestation period cannot be as efficient as one would wish".

As against a target of 10 *per cent* of turn over laid down in the objectives for exports, the actual exports during 1979-80 to 1981-82 ranged from 5.4 to 8.9 *per cent*. The company is yet to enter the field of project exports.

10.02.2 *Backlog of Orders*

As on 1st April 1982, the value of pending orders in Bangalore and Ghaziabad Units amounted to Rs. 24,121 lakhs and Rs. 10,800 lakhs respectively.

Of the pending orders of Rs. 10,800 lakhs relating to Ghaziabad Unit, Rs. 10,619 lakhs pertained to Defence users and Rs. 181 lakhs to Civilian users. These included orders valued at Rs. 6 lakhs due for delivery in 1978-79, Rs. 2 lakhs due in 1979-80, Rs. 33 lakhs due in 1980-81 and Rs. 1468 lakhs due in 1981-82. The huge backlog of orders valued at Rs. 1,509 lakhs as on 1st April 1982 apart from affecting future deliveries must have also affected the User's requirements particularly in the sensitive area of Defence. In this connection, the Ministry stated (April 1983) that the slippages in delivery had come down to Rs. 35 lakhs by end of December 1982 comprising mostly of spares items and copies of technical publications. The Ministry further stated :

> "The turn over of the Unit in the year 1982-83 is expected to be of the order of Rs. 28 crores. Expansion plans are on hand to raise the capacity to attain a turnover of Rs. 40 crores per annum. The orders on hand would, therefore, amount to around 2½ years production only."

10.02.3 *Growth of Sales*

The sale value (including income from other services) at 1970-71 base prices (as furnished by the Company) as well as at current prices during the 5 years period 1977-78 to 1981-82 together with the growth in sales and price escalation are indicated in the following table :

Year	Sales at current prices (actuals)	Sales at constant prices (Base : 1970-71)	Increase in sales at current prices compared to sales at constant prices
	(Rupees in lakhs)		
1977–78 . . .	7460	6532	(+) 928
1978–79 . . .	7638	5825	(+) 1813
1979–80 . . .	8295	6495	(+) 1800
1980–81 . . .	6891	5350	(+) 1541
1981–82 . . .	12844	8990	(+) 3854

The increase in the value of sales in 1977-78, 1979-80 and 1981-82 was also due to export benefits and significant increase in selling prices to the extent of 14.2, 27.7 and 42.9 per cent respectively. The export benefits received during each of the years 1977-78 to 1981-82 amounted to Rs. 391.80 lakhs, Rs. 401.01 lakhs, Rs. 156.87 lakhs, Rs. 202.58 lakhs and Rs. 215.42 lakhs respectively. Thus the factors behind the increase in sales during the period in terms of magnitude were the selling price escalation followed by real growth in sales and exchange rate variation benefits received in respect of export orders.

10.02.4 *Loss in the sale of equipments*

A review of sales of major equipments effected by the Company upto 1981-82 revealed that a loss of Rs. 1689.86 lakhs was incurred in 34 cases (Bangalore Unit : 13 cases—Rs. 150.79 lakhs and Ghaziabad Unit : 21 cases—Rs. 1539.07 lakhs). An

analysis of the cases revealed that the losses were due to the following reasons :

(a) Ghaziabad Unit

(i) Increase in non-manufacturing overheads due to staggering of production to suit delivery requirements of Defence users though facility was created for higher rate of production.

(ii) Deliberate underquoting, a 'Commercial View'.

(iii) Increase in manufacturing cost due to delays in production, teething troubles, delay in getting Bulk Production Clearance from customers, etc.

(iv) Inherent design defects resulting in discontinuance of production.

(v) Unremunerative selling prices.

(b) Bangalore Unit

(i) Orders from customers not materialising to the expected level, with the result that entire pre-production expenses could not be amortised over production.

(ii) Escalation of cost due to delay in production and rectification of numerous defects even after supply of equipments to customers.

(iii) Firm prices having been quoted based on estimates prepared on insufficient/incorrect data.

It would appear, therefore, that the Company's stated objectives of following "a sound and rational pricing policy" has not been fully achieved.

The Ministry stated (March 1983) : "Most of the cases of loss highlighted by the Audit relate to new lines. BEL operating as a Company on commercial lines, cannot avoid taking risks while developing new lines particularly in the fast changing electronic field. The success or profitability of each and every venture cannot be assured. Considering the scale of operations of BEL the number of lines which have proved risky have not been many".

10.02.5 Some individual cases of losses in the equipment sold during 1977-78 to 1981-82 are discussed below :

(i) Supply of Radio Relay Equipment

In order to meet the requirements of Posts and Telegraphs (P&T) department and other civilian customers like Railways, Indian Oil Corporation (IOC), etc., in respect of UHF Radio Relay Equipment, which was hitherto being imported, the development of an indigenous equipment (consisting of Terminal Base band repeaters and IF repeaters) was taken up at the Bangalore Unit of the Company in collaboration with Telecommunication Research Centre (TRC) of the P&T department. After making 7 prototypes of P&T version and 2 prototypes of a civilian version, one working model of P&T version was made available to TRC in November 1972 for laboratory tests. Based on comments received from TRC, 2 'A' models were manufactured in February 1973 and were subjected to tests by TRC representatives. Thereafter, 4 working models, incorporating further necessary changes were subjected to limited field trials by TRC and in May 1974, the results of field trials were intimated to the Company, suggesting certain modifications/improvements of sets. The total development expenditure incurred was Rs. 35.64 lakhs.

Meanwhile, on the basis of provisional estimates prepared by its R&D wing, the Company quoted to IOC in July 1972, for installation of a communication system which included supply of 50 sets of equipment, and secured the order in April 1973. Between December 1973 and March 1979, the Company secured

further orders for 158 sets from various customers. These orders were taken up for execution in Bangalore Unit initially; apart from development expenditure of Rs. 35.64 lakhs referred to above, the Unit incurred a pre-production expenditure of Rs. 9.16 lakhs. In March 1977, production of these sets was transferred to the Ghaziabad Unit along with materials for 150 sets, wherein a further pre-production expenditure of Rs. 17.52 lakhs was incurred.

In July 1979, the Company decided to discontinue the manufacture of equipment with the existing design, after the stock-on-hand was exhausted, for the following reasons :

(i) Impossibility of producing the equipment with the existing design at a lower cost.

(ii) Reluctance on the part of P&T to agree to an enhancement of selling prices in view of lower offers received from other indigenous sources.

(iii) To undertake the designing of a more cost effective UHF equipment.

From 1974-75 to 1980-81, the Company produced only 155 sets (71 in Bangalore Unit and 84 in Ghaziabad Unit) as against 840 sets planned and 208 sets for which orders were actually received. The equipment supplied to P&T department was not found to be upto the required specifications and also not free from defects. Even as late as February 1980, the P&T department reported that they were experiencing serious problems in installing the equipment because of excessive faults arising during energisation.

Out of 155 sets produced, one set was retained by the Company and 154 sets were supplied to various customers upto

31st March 1981. The position regarding customer-wise orders received and supplies effected was as follows :

	Orders received	Supplies effected
IOC	70	70
Railways	28	26
P&T department	104	58
Tamil Nadu Police	6	—
TOTAL	208	154

There were inordinate delays in effecting supplies, ranging from 14 to 64 months, *e.g.* initial supplies of 50 sets to IOC were to be made out of production scheduled to commence during March to September 1974, but supplies were effected during 1975-76 and 1976-77 as production commenced only in September 1974. In the case of P&T department, the entire ordered quantity was to be supplied in November 1975 and August 1977 but only 58 sets were supplied upto March 1981. Due to inordinate delay in supply, the P&T department approached the Director General of Technical Development in December 1977 for clearance to import 100 sets of multi-channel UHF equipment for its immediate requirements and in April 1980 cancelled the order on the Company for 46 sets valued at Rs. 43 lakhs.

On the 155 sets produced by both Bangalore and Ghaziabad Units, the Company incurred a loss of Rs. 299.80 lakhs as indicate below :

	Bangalore (71 units)	Ghaziabad (84 units)
	(Rupees in lakhs)	
Development expenditure	35.64	..
Pre-production expenses not amortised	8.73	17.52
Special test equipment not amortised	16.33	..
Loss due to under-realisation on sales	44.61	173.00
Redundancy of materials	2.66	0.30
Modification expenses not charged to production.	1.01	..
TOTAL	108.98	190.82

The Company had not assessed the value of redundant materials, if any, consequent on cancellation of the order by the P&T department. The above loss would increase further to the extent of materials procured which might ultimately become redundant. The Company stated (September 1981) that a major part of raw materials and components used in this project, being common to other similar projects, would be profitably used and some of the materials would also be supplied as spares to customers.

An analysis of the estimated as well as actual cost of production of 71 sets produced in Bangalore Unit *vis-a-vis* sales realisation revealed the following position :

	Estimated	Actual	Increase
	(Rupees in lakhs)		
Cost of materials (including material overheads)	25.51	40.63	15.12
Labour (including manufacturing overheads)	3.94	30.43	26.49
Other charges	7.67	17.94	10.27
TOTAL	37.12	89.00	51.88
Sales realisation	43.80	44.39	0.59
Net Profit (+)/Loss (—) . .	(+) 6.68	(—) 44.61	(—)51.29

It may be seen that though the Company anticipated a profit of Rs. 6.68 lakhs on 71 sets while quoting to customers, it could not recover fully even the cost of direct materials, labour and manufacturing overheads and the sales realisation fell short of these 2 elements to the extent of Rs. 26.67 lakhs. This was due to initial under-estimation of costs. The increase in labour cost was due to substantial increase in labour hours utilised (about 400 per cent) mostly due to introduction of a number of modifications at different stages after the fabrication was completed. Similarly, on 84 sets produced in Ghaziabad Unit, the loss on account of short recovery of cost of materials, labour and manufacturing overheads worked out to Rs. 98.36 lakhs.

In this connection, the following observations are made :

(i) After developing equipment at a substantial cost (Rs. 35.64 lakhs) and remaining in the field for more than 6 years, the Company was unable to meet the quality and price requirements of the P&T department, forcing it to cancel the order for some of the sets.

(ii) In view of its inability to meet the requirement of customers both in quality and price, the Company failed to arrest the drain of foreign exchange on the import of equipment by the P&T department.

(iii) Due to substantial cost over-runs the Company incurred a loss of nearly Rs. 3.00 crores on the sets supplied.

(iv) In spite of instructions issued (May 1972) by the Government on the recommendations of Committee on Public Undertakings, that the Company should make a thorough analysis of demand and cost of production, before undertaking manufacture of any new items so as to minimise losses, the Company embarked on this venture unsuccessfully and incurred a huge loss.

(ii) LVS 110 Transmitters and VS 403 Receivers

The Company planned (1973-74) the bulk production of both the equipments and procured materials required for the manufacture of 600 sets at a cost of Rs. 61.15 lakhs, in anticipation of additional orders though it had orders only for 251 sets from various State Police departments and the Calcutta Port Trust. In all 189 sets were supplied to the customers during 1976-77 to 1979-80. All the 189 sets supplied were returned to the Company as they were found to be defective. Numerous design and workmanship defects noticed in the sets were rectified and the sets were despatched again to the customers in the latter

half of 1979-80. Since the sets were still found to be defective even after rectifications, they were again returned by the customers for further modifications. The modifications are being attended to by the Company (April 1983).

Upto 31st March 1982, the Company incurred a loss of Rs. 31.15 lakhs on 189 sets supplied (Rs. 25.94 lakhs towards modification expenses and Rs. 5.21 lakhs towards under-realisation of sale value). In addition, the Company had to explore alternative uses for the surplus inventory of about Rs. 42.00 lakhs which otherwise would also become redundant. The loss may further go up to the extent of cost of additional modifications to be carried out and the value of redundant materials, if any. The Ministry stated (March 1983):

> "This equipment is a Police wireless set. Due to the then prevailing conditions in the country and the borders, a huge requirement of these sets was foreseen from indications given by the users like Directorate of Co-ordination Police Wireless (DCPW). Based on this assessment and taking into consideration the pattern of orders received for similar equipment (GH 650 MF 751/3) in the past, the Company took action to order materials for 600 sets. This was a commercial risk which any industrial concern has to necessarily take by foreseeing the demand and delivery requirements.
>
> Because of new technologies involved, the complexity of the equipment, high indigenous development content and changes in specifications by customers, certain changes in design were necessary to accommodate customers' requirements. There were, therefore, no inherent design defects".

(iii) LVS 115 Transmitters and VS 406 Receivers

As against firm orders of 324 sets and further indications of 250 sets, the Company procured raw materials valued at

Rs. 68.78 lakhs required for 700 sets. The production of the first batch of 175 sets was taken up in February 1976 and 50 sets were initially manufactured and supplied to customers in 1977-78 and 1978-79. All the sets were found to be defective and returned to the Company. These sets were modified and supplied in June 1980; balance 125 sets were also supplied during 1980-81 and 1981-82. The production of further 2 more batches of 175 and 250 sets taken up in February and March 1976 respectively was in progress (April 1983). The Company incurred a loss of Rs. 22.10 lakhs on 175 sets supplied in the first batch.

The Ministry stated (March 1983):

> "Based on indications from customers, materials for 700 sets had been procured, although all the 700 Nos. were not covered by firm orders. As at present only 228 out of 700 sets are not covered by firm orders; enquiries for 250 sets from DCPW and 33 sets from others are under various stages of finalisation. The orders from these enquiries themselves will more than cover the 228 sets (out of 700) yet to be covered by orders. In addition, orders for spares are also anticipated. Thus it can be seen that the utilisation of the material is reasonably assured".

(iv) MHS 117 Transmitters & HS 409 Receivers

The Company developed (April 1973) a 100 W Transreceiver at a cost of Rs. 8.50 lakhs and offered (May 1973) it to DCPW for trials. Anticipating orders, the Company procured materials valued Rs. 60 lakhs and programmed (1974-75) production of 300 Transreceiver sets. But DCPW did not accept the equipment as it preferred a 'Transmitter and Receiver' sets. The production of this equipment was, therefore, abandoned and the

pre-production expenditure of Rs. 2.90 lakhs (tooling) was transferred to MHS 117 Transmitter project. The Company stated (September 1981) that materials valued Rs. 58.28 lakhs were utilised for other projects (details not furnished) and the value of balance materials (Rs. 1.72 lakhs) was written off.

In order to meet the requirement of MHS 117 Transmitters and HS 409 Receivers of DCPW and P&T department, the main customers for these equipments, the Company manufactured and supplied 300 sets between 1976-77 and 1981-82 and incurred a loss of Rs. 14.21 lakhs mainly due to additional expenditure incurred on rectification of defects in the equipments. The Ministry stated (March 1983) :

> "Teething troubles are common in manufacturing until the first batch of production of a newly developed products is successfully completed. In this case, some modifications had to be introduced based on feed back from the users."

(v) Equipment 'A'

Based on anticipated requirements of the Indian Army, the Company planned (1971) to manufacture 75 per cent of requirements over a period of 7 years. The Army placed (1973) an indent for 30 per cent of the anticipated requirements which was executed between 1974-75 and 1978-79. No further indent was placed by the Army since the equipment was not performing well in desert conditions. The execution of this order resulted in a loss of Rs. 15.95 lakhs which included unamortised pre-production expenses, value of finished goods and surplus raw materials and components written off.

The Ministry stated (March 1983) :

> "Using the know-how gained from this project, the Company has designed, developed and productionised many other equipments. Many tools

manufactured and test instruments procured for this project are being used for other equipment."

(vi) Portable Tape Recorders

Till 1967-68, the Company was supplying portable tape recorders to All India Radio by assembly and testing of imported kits and assemblies in knocked down condition. In 1968-69, the Company concluded a contract with All India Radio to supply 39 recorders of its own design at Rs. 7000 each. The rate of Rs. 7,000 quoted was on the basis of *f.o.b.* cost of an imported set. Subsequently, orders for 10 more recorders were obtained from All India Radio at higher prices ranging from Rs. 10,000 to Rs. 23,000 each. The production of first batch of 50 recorders, launched in 1968-69, commenced only in 1975 due to "prior commitments" and completed progressively between 1975-76 and 1978-79 ; 48 recorders were supplied during these years, while 2 were used internally. There was delay in the initial commencement of production by over 6 years and due to several modifications to be carried out as a result of customer's trials, etc., the production also took 4 years. As a result of under-quoting for the initial batch of 33 Nos. and cost escalations, the cost of production exceeded the selling price by 250 *per cent* resulting in a loss of Rs. 6.28 lakhs.

Production of the second batch of 175 recorders was taken up in 1977-78 and 117 Recorders were produced by 1980-81 ; of these, 116 were supplied to All India Radio and 1 was internally used. Even in this batch, considerable modifications had to be carried out. The selling prices realised for these sets were Rs. 7,000 each for 46 Nos., Rs. 19,050 each for 5 Nos. and Rs. 20,100 each for 65 Nos. There was a loss of Rs. 7.02 lakhs in the supply of 116 recorders. In addition, due to delay in supplies, All India Radio obtained clearance for import of recorders from Director General of Technical Development (70 in 1976 and 216 in 1979).

(vii) Console Tape Recorders

The Company developed a Console Type Tape Recorder and furnished a prototype to All India Radio in June 1970 for trials. Based on the results of trials, necessary modifications were carried out and the equipment was productionised in 1971-72. In all, 433 recorders were produced in 6 batches and supplied between 1971-72 and 1979-80. Several modifications had to be carried out as the recorders supplied did not function satisfactorily. Due to prolonged production cycle time, there were cost escalations. The Company incurred a net loss of Rs. 10.86 lakhs on 433 recorders supplied.

10.02.6 *Payment of liquidated damages for delayed supplies*

Between 1975-76 and 1981-82, the Company had to pay liquidated damages amounting to Rs. 20.80 lakhs to Defence users for delays in the supply of equipment.

11. MATERIAL MANAGEMENT AND INVENTORY CONTROL

11.01 *Purchase Procedure*

According to the purchase procedure of the Company, formulated in September 1973, production materials are to be purchased on single tender basis in respect of proprietary items and by issue of limited tenders in respect of other items. As regards non-production materials (consumables, etc.), if the value of purchase is Rs. 1 lakh and above and a large number of established sources are available, open tenders are to be invited. But this open tender system can be relaxed with the concurrence of Internal Audit Department where open tender purchase is not economical or fruitful or is time-consuming. The Company stated (August 1978) that this purchase procedure was under review. The revised procedure was still under preparation (April 1983).

11.02 *Inventory holdings*

The overall position of inventory, under various categories, held by the Bangalore and Ghaziabad Units at the end of each of the 5 years upto 1981-82 is indicated below :

Category of Inventory	Unit	Value as on 31st March				
		1978	1979	1980	1981	1982
		(Rupees in lakhs)				
Raw materials and components	Bangalore	3024.38	2961.35	3286.58	3785.49	4531.87
	Ghaziabad	955.68	877.66	926.24	914.89	942.81
Raw materials and components with sub-contractors for fabrication.	Bangalore	56.61	58.65	92.28	82.01	52.18
	Ghaziabad	2.77	4.29	1.53	2.04	11.37
Stores and spares	Bangalore	574.42	593.63	666.77	727.35	887.71
	Ghaziabad	59.85	49.18	54.86	61.22	81.12
Work-in-progress	Bangalore	1545.97	1869.50	1777.55	2298.43	2346.64
	Ghaziabad	652.26	830.04	910.66	898.62	775.66
Finished goods	Bangalore	872.45	812.78	983.95	1431.03	1453.99
	Ghaziabad	44.55	86.63	88.69	92.59	149.85
Materials-in-transit	Bangalore	292.53	266.43	295.60	1030.01	297.59
	Ghaziabad	24.17	104.40	69.98	47.23	63.13
TOTAL	Bangalore	6366.36	6562.34	7102.73	9354.32	9569.98
	Ghaziabad	1739.28	1952.20	2051.96	2016.59	2023.94
GRAND TOTAL		8105.64	8514.54	9154.69	11370.91	11593.92

It will be seen that the value of inventory had been increasing from year to year since 1977-78.

11.03 *Inventory norms*

11.03.1 The norms for inventory holdings were laid down by the Board initially in February 1972. The Board felt (December 1979) that these needed a review and remitted the question to a Committee of Directors. Based on the Committees' recommendations, the Board approved (July 1982) revised norms and decided that they should be implemented effective from 1981-82 itself and that any higher levels should be "worked off" as early as possible.

11.03.2 The inventory holdings as at the end of each of the 4 years upto 1981-82 vis-a-vis the original (upto 1980-81) and revised (for 1981-82) norms fixed by the Board in Bangalore and Ghaziabad Units are indicated in the following table :

Sl. No.	Category of Inventory	Norms fixed by the Board	Actual Inventory held on 31st March							
			1979		1980		1981		1982	
			Banga-lore	Ghazia-bad	Banga-lore	Ghazia-bad	Banga-lore	Ghazia-bad	Banga-lore	Ghazia-bad
1	2	3	4	5	6	7	8	9	10	11
						(Months)				
1.	Imported raw materials and components :									
	(*a*) For Equipment production.	12 month's stock corresponding to issue levels of the subsequent period of production.	10.7	28.3	12.3	24.9	10.4	15.3	12.2	12.9

1	2	3	4	5	6	7	8	9	10	11
	(*b*) For Components production (excluding Crystals production).	6 to 9 month's stock	8.3	..	11.8	..	14.9	..	11.0	..
	(*c*) For Crystals production.	15 to 18 month's stock.	17.2	..	22.5	..	15.2	..	20.0	..
2.	Indigenous materials :									
	(*a*) Indigenous raw materials and components including sub-contracted items (excluding steel).	3 to 6 month's. stock	9.5	25.3	8.1	12.4	6.4	7.4	9.9	6.2
	(*b*) Indigenous Steel .	9 month's stock (Revised to 3 to 6 month's from 1981-82).	9	..	8.1	..	6.4	..	9.9	..
						(*Per cent*)				
3.	Machinery Spares .	10 *per cent* of the value of actual Plant and Machinery and Test Equipment (Revised to 8 *per cent* from 1981-82 in respect of Equipment division spares).	10.3	1.3	11.8	1.3	11.3	1.7	10.7	1.9

4. Work-in-progress :									
(*a*) For Equipment production.	20 to 30 *per cent* of planned production at cost or 30 to 40 *per cent* at selling price (Revised to 30 to 40 per cent of production planned at cost from 1981-82).	43.5	91.4	42.6	86.7	39.4	71.3	40.0	50.9
		34.5	..	32.3	..	30.0	..	26.2	..
					(Months)				
(*b*) For Components production.	Less than one month at any time (Revised to 2 to 3 months from 1981-82).	2.7	..	2.8	..	3	..	2.9	..
5. Finished Goods :									
(*a*) Equipment other than spares.	3 month's stock (Revised to 1 month from 1981-82).	0.9	0.6	0.6	0.5	1.1	0.2	0.9	0.3
					(Per cent)				
(*b*) Saleable spares—equipment.	10 per cent of the production planned.	3.7	5.6	4.3	4.9	4	5.2	4	6.3
					(Months)				
(*c*) Components	4 to 5 month's stock (Revised to 3 month's from 1981-82).	2	..	1.9	..	2.9	..	2.6	..

11.03.3 It may be observed that inventory held in Bangalore and Ghaziabad Units was far in excess of the norms in respect of the following categories :

(a) Bangalore Unit

(i) Imported raw materials and components for Components production (other than Crystals) during 1979-80 to 1981-82 and for Crystals production during 1979-80 and 1980-81. The holding of inventory as on 31st March 1982 was abnormally high in Microwave Tubes, Power Devices, Integrated Circuits and Hybrid Micro Circuits.

(ii) Indigenous raw materials and components (excluding Steel) in 1978-79, 1979-80 and 1981-82.

(iii) In respect of machinery spares, the inventory holding as on 31st March 1982 was abnormally high in Microwave Tubes, Germanium Semi-conductors, Hybrid Micro Circuits and Ceramic capacitors.

(iv) Work-in-progress both for Equipment and Components production during 1978-79 to 1981-82.

The value of inventory in excess of the norms as on 31st March 1982 in respect of all categories of stores amounted to Rs. 568.67 lakhs.

(b) Ghaziabad Unit

The inventory position of imported and indigenous raw materials and components, which was excessive in 1979-80 and 1980-81 improved in 1981-82. However, work-in-progress continued to be far in excess of the norms.

11.04 *ABC Analysis*

11.04.1 Generally the categorisation of items of inventory under ABC classes depends on the value of each individual item. But the categorisation followed in the Bangalore Unit of the Company was as under :

'A' Class : Covering items upto 80 per cent of the stock value in the descending order of value of individual items.

'B' Class : Covering items from 81 to 95 *per cent* of stock value, after 'A' items.

'C' Class : Covering the remaining 5 *per cent* of stock value, after 'A' and 'B' items.

Under the system followed, the categorisation of some of the items changes year to year depending on the number of high value items constituting the total inventory.

11.04.2 The ABC analysis of the value of raw materials and components in the Bangalore Unit at the end of 4 years upto 1981-82 was as under :

Class	Value as on 31st March			
	1979	1980	1981	1982
		(Rupees in lakhs)		
'A'	Nil	2146.66	3073.33	3566.26
'B'	Nil	398.36	570.39	716.14
'C'	Nil	134.66	192.62	271.47
Unclassified	3020.00	698.98	31.16	30.18
TOTAL	3020.00	3378.66	3867.50	4584.05

The above categorisation commenced in Bangalore Unit only from 1979-80. In Ghaziabad Unit, this type of categorisation was not being done.

11.05 *Inventory relating to stalled projects*

The inventory of raw materials and components and work-in-progress of the Bangalore Unit included holdings in respect of

'stalled projects' i.e., projects for which orders for production had been released but bulk production clearance was held up due to design and development problems, delay in customer's acceptance, etc. The position of such holdings at the end of 4 years upto 1981-82 was as under :

Particulars	As on 31st March			
	1979	1980	1981	1982
	(Rupees in lakhs)			
Raw materials and components :				
Low Power Equipment Division	102.32	47.71	0.17	Nil
High Power Equipment Division	56.30	51.00	102.00	107.00
Radar Division . . .	5.20	4.00	..	32.45
TOTAL	163.82	102.71	102.17	139.45
Work-in-progress :				
Low Power Equipment Division	164.17	125.84	23.96	Nil
High Power Equipment Division	87.87	78.05	204.48	73.09
Radar Division . . .	2.14	3.60	..	5.97
TOTAL	254.18	207.49	228.44	79.06

It will be seen that the inventory pertaining to stalled projects has been substantial. Year-wise details of the inventory locked-up were not available.

11.06 *Non-moving and slow-moving stores*

The value of non-moving and slow-moving items as at the end of 4 years upto 1981-82 was as under :

	As on 31st March			
	1979	1980	1981	1982
	(Rupees in lakhs)			
Bangalore Unit :				
Non-moving . . .	82.53	157.75	186.44	285.43
Slow-moving . . .	298.72	277.86	358.53	330.82
TOTAL	381.25	435.61	544.97	616.25
Percentage to total inventory	12.6	12.9	14.1	13.4
Ghaziabad Unit :				
Non-moving . . .	N.A.	N.A.	111.34	114.99
Slow-moving . . .	N.A.	N.A.	N.A.	N.A.
TOTAL	..	..	111.34	114.99
Percentage to total inventory	..	..	12.1	12.0

The value of non and slow-moving items had been increasing from year to year since 1978-79. The non/slow-moving inventory of Bangalore Unit included inventory relating to the 'stalled projects' amounting to Rs. 163.82 lakhs in 1978-79, Rs. 102.71 lakhs each in 1979-80 and 1980-81 and Rs. 139.45 lakhs in 1981-82.

11.07 *Obsolescence and redundancy of materials*

During 1977-78 to 1981-82, materials valued at Rs. 416.75 lakhs were written off by the Company for several reasons such as lack of demand, process/design changes, abandonment of development, deterioration of materials in storage, obsolescence of materials, lower mortality rate than provided for and quality problems with materials, unsuitability, surplus to requirements, etc. The Unit-wise break-up of the amount written off was as follows :

Year	Bangalore Unit	Ghaziabad Unit	Total
	(Rupees in lakhs)		
1977–78	49.69	..	49.69
1978–79	83.78	..	83.78
1979–80	10.80	2.58	13.38
1980–81	1.49	11.17	12.66
1981–82	189.86	67.38	257.24
TOTAL . . .	335.62	81.13	416.75

Though obsolescence and redundancy occurred fast in Electronics Industry and redundancy on account of certain factors had been a recurring feature, the Company had not evolved any policy to make a provision for redundancy annually on an estimated basis in its accounts so that the working results of a particular year were not vitiated as a result of write off.

11.08 *Custody and disposal of materials written off*

11.08.1 As per the procedure in vogue, materials whose value had been written off in the accounts were transferred to and held in a separate store called 'Surplus Stores' where only a

quantitative account was maintained. Generally, there was quite a time gap before they were actually disposed of, as the items were to be reviewed from time to time by a Screening Committe to consider their alternative use by Production departments of all units and co-ordination with Sales department for disposal. After screening, the items to be finally disposed of through auction were determined and transferred to 'Disposal Stores'. Such of those items found useful were again drawn by Production departments, Sales department and other units at 'Nil' value; this resulted in inflation of profits of the year in which they were re-drawn for consumption.

11.08.2 The table below indicates the value of materials held in Surplus Stores :

(Rupees in lakhs)

Year	Opening balance	Addition	Total	Issue for disposal	Redrawal by departments	Total issues	Closing balance
1978–79 .	146.35	85.73	232.08	3.00	14.00	17.00	215.08
1979–80 .	215.08	10.80	225.88	21.71	26.61	48.32	177.56
1980–81 .	177.56	1.39	178.95	29.80	15.00	44.80	134.15
1981–82 .	134.15	211.49	345.64	45.57	12.23	57.80	287.84
TOTAL .		309.41		100.08	67.84	167.92	

In this connection, the following observations are made :

(i) No bin cards were maintained in Surplus Stores for the materials transferred and held there. The register maintained till 1977-78 and Index Cards introduced from 1978-79 did not serve the purpose of bin cards.

(ii) The value of stores was high during each of the years due to inordinate delay in the determination and disposal of surplus stores.

(iii) Though the stock verification procedure prescribed a relaxed cycle of 100 *per cent* physical verification of surplus stores items only once in 3 years this had not been done so far.

The Ministry has stated (March 1983) that the above observations are receiving attention by the Company.

11.09 *Injudicious purchase*

Eight purchase orders were placed by the Bangalore Unit of the Company on a foreign firm between April 1972 and July 1975 *inter alia* for 1350 gms. of Boron Crystaline and 153 Nos. of Velo Foam sheets required for the production of Integrated Circuits. Out of a total quantity of material costing Rs. 12.21 lakhs received between June 1972 and August 1975 only 25 gms. of Crystaline (Value : Rs. 0.20 lakh) were drawn in April 1978 for testing and 48 Nos. of sheets (Value : Rs. 0.50 lakhs) were drawn between March 1975 and October 1982 even though 36.14 lakhs of Integrated Circuits were produced between 1972-73 and 1981-82. Thus, the materials were apparently not required for production during all these years. Repeated purchases without any reference to the consumption pattern, stock position and the schedule of implementation of the project resulted in un-necessary locking up of funds to the extent of Rs. 11.83 lakhs (FE : Rs. 6.67 lakhs) and the consequent loss of interest of Rs. 12.72 lakhs upto November 1982.

The Ministry stated (September 1980) that :

(i) The procurement of the chemical was made on an *ad hoc* basis for developing an entirely new process. However, on trial usage, certain problems were encountered and hence further usage of the material was stopped.

(ii) The chemical had recently been tested and found that the quality was intact. There was already a project coming up for Silicon material manufacture, expected to be launched by 1981-82, and existing stock of the material would be utilised. Cost of the material if procured in 1981-82 or later might be much more than actual expenditure incurred and difference would more than offset loss of interest.

(iii) As regards sheets, the production of MOS type ICs, which consume this material, had been low and that there would be a rapid consumption of this item in coming years as production of MOS type ICs was being stepped up.

In this connection, the following observations are made :

(a) No records have been produced by the Company in support of the statement that certain problems were encountered during trials ; the Company has also not indicated the dates on which tests were conducted to ensure the quality of the chemical.

(b) As the project for manufacture of Silicon materials has been given up in October 1982, there is no possibility for the use of the chemical as claimed.

(c) As heavy unsold stocks of MOS ICs have accumulated, it remains to be seen whether the stepping up of production of these ICs would materialise to an appreciable extent in the coming years.

(d) The fact, however, remains that in this case purchase orders were placed frequently without reference to the stock position and consumption pattern as a result of which the materials are remaining unutilised for a very long time.

In view of the above facts, the reply of the Ministry is not convincing.

12. FINANCIAL POSITION AND WORKING RESULTS, ETC.

12.01 The financial position of the Company during the 5 years upto 1981-82 is indicated below :

Liabilities	1977-78	1978-79	1979-80	1980-81	1981-82
			(Rupees in lakhs)		
(a) Paid-up Capital	846.00	1,000.00	1,150.00	1,300.00	1,350.00
(b) Reserves and surplus	2,780.98	3,187.41	3,443.57	3,978.58	4,762.90
(c) Borrowings :					
Government loans	1,884.19	1,759.37	1,586.37	1,569.29	1,623.12
Deferred credit	26.91	15.90	8.31	4.15	..
Cash credit	408.66	102.08	1,211.87	1,498.96	1,297.32
Loans from Banks	..	..	..	..	200.00
Fixed deposits	..	..	..	..	234.02
(d) Trade dues and other liabilities (including provisions)	8,040.96	8,087.92	8,130.03	10,569.80	10913.72
TOTAL	13,987.70	14,152.68	15,530.15	18,920.78	20,381.08

Liabilities	1977-78	1978-79	1979-80	1980-81	1981-82
Assets			(Rupees in lakhs)		
(*e*) Gross block	5,628.30	5,949.94	6,528.86	7,232.33	8,099.48
(*f*) *Less* Depreciation	3,146.52	3,618.14	4,094.11	4,595.09	5,344.04
(*g*) Net Fixed Assets	2,481.78	2,331.80	2,434.75	2,637.24	2,755.44
(*h*) Capital works-in-progress	131.81	204.24	158.93	316.03	286.50
(*i*) Deferred revenue expenditure of Pune Unit	5.41	18.52	..	5.25	5.25
(*j*) Current assets, loans and advances	11,368.70	11,598.12	12,936.46	15,962.25	17,333.87
(*k*) Investments	..	..	0.01	0.01	0.02
TOTAL	13,987.70	14,152.68	15,530.15	18,920.78	20,381.08
Capital employed*	5,809.52	5,842.00	7,241.18	8,029.69	9,175.59
Net Worth**	3,621.57	4,168.89	4,593.57	5,273.33	6,107.65

*Capital employed represents net fixed assets *plus* working capital.

**Net worth represents paid-up capital *plus* reserves and surplus *less* intangible assets.

12.02 *Working Results*

12.02.1 The overall working results of the Company during the 5 years upto 1981-82 are tabulated below :

	1977-78	1978-79	1979-80	1980-81	1981-82
			(Rupees in lakhs)		
1. Sales (including income from services)	7,459.67	7,637.69	8,294.98	6,890.68	12,843.95
Less Excise duty, discounts, allowances and rebates	208.28	308.68	468.55	185.98	231.33
2. Net sales (including income from services)	7,251.39	7,329.01	7,826.43	6,704.70	12,612.62
Accretion (+)/Decretion (—) in finished goods and work-in-progress	(+) 156.02	(+)533.93	(+) 206.53	(+)1,017.05	(—) 115.40
3. Net value of production	7,407.41	7,862.94	8,032.96	7,721.75	12,497.22
Less Consumption of raw materials and components, etc.	3,190.74	3,502.92	3,823.77	3,407.10	5,123.33
Value added	4,216.67	4,360.02	4,209.19	4,314.65	7,373.89
Conversion cost :					
Employees' remuneration and benefits	2,096.66	2,303.50	2,420.75	2,215.04	3,132.33
Depreciation	470.82	471.33	492.24	523.68	762.03
Interest	335.97	201.88	286.32	415.56	525.75

	1977-78	1978-79	1979-80	1980-81	1981-82
Power, Fuel and Water	145.90	175.29	174.75	181.36	238.38
Repairs and maintenance	139.97	158.76	214.66	189.32	290.10
Other expenses	564.29	462.13	471.90	482.82	913.28
TOTAL	3,753.61	3,772.89	4,060.62	4,007.78	5,861.87
Less other revenues and transfers	435.02	633.09	702.11	586.46	500.57
Net Total	3,318.59	3,139.80	3,358.51	3,421.32	5,361.30
6. Profit before tax (4 — 5)	898.68	1,220.22	850.68	893.33	2,012.59
7. Provision for tax	510.00	700.00	470.00	415.24	1,075.00
8. Profit after tax	388.08	520.22	380.68	478.09	937.59
9. Percentage of :			(Per cent)		
(*a*) Value added to net value of production	56.93	55.45	52.40	55.88	59.00
(*b*) Conversion cost to value added	78.68	72.01	79.79	79.30	72.71

The Company incurred losses aggregating Rs. 9 lakhs since its inception in 1954-55 upto 1958-59 and thereafter it has been earning profits. The total profits (net) before and after tax upto 1981-82 amounted to Rs. 11,963 lakhs and Rs. 5,817 lakhs respectively.

In this connection, the following points deserve mention :

(i) The profits did not take into account the entire value of redundancies and obsolescence in inventory but only to the extent they were written off each year. As the Company conducts an annual review of inventory without reference to the project-wise inventories, the amounts written off in the accounts of each year did not represent the entire redundancy/ obsolescence in inventory of all the abandoned or discontinued projects.

(ii) The decrease in profit before tax in 1979-80 by Rs. 369.54 lakhs as compared to 1978-79 was stated to be due to the decline of margins on Defence orders. The profit of Rs. 893.33 lakhs before tax in 1980-81 (an increase of Rs. 42.65 lakhs compared to 1979-80), in spite of the lower turn-over in Bangalore Unit on account of the prolonged strike, was mainly due to higher export assistance/receipts in the Bangalore Unit and profit of Rs. 323.38 lakhs made by the Ghaziabad Unit, for the first time since inception.

(iii) The substantial increase of Rs. 1,119.26 lakhs in profit before tax during 1981-82 compared to 1980-81 was due to price increase of Rs. 456 lakhs obtained during 1981-82 on an equipment supplied to the Army in 1980-81 and increase of Rs. 265 lakhs in the profit of Ghaziabad Unit and substantial increase in sales of equipment in Bangalore Unit resulting in increase of profit by Rs. 400 lakhs during the year.

12.02.2 The working results of Ghaziabad and Bangalore Units (excluding head office over heads) are discussed below :

(a) *Ghaziabad Unit*

Year	Expenditure	Revenue	Profit / (Loss)	Cumulative loss at the end of the year
		(Rupees in lakhs)		
Upto 1977-78	4414	3465	(949)	(949)
1978-79	1124	805	(319)	(1268)
1979-80	1302	1150	(152)	(1420)
1980-81	1527	1850	323	(1097)
1981-82	1965	2553	588	(509)

The net loss of Rs. 1,420 lakhs of the Unit upto 1979-80 completely wiped out the total investment upto that date. The trend of continued losses since inception underwent a change in 1980-81 when the Unit earned a profit of Rs. 323 lakhs. In 1981-82, the Unit earned a profit of Rs. 588 lakhs. The cumulative loss to end of 1981-82 thus came down to Rs. 509 lakhs.

The factors which mainly contributed to the losses in the Ghaziabad Unit are :

(i) High production costs due to prolonged production cycle beyond the targets envisaged.

(ii) Huge pre-production costs charged off in accounts without amortising over production.

(iii) As all the products manufactured are either developed items or manufactured for the first time, huge expenditure involved in frequent changes in the design consequent to customer trials, could not be absorbed in the selling price.

(b) *Bangalore Unit*

Division	Profit/(Loss) 1977-78	1978-79	1979-80	1980-81	1981-82
	(Rupees in lakhs)				
Equipment Divisions					
Low Power Equipment . . .	224.10	77.28	205.51	49.59	216.06
High Power Equipment . . .	164.20	63.59	220.99	427.01	776.31
Radars . . .	631.70	1088.48	179.56	49.47	504.93
Components Division					
Entertainment tubes	34.80	182.59	227.51	123.24	39.15
Semi-conductors .	10.10	76.57	162.64	(64.19)	(108.34)
Passive components	32.60	45.02	41.94	8.17	24.36
Coils, PCB, etc. .	..	..	0.61	(0.54)	2.30
TOTAL . .	1097.50	1533.53	1038.76	592.75	1454.77
T.V. Picture tubes included in Entertainment tubes .	(3.90)	85.65	120.29	77.54	137.80
Integrated Circuits included in Semiconductors .	(80.81)	(46.86)	(27.58)	(78.55)	(186.10)

It may be seen that the operations of High Power Equipment Division, which supplies equipment mainly to Civilian customers, are resulting in substantial profits. In the Components Division, the Company has been incurring continuous losses on Integrated Circuits.

12.03 *Sundry Debtors*

12.03.1 The particulars of Book debts and Sales during the 5 years upto 1981-82 are given below :

Year	Book debts at the year end			Sales (including income from services) during the year	Percentage of book debts to Sales
	Considered good	Considered doubtful	Total		
			(Rupees in lakhs)		
1977-78. . .	1505.09	42.08	1547.17	6010.22	25.74
1978-79. . .	1451.48	49.65	1501.13	7075.81	21.21
1979-80. . .	1745.69	45.96	1791.65	7299.69	24.54
1980-81. . .	1468.46	82.45	1550.91	5060.75	30.65
1981-82. . .	3175.26	76.03	3251.29	10205.62	31.86

The customer-wise analysis of the Book debts outstanding for more than one year as on 31st March 1982 is furnished below :

	More than one year but less than 2 years	More than 2 years but less than 3 years	More than 3 years	Total
		(Rupees in lakhs)		
Defence.	131.15	34.57	27.70	193.42
Other Central Government departments . . .	44.96	57.14	38.60	140.70
State Governments . .	12.82	2.57	3.48	18.87
Public Sector Institutions .	4.99	5.42	3.14	13.55
Others	0.39	0.34	0.33	1.06
TOTAL	194.31	100.04	73.25	367.60

12.03.2 The Book debts outstanding at the end of each year included substantial amounts relating to Sales remaining unbilled. Year-wise position of such unbilled outstandings for the 5 years upto 1981-82 is as follows :—

Year	Total Book debts at the end of the year	Unbilled Sales at the end of the year	Percentage of unbilled sales to total debts
	(Rupees in lakhs)		
1977–78	1547.17	468.07	30.3
1978–79	1501.13	539.26	35.9
1979–80	1791.65	575.72	32.1
1980–81	1550.91	624.94	40.3
1981–82	3251.29	1885.19	58.0

The setting up of Sales in Accounts without raising bills is *prima facie* an incorrect commercial practice. The non-billing of Sales was mainly due to non-finalisation of acceptance of tenders and non-receipt of inspection notes in respect of supplies made. An analysis of unbilled outstandings of over 3 years as on 31st March 1982 revealed that most of the amount pertained to non-billing of balance 5 *per cent* of supplies made against Directorate General of Supply and Disposals orders and also included amounts outstanding for over 5 and 10 years amounting Directorate General of Supply and Disposal's orders and also of interest on the unbilled outstandings for over one year worked out to about Rs. 13.00 lakhs annually.

As against Rs. 1,885.19 lakhs outstanding as on 31st March 1982, the unbilled Book debts as on 28th February 1983 was reported to be as under :

Year of despatch	Balance as on	
	31st March 1982	28th February 1983
	(Rupees in lakhs)	
1981–82	1699.51	208.53
1980–81	121.94	10.01
Upto 31st March 1980	63.74	41.93
TOTAL	1885.19	260.47

12.03.3 The Company wrote off unbilled book debts aggregating Rs. 12.26 lakhs during 1977-78 to 1981-82 as under :

Year	Amount
	(Rupees in lakhs)
1977-78	2.02
1978-79	5.14
1979-80	3.57
1980-81	0.26
1981-82	1.27
TOTAL	12.26

The Debts (Rs. 5.14 lakhs) written off in 1978-79 pertained to 1963-64 to 1975-76 and related mostly to unbilled outstandings of DGS&D contracts for which acceptance of tenders had not been finalised. Thus, the possibility of unbilled debts outstanding for over 2 to 3 years becoming eventually irrecoverable cannot be ruled out.

12.04 *Internal Audit*

An Internal Audit Department was set up in the Company in June 1956. The functions of Internal Audit prescribed in the Chapter on Internal Audit in the Accounts Manual (1971) of the Company include the offering of financial advice, conducting of special reviews covering budgetary/cost control, operational cost, working of projects/departments, idle capacity, surplus staff, materials, etc. The Internal Audit Department had not conducted any system reviews as envisaged but involved itself mostly in physical verification of stocks. The Company claimed that the following reviews/appraisals done during the last few

years (1978—82) by Officers from other disciplines had to be treated as done by Internal Audit :

(i) Study of accounting and classification systems.

(ii) Appraisal of cash management.

(iii) Review of investments made in respect of certain products of Components Division.

(iv) Review of stores procedures and categorisation.

(v) System review of inspection of materials received.

(vi) Review of operation of Regional offices/Sales depots and preparation of a manual to cover these operations.

Entrusting of the function of offering financial advice, which is *prima facie* an accounting function, to Internal Audit is not in order. In addition, the reviews conducted above by the Officers from other disciplines cannot be treated as reviews done by Internal Audit. In addition, important findings of Internal Audit have not been placed before the Board of Directors.

In this connection, the Ministry stated (April 1983) as follows :

> "The Company is being advised to place the important findings of every Internal Audit Report to the Board of Directors through the Chief Executive.
>
> A revised Internal Audit Manual, setting out the organisation and function of the Internal Audit in the Company is being finalised and will be placed before the Company's Board of Directors shortly. This will provide for disassociating the Internal Audit

Department from rendering advice at the pre-decision making stages; routine functions such as stock verification shall also be excluded from the purview of the Internal Audit. The change-over to the new system will, however, be effected in phases.

The Company, however, is being advised to constitute regular Internal Audit teams in future, co-opting Officers from other disciplines as members of the Audit team wherever necessary."

12.05 *Budgetary Control*

A comprehensive budget manual as per Bureau of Public Enterprises' instructions of March 1968 has not yet been complied so far (April 1983).

The Ministry stated (April 1983) as under :

"The Budget Manual is likely to be finalised soon by the Company and placed before the Board for approval. However, the Ministry has already prescribed uniform formats for preparation of Budget in September 1982, for public sector undertakings under its administrative control. The instructions visualise a mid-year review."

13. OVERALL SUMMARY

13.01 *Introduction*

The Company (authorised and paid up capital at Rs. 1500 lakhs and Rs. 1350 lakhs as on 31st March 1982) was established as a fully-owned Government of India Undertaking in 1954 to produce professional electronic equipment required for Defence Services and other Civil Government departments and specialised components for the entertainment electronics industry in the country.

13.02 *Objectives*

Till November 1979, the Company had not laid down its Corporate objectives and obligations as required in the Bureau of Public Enterprises' circular of November 1970. In November 1979, the Company forwarded to the Bureau of Public Enterprises and the Government its Corporate and Micro-objectives and Corporate Plans for 1979—86 to be consistent with the broad objectives spelt out in the Industrial Policy Statement of December 1977 without getting them approved by the Board of Directors; these were ratified by the Board in April 1982. In December 1979, the Ministry communicated certain observations on which action is yet to be taken (April 1983).

The actual achievement for the 3 years upto 1981-82 in respect of Capital expenditure was Rs. 2,333 lakhs as against Rs. 5,708 lakhs planned and in respect of Sales Rs. 28,030 lakhs as against Rs. 33,400 lakhs planned.

13.03 *Sanctioning and Implementation of Project*

The Company has established 3 production units at Bangalore, Ghaziabad and Pune. The Company's plans to establish 2 more units, one each in Haryana and Uttar Pradesh, and a plant near Greater Bombay are under implementation.

Upto July 1978, the proposals for taking up new/expansion projects submitted to the Board/Government did not comply with the important guidelines laid down by the Bureau of Public Enterprises in April 1968 and December 1969. There was also no system of monitoring regularly, the physical and financial progress of the projects under implementation and only in April 1982, this system was introduced. As a result, the Company did not have the details of actual expenditure incurred in respect of each implemented project *vis-a-vis* the cost over-runs. Some of the salient features noticed in the implemented projects are as follows :

(a) In some cases the gestation period in achieving the expected production capacity for the projects was too long.

(b) In the case of Ghaziabad Unit, the Product-mix originally envisaged did not materialise due to the changes in the Defence Plan. As a result, the capacities established remained largely unutilised for several years. The Company preferred a claim for compensation for the idle capacities which was turned down by Government. There was delay of about 2 years in the implementation of the Diversification Plan. The Unit incurred losses of Rs. 1420 lakhs upto 1979-80 since inception. Only from 1980-81, it earned profits which brought down the accumulated loss to Rs. 509 lakhs to end of 1981-82.

(c) In the case of the T.V. Picture Tubes Project, there was a delay of over 4 years in implementing the scheme for enhancement of production capacity from 1 lakh to 2 lakh tubes annually. As a result, the country had to import tubes to meet the growing requirements.

(d) In the case of Integrated Circuits, the Company obtained design and production information only in respect of 50 per cent of the types of products which were being produced by the Collaborator; the percentage of utilisation of established capacity had been low; the ICs taken up for production were mainly of SSI Complexity and in some cases of out-dated design; the cost of production being very high, the Company had incurred losses in the sale of these products, the cumulative loss working out to Rs. 401.52 lakhs. The Company had not been

producing some of the ICs required for its own in-house requirements necessitating imports though the production capacity was lying unutilised.

(e) The Silicon Materials Project, which was considered critical from the national angle was abandoned on the plea of inadequate finances.

(f) In the case of Marine Navigational Radars, the types of Radars selected by the Ministry of Defence for manufacture in collaboration with a foreign firm were subsequently found to be obsolete and as against an estimated requirement of 200 Radars for civil and defence users at the time of formulation of project proposal, orders for only 22 Radars were actually received by the Company. A loss of Rs. 19.13 lakhs was incurred by the Company in this project which has since been discontinued.

(g) In the case of Cyclone Warning Radars, the Company supplied 4 Radars to the Meterological Department with delays ranging from 14 to 60 months.

13.04 *Research and Development*

(a) The Company entered into 43 collaboration agreements with 22 collaborators upto 31st March 1982 for manufacture, under licence, various products. Only 2 licences are currently running. The total amount of licence fee and royalty paid on these agreements upto 1981-82 was about Rs. 550 lakhs.

In respect of the agreement concluded with M/s. 'S' of Country 'X' in February 1969, the collaborators did not furnish details of the prices of sub-assemblies and components as required under the terms of the agreement and the Company had to pay for the imported parts, prices as claimed by the collaborators

though in some cases the prices charged were found to be high. In the case of another agreement with M/s. 'T' of Country 'Y' concluded in February 1971, Government did not exercise the option to develop certain equipment with their assistance. Instead, the development was entrusted to an indigenous agency in July 1976; the equipment is expected to be productionised in 1985. Meanwhile, equipment valued at Rs. 994.13 lakhs had to be imported to meet the immediate requirements of the Defence Services.

(b) Though Research and Development activities commenced in the Company since 1956, only in April 1982 the Board had laid down a detailed policy on the R & D activities to be undertaken in the Company. A Special Committee appointed by the Board in March 1977 to examine and report on all aspects of the problems relating to development, engineering, proto-type fabrication and transfer of technology to production, pointed out several deficiencies in the R&D organisation. Though the Committee on Public Undertakings (1971-72—5th Lok Sabha) recommended that a perspective plan for R & D be drawn up for next 10—15 years, no action has so far (April 1983) been taken by the Company to prepare a perspective R & D plan.

Even after incurring a revenue expenditure of Rs. 3768.87 lakhs and a capital expenditure of Rs. 730.09 lakhs upto 31st March 1982, in the Bangalore Unit the value of production of wholly/partially Company-developed products worked out to 37.77 *per cent* of the total production upto that date.

The Company did not maintain records showing the number of R & D projects taken up, the number of projects successfully developed and productionised, etc. In the area of Components, the overwhelming emphasis on R & D was on active devices; in the area of passive components, the R & D effort had been restrictive. Upto 31st March 1982, 34 projects taken up for development on which an expenditure of Rs. 68.20 lakhs was

incurred were abandoned for reasons such as non-materialisation of expected orders, lack of conformity to specifications, changes in Users' requirements, etc., and 29 successfully developed projects on which an expenditure of Rs. 44.49 lakhs was incurred, were either not productionised at all or only small quantities were produced for which reasons were not available. In addition, 5 more successfully developed projects, on which an expenditure of Rs. 156.53 lakhs was incurred, were abandoned for reasons such as competition from equipment produced through imported kits by other manufacturers and availability of cheaper sets with foreign know-how manufactured by other undertakings.

Out of 139 projects which were under development in the Company as on 31st March 1982, there were cost over-runs ranging from 10 to 967 *per cent* in 35 cases and time over-runs of more than 4 years in 14 cases. In view of the inordinate time over-runs that had taken place in the development of the products, the utility of the equipment under development appears to be doubtful in view of high obsolescence rate in the Electronics Industry.

An analysis in respect of 4 equipments developed by the Company, for which bulk production clearance was obtained during September 1979 to May 1980, revealed that the total time taken from the date of 'go ahead' to the date of receipt of bulk production clearance, ranged from 52 to 116 months; of this the time taken by the Company for submission of proto-types, modifications, etc. ranged from 36 to 57 months and the time taken by the Users for approval of specifications, conducting of trials, etc. ranged from 13 to 59 months.

13.05 *Utilisation of Capacity*

The Company's present product range consists of 50 equipments and 400 types of components mostly meant for Defence and other Government departments and to some extent for the market.

The Company had fixed production capacities in terms of physical output only for the products manufactured in the Components and Radar Divisions at Bangalore and for the opto-electronic devices produced at Pune Unit. In respect of Ghaziabad Unit the production capacity had been fixed only in terms of value. In respect of products manufactured in the Low Power and High Power Equipment Divisions at Bangalore, the rated capacity had not been fixed either in terms of physical output or in terms of value.

The non-fixation of capacities in terms of physical output was in spite of a specific recommendation of the Committee on Public Undertakings (1971-72—5th Lok Sabha) which suggested that the Company should undertake an assessment of the ultimate and rated capacity and keep a watch over the progress made to achieve the capacity.

In the Components Divisions, for 7 out of 14 products the targets fixed were lower than the capacity established and the actual utilisation was still lower than the targets fixed. In the case of Radar Division, though the Company established capacity in terms of plant and machinery for an annual production of certain quantity of Radars, the man-power engaged was restricted to an annual production of 75 *per cent* of the quantity of leaving machine capacities unutilised. Though the Company was having plans to take up additional items for production in the Division, it was stated that 25 *per cent* of the fabrication capacity, in terms of high cost machinery installed for the production of a particular type of Radar, would continue to be idle.

In respect of Low Power and High Power Equipment Divisions at Bangalore, the extent of utilisation of capacity was not available as the rated capacity was not fixed. The Company, however, estimated that during 1981-82, the utilisation of capacity in Low Power and High Power Equipment Divisions based on its own

assessment of availability of standard hours was 61 *per cent* and 75 *per cent* respectively.

13.06 *Production Planning and Performance*

(a) There was no long-term futuristic production planning in the Company so as to ensure that action for provisioning of materials, involving long lead time, could be taken on the basis of firm production forecasts. Instead, only annual production plans were being drawn up in respect of Components; in respect of Equipment, a Rolling plan for a period of 3 years was being prepared and the annual production plan was being firmed up for each year just a few months before the commencement of the year. As a result of absence of long-term production planning in the Company, raw materials, components and stores and spares valued at Rs. 416.75 lakhs were written off during the period 1977-78 to 1981-82 due to obsolescence, of which about 42 per cent was attributed to lack of demand for the products.

There were shortfalls in the production targets fixed in the Low Power and High Power Equipment Divisions at Bangalore during 1977-78 to 1981-82, some of the common reasons for all the years being delays in development of products, delays in obtaining bulk production clearance, initial teething troubles in productionisation of newly developed products, delays in obtaining supply of components from indigenous/foreign suppliers, etc.

(b) *Rejections and Re-work*

No norms were laid down for rejections in the Equipment Divisions at Bangalore. In the Components Division at Bangalore norms were fixed only for 6 out of 14 products that too only for the assembly stage of manufacture. The reasons for rejections were not being analysed so as to take remedial steps and reported to higher Management. In the case of T.V. Picture Tubes, the process rejections of raw bulbs varied from 5.41 per cent

to 11.06 per cent during 1977-78 to 1981-82 reasons for which were not analysed. The percentage of process rejections fixed by the Company was higher than the percentage indicated by the Collaborators and in all processes excepting one the actual rejections were still higher than the norms fixed by the Company. In the case of Germanium Semi-conductors and Ceramic Capacitors, the actual rejections were more than the standards fixed by the Company.

The cost of re-work in the Equipment Divisions at Bangalore Unit during 1977-78 to 1980-81 worked out to Rs. 463.69 lakhs and reasons for re-work were not analysed. In the case of Components (T.V. Picture tubes), the extent of expenditure on re-work was not assessed and reported to higher Management.

13.07 *Manpower Analysis and Labour Utilisation*

Reconciliation between the total hours paid for and the hours actually booked to productive jobs, showing also unaccounted hours, was not done both in Bangalore and Ghaziabad Units to have better appreciation of the factors relating to non-utilisation of direct workers for other than productive jobs. The cost of idle time in the Equipment Divisions of Bangalore Unit and in the Ghaziabad Unit during the 3 years upto 1981-82 amounted to Rs. 94.18 lakhs. The labour efficiency in the Equipment Divisions at Bangalore Unit and in the Ghaziabad Unit had been low during the 5 years from 1977-78 to 1981-82.

13.08 *Machine Utilisation*

The utilisation of machinery in the Components Division at Bangalore Unit had not been ascertained. The idleness of machinery in the Equipment Divisions at Bangalore Unit and in the Ghaziabad Unit ranged from 30 to 40 per cent in 1981-82. The main reasons for idleness were want of work, want of operators and electrical and mechanical breakdowns. To end of

March 1982, 84 machines costing Rs. 57.97 lakhs were idle for periods of 6 months and above in Bangalore and Ghaziabad Units.

13.09 *Costing System*

The Committee on Public Undertakings (1971-72---5th Lok Sabha) recommended that the Company should introduce standard costing so that performance could be watched against standards. Though the Company introduced standard costing for 2 products in 1973-74 it was discontinued from 1974-75. Reconciliation of input of precious metals issued for production with the output (contained in parts produced/plated) and the quantity recovered was not being done. The Company did not have the information regarding the value of precious metals used in the manufacture of components. In respect of gold plating of Semi-conductors alone the value of Gold Content in the Gold Potassium Cyanide used during 1980-81 and 1981-82 worked out to Rs. 232.45 lakhs.

13.10 *Sales Management and Pricing Policy*

The Board of Directors or the Management did not formulate any pricing policy for the products sold keeping in view the different classes of customers or the products to be sold.

As on 31st March 1982, the value of pending orders in the Bangalore and Ghaziabad Units amounted to Rs. 34,920 lakhs. In the case of Ghaziabad Unit the pending orders related mostly to Defence users and included deliveries due in 1978-79 (Rs. 6 lakhs), 1979-80 (Rs. 2 lakhs), 1980-81 (Rs. 33 lakhs) and 1981-82 (Rs. 1,468 lakhs).

A review of sales of major equipment effected by the Company upto 1981-82 revealed that a loss of Rs. 1689.86 lakhs was incurred in 34 cases for reasons such as deliberate

under-quoting, increase in manufacturing cost due to dealy in production, firm prices having been quoted based on estimates prepared on insufficient/incorrect data, amortisation of the entire pre-production expenses over a limited number of orders as the expected orders did not materialise, etc. As against a target of 10 *per cent* of turn over laid down in the objectives for exports, the actual exports during 1979-80 to 1981-82 ranged from 5.4 to 8.9 *per cent;* the Company is yet to enter the field of project exports.

13.11 *Material Management and Inventory Control*

The value of inventory held by the Company increased from Rs. 8,105.64 lakhs as on 31st March 1978 to Rs. 11,593.92 lakhs as on 31st March 1982. The inventory held in Bangalore Unit as on 31st March 1982 in excess of the norms fixed, amounted to Rs. 568.67 lakhs. The Company had written off materials valued at Rs. 416.75 lakhs during 1977-78 to 1981-82 for reasons such as lack of demand, process/design changes, abandonment of development, deterioration of materials in storage, obsolescence of materials, lower mortality rate than provided for, quality problems, unsuitability, surplus to requirements, etc. From out of the materials written off in the accounts, materials valued at Rs. 67.84 lakhs were retrieved and reused for production during 1978-79 to 1981-82. There was considerable delay in the disposal of surplus stores the value of which amounted to Rs. 287.84 lakhs as on 31st March 1982.

13.12 *Sundry Debtors*

The Company had not been issuing bills in respect of amounts for which Sales were set up. The book debts of Rs. 3,251.29

lakhs at the end of 1981-82 included unbilled sales of Rs. 1,885.19 lakhs representing 58 per cent of the debts outstanding. The unbilled outstandings as on 28th February 1983 amounted to Rs. 260.47 lakhs. The Company wrote off unbilled book debts aggregating Rs. 12.26 lakhs during 1977-78 to 1981-82.

(R. C. SURI)
Chairman, Audit Board and Ex-officio
Additional Deputy Comptroller and
Auditor General (Commercial)

New Delhi
The 9-12-1983

Countersigned

(GIAN PRAKASH)
Comptroller and Auditor General of India

New Delhi
The 9-12-1983