C. P. U. No. 180

COMMITTEE ON PUBLIC UNDERTAKINGS (1971-72)

(FIFTH LOK SABHA)

THIRD REPORT

BHARAT ELECTRONICS LIMITED BANGLORE

MINISTRY OF DEFENCE
(DEPARTMENT OF DEFENCE PRODUCTION)

LOK SABHA SECRETARIAT
NEW DELHI

November, 1971/Kartika, 1893 (S)
Price : Re. 1·50

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C O R R I G E N D A

Third Report of the Committee on Public Undertakings on Bharat Electronics Ltd. (5th Lok Sabha)

Page	Para	Line	For	Read
(iii)		3	Members	Chairman
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23	2.23 (table)	against 1958-59 & under coloumn "Production including work-in-progress".	64.98	64.80
23	2.23 (Table)	against 1961-62 & under coloumn, "Completed Production".	239.14	239.47

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Page	Para	Line	For	Read
23	2.23 (Table)	against 1966-67 & under Col. "Completed Production".	5016.07	1016.07
23	-do-	against 1957-58, & under Col. "Foreign Exchange Savings"	12.68	13.68
23	-do-	against 1966-67 & under Col. 'Foreign Exchange Savings'	671.74	675.74
23	2.23	7. (From bottom)	files	prices
23	-do-	5 (from bottom)	spen	spent
24.	2.26	3	25.56	35.56
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27	3.7	3 (from bottom)	involved	involve
30	3.17	2	held	field
33	4.6	Statement (against item 7)	shift the '*' below "36000 unit under Col. "installed capacity" (against	against Sl.No.7.
39	5.11	(1959-60)	109.68	109.58
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41	5.17	Table (above Col. 3-4)	Achievements Equipments Radar	Achievement Equip- Radar ment 3 4

Page	Para	Line	for	Read
41-42	Heading of the Table (above Cols. 5-8) on pages 41-42.			

For:

Components Division				Total	
Target		Achievement		Target*	Achievement
5		6		7	8

Read:

Components Division				Total	
Target		Achievement		Target*	Achievement
5		6		7	8

43		4	add 'lakhs' after '(No. in	
44	last item of the statement	(fli)		(vi)
48	5.27	7	man	many
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57	6.6	last	delete '2129(Ali)LS-5.'	
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63	7.17	6	nitegrated	integrated
65	(statement)	against 1955-56 under heading "Adjustments pertaining to previous year"	delete	0.21
65	-do-	against 1956-57 under Col. "Profit(+) loss (-)."	add	0.21 after (-)
65	-do-	against 1959-60 under the heading 'Share Capital"	49	496

Page	Para	Line	For	Read
65	(Statement)	against 1966-67 under heading "Cumulative Build up of Reserves"	151	296
65	-do-	2 (from bottom)	add	'urgent operational' after 'to meet'.
66	8.3	(Table) against item (g) under Col. 1968-69'	857.52	857.92
67	-do-	against item (iii) under Col. '1969-70'.	250.75	250.76
70	Table against Sl.No.1 under the heading "BEL Current selling Price."		3,67	3,675
70	Table against Sl.No.2 under the heading "BEL Current Selling Price."		12,00	12,000
71	Table against type "EL-26" under the heading 'BEL wholesale price."		4.10	5.10
71	Note (2) below the table		50½%	50%
71	-do-		material	materials

Page	Para	Line	For	Read
72		9	Delete the word ' 'Germanium."	
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73	Note 3 (below table)		stabilished	stabilised
74	7 (from bottom)		sLowest	Lowest
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78	8.23	18 (from bottom)	these	the
79	8.27	2	taken	take
82	8.35	3	delete after the word 'Government'	
82	8.35 (table)	under Col.4	2.39	21.39
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99		3 (under Col.3)	op	on
103		9 (under Column 3)	duty	duly
106	3(under Co.3)		from	hours
109	18 (under Col. 3)		types	type
113	Under Col.2 against item 26		delete 'and 8.29'	

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COMMITTEE ON PUBLIC UNDERTAKINGS
(1971-72)

MEMBERS

Shri M. B. Rana

MEMBERS

2. Shri K. Baladhandayutham
3. Shri Dinen Bhattacharya
4. Shri G. Bhuvarahan
5. Shri Khemchandbhai Chavda
6. *Shrimati Subhadra Joshi
7. Dr. Kailas
8. Shri S. N. Misra
9. Shri Amrit Nahata
10. Shri P. Parthasarathy
11. Shri Syed Ahmad
12. Shri Narayana Kalliyana Krishnan
13. Choudhary A. Mohammad
14. Shri Dahyabhai V. Patel
15. Shri Kota Punnaiah.

SECRETARIAT

Shri Avtar Singh Rikhy—*Joint Secretary.*

Shri Sameer C. Mookerjee—*Deputy Secretary.*

Shri M. N. Kaul—*Under Secretary.*

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* Elected w.e.f. 11-8-71 in the vacancy caused on the resignation of Dr. V. K. R. Vardaraja Rao, M.P. on 29-7-1971

STUDY GROUP II ON ELECTRONICS AND ELECTRICAL UNDERTAKINGS

COMMITTEE ON PUBLIC UNDERTAKINGS

(1971-72)

1. Shri Dahyabhai V. Patel—*Convener*
2. Shri Amrit Nahata—*Alternate Convener*
3. Choudhary A. Mohammad — *Member*
4. Shri Narayana Kalliyana Krishnan — "
5. Shri S. N. Misra — "
6. Shri Kota Punnaiah — "
7. Dr. Kailas — "

INTRODUCTION

I, the Chairman, Committee on Public Undertakings having been authorised by the Committee to present the Report on their behalf, present the Third Report on Bharat Electronics Limited.

2. This report is based on examination of the working of Bharat Electronics Ltd. upto the year ending the 31st March, 1970. The subject was examined by the Committee on Public Undertakings 1970-71. The Committee also took evidence of the representatives of Bharat Electronics Ltd. and of the Ministry of Defence (Department of Defence Production) on the 18th and 20th August, 1970 respectively. The Committee, however, could not finalise their report due to the sudden dissolution of the Fourth Lok Sabha on the 27th December, 1970. The Committee on Public Undertakings (1971-72) considered and finalised the report at their sitting held on the 16th September, 1971 based on the evidence taken by the previous Committee and the further information furnished by the Ministry/Bharat Electronics Ltd.

3. The Committee place on record their appreciation of the commendable work done by the Members of the Committee on Public Undertakings (1970-71) in taking evidence and obtaining information for this report which could not be finalised by them because of the sudden dissolution of the Fourth Lok Sabha.

4. The Committee wish to express their thanks to the Ministry of Defence (Department of Defence Production) for placing before them the material and information they wanted in connection with the examination of Bharat Electronics Movers Ltd. They wish to thank in particular the representatives of the Ministry and Undertaking who gave evidence and placed their considered views before the Committee.

5. The Committee also place on record their appreciation of the assistance rendered to them in connection with the examination of Audit Paras relating to Bharat Electronics Ltd. by the Comptroller and Auditor General of India.

NEW DELHI;
November 2, 1971.
Kartika 11, 1893 (*S*).

M. B. RANA,
Chairman,
Committee on Public Undertakings.

I

INTRODUCTORY

(A) Historical Background

1.1. In 1948, for the first time, the question of establishing electronic industry in India was considered by the Government of India. In the Industrial Policy Resolution dated 6th April, 1948, Government of India announced the industries, future development of which would be the exclusive responsibility of the State. The wireless apparatus (excluding radio receiving sets) industry was one among them. Government thus assumed the responsibility to establish a sound wireless and electronic industry in India on which future expansion could be based so as to attain, in the near future, a measure of self-sufficiency in the vital equipment of strategic importance.

1.2. An Exploratory Committee was set up by the then Ministry of Industry and Supply in May, 1948 composed of the representatives of the principal users of wireless equipment to advise Government on the steps to be taken to establish the industry in the country.

1.3. The Exploratory Committee addressed electronic equipment manufacturers of international repute for obtaiining offers of collaboration for setting up the industry in India and obtained project reports from firms who evinced interest in the proposed collaboration. A Technical Sub-Committee was thereafter appointed to examine the project reports and to recommend the suitable collaborator. The Technical Sub-Committee recommended in September, 1950 collaboration with a leading French firm of electronic manufacture named Compagnie Generale De Telegraphic Sans Fil (CSF.).

1.4. On the recommendation of the Planning Commission, the project was transferred to the Ministry of Defence in August, 1951. It was then found necessary to reassess the requirements of the principal user departments taking into account the changes that might have taken place during the intervening period. Accordingly, all the Ministries concerned in the matter were requested to furnish their anticipated requirements for 6 or 7 years to come. The requirements as furnished by them were studied by experts to ensure a certain amount of standardisation and the approval of the Cabinet was obtained in the middle of 1952, for setting up of

the Industry in India in collaboration with C.S.F. An Agreement for obtaining technical collaboration and assistance from the CSF for a period of 10 years from 1st January, 1953 was signed in December, 1952.

1.5. A special cell was created in the Ministry of Defence to deal with the preliminary work of the project and to arrange for procurement of machinery and equipment, construction of buildings, etc. for the factroy.

1.6. Later on, in April, 1954, Bharat Electronics Ltd. was formed as a limited concern with an authorised capital of Rs. 10 crores to be subscribed solely by Government of India. The work connected with the project was transferred by the Government of India in May, 1954 to Bharat Electronics Ltd.

(B) Objectives

1.7. The Company was established primarily to meet the requirements of Government Departments and undertakings as well as the requirements of non-Governmental concerns particularly in the matter of components for radio manufacture etc. The formation of BEL as an autonomous company was with a view to ensure expeditious conduct of work by adoption of business like methods of production decentralisation of authority and for attaining self-sufficiency to the extent possible within the minimum period of time in this sophisticated and fast developing field. The main objects of the Company are—

(i) To design, develop and progressively manufacture electronic equipment such as transmitters, transreceivers, oscillators, amplifiers, X-ray tubes, surgical, medical and other appliances and instruments intended for electro and other therapy treatment, and

(ii) to undertake the manufacture of specialised and electronic components, including valves.

1.8. An independent examination of the Bharat Electronics Ltd. was done by the Estimates Committee in 1956-57 and 1958-59 and their recommendations/observations are contained in their Thirty-Ninth and Fifty-Ninth Report respectively. The replies furnished by Government indicating the action taken by them on the recommendations contained in the Reports were considered by the Estimates Committee in 1959-60 and 1960-61 respectively and reports thereon (Sixty-Eighth and Hundred-first) were laid on the Table of the House on 30-4-1959 and 14-12-1960 respectively.

(C) Scope of Development of Electronics Industry

1.9. The first coordinated efforts to assess the requirements of the country (both Civil and Defence) in terms of money for electronics equipments and components was made by Bhabha Committee who had assessed that the annual production of Electronics items in the country which was Rs. 26.5 crores in 1964-65 had to be stepped upto Rs. 300 crores per annum by 1975. On being asked whether the target of Rs. 300 crores for manufacture of electronics equipments per annum by 1975 was considered to be a realistic estimate, the Secretary of the Department of Defence Production stated as follows:—

> "As far as the country's requirements are concerned, the first co-ordinated effort to assess the country's requirements was made in the Bhabha Committee Report and they envisaged that in ten years period—from 1966—75—the total production would be Rs. 1650 crores of equipment; a production of Rs. 300 crores per year by 1975 in equipment, and Rs. 84 crores in components. This included both Defence and Civil requirements. In that, the Defence portion was about Rs. 730 crores out of Rs. 1650 crores. Now, these figures, are being continuously reviewed and the Defence requirements, which have now been formulated on the basis of the present day assessment, are much less than Rs. 730 crores. They are merely Rs. 350 to Rs. 400 crores. But on the other hand, the other requirements for civil needs are much more than the Bhabha Committee's assessment. The overall assessment of production for the 10 year period would be of the order of Rs. 1550 crores. Even though the Defence requirements will be very much less, in the matter of components, where they mentioned that the component production should go to Rs. 84 crores in 1975 our present assessment is that it would be more than that. The production would be more than Rs. 100 crores a year. As for their requirement, it would be more than 300 crores of rupees, and it would be Rs. 400 crores, both Civil and Defence."

1.10. As far as BEL was concerned, the Secretary, Defence Production stated that year by year, the production in Bharat Electronics, was on the increase. For example, in 1969-70 the production was of the order of Rs. 24 crores. For 1970-71 estimated figures were stated to be Rs. 31.30 crores inclusive of about Rs. 6.29 crores for components. The production in 1973-74 was also estimated to go up to Rs. 40 crores of equipment including some items for civil use,

which were estimated at about Rs. 9 crores. So far as components were concerned, it was estimated that during 1970-71 the total production of components in BEL would be of the order of Rs. 6 crores. The witness added that the production in BEL would go on increasing. The witness stated that the level of production in BEL would be stepped up. B.E.L. will set up another factory in Ghaziabad to manufacture latest and more sophisticated equipments like radar etc. with the result that producion would furher go up by Rs. 10 to 15 crores per annum.

Progress of Development of Electronics

1.11. In a note regarding the progress of Electronics, after meeting with the former Member of the Planning Commission and the Secretary, Deptt. of Electronics the Department of Defence Production has stated as follows:—

Total Production of Electronics items:

The Bhabha Committee had visualised that the production of electronics equipment which stood at Rs. 26.5 crores in 1964-65 should increase to Rs. 300 crores per annum in 1975-76 and the production of components from Rs. 4 crores in 1964-65 to Rs. 84 crores per annum in 1975-76. To achieve the targets envisaged by the Bhabha Committee the overall production of electronics equipment had roughly to be doubled every three year, and components two and half times every three years. On this criterion the annual production should have increased by 1970-71 to Rs. 114 crores for equipment and Rs. 25 crores for components. As against these figures, the actual production of equipment and components has been Rs. 138 crores and Rs. 37 crores respectively in 1970-71. The Bhabha Committee had visualised slightly more than four-fold increase in the production of equipment and more than six-fold in the production of components in the six year period. The actual production has been more than five times in the case of equipment and nine times in the case of components. The sector-wise production is discussed further below.

Entertainment Equipment:

The Bhabha Committee had visualised a total production of Rs. 450 crores of entertainment equipment over a 10 year period from 1966 to 1976 and an annual production of Rs. 73 crores to be attained by 1975. As against the anticipated production of Rs. 73 crores in 1975, production has already crossed this figure and was of the order of

Rs. 80 crores in the year 1970-71. Since the prices of entertainment equipment have fallen by about 30 per cent since the Bhabha Committee's recommendations, the actual production in 1970-71 in physical terms is even more than Rs. 80 crores in terms of 1966 prices on which the Bhabha Committee figures were based.

Defence and telecommunications equipment:

In so far as Defence and Telecommunications requirements of the various Government Departments are concerned, they were to be met, by and large, by production in the public sector undertakings, viz. Bharat Electronics Limited and Hindustan Aeronautics Limited under the Ministry of Defence and Indian Telephone Industries under the Ministry of Communications. The Bhabha Committee had envisaged that Defence would need equipment, accessories and spares of the value of Rs. 729 crores over a period of 10 years from 1966 to 1975. This estimate was based on projections given by the users to the Bhabha Committee which had not been subjected to any financial or other scrutiny. Subsequently, these requirements have been reviewed and are likely to be of the order of Rs. 375 to 400 crores for the period 1966 to 1975. The Defence Ministry has been reviewing the requirements from year to year and on the basis of this review they have been planning the production in the Bharat Electronics Limited and Hindustan Aeronautics Limited. By and large, these requirements have been met by indigenous production. Imports have been resorted to only in the case of very urgent requirements or where quantities are so small that it is not economically feasible to undertake indigenous production. It might be pointed out thta production of Defence and other professional equipment by Bharat Electronics Limited and Hindustan Aeronautics Limited, which was of the order of Rs. 6.60 crores in 1965-66 has increased to over Rs. 30 crores in 1970-71. With the reduced requirements of Defence as now determined this rate of growth would be adequate to meet almost all the Defence requirements from indigenous production. In the telecommunications field, however, production in the Indian Telephone Industries increased from Rs. 3 crores in 1965-66 to only Rs. 6 crores in 1970-71. Their production is expected to increase to Rs. 20 crores per annum from 1974-75. The production of the Indian Telephone Industries has not been adequate to meet the total

requirements of telecommunications equipment and imports have had to be resorted to from time to time. However, in order to meet the total requirements in future, a new factory is being set up at Naini in Uttar Pradesh by the Ministry of Communications. There may, however, be need for establishing more factories for meeting the total requirements and this is being investigated.

Other equipments:

In the field of Computors, Industrial Heating equipment, Process Control Equipment, Railway Signalling Equipment, Test Equipment and Nuclear Electronics equipment, the production has also been established and it is increasing so that the total requirements of the country can be met.

Electronics Components:

The Bhabha Committee had laid the greatest stress on the development of electronic components and has called components as the crux of the electronics industry. As stated earlier, the Bhabha Committee had visualised an annual production of components of the value of Rs. 84 crores by 1975. Production in 1970-71 was of the order of Rs. 37 crores, as compared to the Bhabha Committee target of Rs. 25 crores. It is anticipated that the production in 1975 would be of the order of Rs. 140 crores as against Rs. 84 crores envisaged by the Bhabha Committee. Since the prices of components have fallen by almost 30 per cent from what they were in 1966, the present production of Rs. 37 crores is even more in physical terms based on 1966 prices.

Though initially efforts were made to establish production of the common types of electronics components for which there was urgent need and whose capacity could be established quickly, subsequently capaity has also been established for sophisticated and professional grade types of components like Relays, Connectors, Television Picture Tubes, Professional Grade Switches, Capacitors, Registors, Condensers, etc. Production has also been established of some types of Microwave components.

With these efforts, the country would become substantially self-sufficient in the field of electronic components. There are, however, still certain types of equipments where on account of the fact that requirements are limited it would not be economical to set up their production in the country and imports may still have to be resorted to. Such requirements are not likely to be large.

Foreign Technology and Licensed Production:

The Bhabha Committee had visualised that in order to bridge the time gap and to meet urgent requirements, licensed production may have to be resorted to for a period of five years but that efforts should simultaneously be initiated to build up a sound research and development organisation so that the future generation of equipments could be produced on indigenous designs. In the case of professional equipment, particularly those required by the Armed Forces, Production has to be organised to meet a very tight time frame and stringent specifications. In respect of such equipment, therefore, production has been established under licensed agreement for a number of items. At the same time research and development efforts have been increased. Expenditure on electronic Defence research has been steadily increasing. It rose from Rs. 112 lakhs in the year 1965-66 to Rs. 341 lakhs in the year 1969-70. The Bharat Electronics Limited which is the main electronics factory under the Defence Ministry has increased considerably the total volume of production based on indigenous design and development. In 1968-69, the value of indigenously developed equipment produced by Bharat Electronics Limited was of the order of Rs. 1.3 crores out of a total equipment production of Rs. 16.72 crores. In 1970-71 the value of such production was Rs. 6 crres out of a total production of Rs. 1.40 crores.

So far as telecommunications is concerned the entire production which is organised in the Indian Telephone Industries is based on indigenous know-how.

Prices:

The prices of professional and Defence equipment are comparable to those of imported equipment. As regards entertainment equipment and components, with the rapid expansion of production, prices of electronics items have come down by as much as 30% over those prevailing in 1966. The prices of components as well as of the entertainment equipment are, however, still higher than the international prices. This is primerily on account of the fact that the production established in the country in each unit is for very much smaller quantitieh than those in Japan, U.S.A. and other countries. In licensing capacity. the basic policy of the Government has been to broadbase the industry by giving preference to individual enterpreneurs, especially engineers, scientists and technicians. It has also to be ensured that monopolistic tendencies are not created by sanctioning very large capacities which is the case in other countries. The large scale production advantage in bringing down prices, is, therefore not available to our manufacturers. It has been observed that wherever

larger capaities have been licensed to the existing manufacturers, the prices have come down substantially. However, as their volumes are not as large as those produced in other countries, it is difficult to match the international prices.

Foreign Exchange Content:

With larger production of components, the import content in the various equipments has been gradually coming down. Taking the example of Radio Receivers where foreign exchange to the extent of Rs. 8|- per Receiver was released in 1967, the amount has been brought down to only Rs. 0.75 per cent in 1971-72. Similarly in other items of entertainment equipment, test instruments and other equipment, the import content has been coming down with the production of more and more types of components.

For the production of the various types of components foreign echange is released for the import of raw materials. Steps have also been taken to establish indigenous production of many of these raw materials as a result of which the average import content for manufacture of components is about 10 to 15%.

In the case of professional equipment, despite the difficulty of making in India components for which requirements are limited, import content in the case of most equipments for which requirement is large has been gradually brought down. In the case of equipment produced at Bharat Electronics Limited, the import content now generally varies from about 15% to 30% at the stage of final production whereas about four years age, it varied from about 20% to 40%.

National Conference of Electronics:

1.12. A National Conference on Electronics was held in Bombay from 24th to 28th March, 1970 to take stock of electronics industry in the country. This conference being the first of its kind had an added importance because it had collected together all the authorities concerned with research, development and manufacture of electronics.

Action points arising out of the National Conference on Electronics:

1.13. Advances made by the Indian Electronics Industry were highlighted recently in the National Conference on Electronics. The important Action Points are set out below:

1. Innovative leadership with a commitment to the principle of maximum self-reliance must be given due recognition and maximum encouragement.

2. Professional electronics need faster development. To achieve this, it is recommended that some areas of low-power communication in HF, VHF and UHF be thrown open for manufacture and usage by private sector as well as public sector.

3. A coordinating body comprising the Department of Defence Supplies, DGTD, CCI&E and the Finance Ministry would accelerate the development of the electronics industry.

4. It is vital that time delays lengthy paper-work and plethora of rules and regulations be drastically reduced, if the tempo of the electronics industry is to be increased.

5. Economy of scale, specially in the components industry must have a relation to prevailing international scale. Existing units must first be brought up to bulk production levels.

6. An advisory body (from industry) comprising of representatives of the major associations should be considered.

7. To encourage exports, procedures for advance licence drawback etc. need to be standardised and greatly shortened to permit on-the-spot settlement.

8. The scope of the small scale industry must be broadened, permitting them economic capacities of all items including professional equipment.

9. In view of the continuing sophistication in electronics no doctrinaire approach can be taken in regard to collaboration. The guidelines and principles laid down by Bhabha Committee must be srupulously followed. In case foreign inputs are considered necessary for a given product, a graded approach must be used trying the earlier of the following list of alternatives first (a) licensing of patents; (b) consultancy; (c) adaptation etc., before going all the way to 'collaboration'.

10. Licensing for items based on Research and Development conducted within the country should have minimum steps and should normally be considered as assured.

11. To accelerate and actively sustain R & D activities, it is important that a small percentage of foreign exchange allocations be permitted for the unrestricted import of small but vitally essential items without lengthy certification procedures.

12. Industry-wise information and future planning data should be widely circulated so that industry as well as R & D groups are given sufficient lead time to orient their own plants.

13. The Government must encourage small scale industry to establish cooperative units for providing various services including R & D testing, management guidance etc.

14. Materials developed in the National laboratories must be productionised immediately at all costs, including establishment of pilot plants and incentives to industries that do not need foreign collaboration etc.

15. Such sectors of the computer industry which is expected to form an increasing portion of electronics, as can be taken up by small and medium industrial units must be quickly identified and widely publicised.

16. Immediate need for micro-circuits was highlighted at the conference. The technological base and manufacturing facilities existing in the country should be mobilised to provide micro-circuits at an early date.

17. Satellite TV programme offers a tremendous challenge and opportunity for the further development of the electronics industry which must not be missed. The electronics requirements of the programme must be widely published. Some delegates were of the opinion that parties which have their own TV know-how and are not importing same be also allowed to manufacture TV receivers. They should be given liceces for capital equipment and encouragement for R & D.

1.14. The Ministry of Defence in a note have stated that when Dr. B. D. Nag Choudhuri made certain remarks at the National Conference on Electronics he had particularly in mind that production costs of indigenous equipments and components were high compared to international costs despite our lower wages. There was excessive reliance on (i) technical know-how obtained from foreign sources and (ii) licensed production. Government has since constituted a separate Department of Electronics and Electronics Commission with very wide powers to further develop electronics industry.

1.15. Dr. Vikram A. Sarabhai, Secretary, Department of Atomic

Energy and former Chairman, Electronics Committee has stated in a note furnished to the Committee:

> "It is my firm conviction based on facts that were available to me when I was Chairman of the Electronics Committee that our progress in the achievement of self-reliance in the field of Defence and Telecommunications electronics throughout the sixties was most disappointing. This has led to continued dependence even in the early seventies on large scale importation of almost all major systems which should have been produced nationally according to our own needs. Some of the important criteria to judge the progress of a company or an industry in acquiring self-reliance in respect of R & D and in effecting import substitution are:
>
> (1) Relative proportion of requirements of electronics equipment—Defence and for microwave Telecommunications—imported and produced locally at different periods during the past ten years and as it now visualised during the Fourth Plan period.
>
> (2) The c.i.f. value of the imported content of the systems fabricated in India compared to the c.i.f. value of the systems had they been imported as a whole.
>
> (3) The percentage of the total production in the Indian factories which is being undertaken under foreign collaboration of one form or another.

The creation of the Electronics Commission and the Department of Electronics is a step which was overdue and can be confidently expected to successfully created conditions for the overall development of electronics industry as was visualised by the Bhabha Committee.

1.16. The Committee note that at the National Conference on Electronics held in Bombay in March, 1970 some of the leading authorities on Electronics including the ex-Chairman of the Electronics Committee and a leading scientist, who was formerly a Member of the Plnaning Commission and is now Scientific Adviser to Defence Minister were frankly critical of the excessive reliance placed on foreign collaboration and observed that the achievements in the field of attaining self-reliance in Defence and telecommunications electronics throughout the sixties were disappointing. The Committee feel that the perspective plan for electronics industry having been prepared under the eminent chairmanship of late Dr.

Bhabha, there was not adequate follow-up action with the result that even in 1970-71 the value of equipment produced with indigenous know-how in B.E.L. was no more than Rs. 6 crores out of a total production of Rs. 21.40 crores. The Committe would like Government to give the highest priority to the intensification of research and development programme in Electronics in the country so that we are able to attain self-reliance in this crucial industry. In particular, the Committee would commend the suggestions made at the Conference that requests for foreign inputs for electronics industry should be most critically examined with a view to develop self-reliance and do away with, as far as possible, foreign collaboration. The Committee in particular suggest that the methods followed by Japan in achieving a break-through in electronics, by purchasing outright know-how (where necessary) intensifying research and development in close collaboration with industry and production of quality goods at most competitive prices, should be closely examined by Electronics Commission and adopted as necessary in the interest of stepping up our production of electronics to meet the demands of home market and avail of its export potential.

1.17. The Electronics Commission should draw up a perspective plan for the electronics industry in the light of all relevant developments since the Bhabha Committee Report was submitted and have a system of continuously reviewing the trends in demand and production so as to extend in concrete terms every help to the development of electronics industry within the country. A yearly report on the achievements in the electronics industry should be presented in time to Parliament so that the matter receives continuous attention at the highest level.

II

(A) Consultancy & Collaboration

2.1. The main objects of BEL are to design, develop and progressively manufacture electronic equipment like transmitters, transreceivers, escillators, amplifires, X-ray tubes, surgical, medical and other appliances and instruments intended for electronic and other therapy treatment and to undertake the manufacture of specialised and electronic components, including valves.

2.2. The various types and numbers of equipments visualised for production during the period of agreement together with broad outline of the specifications are available in the schedules attached to the CSF agreement. The production activities of the company were based mainly on 4 broad categories:

(a) Communication equipments including Receivers, Transreceivers, Transmitters

(b) Radars

(c) Test and Electronic Instruments

(d) Electronic Components like Receiving Valves, Germanium Semiconductors, Silicon Semiconductors, Mica Capacitors. Ceramic Capacitors, Crystals, Transmitting Tubes, Magnetrons, X-ray Tubes, T.V. Picture Tubes and Cathode Ray Tubes, etc.

2.3. The types of equipments mentioned in the schedule of the CSF Agreement were based on anticipated requirements of the user departments as advised by them at the time of finalising the agreements. The user departments had assessed the requirements based on certain forecasts for a prolonged period. Since rapid developments were taking place in the field of electronics and the actual requirements of the user departments were bound to undergo considerable changes during such a long period, the types of equipments mentioned in the schedule could not be considered as firm by the undertaking. Moreover, in the field of electronics, the manufacturers abroad generally specialised in manufacturing limited types of equipments. There specifications, characteristics and performance were designed to fulfil the particular roles in the electronic industry that the manufacturer had planned. Consequently, no individual

manufacturer, could be able to manufacture and supply the entire range of equipments with the facilities required by the various user departments in India. According to clause 12(i) & (ii), the licence given by CSF was to cover 70 to 80 per cent of the value of production envisaged in Schedules I & II to the agreement. For the remaining 30 to 20 per cent the CSF was to use its good offices to obtain licences etc. from other companies with whom contracts could be entered into by Government.

2.4. Taking into account the imperative need to fully utilise the installed production capacity which are varied and specialised and at the same time, the pressing requirements of the user departments, the only practical course open to the undertaking was—(besides taking up the manufacture of instruments immediately available from the range covered by the CSF) to enter into licensing agreements with other foreign reputed manufacturers whose equipments were found to readily meet the specifications, requirements and preference of the user departments.

2.5. BEL had already derived benefits in the shape of technical and industrial assistance together with production techniques, systems, etc. from the basic collaboration agreements with CSF with the help of which it was possible for BEL to launch production of non-CSF equipments with limited assistance available under new licensing agreements (which were distinct from comprehensive collaboration agreements). This accounts for their entry into collaboration agreements with following 20 collaborators:—

1. CSF, Paris, France.
2. Pye Telecommunications Ltd. England
3. NV Philips' Gloeilampenfabriken, Holland.
4. Marconi's Wireless Telegraph Co., Ltd., U.K.
5. NRDC, New Delhi.
6. NEC Ltd., Japan.
7. Bendix Corporation, USA.
8. Contraves AG, Switzerland
9. S&HAG, West Germany
10. A.E.I. Ltd., England.
11. AT&E (Bridgnorth) Ltd. UK.
12. Redifon Ltd., England
13. Mullard Equipments Ltd., England.

14. Plessey Co., (UK), Ltd., England.
15. Recal Electronics Ltd., England.
16. RCA, U.S.A.
17. Siemens, West Germany.
18. Dyanmics Corporation of America, New York.
19. Fernseh, GmbH, West Germany.
20. Selenia Industries Electroniche Associate Sv-P.A., Roma, Italy.

2.6. The rationale behind the collaboration agreements according to BEL was to bridge the technological gap between the modern technology and the existing State of technology in India. The local research and development may take a long time to design these equipments and components, and it was thought by the undertaking/ Government expedient to undertake licence manufacture instead of starting research and development *de novo*.

2.7. Realistic assessment of the demand of products, in the opinion of the Committee, is vital for every undertaking. In the case of BEL, which bases its demand survey on the anticipated demands of the user departments 'as advised by them (those departments) in their agreements', assessment of demand of products may not prove to be completely realistic. Rapid development is taking place in the electronic Industry. Actual requirements of the user departments may undergo a change in the future. The Committee therefore, recommend that the undertaking should exercise utmost caution in making their demand survey of products and instead of depending exclusively on the assessment made by the user departments, should evolve its own machinery for making demand survey, bearing in mind the likely developments in the electronic field in the future.

2.8. The Committee note that no individual manufacturer, abroad is capable of manufacturing and supplying the entire range of electronic equipments with facilities to user departments in India. In this background, the undertaking/Government had provided in the CSF agreement that the Government should have the liberty to collaborate with other firms. They recommend that BEL should take steps to obviate such a contingency in India in regard to the production of electronic equipments. BEL should, the Committee feel, equip itself in such a way that its products are not restricted in their manufacture to limited type of equipments as in foreign countries. They hope that in this connection, the undertaking will make full use

of the 'liberty to collaborate' with other foreign firms. They note that the BEL has entered into non-CSF collaboration agreements which is a step in the right direction.

2.9. *Basic features of the licence agreements*

All the agreements provide for the following:—

(a) Comprehensive supply of design and manufacturing know-how on the products covered including information on the improvements etc. affected by the collaborator during the course of the agreement.

(b) Technical assistance which includes free training of Indian Engineers on all the processes involved in manufacture of equipment in the works of the licensor as also for the deputation of their engineers to BEL for any assistance required in the production of items.

(c) Supply of specialised machinery, test equipments etc., if required, for establishing indigenous production.

(d) Obligation of the licensor to supply raw materials and components etc., required for the Indian production during the tenure of the agreement on mutually agreed prices.

BEL had informed that the terms and conditions of all the licence agreements concluded are in conformity with the policies laid down by the Government from time to time in this regard.

2.10. During the course of evidence on a question as to whether the collaboration agreements with foreign collaborators provide for association of Indian scientists and engineers at the planning and design stage so that they could adapt the process to Indian conditions and also use their experience continuously to improve the product, the Secretary, Defence Production informed the Committee that the research workers, scientists and technologists were associated in the process of development and they knew the techniques and the manner in which things were developed.

2.11. The BEL have stated in a written note that the first agreement with M|s CSF, France (now known as Thomson CSF) had a clause requiring the collaborator to furnish know-how for planning and designing. The collaborators trained the officers of the Company in adopting the techniques in their factories in France to suit Indian conditions. The other collaboration agreements entered into

are only for the know-how for the manufacture of specified equipments and components. Planning an designing have been made entirely by the company without any know-how whatsoever in this behalf, except to a limited extent of the collaborators giving a list of machinery, test equipment, etc. required for the project. These were also screened by the Company's engineers to determine the exact quantity required to suit the conditions in the Company.

2.12. To the best of the information of BEL. there has not been any overlapping in the field of foreign collaboration. The Government, according to written replies of the undertaking, has taken measures to obviate such overlapping by insisting on the agreements, inclusion of a clause stating that, if required, the collaborator will either himself or through the undertaking pass on the know-how to third parties as per terms and conditions to be mutually agreed. This policy was communicated to BEL vide letter No. F. 17(65)|69|D (PS) dated the 15th May, 1969 of the Ministry of Defence.

2.13. The Committee note that one of the basic purposes of the collaboration agreements entered into by BEL, is to secure the association of Indian scientists and engineers at the planning and designing stage so that they could adapt these processes to Indian conditions and use their experience towards improvement of production. As a step in this direction, some officers of the undertaking were trained abroad also in factories of the collaborators. The Committee note the steps taken by the undertaking in the direction of becoming progressively self-reliant in regard to technical personnel raised out of Indian scientists and technicians. The Committee recommend that the process of Indianisation of the technical personnel and scientists should be completed in the undertaking as soon as practicable.

working of Licence agreements

2.14. B.E.L. in a written note have stated that there are 20 collaborators. Out of them one, N.R.D.C. New Delhi is the only Indian Collaborator and the rest are all foreign. B.E.L. have entered into 40 licensing agreements with the said 20 collaborators for the manufacture of various equipments/components. 17 licences have since expired.

2.15. The advantages gained by BEL from Consultants| Collaborators, in brief, are as follows:

(a) establishment of an industry in India in this sophisticated field.

(b) know-how and manufacturing data in respect of a wide range of electronic equipments to meet various user requirements.

(c) manufacture of several equipments/components resulting in considerable saving in foreign exchange.

(d) gaining knowledge of design data etc. and experience in production has given necessary proficiency to Indian Personnel to:

(i) design and develop wide range of new equipments and components;

(ii) to effect improvements and modifications to licensed products;

(e) Bridge the technological gap between India and the western countries and establishing manufacturing and reserach and development facilities;

(f) stepping up of indigenous content in the equipments and

2.16. B.E.L. have stated that extensions were found necessary in the following case:

(1) Agreement with Messrs. COMPAGNIE GENERALE DE TELEGRAPHIE SANS FIL (now designated as M|s. Thomson—CSF, France) dated 11.12.52.

(2) AGREEMENT DATED 11.5.1959 FOR RADIO RECEIVING VALVES WITH M|s. NIV. Philips' Glooilamperfabriken Eindboven, Notherlands (Holland).

Extended for two years from 11.5.1969 to 10.5.71 on existing terms.

(3) AGREEMENT DATED 26.10.1960 FOR MEDIUM WAVE BROADCAST TRANSMITTERS WITH M/s. Nippon Electric Company, Japan Extended for five years from 26-10-1965 to 25-10-1970 on existing terms.

(4) AGREEMENT DATED 20.6.1961 for the manufacture of TAPE RECORDERS with Messrs. Nippon Electric Company Limited, Japan.

Extended for 5 years with effect from 20.6.1966 to 19.6.1971 on existing terms.

A proposal for further extension of the Agreement dated 16th June, 1961 with Messrs. Contraves AG Zurich, Switzerland for the manufacture of Superfledermaus Fire Control Radar, which has expired on 15th June, 1971 for a period of five years, is at present under consideration.

2.17. In regard to the actual performance of the completed as well as current agreements BEL have stated that:—

"The collaborators have adhered to the terms of Agreements in regard to duration, items of manufacture and payments. The performance of agreements (both completed and current) has been satisfactory and the BEL has confirmed that the objectives for which the agreements were concluded have so far been generally achieved. In the case of two omnibus agreements concluded with Marconi Wireless Telegraph Co. Ltd., U.K. and Bendix Corporation U.S.A., the number of equipments taken up for manufacture was much smaller than was originally contemplated. The payments were however, related only to equipments selected for manufacture.

The performances of all the licensors with whom BEL entered into licence agreements have been good to the Company. It has helped BEL to establish competency in design and development and indigenous manufacture of a wide range of equipment and components.

There has been no failure in the performance of the obligation on the part of the various licensors with whom we have licensing know-how arrangements. In the case of N.R.D.C. also, the arrangements permitted the use of their patents. But as the Patents were not supplemented or backed up by N.R.D.C. with economic mass-production facilities including specially designed equipment, the assistance available was not adequate for large scale production."

2.18. B.E.L. have further informed the Committee as follows in regard to the working of the licence agreements entered into by them.

(i) *Realisation of the programme of production envisaged in the agreements.*

The programme of production envisaged in the Agreements has been generally achieved. The Agreements provide for

technical assistance and the value of production from time to time is regulated by customer demands.

(ii) *Attainment of self-sufficiency in the matter of production as well as raw materials.*

In this sophisticated field, no individual country or foreign manufacturer is completely indepedent of supplies from other countries or other manufacturers. The licence agreements contemplated provision of manufacturing know-how for parts designed and manufactured by licensors and do not cover items they themselves buy from others. By and large indigenous production of all items for which know-how was available, except for individual items where quantities required were too small for economic production, has been established. Establishing manufacture of components required in small number would involve heavy capital investment which cannot be justified on economic grounds.

(iii) *Attainment of self-sufficiency in the matter of requirements of technical personnel:*

BEL is manned by qualified Indian Personnel and it is only when a new product is undertaken that assistance of a few foreign experts is sometimes obtained for a limited period. No foreigner is a regular employee of BEL.

(iv) *Comprehensive supply of design and manufacturing know-how on the products covered.*

All the licensors have supplied or are supplying the necessary design and manufacturing know-how of the products as well as improvements thereto as envisaged in the agreements.

(v) *Technical assistance which includes free training of Indian engineers on all the processes involved.*

As per terms of the agreements, free training facilities for the engineers of the Company is required to be provided by the licensors at their work. Whenever any assistance is required, deputation of licensor's engineers to assist BEL in production of items can be obtained as provided for in the agreements; but this has been found necessary on rare occasions and in restricted fields. for limited duration.

(vi) *Supply of specialised equipment, test equipment etc. for indigenous production.*

The agreements provide for furnishing data (and also manufacturing know-how, when they are made by the licensors themselves) and specifications of specialised equipments, test equipments etc. In most agreements there is also specific provision for the supply of these equipments by the licensors, if so required. Where the items cannot be fabricated in BEL, purchases are made from the licensor or other sources.

(vii) *Obligation of the licensor to supply raw materials and comments etc.*

In most of the agreements a basis is laid down for fixing of prices of components. However, in respect of raw materials and other items, the prices are required to be agreed at the time of placement of orders. The collaborators have fulfilled their obligation as laid down in the agreements, although there have been delays sometimes in supplies and in some cases negotiations on prices have taken time.

(viii) *Observance of standard terms prescribed for entering into foreign collaboration agreements by the Ministry of Finance|Economic Affairs.*

The collaboration agreements entered into generally conform to the guidelines laid down for entering into foreign collaboration agreements by the Ministry of Finance|Economic Affairs. The deviations, where made, have generally been found necessary because no other collaborator was forthcoming to meet the particular requirements for which the agreement was concluded. In some cases, the collaborators explained that they had their own pattern of payments of technical know-how fee, royalty, and duration of the agreement. and expressed difficulty in deviating from such pattern which had been adopted by them in the case of other licences. In such cases. deviations from guidelines were accepted after ensuring that, on an overall view, the pattern of payments and duration of agreements were reasonable. Approval of appropriate competent authority was taken in these cases.

2.19. The Committee note that the BEL entered into 40 agreements with 20 collaborators. In some of the agreements extension of time had been granted by the undertaking. It is not quite clear from the note furnished by the Ministry the number of cases where deviations have taken place from the guidelines laid down by the Ministry of Finance/Economic Affairs for entering into collaboration agreement.

2.20. The Committee recommend that:

(i) reliance on foreign collaboration agreements for import of technical know-how for the production of various equipments and components should be brought to the minimum and the BEL and other undertakings should strive to attain self reliance;

(ii) extension of tenure of agreements with foreign colaborators should be granted on very rare occasions and deviation from the norms/guidelines laid down by the Ministry of Finance/Economic Affairs should be avoided;

(iii) all undertakings in Public Sector should endeavour without any further loss of time to attain indigenisation in the technical know-how, and in the production of equipments and components and should in no case approach a foreign agency unless a clear certificate is given by the concerned Ministry about their inability to meet their requirements from indigenous sources.

(B) Savings on Foreign Exchange

2.21. The Committee have been informed that the undertaking has contributed its share in the programme of imports substitution in the manufacture of equipments, sub-assembly and components under licence agreement. On the import substitution for the manufacture of equipments and components produced under licence and with the introduction of indigenously designed equipments and components, the undertaking effected saving in foreign exchange amounting to Rs. 1530 lakhs in the year 1969-70."

The total foreign exchange savings from 1955-56 to end of the year 1969-70 amounts to Rs. 6,323 lakhs. Continuous efforts are being made by the undertaking to increase the indigenous contents in the products manufactured by them either by manufacturing the imported components and sub-assemblies in BEL or by locating indigenous sources of supply in the undertaking.

2.22. The Undertaking has stated that it has felt the dearth of sub-contractors willing to manufacture components and sub-assemblies upto the required specifications and incidence of obsolescence of the equipment under production. Frequent introduction of newer equipments incorporating advanced techniques according to BEL will act as limiting factors to the indigenisation efforts. In spite of all these limitations, the Undertaking is constantly endeavouring to increase the indigenous content of the equipments and components manufactured under licence and in addition the undertaking is also introducing equipments and components of its own design to meet the specific requirements of the Defence Services and other user departments.

2.23. The following will show the yearwise savings of foreign exchange effected by the BEL:—

(Rupees in lakhs)

Year	Production including work-in progress	Completed production	Foreign Exchange content	Foreign Exchange savings
1955-56	0·10	..	..	..
1956-57	5·97	2·01	0·54	2·74
1957-58	27·88	11·06	3·21	12·68
1958-59	64·98	67·98	21·20	60·01
1959-60	109·58	110·02	30·93	77·09
1960-61	171·58	131·01	57·36	76·68
1961-62	243·12	239·14	82·47	176·97
1962-63	302·74	310·59	108·97	188·54
1963-64	620·65	495·35	243·18	240·50
1964-65	707·97	520·93	171·69	348·08
1965-66	926·74	934·93	289·00	593·10
1966-67	1194·03	5016·07	304·64	671·74
1967-68	1583·87	1663·29	562·30	1095·49
1968-69	2072·86	1954·15	694·00	1244·27
1969-70	2411·26	2252·77	726·74	1530·26
TOTAL	10443·15	9709·63	3296·23	6323·55

NOTE: (a) Value of production is based on selling files obtaining from time to time.

(b) Foreign Exchange savings have been generally worked out on PEL's selling prices on CIF cost of imported items whichever is lower less foreign exchange spen

2.24. According to the undertaking the saving in Foreign Exchange has been worked out with reference to the selling price or C.I.F. cost whichever is lower as reduced by foreign exchange content of the imported items. The Committee, however, notice from the

Annual Report of the Company for the years 1964-65 and 1965-66 that the value of production including the work-in-progress has been assessed on the basis of the selling prices. As the value of production so arrived at has been reduced to exclude the value of work-in-progress at cost, the resultant value of completed production represents the selling prices. On the basis of the data furnished to the Committee at Paras 8.10 and 8.11 of this Report it is noticed that the landed cost inclusive of Customs duty is lower than the selling prices of the Company.

2.25. In view of the above, the Committee are unable to express any opinion of the quantum of Foreign Exchange claimed to have been saved by the undertaking. The Committee would, therefore, recommend that the Foreign Exchange savings worked out with reference to the C.I.F. costs may be furnished to them duly vetted by Audit'.

2.26. The Committee find that percentage of foreign exchange content of completed production has been on the rising side. Compared to 29.98 per cent in 1966-67, it has risen to 25.56 per cent in 1968-69. The Committee are unable to locate the exact reasons for such progressive increase in foreign exchange content in their products instead of their reduction.

However, the Committee note that in 1969-70, the percentage content of foreign exchange in completed production has shown slight improvement (fall by 3 per cent) but compared to 1966-67 foreign exchange content still remains high. Stressing the need for attaining self reliance as soon as practicable, the Committee urge on the BEL to study this aspect of their performance and take effective remedial measures to reduce their dependence on imported components in this vital industry.

2.27. In a written note BEL has stated that the royalty paid to the foreign collaborators is as follows:—

Year	Rupees in lakhs
1965-66	11·43
1966-67	11·50
1967-68	29·21
1968-69	35·99
1969-70	35·09

2.28. The Committee note that with the introduction of indigenously designed equipment and components, the undertaking has made progressive efforts towards saving of foreign exchange. However, as pointed out in the Report elsewhere, a lack of rapport was visible between BEL and NPL resulting in limited utilisation of knowhow developed by NPL for Ceramic Capacitors, etc. The Committee would urge that there is need for close coordination and cooperation between national laboratories (National Physical Laboratory and Central Electronics and Engineering Institute etc.) under CSIR and BEL in the matter of research and development of knowhow in specified fields so that the country is able to attain self reliance at the earliest and thereby conserve foreign exchange. The BEL has a vital role to play in building up the electronic industry in our country to meet the internal demand and capture an increasing share in export market.

III

ORGANISATION

(A) Organisational set-up

3.1. A chart showing the present organisational set up of Bharat Electronics Ltd. is given at 'Appendix I'.

(i) *Board of Directors*

3.2. Under Articles 70 and 71 of Articles of Association of BEL, the President from time to time, determines, in writing, the number of Directors, of the Company such number, however, not exceeding eleven. The Directors are also appointed by the President and are paid such remuneration as the President may, from time to time, determine. The President has the power to remove any Director appointed by him from Office at any time in his absolute discretion. The vacancy in the Office of a Director appointed by the President caused by retirement, removal, resignation, death of otherwise, may be filled by the President by fresh appointment.

3.3. The present composition of the Board of Directors of BEL is as follows:—

Lt. Gen. A. C. Iyappa (Rtd.)—Chairman-cum-Managing Director.

Directors

Shri J. P. Kacker—Joint Secretary, Department oi Defence Production.

Shri S. G. Dube—Additional Financial Adviser Ministry of Finance (Defence).

Shri A. S. Gill—Joint Secretary, Ministry of Information and Broadcasting.

Dr. D. Y. Phadke—Head of the Technical Physics Division, Tata Institute of Fundamental Research, Colaba, Bombay.

Dr. B. D. Nag Chaudhuri—Scientific Advisor to Defence Minister.

Shri B. Y. Baliga—non-official.

Lt. Gen. E. G. Pattengal—Signal Officer-in-Chief, Indian Army Headquarters, New Delhi.

Air Vice Marshal K. Narasimha—A.C.A.S. (Systems) Air Headquarters, New Delhi.

Commodore B. C. Chatterjee—Director of Electrical Engineering, Naval Headquarters, New Delhi.

3.4. The Chief Executive of the B.E.L. is the Managing Director. He is assisted by—

(1) General Manager.

(2) Controller of Finance.

(3) Officer-on-Special Duty Planning.

(4) Chief Inspector.

(5) Chief Commercial Manager; and

(6) Administrative Manager.

3.5. Article 74(1) of the Articles of Association of the Company empowers the Board of Directors to delegate powers to the Managing Director.

(ii) *Powers of the Managing Director*

3.6. The Managing Director has been vested with wide powers which include (i) purchasing of raw materials, articles and other things required in connection with the operation of the company within limits of Annual Appropriation therefor as sanctioned by the Board of Directors, (ii) to stock spares not exceeding 10 per cent of the value of equipments manufactured or under manufacture (iii) to sanction any project for Research and Development provided the expenditure involved does not exceed Rs. 20,000 in the case of laboratory models, subject to funds being found from the grant for development Projects and report to Directors (iv) to write off losses to an amount of Rs. 10,000 in each case where loss is not occasioned by fraud, theft, or negligence.

3.7. The Managing Director has no powers in respect of acts and things which are specifically required to be done under the Companies Act either by the Board of Directors, or by the Company in the General Meetings. He is also required to refer to the Board all issues which involved:—

(i) Pledging of Company's property.

(ii) Raising of loans, debentures and|or over drafts;

(iii) Disposal or acquisition of any buildings or land;

(iv) Fixation or revision of scales of pay.

3.8. All questions affecting finance and accounts are to be decided by him in consultation with the Controller of Finance.

(iii) *Board of Management*

3.9. Further, the Board of Management of the Company constituted by the President under article 74 of the Articles of Association of the Company serves as an Advisory Board to the Managing Director in the conduct and affairs of the business of the Company. The Constitution of the said Board of Management is as follows:—

(1) Managing Director—Chairman
(2) Controller of Finance—Member
(3) General Manager—Member
(4) Deputy General Manager (E)—Member
(5) Deputy General Manage (R)—Member
(6) Deputy General Manager (P)—Member
(7) Administrative Manager—Member
(8) Chief Commercial Manager—Member.

The functions and powers of this Board of Management as delegated by the Board of Directors are shown at "Appendix II'.

(iv) *Relations with Government*

3.10. Under Article 114 of the Articles of Association of BEL, the President may from time to time issue any such directives or instructions as he may consider necessary in regard to the affairs or conduct of the business of the Company or Directors thereof and in like manner may vary and annul any such directives or instructions. So far, there have been no directives issued under these powers. However, the Ministry of Defence (Department of Defence Production) Government of India who are the Administrative Ministry to co-ordinate the work of the Company have been forwarding the decisions of the Government for information and necessary action.

(B) Coordination with Public Sector Undertakings etc.

3.11. During evidence, the Chairman of BEL stated that BEL maintained close coordination with the Electronics Corporation of India, a public sector undertaking under the administrative control of the Department of Atomic Energy, and were in constant touch

with them. He informed the Committee that Electronics Corporation of India were making certain types of capacitators for BEL to their specifications.

3.12. As regards coordination with Central Electronics and Engineering Research Institute, Pilani, the General Manager of BEL informed the Committee as follows:—

> "I also happened to be nominated on the Committee of that Institute and we are closely in touch with them. There are certain problems of mutual development which we discuss sometimes and collaborate with each other on specific problems. We assign specific tasks to both, NPL and other agencies and take advantage of their organisation."

3.13. During evidence the Secretary, Defence Production stated that coordination between three public sector undertakings, viz., Bharat Electronics Ltd., Hindustan Aeronautics Ltd. and Electronics Corporation of India was effected through the medium of 'Electronics Committee." Apart from that there was also the personal contact between the Scientific Adviser to the Defence Minister as also the Chairman of the Atomic Energy and at the level of those two, some coordination was possible.

3.14. The Committee enquired whether it would not facilitate matters if all the three undertakings were brought under one management. The Secretary, Department of Defence Production stated as follows:—

> "Simple items can, perhaps, be easily coordinated by one management. But the Atomic Energy Commission is also dealing with the highly sophisticated items required exclusively and specially for their purposes. And for these Thumba experiments and all that, they also need sophisticated equipment and their organisations will be taking care of that. They are also in the process of expansion. Similarly, on the Defence side, there are some equipment meant exclusively for the Defence, which have no connection whatsoever with what the Atomic Energy Commission needs or the Civil market needs. So it will be difficult for me to say that one management for all these units will be of the best advantage. But, as I said, we will go deep into the matter and consider these matters, and then we will formulate our views."

3.15. In a written note the Ministry have further stated that at present electronic components were being made only in BEL, but HAL Hyderabad was also trying to establish manufacture of certain types of components which BEL was not producing. In respect of Electronic Corporation of India Ltd. it was essentially set up for the manufacture of nuclear Instruments, Electronic Control Instrumentation requirements of the Atomic Energy Commission and cerain other types of components. Though these units are under two different Ministries, the essential coordination among the three was being done by the Department of Defence Supplies in the Ministry of Defence, who were the authority for implementation of the Bhabha Committee Report. In the latest reorganisation of the Central Secretariat, this work has been transferred from the Ministry of Defence to the newly constituted Department of Electronics in the Cabient Secretariat. Apart from this, the Govt. have decided to set up Electronics Commission from Feb, 1971 which should be able to effect greater coordination.

3.16. The Committee recommend that organisational set up of Bharat Electronic Ltd. should be kept under constant review so that improvements can be effected. It will indeed be a useful exercise if the organisational set up of enterprises engaged in electronics industry in leading foreign countries e.g. Japan, U.S.A. etc. are studied to keep abreast of latest developments in the Electronics Industry and the organisational efficiency with a view to their adaption in the undertaking.

3.17. The Committee are of the view that progress in the electronics held depends upon how far various agencies engaged in design, development or research in electronics field are able to pool their resources and forge a common integrated programme of work. But this is possible only if a close coordination between three public sector undertakings viz. Bharat Electronics Ltd. Hindustan Aeronautics Ltd. and Electronics Corporation of India on the one hand and various Research organisations universities etc. working in the direction of development of Electronics Industry in the country on the other is maintained.

3.18. The Committee note that needs of Atomic Energy Commission and public undertakings on the Defence side vary considerably. The Commission needs highly sophisticated Electronic control instruments required for research and atomic power Stations. Similarly Public Undertakings on Defence side manufacture equipment which primarily serves the needs of Defence and may have no direct

connection with what the Atomic Energy Commission on the Civil side might stand in need of. In view of the above reasons, it does not appear to be advisable to bring these organisations under one umbrella. The Committee, however, suggest to wait for the report of Electronics Commission but in the meantime survey should be conducted to see what simple items of equipment can be co-ordinated and manufactured at one place with a view to standardisation and to economise cost of large scale production

IV

PRODUCTION CAPACITY

(Para 3, Section IX, Audit Report (Commercial) 1969)

Rated Capacity:

4.1. The Company produced about 70 types of various electronic equipment besides a number of components. Owing to diversified production necessitating different types of operation on different machines, no assessment had so far (August, 1968) been made of the rated capacity. The Company, however, planned its annual production programme in advance taking into consideration the demand for the production, capacity of the various shops and availablility of materials from foreign suppliers.

4.2. In this connection, Ministry stated (November, 1968) as follows:—

> "....the position is that owing to diversified production necessitating different types of operation on different machines, product mix of equipment will vary from year to year. It would not therefore be possible to assess rated capacity of the plant except in regard to repetitive items like Valves, Transistors etc."

4.3. The Management in their reply dated 25-11-1967 had stated, inter alia, that apart from diversification of equipment and maximising production, considerable effort was put in to establish indigenous production of more and more components.

4.4. During the course of evidence of the representatives of BEL, the General Manager, BEL, informed the Committee that their assessment of Rated Capacity of important shops was as follows:—

> "There is a mixture of different products; the parts are made in different shops in the factory. You can produce so many meters of textile cloth in a mill or so many tons of iron from a shop, but in the case of electronic equipment which involves fabrication of parts, the equipments are finally assembled and lot of testing takes place thereafter. The production capacity has got to be stated in detail. It is not as if we do not know the capacity of

each shop. We do know it. For example take the production in fabrication shop. It has got a sheet metal shop, it has got an electroplating shop, it has also got transformer division. We practically utilise all the machines in each shop. And in our factory the total utilisation of these machines is of the order of 70 to 75 per cent, which exhibits the correct shop loading, as far as we are conerned. But in terms of the total rupee value, we may say that based on the present product-mix, our production capacity is of the order of 25 to 30 crores."

4.5. Asked whether there was any machinery in BEL, by which they could find out whether the machines existing there had the capacity to produce the expected number of units or not and when they (BEL) fell short of produtcion, was it because of shortage of raw material or lack of machinery? The General Manager, BEL replied as follows:—

"If product-mix can be predetermined and specified, we can indicate the capacity for the product-mix with the available machines and produtcion facilities at our disposal."

4.6. In a written note furnished after the evidence, Ministry of Defence have stated that so far as shops engaged in the manufacture of Components like Valves, Transistors etc., were concerned where the produtcion was repetitive and the quantities large, there was no difficulty in estimating the rated capacity. The present licensed capacity in respect of some of these components in the production line is indicated below:

(Figures in million units)

Sl. No.	Item	Present licenced capacity	Year	Installed capacity	Production Planned	Actual
1	Receiving Vales . .	5·00	1968-69	5·00	4·00	3·27
			1969-70	5·00	3·10	3·21
2	Germanium Semi conductors . . .	16·00	1968-69	10·00	8·00	7·78
			1969-70	10·00	10·00	8·84
3	Silicon Semi conductors	10·00	1968-69	4·00	1·00	1·19
			1969-70	4·00	2·00	2·59
4	Ceramic capacitors	20·00	1968-69	20·00	7·00	8·73
			1969-70	20·00	9·50	11·46
5	Mica capacitors .	14·40	1968-69	7·20	4·00	3·10
			1969-70	7·20	2·00	2·81
6	6. Transmitting Tubes	3600 Units	1968-69	36000 Units	20000 Units	6586 Units
			1969-70	36000 units	4000 units	7695unit
7	X Ray Tubes	3600 units	1969-70		*335 units	294 units

*(This is a new project. The ultimate capacity of 3600 tubes per year is progressively being established.)

4.7. It will be seen from the above statement that the actual production and planned production in almost all the cases was far below the installed capacity. The Committee view with concern the wide gap between the installed capacity and the actual production. The low production not only means loss to the Undertaking but also results in high cost of production. The Committee could get no proper explanation for low production of these items. They desire that the Company should keep a constant watch over the production and sustained efforts should be made to achieve the installed capacity.

4.8. In the aforesaid note BEL further stated that the difficulty in regard to assessing capacity however, arose in the case of Equipment production. A large number of equipments were produced in relatively smaller batches. The product-mix depending upon customer demand and priorities varied from time to time. The indigenous content contributed in the factory in regard to some equipment often varied from batch to batch. The shop facilities for production of equipment could be broadly grouped as follows:—

(a) Fabrication including turning, milling, Jig boring, Fitting, Precision Fitting, Press, Sheet Metal, Mechanical assembly and welding.

(b) Assembly and Inspection.

(c) Testing Services.

(d) Special units and supporting service shops like Moulding, Printed Circuits, Heat Treatment etc.

4.9. Most of the capital investment was centred round Fabrication Shops and Inspection and Testing. In view of the above, when a reference was made to installed capacity, it would to a great extent, refer to fabrication capacity. In the requirements, types of machines employed as well as hours required varied in respect of each equipment e.g., production of some equipment may not utilise any Sheet Metal or Jig Boring or Press Shop facilities at all. Further, the pattern of machine and machine-hour requirements varied as between Transitorised Equipment and the earlier generation of heavier and bulky equipment using Valves. Thus the pattern of loading as well as utilisation of machines would vary depending on product-mix obtained from time to time. It was in this context that it was explained that it would not be possible to give any realistic figure of the rated capacity of the plant. Based on long-term production programmes and product-mix planned from time to time, machines and machine-hours requirements are assessed and additional machinery augmented where such long term loads would warrant. Wherever

practicable and feasible to reduce investments on additional machines, two or more shifts on existing machines were planned to meet such additional commitments. Equipments required for inspection and testing were also reviewed based on such anticipated work-loads and balancing items augmented to meet such expanded requirements or needs of testing new products. In the assembly shops where machines were not involved, man-power was regulated based on future work loads.

4.10. The overall utilisation of productive machines in the Equipment Division, expressed as a percentage of the available capacity on the basis of two eight-hour shifts had been 72% in 1969-70.

4.11. The initial Project Report contemplated a capital investment of Rs. 647 lakhs for an annual production of Rs. 425 lakhs. As pointed out earlier, the capital investment on buildings and machinery was regulated from time to time taking into account the anticipated load and additional requirements of balancing plant or special plants necessary for new products. With an investment of about Rs. 1420 lakhs as on 31st March, 1969, the value of production achieved during the year 1969-70 was to the order of about Rs. 24.11 crores. In the light of this clarification, it would be correct to say that the plant was working to its full capacity.

4.12. The Committee note the view point of the management that the plant was working to its full capacity but BEL may try to bring in full capacity of its Equipment Division also. As mentioned in para 4.10. the overall utilisation of productive machines in the equipment division, had been 72 per cent of the available capacity in 1969-70 on the basis of two eight hour shifts. It is, therefore, evident that all the units of the plant were not working to their rated capacity.

4.13. 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 the 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.

V

PRODUCTION PERFORMANCE

(A) Projection of Demand—Demand Survey

5.1. During evidence the Committee drew the attention of the Managing Director, BEL to the recommendations made in the Bhabha Committee Report, *inter alia* the principal recommendations of the Bhabha Committee in respect of production of electronic equipment and components are:

(i) to organise the electronics industry in such a manner as to achieve a total production of electronic equipment of the value of Rs. 1,650|- crores in the 10 years period 1966—75 and an annual production of the value of Rs. 300 crores in the last year involving an investment of about Rs. 118 crores over this period;

(ii) to develop the electronic components industry and to achieve an annual production of the order of Rs. 84 crores by 1975 involving an investment of about Rs. 41 crores;

(iii) to organise the production of primary material so as to obtain an annual turn over of the order of Rs. 28 crores by 1975 involving an investment of about Rs. 12 crores.

5.2. Attention of the Managing Director, BEL was also drawn to the remarks of the Chairman of the Electronics Defence Committee as well as Members of the Planning Commission made at a conference held at Bombay in March, 1970 that "the developments in electronics in the last few years are discouraging and the existing official policies called for immediate reorientation."

5.3. The Managing Director, BEL stated in reply that as far as BEL was concerned, it was set up to provide the Defence Forces with the maximum amount of electronic equipment they wanted. The Defence Forces had decided on equipment specification made in the West and they wanted it to be supplied within a certain time. BEL was in certain areas able to meet their requirements with indigenous development. BEL had already designed equipment which was being tried out by the Defence Forces. BEL had no other alternative but to go into licensed production to be able to make the time-framed supplies. BEL had developed a large number of equipments of their own.

5.4. Asked as to whether any estimate was made of the increased production which would be available indigenously for Defence, the representative of the undertaking said:

> "There are two or three sectors in electronics. One is the entertainment sector; the other is the Defence sector; the third sector is what you may call professional equipment for All-India Radio and other Government Departments for civil use. If you are now thinking of the consumer electronics, the estimates have been exceeded actually. But as far as the professional equipment is concerned, the Ministry would be in a better position to answer. The projection made to the Committee at that stage was a certain figure and that figure has undergone revision and the Ministry officials would be in a position to clarify the exact ratio between the civil and military or professional equipment. The conclusion of the Committee on the basis of a review in the National Electronics Conference was that the original projections definitely needed a review and this has been accepted and this is being done, as far as the professional sector is concerned."

> "The targets have to be periodically reviewed. Last year we (BEL) had a total output of about Rs. 20|- crores for professional equipment, which will increase this year to Rs. 25 crores."

5.5. During evidence, the representative of the Ministry of Defence also informed the Committee that as far as the country's requirements were concerned, the first co-ordinated effort to assess the country's requirements was made in the Bhabha Committee Report (as stated in para 5.1). That Report envisaged that in ten years' period—from 1965 to 1975—the total requirement would be Rs. 1650|- crores of equipment; a production of Rs. 300 crores per year by 1975 in equipment, and Rs. 84 crores in components. This included both Defence and Civil requirements. In that, the Defence portion was about Rs. 730 crores out of Rs. 1650 crores. The representative added that these figures were being continuously reviewed. The Defence requirements, which have now been formulated on the basis of the present day assessment, were much less than Rs. 730 crores. They were merely Rs. 350 to Rs. 400 crores for the period from 1965-66. But on the other hand the other requirements for Civil needs were much more than the Bhabha Committee's assessment.

5.6. The representative indicated that the overall assessment of production for the 10 year period would be of the order of Rs. 1550

crores. Even though the Defence requirements would be very much less in the matter of components, the production of components which should be of the order of Rs. 84 crores in 1975 according to the recommendations of the Bhabha Committee, would be more than that and may be more than Rs. 100 crores a year. As far the production of equipment is concerned it would be more than Rs. 300 crores and as such the production would be Rs. 400 crores, both Civil and Defence.

5.7. The Secretary, Defence Production further stated that year by year, the production in the Bharat Electronics Ltd., was on the increase. In 1969-70, the figures of production were of the order of Rs. 24 crores. The estimated figures for 1970-71 were stated to be Rs. 31.30 crores inclusive of about Rs. 6.29 crores for components. The production in 1973-74 was also estimated to go up to Rs. 40 crores of equipment including some items for civil use, which were estimated at about Rs. 9 crores. As far as components were concerned, it was estimated that during 1970-71 the total production of components in BEL would be of the order of Rs. 6 crores. The witness hoped that the production in BEL would go on increasing.

5.8. The Committee were also informed that BEL had decided to set up another factory at Ghaziabad (U.P.) to deal with newer equipment, more sophisticated radars etc. With the coming of that factory, the production would go up by Rs. 10 to Rs. 15 crores per year.

5.9. Asked as to what would be the value of imported electronics equipment for Defence by 1975, the Secretary, Defence Production informed the Committee that there had been substantial decline from year to year because the BEL and the other participants like ITI were coming up with their production and that they were giving more and more equipments to the Defence that they needed. Only marginal imports were taking place and by 1975 the import of full equipment would be negligible. It was further stated that 100 per cent indigenisation was not possible because the state of country's technology particularly in the matter of materials and small sophisticated components was not still very satisfactory.

5.10. The Committee note that the first coordinated effort to assess the country's requirements in respect of electronics equipments and components was made by the Bhabha Committee. But they note with regret that it would have been better if a systematic effort would have been made to see how far the projections of demand made by that Committee have stood the test of time and proved realistic. The present system whereby each undertaking conducted a review of demand of its own items of manufactured

products is perhaps not the correct way to give an overall assessment. As electronics industry is a highly sophisticated and specialised branch of engineering, the Committee feel that there is need to subject the .long term projection to a periodical review by a standing Expert Committee. Such a Committee would naturally consist of renowned Electronic Engineers, eminent Economists and representatives of trade, industry etc. so that reviews sumbitted to Government were realistic and could be reliable basis for advance planning.

(B) Production Performance

5.11. Bharat Electronics Ltd. went into production in the year 1956. The value of production achieved each year was as follows:—

	(Rupees in lakhs)
1955-56	0.10
1956-67	5.97
1957-58	27.88
1958-59	64.80
1959-60	109.68
1960-61	171.58
1961-62	243.12
1962-63	302.74
1963-64	620.65
1964-65	707.97
1955-65	926-74
1966-67	1194.03
1967-63	1583.87
1968-69	2072.86
1969-70	2411.26

5.12. The production activity of the Company could be divided into 4 broad categories:—

(a) *Communication equipments including Receivers, Transreceivers, Transmitters.*

In view of the large requirement of communication and broadcast equipments, the production activity is stated to have been taken up in two Divisions *viz.*, Low Power and High Power. In Low Power

Division, BEL manufacture equipments with a power output upto 100 W. and in High Power division equipment with an output of greater than 100W.

(b) *Radars*

Certain types of radars required by Defence Services and Stern Warning Radar are under production at B.E.L. Cyclone Warning Radar is under development. Plans for the manufacture of Marine Navigational Radars are on hand. The production of each of these Radars depend on the orders placed with the company and the stage of development.

(c) *Test and Electronic Instruments*

Clinical Audio Meter, Valve Voltmeter, RF Power output meter etc. are being manufactured.

(d) *Electronic Components*

The various type of components manufactured by the Company are, Receiving Valves, Germanium Semi-conductors, Silicon Semi-conductors, Mica Capacitors (in Blades) Ceramic Capacitors, Crystals, Transmitting Tubes, Magnetrons, X-Ray Tubes, T.V. Picture Tubes and Cathode Ray Tubes. This bulk of the components is required for the Radio manufacturing industry. The TV Picture Tubes are meant for the TV Receiver sets and X-Ray Tubes for clinical X-Ray equipment.

While the components are meant mainly for Radio Receiver Industry. Equipments are mainly for the Defence Services, though the requirements of the Civilian customers such as All India Radio, Meteorological department, Police, Border Security Force, Overseas Communication Services, Port Trust, Railways etc. are also met.

5.13. The total production in respect of Equipments, Accessories and Spares and Components for the last three years is given below:—

(Value Rs. in lakhs).

Year	Equipments Accesspries and spares	Components	Total
1967-68	1079.43	504·44	1583·87
1968-69	1672·31	400·55	2072·86
1969-70	1953·68	457·58	2411·26

5.14. The Project Report of the Collaborators contemplated an annual production of Rs. 4.25 crores. In the beginning, two production divisions *viz.*, Equipment and Components were established; the former for the manufacture of various types of Wireless Receivers, Transmitters and Transreceivers and the latter for the manufacture of Components *viz.*, Radio Receiving Valves, Crystals, etc. However, when the value of production increased far beyond annual output of Rs. 4.25 crores envisaged in the original project report, and keeping in view the diversified product-mix for BEL further subdivided and grouped the production activities so as to ensure a manageable span for effective control. This problem of reorganisation and streamlining was stated to be continuously under rsview.

5.15. A large number of different types of communication equipment including radars with varying degrees of indigenous content are in production line at any one time. The time cycle of production also vary from equipment to equipment extending to as long a period as 7 to 8 months in the case of radars. Keeping in view above aspects and various teething troubles that have to be faced in establishing indigenous production, physical targets in terms of different individual equipments were planned. When production line of some equipment faced supply or other production problems, it becomes necessary to progress production of alternative equipment.

5.16. In the case of Components also, there are large number of different types of items and their production during the course of the year is continuously revised and adjusted to match the market demands.

5.17. Targetted and actual production in terms of value of production of equipments and components during the last 5 years was as follows:—

(Rupees in lakhs)

Year	Equipment and Radar Divisions			Components Division		Total	
	Target	Achievement Equipments	Achievement Radar	Target	Achievement	Target*	Achievement
1	2	3	4	5	6	7	8
1965-66 .	659·94	529·88	127·18	207·00	269·68	866·94	926·74
1966-67 .	1017·03	672·00	152·10	300·00	369·93	1317·03	1194·03
1967-68 .	1059·54	836·91	242·52	492·52	504·44	1552·06	1583·87

[Contd. next page]

*See footnote on next page.

Rs. in lakhs.

Year	Equipment and Radar Divisions		Components Division		Total	
	Target	Achievement Equipment Radar	Target	Achievement	Target*	Achievement
1968-69 .	1693·04	1046·22	626·09	446·17	400·55 2139·21	2072·86
1969-70 .	1942·22	1323·18	630·50	443·00	457·58 2385.22	2411.26

5.18. The Committee have noted with satisfaction the fact that value of production in BEL has increased from year to year and from Rs. 926.74 lakhs in 1965-66 to Rs. 2,411.26 lakhs in 1969-70, an increase of 160 per cent in a period of 5 years. The Committee, however, hope that this record of achievement will be maintained and improved in future so as to attain self-reliance and self-sufficiency at an early date in the crucial field of electronics for Defence and Industry.

(e) *Ceramic Capactors*

5.19. In March, 1960 the Company, after assessing the country's requirements of capacitors, entered into an agreement with the National Research Development Corporation of India for a term of 14 years with effect from 1st April, 1960, which authorised it to use the patents and processes for the manufacture of ceramic capacitors in its factory.

*The comments of Audit in this regard are as follows ;

"According to the data in the initial draft Review which was issued to the Ministry and in respect of which no comments were offered by them, the targets for 1965-66 to 1967-68 (data for the subsequent period not available were as follows :—

(Rs. in lakhs)

	Original	Revised
1965-66 .	1044·00	904·00
1966-67 .	1351·00	1378·00
1967-68 .	1475·00	1478·49

The following table in this sub-para indicates the rate of production of the various kinds of capacitors to be achieved as per Project Report:

(No. in

Year	Rate of production as per project Report			Actual Production		
	Disc.	Tubular	Trimmer	Disc.	Tubular	Trimmer
1962 . .	24		..	10·45		..
1963	24	9	12	21·30		..
1964 . .	24	9	12	23·89	..	..
1965 .	24	9	12	26·54	..	—
1966 .	24	9	12	28·52		—
1967 . . .	24	9	12	32·99	..	—
1968 . . .	24	9	12	..*	..	..

*The Company has stopped production of disc. type of capacitors since April, 1968 and the period of the agreement has been reduced from 14 years to 10 years.

5.20. Regarding the non-production of tubulars and trimmers, the Management had stated (August, 1968) that, as know-how had not been developed sufficiently by the National Research Development Corporation, the manufacture of tubulars was taken up indigenously by the Company on its own in 1965-66 a pilot run. Up to 1966-67 the Company produced on an experimental basis 6,33,833 numbers of tubulars at a cost of Rs. 3,26,757. Out of these 6,27,980 tubulars were sold for Rs. 50,168 and the balance 5853 numbers were utilised by the Company. The entire expenditure had been treated as development expenditure and charged off in the accounts as such.

5.21. A sum of Rs. 4.85 lakhs was spnt on the purchase of equipment and accessories, etc. for the manufacture of ceramic capacitors with the assistance of National Research Development Corporation's know-how.

5.22. As the manufacturing techniques under the National Physical Laboratory process were mostly labour intensive, the Company decided to change the process of disc type of capacitors for mass pro-

duction with the result that the following items became surplus which had since been written off in the accounts for the year 1967-68:—

	Rs.	(Written down value)
(i) Plant and Machinery	42,221	
(ii) Tools	5,385	Do.
(iii) Raw materials	37,238	
(iv) Finished stock	41,482	
(v) Consumable stores	6,695	
(fli) Spares for furnances etc.	14,188	
	1,47,209	

5.23. To a question by the Committee as to whether any machinery was specifically installed for the manufacture of tubular and trimmer capacitors only, the production of which with National Research Development Corporation's know-how was not taken up by the BEL, the Management of BEL in a written reply stated as follows:—

> "It may be mentioned that a sum of Rs. 4.85 lakhs spent on purchase of equipment and machinery was mainly for the manufacture of disc types of Capacitors. Except the extrusion press there was no item of machinery which was exculsively meant for manufacture of Tubulars. The development of Tubulars was taken up as part of our research and development activity."

5.24. A factual note on the points mentioned in the Audit Report (Commercial) (reproduced at para 5.20 above) was called from the National Research Development Corporation Council of Scientific and Industrial Research.

Relevant extracts from the reply of the Council of Scientific & Industrial Research received through the Ministry of Education and Youth Services are reproduced below:

> "The work on tubular capacitors was undertaken on 20.7.62 and 50 per cent of the work was completed on 25.9.62.

The balance of the work was undertaken by Mr. Nagarajan but he was called back to BEL as they stated that his services were badly needed for the production of disc type capacitors. When the movement order was received, it was pointed out to BEL that the process for outside coating has not been completed and at least a month will be required to complete and assess the economics of the method of coating developed, for production purposes.

It wil be noticed that in the course of the development of coating of tubular capacitors equipments were designed for automatic coating both inside and outside, for which patents also have been taken.

The report by Mr. Susheelendra on Trimmers Bases clearly indicates that he could not complete his assisgnment. Mr. Susheelendra was assigned by BEL for this project.

However, NPL continued work on the development of Trimmer Bases, which are acceptable to Messers Murphy and Messrs Mulchandani, two well known manufacturers of radio receivers. NPL from its Pilot Plant, made and supplied the trimmers to the tune of nearly 1.4 million pieces to both the firms, commencing from December 1965.

The process for ceramic trimmers was not passed on to BEL since they did not show any interest The reason for delay in completion of the trimmer assignment was that there was a set back in the programme of the DPEC Unit during the tenure of Dr. W. M. Vaidya as Deputy Director Incharge of NPL from 21.4.62 to 28.10.63. A decision was taken even to close down entire plant and all activities had to be stopped since no funds were provided. It was after the visit of Professor Blackett (January 1963) who thought that the work of the Radio Components Unit was worth continuing that a revival was made. This was done in 1965 and we were then able to complete the development of the trimmer bases and supply the Industry.

Profesor Blackett recommended the conversion of Riadio Components Unit into a Development-*cum*-Production of Electronics Components Unit and a Committee with Mr. Baliga as the Chairman was appointed to guide the activities of this Unit. This was in June, 1963. Mr. Baliga was asked by the Chairman of BEL to enquire into the

reasons for not stepping up production of ceramic capacitors at BEL. In that connection some comments were made which were referred to NPL for remarks. This was replied to in detail and the relevant extract is given below:—

'You may remember that one of the projects which I have included for the DPEC Unit is further work on the high K Bodies and for high voltage purposes also and this question was discussed on the 30th August, 1963 with you and Shri Subramaniam. You may also remember that you felt since you are creating a new development unit attached to the ceramic capacitors plant, they will be undertaking the development work.

However, we propose to continue to work in the field in our own small way within our limited means and facilities here.'

From this it will be obvious that BEL had decided on 13.8.63 that they will do the development themselves of trimmers, tubulars, etc. and so NPL need not continue any development work on these items. However NPL did continue the work on a reduced scale and was able to develop by end of 1965 trimmer bases which were acceptable to the industry, and start suplying from the Pilot Plant.

Since BEL had made preliminary moves in getting into collaboration agreement with a foreign firm, NPL did not find it necessary to pass on the know how for Trimmer bases to BEL. Instead, after successful completion of the production of trimmers to the satisfaction of users such as Murphy Mulchandani, etc., NRDC licensed other parties notably Messrs Nicro Ceramics (P) Limited, Hyderabad, who have and are supplying the industry with ceramic timmer bases on NPL know how. They do not appear to find any difficulty in taking the process from NPL from the same stage as we had done for the ceramic capacitors and success fully set up a factory."

5.25. In a written note the management of BEL informed the Committee that the production and sales were at 3 million in the year 1967-68 and it was restricted to production of Disc type only. After BEL shifted over to the manufacture of Ceramic Capacitors on the automatic machine with LCC (French) know-how, the production was increased by 100% in 1968-69 and it was further increased during 1969-70 and 1970-71. Besides this, the company could

introduce plaquette types of capacitors which was very essential for the transistor receiver industry. But for the change over in the know-how, this diversification and improvement in production and sales so as to enable the company to have a larger share of the market in the field would not have been possible.

5.26. The Management of BEL have further stated as follows:—

"The very reason to take up manufacture of Ceramic Capacitors from N.P.L. was to take advantage of the indigenous know-how wherever possible. The agreement with NPL was signed on 21.3.1960. NPL had set up a pilot plant at New Delhi for production of 'Disc' Type capacitors. The pilot plant run by NPL was initially taken over by the Company w.e.f., 1-11-1960 and continued production at the plant till October, 1962, by which time, production facilities in BEL were established. As NPL themselves had proved pilot production of Disc types under their patents by setting up a pilot plant, it was possible for BEL to establish production facilities for Disc types in BEL at Bangalore. BEL however had to carry out modifications to the compositions envisaged in the patents to suit market needs. Normally in the field of production of such components it is the practice that development of the techniques also covers design and development of special automatic machines for production in accordance with the processes, the patents are integrated including specialised equipments for mass production for comprehensiveness and competitiveness and since the requirements of the country were very large, it was neither practicable to meet the demands nor to establish economic production unless specialised automatic machines were employed.

The Indian patents by themselves were not suitable for their use in the manufacture of Tubulars, Trimmers or Plaquettes. The basic compositions would have to be modified to convert them into the required forms and shapes. Since NPL had not done any work on their production, one officer from BEL well-trained as Ceramist was deputed to assist NPL to carry out their development in NPL the production of Tubulars and Trimmers could be established in BEL using ceramic compositions covered under the Indian patents referred to above. However, even after 1½ years, no progress could be achieved in the development of either tubulars or Trimmers. Under these circumstances,

BEL were not in a position to establish industrial production of Tubulars and Trimers under NPL|NRDC patents without further investigations.

With the introduction of Transistors in electronic circuits, the requirements of low voltage capacitors such as Plaquettes increased considerably. Similarly, there arose large requirements of power capacitors for use in the professional equipments, such as, transmitters, etc. On both these products, NRDC's know-how did not cover the technique of manufacture and so far as we were aware, NPL had also not done any work on them at that time.

BEL had to establish mass production of not only Disc type of Capacitors but also Plaquettes and other types by obtaining know-how and assistance of the CSF reverting to the already existing agreement which had been entered into with them as early as 11th December, 1952. This proposal was approved by the Board in 1965.

Ceramic Capacitors is also an item covered under the original collaboration agreement entered into between Government and CSF on 11-12-1952. The manufacture of Capacitors under this agreement was started during February, 1966. The types covered are Discs, Plaquettes, Tubulars and Power Capacitors. In view of the automatic technique and better production facilities that were possible with CSF assistance, the NPD techniques were given up. BEL understand that a few firms have been licensed to manufacture Ceramic Capacitors with the NPL know-how but do not however, have information whether the parties so licensed have started production."

5.27. P.A.C. in its 122 nd Report on National Physical Laboratory stated "another instance of this kind is the agreement made by Bharat Electronics with the NRDC to obtain the basic know-how for the manufacture of ceramic capacitors on royalty basis from the National Physial Laboratory. In actual practice, the problems involved in the transfer of know-how to commercial production were so man, that the Bharat Electronics were ultimately compelled to obtain know-how for the same purpose from abroad and only then could it produce ceramic capacitors in 1968."

5.28. The Committee find that the BEL had entered into an agreement with CSF (French Collaborator) in 1952 which also covered inter alia manufacture of ceramic capacitors. On 1st April, 1969,

BEL entered into another agreement with NRDC|NPL for a period of 14 years for the manufacture of ceramic capacitors in their factory. Subsequently, BEL curtailed this agreement with NRDC from 14 years to 10 years.

5.29. The Committee note that the undertaking changed the process of manufacture of dise type of capacitors which they were following on the NRDC|NPL know-how as that process was found by the undertaking (BEL) to be expensive and labour intensive. Moreover, the technical know-how for the manufacture of not only disc type of capacitors but also of plaquettes, tubulars, and trimmers types of capacitors prompted the undertaking to seek the assistance of its collaborators CSF, (French Firm).

5.30. The Committee note that in 1965, the BEL decided to go in for foreign collaboration for manufacture of tubulars and trimmers and started their actual production in February 1966 whereas according to the National Physical Laboratory, the Laboratory was able to develop by end of 1965 "trimmer bases which were acceptable to the industry."

5.31. The lack of understanding and rapport between BEL and National Physical Laboratory would be clear from Statement of National Physical Laboratory to the Committee that "Since BEL had made preliminary moves in getting into collaboration agreement with a foreign firm, NPL did not find it necessary to pass on the know-how for Trimmer bases to BEL", while the BEL have stated in the note to the Committee that "BEL understand that a few firms have been licensed to manufacture Ceramic Capacitors with the NPL know-how but do not however have information whether the parties so licensed have started production."

5.32. The Committee deprecate strongly this lack of co-ordination between National Physical Laboratory and BEL both of which are financed from Government funds. The Committee consider that National Physical Laboratory should have specifically brought to the notice of BEL the process for manufacture of trimmers and tubular capacitors as soon as they had developed it for commercial exploitation and the BEL should have on its own also kept track of the investigations and research being continued at National Physical Laboratory so as to avail of the indigenous know-how as soon as it came upto the mark, in preference to the foreign collaboration.

5.33. The Committee urge that there should be a very close cooperation between National Laboratories (National Physical Laboratory, Central Electronics and Engineering Institute etc.) under CSIR

and BEL and similar undertakings in the matter of Research and Development. The Committee are of the view that the purpose should be to attain self-reliance at the earliest available opportunity and the import of technical know-how on items of technology where indigenous know-how and expertise is available should be avoided.

5.34. The Committee are also surprised at the way the production of tubulars was taken up by the undertaking. The Company produced 6,33,833 tubulars upto 1966-67 at a cost of Rs. 3,26,757. Out of these 6,27,980 tubulars had been sold for Rs. 0.50 lakhs and the balance 5853 numbers were utilised by the Company. B.E.L. thus incurred a loss of Rs. 2.75 lakhs on this venture. The B.E.L. characterised the entire expenditure as developmental in nature a view point which the Committee is not in a position to accept. This is not all. When BEL changed the process of disc type of capacitors for mass production, items like Plant and Machinery, tools, raw materials etc. of the value of Rs. 1.47 lakhs became surplus. This amount had to be written off.

The Committee are not able to appreciate why the research on tubular capacitors was not continued in a co-ordinated manner by NPL|BEL so as to achieve a break-through at the earliest and also reduce developmental expenditure. The Committee hope that B.E.L. would make a thorough analysis of demand and cost of production before undertaking manufacture of any new items to avoid recurrence of such losses in future.

(C) Product Mix

5.35. "The original Project Report prepared by the main collaborators, M|s C.S.F., envisaged the division of the fastory into three major areas: (i) Production of Equipment, (ii) Production of valves, and (iii) Production of Components. As the production activities in the factory expanded it was felt desirable to review the organisation and the product mix of the various divisions and the factory has been organised as under:—

(1) *Low Power Equipment Division*

This Division is responsible for the production of VHF & HF Communication equipment and accessories;

(2) *High Power Equipment Division*

This Division has been organised to cater for the manufacture of High Power Communication Transmitters, Broadcast Transmitters and auxiliaries.

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(3) *Radar Division*

This Division has been set up to manufacture Radars. As an interim measure, additional responsibilities for the manufacture of Computers and Gun Control Equipment have been assigned to this Division. This will be reviewed incourse of time depending upon the growth of those projects.

(4) *Semiconductors Division*

This Division is responsible for the manufacture of Semi-conductor devices—both germanium and silicon.

(5) *Electron Tubes Division*

This Division is responsible for the manufacture of various kinds of electron tubes like the Receiving Valves, Transmitting Tubes, TV Picture Tubes and X-Ray tubes.

(6) *Passive Components Department*

This department is responsible for the manufacture of passive components like Ceramic and Mica capacitors and Piezo-electric crystals.

5.36. The position regarding 'market acceptance' of the products was stated to be as indicated below:

In respect of professional communication equipment, production was always based on the acceptance by the users of the selected equipment. Selection of an equipment was preceded by consultations with the Users and their acceptance was generally assured in advance. As regards components like Transistors and Receiving Valves, BEL claimed that the products made had been very well received and majority of Radio Receivers manufactured in India used BEL transistors and valves. So was the case with Ceramic capacitors made in BEL.

5.37. The Committee recommend that the present product mix of Bharat Electronics Ltd. should be kept under constant watch and changes made as and when variations of demand and consumers preferences arise or are likely to arise. Special care should be taken by

BEL to meet the requirements of components of small scale manufacturers of electronic equipments meant for entertainment purposes. BEL should also develop capacity and keep pace with expanding requirements of components for T.V., computers etc.

(D) Consultation with users

5.38. To a question on the steps taken by the undertaking to acquire flexibility in production responsive to changes in demand and towards diversification of production the BEL stated that the production of equipment in BEL was preceded by consultation with the users. The cycle time for production of professional communication equipment and complex systems like Radar was of the order of 3-5 years. Perspective planning of the requirement of the Defence Services was undertaken in consultation with the Ministry of Defence and the users. In view of this, sufficient flexibility in production was ensured to meet changes in demand. In the field of the Transistors and valves, a patern of diversification of production had been evolved to keep in step with market demands. For example, silicon semiconductors had been introduced when it was noted that the demands for the germanium semiconductors and valves to meet different new applications were being progressively introduced in step with market requirements.

5.39. Consultation with users can go a longway to undertaking perspective long term planning. Every effort should be made by BEL to obtain from users firm orders on a long-term basis to avoid the possibility of unplanned and uneconomic production. The Committee, therefore, recommend that Bharat Electronics Ltd. should deve- to obtain from users firm orders on a long-term basis to avoid the demand survey from time to time so as to gear up their manufacturing programme to meet anticipated requirements.

(E) Cost of Production

5.40. The Components manufactured at BEL are stated to have been broadly classified under Receiving Valves. Semiconductors etc. and there will be different types of such Components in the production line at any given time, the value of which would be varying. The cost of production is dependent on the volume of production. In the circumstances, the requirements of staff are being worked out from time to time so that there may not be any idle manpower within the division. A statement showing the present cost of pro-

duction of Receiving Valves, Semiconductors and Transmitting Tubes is given below:—

RECEIVING VALVES

S. No.	Type	Cost per 100 Nos.			
		1966-67	1967-68	1968-69	1969-70
1	EZ 80	117·63	107·91	160·50	147·68
2	UY 85	126·14	111·17	156·43	146·22
3	EBC 81	128·50	118·36	178·81	155·43
4	UBC 81	129·93	118·98	159·39	168·77
5	EF 89	149·75	140·66	206·77	176·70
	UF 89	153·78	138·78	190·37	203·87
7	ECH 81	171·18	156·31	221·59	212·88
8	UCH 81	172·05	162·10	231·47	223·13
9	EL 84	162·70	153·84	222·17	225·28
	UL 84	205·97	195·99	267·42	256·15
11	EM 84	210·59	183·54	299·63	218·56
12	UM 84	215·03	194·26	269·76	233·88
13	EBF 89	177·15	165·44	212·02	200·44
14	UBF 89	182·44	157·25	244·26	204·61
15	ECL 82	203·21	177·50	254·49	266·69
16	UCL 82	212·18	195·65	283·45	257·70
17	EZ 81	166·65	174·30	202·88	166·32
18	5654	211·41	201·71	275·48	233·51
19	EC 81		296·11	394·83	301·74
20	ECC 82	..	229·63	281·20	196·26
21	ECC 83		290·64	217·30	202·93
22	EL 86	188·56	177·70	246·63	219·62

GERMANIUM SEMICONDUCTORS

Sl. No.	Type	Cost per 100 Nos.			
		1966-67	1967-68	1968-69	1969-70
1	OA 79 Diode	46·52	47·82	65·90	46·23
2	OA 81/85 Diode	54·00	47·41	56·50	55·48
3	OA 91/95 Diode	..	107·91	70·13	..
4	AC 114/115/116/117	106·59	108·70	153·76	112·45
5	AC 127	173·75	153·34	234·41	168·46
6	AC 128	131·03	119·81	185·11	114·69
7	AC 125/126/132	131·22	127·90	178·73	153·30
8	AO 70 Diode	52·27	40·67	..	41·49

TRANSMITTING TUBES

Sl. No.	Type	Cost per piece (in Rs.)			
		1966-67	1967-68	1968-69	1969-70
1	BEL 2(a)	..	110·78	145·70	112·38
2	BEL 5(a)			253·96	174·32
3	BEL 10(a)			743·61	779·53
4	BEL 40(a)		..	1584·06	1304·61
5	BEL 25		60·35	127·18	64·58
6	BEL 100	..	257·42	519·17	..
7	BEL 125		..	402·66	254·73
8	BEL 250		409·56	847·03	405·44
9	BEL 400		462·09	752·06	442·95
10	BEL 450			1376·05	..
11	BEL 3000	..	..	5218·04	..

5.41. The Committee note with concern that the cost of production of most of the components manufactured at BEL has increased considerably in 1969-70 as compared to their cost of production in 1966-67. The cost of production has risen by more than 25 per cent during the aforementioned period, e.g. the cost of production of Re-

ceiving valves EZ 80 has increased by 25.4 per cent, EBC 81 by 20.96 per cent; UF 89 by 32.57 per cent; UCH 81 by 29.7 per cent; EL 84 by 38.46 per cent and ECL 82 by 31.23 per cent. Even the cost of production of BEL 100 type transmitting tubes has increased from Rs. 257.42 per piece in 1967-68 to Rs. 519.17 per piece in 1968-69, i.e. by 101.68 per cent. The Committee recommend that the reasons for this increase in the cost of production may be gone into and the remedial steps be taken to arrest this trend.

VI

QUALITY CONTROL

6.1. To a question by the Committee, whether B.E.L. has done any research in quality and cost obtaining in foreign market, the representatives of B.E.L. informed the Committee as follows:—

> "There are two fields here—one is the equipment field and the other the components field. Normally in the equipment field, we have not really gone into many sales abroad. We did sell a small number of receivers in United Kingdom, but that is under special circumstances. By and large, most of our sales of equipment would be to under-developed countries. Unfortunately, most under-developed countries depend for their finance on aid and therefore, when they get aid from 'X' they buy from 'X'. We have not been able to compete in the market at all. In fact, we have started increasing investigations for export. There has been certain progress in the components field. So far as components are concerned, this year our exports will be higher and may be of the order of nearly Rs. 30 to 40 lakhs. And there has been no difficulty as far as quality is concerned because production has been based on imported know-how and our control organisation has been well set up with all statistical and quality control measures. So, actually we have had no come-back as far as the quality of our components is concerned. On the other hand, orders are coming in, but our capacity does not enable us to fulfil them. If we expand our capacity, we would be able to export more."

(A) TESTING

6.2. To a question as to what steps had been taken to maintain the quality of transistors manufactured by the Company and was there any machinery for quality control the BEL stated that the transistors manufactured in their enterprise were completely tested. Only those which passed all the tests were store-creditd. There was an in-built inspection at every stage of process of manufacture so as to ensure strict quality.

(B) Rejections

6.3. The percentage of rejections in electronic industry depended upon various factors, *e.g.*, the rejection might come at any stage from the beginning right to the final testing of the transistor. Further, the rejections also depended upon the types of transistors under production. Certain types were susceptible to higher rejections than others. The typewise details of the overall rejections for the last two years was as below:—

Process Rejection of Germanium Semiconductors

Type	Percentage of Rejection	
	1968-69	1969-70
IODES :		
OA 95/91	41·07	..
OA 70/73		15·19
OA 79/72	16·17	23·84
OA 85/81	16·03	32·58
TRANSISTORS :		
AF 114/115/116/117	13·30	13·45
AC 127	22·83	38·59
AC 128	18·42	21·84
AC 132	19·61	30·99
AC 187	19·02	36·27

6.4. The percentage rejection is stated to be within the limits normally encountered by manufacturers abroad.

6.5. There was no sub-standard quality transistors as all those which did not pass the test were destroyed. All the rejections were treated as process losses, and as stated above, BEL's rejection rates were within the normal norms.

6.6. The Committee regret that percentage of rejection of Germanium Semiconductors is on the increase. For example percentage of rejection of OA 79/72 has increased from 16.17 per cent in 1968-69 to 23.84 per cent in 1969-70, that of OA 85/81 Diode from 16.03 per cent in 1968-69 to 32.58 per cent in 1969-70. Similarly, percentage rejection of AC 127, AC 132 and AC 187, Transistors has gone up from

22.83, 19.61 and 19.02 in 1968-69 to 38.59, 30.99 and 36.27 respectively in 1969-70. Though Bharat Electronics Ltd. claim that these percentage rejections are "within the limits normally encountered by manufacturers abroad," they have not given precise details of such limits. It is however, evident that the percentage of rejections in 1969-70 has shown a rising trend. The Committee recommend that Management of Bharat Electronics Ltd., should make concerted efforts to arrest this disturbing trend by putting the present arrangements for quality control in their enterprises on a sound footing.

VII

RESEARCH & DEVELOPMENT

(A) Activities and Achievements

7.1. To meet urgent requirements of customers and to reduce to the extent possible, the technological gap in electronic industry in India and abroad, licencing agreements with very limited foreign exchange assistance had been entered into. In many cases equipment produced under licence had been modified and improved upon by the Research and Development Departments of B.E.L. to meet the special requirement of the customers.

7.2. Apart from this, in 1956, a Research and Development Department was established in the Industry, to undertake product-oriented design, development and application of research in the field of electronic equipments, instruments, components and other devices.

7.3. The activities of Research and Development Department in B.E.L. was stated to have been diversified and increased manifold, and a large variety of minor equipment in the field of Broadcast, communications, Electronics Measurements, Medical Electronics, Radars had been indigenously developed and many more new items were in various stages of development with a view to ensure that the factory was progressively fed with products of its own design, thus tapering off and need for foreign licensing with consequent saving of valuable foreign exchange. It was further stated that Research and Development Department had acquired the capability of undertaking major development programme to fulfil the needs of various communication equipments, components and devices by indigenous research and development efforts in the field of Electronics.

7.4. Design and Development of over 80 different minor items had been successfully completed. Some of the representative items of equipment indigenously designed, developed, and under manufacture in BEL were various types of airborne transreceivers, rescue equipments, fully transistorised manpack VHF sets, simpler version of the Radio Telegraph Adaptor, Transistorised Fish Finder Equipment etc. It was further stated that major equipment developmental programmes to meet the requirements of the Indian Air Force had

been entrusted to B.E.L. and were stated to being successfully progressed.

7.5. The future programme of the Department takes into account the critical appraisal of the future trend of progress in the field of Communications and the projected plans of Communication systems of major users. The Department had recently started design work in the field of military grade equipments of modern types for incorporation of uptodate technology and solid state devices. It proposes to cover the design and development of the complete range of equipments required by the Army/Air Force based on advanced concepts and technology for optimum reliability, maintainability and operational flexibility and application research relating to circuit techniques, semiconductor devices, micro-circuit tehnology and hardware materials etc.

7.6. The Research and Development Department maintains close liaison with appropriate design development and inspection agencies of user departments to ensure that the design research efforts are oriented to cover fully the operational and functional aspects as required by the ultimate users. It is represented in various National and Regional Research Committees, in order to coordinate research and design efforts of the country towards product development in the Communication field.

(B). Expenditure on Research and Development in Electronics

7.7. The following expenditure was incurred during each of the last five years on research and development of electronics by: Bharat Electronics, Defence Research and Development Organisatin, Council of Scientific and Industrial Research and Atomic Energy Commission:—

Research & Development expenditure (Rs. in lakhs)

Year	B.E.L.	Defence R&D Orgn.	Atomic Energy Commission	C.S.I.R.	Total
1965-66	17·00	95·00	64·00	32·00	208·00
1966-67	33·00	120·00	83·00	50·00	286·00
1967-68	58·00	145·00	59·00	63·00	325·00
1968-69	67·00	185·00	61·00	63·00	376·00
1969-70	69·00	268·00	57·00	58·00	452·00

7.8. The Value of electronics equipment produced in the country and the Value of electronics equipment produced in the public sector and the percentage of R & D expenditure is as given below:—

(Rs. in crores)

Year	R&D Expenditure by BEL/Def. R&D, ARC & CSIR	Total value of production of electronic equipment in the country	Value of production of electronic equipment in the Public Sector	Percentage of Col. (2) to (3)	Percentage of Col. (2) to (4)
1	2	3	4	5	6
1965-66	2·08	37·00	9·60	5·6%	21·7%
1966-67	2·86	50·00	11·90	5·7%	24%
1967-68	3·25	65·00	16·80	5%	19·4%
1968-69	3·76	85·00	26·20	4·7%	14·3%
1969-70	4·52	110·00	36·10	4·1%	12·5%

7.9. During the course of evidence, Secretary, Department of Defence Production informed the Committee that the total investment in Research and Development on Electronics in the country according to Bhabha Committee had been worked out as Rs. 85 crores per annum as against a production of Rs. 300 crores worth of equipment and Rs. 84 crores worth of components by 1975, representing about 22% of the value of production. According to the representative this was a very high percentage. In Japan, the over all expenditure was about 5% as their production was Rs. 5000 crores. Out of this Rs. 250 crores was spent on Research and Development. The Research and Development Expenditure on electronics in our country in 1969-70 was about Rs. 8 crores as against the production worth Rs. 138 crores i.e. about 5 to 6 per cent of total production.

7.10. As far as Bharat Electronics was concerned the Secretary, Defence Production stated that an amount of Rs. 17 lakhs was spent on R & D in 1965-66, Rs. 33.00 lakhs in 1966-67, Rs. 58.00 lakhs in 1967-68, Rs. 67.00 lakhs in 1968-69 and Rs. 69.00 lakhs in 1969-70. The witness also informed the Committee that as a result of indigenous design and development work in the Bharat Electronics during last year, it had been able to produce equipment costing about Rs. 380 lakhs out of their total production of about Rs. 2400 lakhs. In the

Defence Sector there were also some R&D Units and apart from production unit they were investing a lot of money in other Research Units exclusively for research in the electronics field. In Defence there were four such units and in one of these units, they had planned to incur Rs. 152 lakhs, in second Rs. 98.45 lakhs, in the third Rs. 58.76 lakhs and in the fourth Rs. 26.65 lakhs. All that money was devoted to R&D work in electronics. The Committee were further informed that BEL was taking up the work of design and development and as a result of that, indigenously designed equipment costing about Rs. 82 crores would be produced in the next six or seven years.

7.11. Summing up the Secretary, Defence Production said, "If we have to catch up with the other nations of the World in the field of electronics, we shall have to spend much more than what we are doing today in research and development."

7.12. Asked as to whether any direct research was being done, the Secretary, Defence Production informed the Committee in affirmative and stated that some of their units were dabbling in some of the most modern and recent technologies and were doing work upon them.

7.13. In a written note, the Ministry have stated that there were three groups of Public Sector Undertakings manufacturing electronic equipments. There are two units under the Ministry of Defence which were engaged in the production of Defence equipment. The Indian Telephone Industries under the Department of Communications were producing telecommunication equipment. The Electronic Corporation of India under the Department of Atomic Energy was in addition to other items, producing nuclear instruments and other nuclear electronic equipments. It was further stated that those factories not only had their own research and development activity, but their production was also backed by research and development being done by the laboratories under the different Ministries. It had been added that Government had also requested the management of these various public sector undertakings to incur atleast 5 per cent of their total turn-over in research and development.

7.14. Research and Development is an activity which is vital for healthy growth of Electronic Industry in India. The Committee are of the view that success of any research project does not depend on how much expenditure is incurred on it but the performance of specific tasks related to production and solution of practical problems posed by the industry. The Committee therefore, recommend that

there should be close co-ordination between the production and research wings of the industry so that problems of crucial importance are tackled in a concerted manner.

7.15. The Committee wish to stress that Research and Development of B.E.L. should work in close coordination with C.S.I.R. and other related research laboratories in the country so that a coordinated approach can hasten the achievement of self reliance in technology, obviate unwitting duplication of research effort, reduce cost of production and above all lay a sound technological base for the electronic industry in India.

7.16. In a written note the Ministry have further stated that at present electronic components are being made only in BEL, but HAL Hyderabad is also trying to establish manufacture of certain types of components which BEL is not producing. In respect of ECIL, it was essentially set up for the manufacture of Nuclear Instruments, Electronic Control instrumentation requirements of the Atomic Energy Commission and certain types of components. Though these units are under two different Ministries, the essential coordination among the three was being done by the Department of Defence Supplies in the Ministry of Defence, who were the authority for implementation of the Bhabha Committee Report. In the latest reorganisation of the Central Secretariat, this work has been transferred from the Ministry of Defence to the newly constituted Department of Electronics in the Cabinet Secretariat.

7.17. The Committee understand that on Electronics Commission has recently been created by the Government. The Committee feel that in an industry like electronics, where the pace of obsolescence is faster than the pace for acceptance, time is the essence of the matter. With the creation of the Electronics Commission by the Government, the Committee hope that a well coordinated and nitegrated programme for research and development would be evolved and implemented. The Committee would suggest that a perspective plan for research and development be drawn up for next 10—15 years. This plan should be reviewed every year in the light of performance and demand projection. 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.

VIII

FINANCIAL MATTERS

(A) Profitability

8.1. The production|sales activities of the company have been broadly brought under two categaries, viz., (i) Equipments (ii) Components.

(i) *Equipments*

Professional Transmitters, Receivers, Transreceivers and Radars are mostly required by the Defence Services and various Government Departments. The product mix of equipments varies from time to time, depending upon the customer requirements and the production facilities (capital assets) available are reviewed and augmented to the extent necessary from time to time, taking into account many special or additional facilities required for manufacture of new products. With the Chinese emergency, the demand for supply of electronics equipments to meet the modernisation and expansion of the Defence Services considerably increased suddenly and the undertaking had to be geared to step up its production steeply and meet these demands at the earliest possible time. The increase in the annual value of production of equipments from Rs. 233 lakhs in 1962-63 to Rs. 1,954 lakhs in 1969-70 represents an achievement on account of efforts put in during the recent years.

(ii) *Components*

The second broad category relates to components (valves, Transistors, Capacitors etc.) required mostly for the radio manufacturing industry in the country. Depending upon the build up of market and the demands, which vary, the production has to be planned and adjusted from time to time including adjustments in the quantity planned for the year during the year itself.

8.2. A statement giving particulars in respect of (i) value of annual production and (ii) Sales on year to year basis from 1955-56 when the factory first went into trial production is given below:—

PRODUCTION/SALES/PROFITS/DIVIDENDS

(All Figures rounded to lakhs of rupees)

Year	PRODUCTION		Sales Actuals	Profit(+) Loss (—)	Adjustments pertaining to previous year	Provision for tax	Dividends		Share Capital	Cumulative Build up of Reserves
	Programmed	Actuals					% on share Capital	Amount		
1955—56	—	—	—	(—)16	0.21	—	—	—	188	—
1956—57	39	6	2	(—)	—	—	—	—	344	—
1957—58	136	28	7	(—)4	—	—	—	—	406	—
1958—59	71	65	53	(—)1	—	—	—	—	481	—
1959—60	108	110	106	+7	—	—	—	—	49	1
1960—61	175	172	140	12	—	—	—	—	521	10
1961—62	230	243	249	20	—	—	—	—	521	12
1962—63	275	303	361	47	—	4	—	—	521	37
1963—64	420	621	470	54	—	20	—	—	521	71
1964—65	750	708	617	97	—	37	5	26.06	521	105
1965—66	867	927	915	144	+8.61	75	6	31·27	521	151
1966-67	1317	1194	1372	256	+18·60	124*	7	36·49	521	151
1967-68	1552	1584	1956	381	+8·10	170	8	41·70	521	476
1968-69	2139	2073	2700	434	+6·97	190*	10	52·12	521	699
1969-70	2385	2411	2465	427	—16·05	176	10	52·12	521	882

*Out of the provisions, Rs. 57 lakhs transferred to Reserve during 1966-67 and 1968-69 as no longer required.

(*i*) Value of annual production:—The Growth has been steady and increasing from year to year.

(*ii*) The sale figures include certain items purchased from collaboration and supplied to Defence Service to meet commitments.

8.3. The financial position of BEL for 1968-69 and 1969-70 is as below :—

(Rupees in lakhs)

FINANCIAL POSITION : *Liabilities*	1968-69	1969-70
(*a*) Paid up Equity Capital	521·25	521·25
(*b*) Reserves and Surplus	699·05	881·03
(*c*) Borrowings :		
(*i*) From Govt. of India	568·00	524·00
(*ii*) Deferred Credit	286.04	277·02
(*iii*) Cash Credit & Overdraft	141·50	30·69
(*d*) Trade dues and other currents liabilities (including Provisions)	1,780·51	2,003·32
Total	3,996·35	4,237·91

Rs. in Lakhs

Assets :	1968-69	1969-70
(*e*) Gross Block	1,420·08	1,706·60
(*f*) *Less* Depreciation	562·16	716·97
(*g*) Net fixed Assets	857·52	989·63
(*h*) Capital Works-in-progress	94·55	57·88
(j) Current Assets, Loans & Advances	2,972·33	3,150·91
(j) Miscellaneous Expenditure	71·55	39·49
Total	3,996·35	4,237·91
Capital Employed	2,112·91	2,226·24
Net Worth	1,148·75	1,363·39

NOTE : 1) Capital employed represents Net fixed Assets plus Working Capital.

2) Net worth represents paid up Capital plus Reserves less intangible assets.

WORKING RESULTS :

Working results of the Company for the years 1968-69 and 1969-70 are as under :-

	1968-69	1969-70
(*i*) Profit before tax	434·24	426·76
(*ii*) Tax Provision	190·00	176·00
(*iii*) Profit after Tax	244·24	250·75
(1) Percentage of profit before tax		
(*a*) To sales	16·08	17·27
(*b*) To gross fixed Assets	30·58	25·07
(*c*) To capital employed	20·55	19·17
(2) Percentage of profit after tax.		
(*a*) To net worth	21·26	18·39
(*b*) To equity capital	46·86	48.11
(*c*) To capital employed	11·56	11·26

(Audit had suggested that the exhibition adopted by them in their review be followed by BEL and hence the revision).

8.4. In a written note about the growth of profit, which was not compatible with the growth in the volume of sales in 1968-69, BEL has stated as in the following paragraph:—

8.5. The reasons for the reduced percentage of profit as compared with the figures of sales for the year 1967-68 and 1968-69 are furnished below:—

(i) During the year 1968-69, out of the sales of Rs. 27 crores a substantial sum of Rs. 531 lakhs, representing items purchased for resale on which the Company did not have a good margin of profit.

The position of sale of items purchased for resale during the years 1967-68 and 1968-69 were as follows:—

(Rupees in lakhs)

	Value of sales	Cost of Sales	Net Margin
1967-68 .	279	242	37
1968-69	531	527	4

The above position indicated that the Company did not have a good margin of profit on items purchased for resale during the year 1968-69.

(ii) There was a general decline in the demand for valves and transistors owing to the imposition of Excise Duty at the rate of Rs. 3 per valve and Re. 1 per transistor which was almost equivalent to 100 per cent of the cost of production. During the year the prices of transistors were reduced by about 12 per cent. The total benefit passed on to the customers, taking into account the reduction given in January, 1968, was of the order of Rs. 65 lakhs during the year. This had a direct bearing on the profits.

(iii) In spite of increased payments of wages, due to increased cost of living and increased prices of raw materials, the prices were not revised upwards.

It will be seen from the above, that the reduction in the growth of profit was not due to increase in production cost only".

8.6. The Committee note that decline in percentage of profit as compared with the volume of sales for the year 1967-68 and 1968-69 was not due to increase in cost of production only. If profitability of BEL goes down inspite of growing volume of sales, it is a development which has to be viewed with concern, whatever be the reasons for such a development. The Committee hope that BEL would be able to arrest this disturbing trend soon by giving a better return on the investment made.

(B) Pricing Policy and System of Costing

8.7. BEL have stated in a written note that they have always adopted the policy of quoting fixed prices as distinct from prices based on "cost plus" basis. In arriving at initial quotation of selling price, a profit margin of 10 per cent was provided for. It had been the experience of BEL that while the cost of initial batches of production was relatively high, it was generally possible to effect economies in later batches when the quantities ordered and to be produced were in relatively large numbers. That was because by that time, initial teething troubles would have been overcome and it would have been possible to bulk their requirements and establish economic sources of supply both for materials as well as sub-contract items. Where such economies had been effected, it had been the policy of BEL to share with the customer benefits arising from reduction in production cost by reducing the prices or maintaining earlier prices in spite of rise in wage levels and material costs. In such cases, besides providing the customers equipment at economic prices, the Company had been able to make a profit of more than 10 per cent initially catered for.

8.8. As regards equipments including radars, all quotations of BEL in respect of equipment to Government departments were scrutinised by their administrative, technical and financial authorities and were accepted by them, after negotiations in individual cases, where considered necessary. In the case of many of their major equipments, BEL's selling prices were generally less than what it would cost the customers for import of similar equipment from abroad. BEL's selling prices of major items of equipment manufactured and

sold as well as the corresponding prices of similar imported equipment are given below:—

Imported cost of major equirpments manufactured in BEL with corresponding BEL selling price

Sl. No.	Equipment	Estimated current CIF cost	BEL Current selling price
		Rs.	Rs.
1	Equipment 'A' .	8,318	3,67
2	„ 'B'	21,258	12,00
3	„ 'C'	44,870	34,300
4	„ 'D'	14,627	12,885
5	„ 'E' . .	6,042	3,300
6	„ 'F'	7,528	3,920
7	„ 'G' .	8,490	8,106
8	„ 'H' . .	1,44,827	1,34,000
9	„ 'I'	19,86,777	14,85,000 (ph. IV)
10	"J"	78,027	70,500

8.9. In the case of Components sold for civil trade like Valves, Transistors, Capacitors, etc., selling prices were stated to have been fixed taking into account the prices the market could bear in competition with Private Sector units manufacturing similar items, etc. The selling prices were reviewed and revised from time to time in the light of new developments, e.g., prices of Transistors were revised twice during 1968,—on the first occasion, with a view to enable the Radio manufacturers to bring down costs and make low cost Receivers and again later a second time to partially absorb excise duty levied by Government on that item and to make smuggling less attractive.

8.10. BEL's selling prices of Valves were stated to be comparable and competitive with landed cost of imported Valves.

A comparative statement is given below:—

COMPARISON OF BEL SELLING PRICES WITH IMPORTED PRICES

Receiving valves

Type	Total Landed Cost	BEL Wholesale price (including Excise Duty) effective from 1-3-1969
	Rs.	Rs.
EZ-80	5·46	3·90
UY-85	5·46	4·00
EBC-81	7·40	4·30
UBC-81	7·40	4·30
EF-89	6·63	4·80
UF-89	6·63	4·80
EL-84	6·77	4·80
UL-84	7·75	4·80
EL-86	7·26	4·10
ECH-81	7·43	4·90
UCH-81	7·43	4·90
EBF-89	7·40	4·80
UBF-89	7·40	5·10
EM-84	9·38	5·10
UM-84	9·38	5·10
ECL 82	8·60	5·10
UCL-82	8·60	5·10

Note : (1). This is a product on which BEL has a monopoly.

(2) While the import duty on finished product is 50% the duty on raw material imported for manufacture ranges from 27½% to as high as 100%.

It has further been stated that foreign manufaturers were either stopping or reducing the manufacture of valves abroad due to obsolescence and decreasing demands of valves.

8.11. In the case of other Components like transistors and capacitors, it had been stated that in view of the limited market and limit-

ed production in India, it might not be correct or fair to make comparison of BEL's selling prices with landed cost of foreign transistors, as foreign manufacturers had, not only been in the field many years earlier, but their market as well as quantities of production were many times the capacity of the plant in BEL. It was pointed out in that connection that cost of production of components, came down considerably when quantities of production and turnover increased. BEL's selling prices as well as landed cost of imported (a) Germanium.

Transistors and (b) Silicon Transistors are as follows:—

COMPARISON OF BEL SELLING PRICE WITH IMPORTED SELLING PRICE

Germanium Semi Conductors

Type	Total Landed Cost	BEL Wholesale Prices (including Excise Duty) effective from 1-3-1969
	Rs.	Rs.
OA 70	1·07	1·50
OA 73	1·07	1·60
OA 79	1·07	1·30
OA 81	1·07	1·60
OA 85	1·07	1·80
OA 91	1·07	1·90
OA 95	1·07	2·00
AC 125	2·77	2·80
AC 126	2·77	2·90
AC 127	2·77	2·90
AC 128	3·02	2·90
AC 132	2·77	2·90

Note : (a) This is a product, for which there is internal competition from 2 more units in the Private Sector, and the prices have been fixed taking into consideration what the market can bear.

(b) While the import duty on the finished product imported is 50% the import duty on raw materials used in production ranges from 50% to 130%. In a few items of chemicals the duty is as high as 80 times the F.O.B. cost.

(c) The volume of production of foreign manufactures are many times higher than that of BEL.

COMPARISON OF BEL SELLING PRICES WITH IMPORTED SELLING PRICES

Silicon Semiconductors

Type	Total Landed Cost	BEL Wholesale prices (including Excise Duty) effective from 1-3-1969
	Rs.	Rs.
BF 115	3·02	3·80
BF 185	2·71	3·60
BF 184	2·71	3·70
BF 195	2·55	3·00
BF 194	2·55	3·00
BC 109	2·87	4·00
BC 107	3·19	3·80
BC 108	2·71	3·70
BC 149	2·55	3·50
BC 147	2·71	2·80
BC 148	2·39	2·60
BY 100	3·82	5·50
BY 114	3·50	5·00
BY 127	2·87	4·00
BY 126	2·55	3·50

Note : (1) This is a product for which there is internal competition from 2 more units in the private sector and the price is fixed based on what the market can bear.

(2) While the import duty on the finished product imported is 50%, the import duty on raw materials used in production ranges from 50% to 130%. In a few items of chemicals, the duty is as high as 80 times the F.O.B. cost.

(3) This is a new line taken up and production has got to be stabilished and phases to be progressed.

8.12. Transmitting Tube was stated to be a very critical component of transmitters, which was in operation with the All India Radio and Defence Services. Types required were many and requirements of each type were stated to be rather small. On technological and strategic grounds and in the larger interests of saving foreign exchange

to the maximum extent possible, facilities had been set up for the production of these tubes in BEL. A statement indicating BEL's selling prices and minimum and maximum landed cost of comparable items is an given below. In view of the diversity of types and limited production of each type, the costs in BEL were stated to be high. When the demands from customers build up (after imported stocks are consumed by them) and quantity of production was stepped up, the production costs were expected to come down.

COMPARISON OF BEL SELLING PRICES WITH IMPORTED SELLING PRICE

Transmitting valves

Type	Landed cost per Unit		BEL Selling prices per Unit
	(Lowest)	Highest	
BEL 25	16	153	50
BEL 100	181	496	300
BEL 125	217	451	450
BEL 250	309	868	600
BEL 300	363	3690	500
BEL 400	329	871	650
BEL 450	691	1512	1000
BEL 3000	2160	2481	3000
BEL 5000	3240	3995	4400
BEL 6000	2835	..	4000
BEL 25000	9923	23749	16300
BEL 2(a)	59	141	90
BEL 5(a)	80	228	150
BEL 6(a)	126	334	225
BEL 10(a)	567	1714	900
BEL 40(a)	1260	2416	1950

Note : (1) The foreign prices vary very widely depending upon the make and quantities. Hence the landed cost—sLowest and Highest as per available data are indicated.

(2) The manufacture of this product in BEL was started about 2 years ago and phased development is yet to be accomplished.

(3) At present BEL is the only manufacturer in India.

(4) Rated capacity has not yet been reached as demand has not picked up owing to large stocks with users imported earlier.

8.13. The Committee regret to note that BEL's selling prices (including excise duty) effective from 1st March, 1969 in respect of Germanium Semi-Conductors (OA 70, 73, 79, 81, 85, 91 & 95) range from Rs. 1.30 to Rs. 2.00 as against total landed cost of Rs. 1.07. The position in respect of silicon Semi-Conductors was no better. For example, as against the total landed cost of Type BY 100 and BY 114 as Rs. 3.82 and 3.50 BEL's wholesale prices were Rs. 5.50 and Rs. 5.00 respectively. The position of some types of transmitting valves was still worse. For example, the selling price per unit of B.E.L. 3000 and 5000 types was Rs. 3,000 and Rs. 4,400 respectively as against the highest landed cost per unit of these types which were Rs. 2,481 and Rs. 3,995. BEL had argued that "it might not be correct or fair to make comparison of BEL's selling prices with landed cost of foreign transistors, as foreign manufacturers have not only been in the field many years earlier but their market as well as quantities of production was many times the capacity of the plant of BEL". The Committee agree that those factors do influence the selling price of a product but wish to stress that BEL should not relent in their efforts to reduce their cost of production so that it might be possible to bring their selling prices at par with the landed cost of Germanium Semi-Conductors, Silicon Semi-Conductors and Transmitting valves etc. etc.

System of Costing

8.14. In para 8, Section IX of Audit Report (Commercial) about costing in BEL, it has been stated that the factory is organised principally into (a) Equipment Division and (b) Components Division. In the Equipment Division, where electronic equipment of various types is manufactured in batches, a system of "batch costing" is followed. In the Components Division, where components like valves, transistors, capacitors and crystals are manufactured and the production is repetitive as well as continuous, system of "multiple costing" is in vogue.

8.15. Standard costing has not been introduced (August, 1968) although the final phase in the case of valves was completed in September 1964. The Ministry have stated (November, 1968) that "the standard costing—is liable to be met with difficulties in actual working due to variation in purchase prices, customs and excise duties on materials, and variations in wage rates, etc., that is to say, factors on which Bharat Electronics Limited have no control."

8.16. The capacitors manufactured by the Company "not against orders" are not assigned any value. The total cost of production is charged over the capacitors covered by customers' orders. As on

31st March, 1968, 11.29 lakh ceramic capacitors and 4.52 lakhs mica capacitors bearing no value were in stock. The Ministry have stated (November, 1968) as follows:—

> "...It is a normal practice to plan for the production of 10 to 15 per cent extra quantity to cover the mortality in production and items which may fall outside the tolerance limits. Since it would be difficult to forecast the possibility and period within which the surplus quantities thus produced can be sold, the entire cost of production is released over the quantities covered by the orders. The balance items are physically retained for future sale without being assigned any sales value."

8.17. During the course of evidence of the representatives of BEL the Controller of Finance of BEL stated as follows:—

> "The standards are desirable and are set in physical terms. If you want to produce certain thing we set standard based on efficiency. What are the machines and manpower required? It is easier to control the standards. But if you want to introduce book-keeping, there are so many valuable factors which go into change and create a lot of difficulties. I think this Committee has appreciated this problem in their Fifteenth Report and if I am permitted to read from the recommendation, this is what had been said:—
>
> "The Committee feel that introduction of standard costing is very necessary for exercising effective cost control. The standard cost should be calculated on the basis of normal levels of activity and efficiency and should be reviewed periodically so as to take into account changing conditions. There may be some difficulty in expressing the standard cost in monetary terms, as due to the all round increase in price, standard cost is likely to become out of date very often. The Committee, therefore, consider that it will be advantageous to lay down physical norms for determining standard cost i.e. the quantity of materials that should be consumed per unit of end product, labour hours, machine hours etc. per unit of end product"."

The witness stated that all these were provided for in their costing procedure.

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.

(C) Sales & Marketing

8.19. The Sales and Marketing arrangements of the products manufactured by BEL are undertaken by the Commercial Division of the factory. The Commercial Division has four Sales departments, each department being responsible for the sales and after-sales service of the products made by the associated Production divisions in the factory *viz.*, Low Power Equipment Division, High Power Equipment Division, Radar Division and Components Division. In addition, the Overseas Sales Department had been recently established to look after the export sales activities.

8.20. The buyers for the electronic equipments made in the factory are mostly Government departments including the Defence Services. Many of the components manufactured other than those going into production of equipment of BEL itself—are for the radio receiver industry in the country. The following procedures generally apply with regard to the sales of the products:—

(a) *Electronic Equipments*

8.21. More than 80 per cent of the yearly production of the Electronic equipment during the last few years has been sold against requirements of the Defence Services. The indents for the products are placed by the purchasing branch of the concerned Defence Services directly on BEL, against quotations submitted by BEL, on a commercial basis. The terms and conditions of supply and method of payment for the sales are presently governed by contractual terms evolved by the Ministry of Defence, whereunder progressive payments are made to BEL of amounts dependent on the values of the orders placed on BEL by the Defence Services and progress of expenditure related to the action taken in BEL for the production of the items ordered. Upto 95 per cent of the value of each consignment is paid on proof of despatch of the equipment to the consignee and balance 5 per cent is paid on the consignee's certificate regarding the receipt of stores in good condition.

8.22. In the case of the orders for equipment from the civil departments, wherever the indents are placed by the concerned departments, through the DGS & D, the DGS&D terms and conditions for payment apply. In the case of direct orders from civil departments, terms of payment are generally as per DGS&D *i.e.*, 95 per cent payment

against proof of despatch and the inspection note by the DGS&D/user representative and the balance 5 per cent of receipt of the goods in good condition.

8.23. Action is taken by the respective Sales departments to book orders in advance. The production plans for each year are also drawn in advance relating to demands. Some times, where there was not enough lead time for manufacture and supply to meet urgent operational requirements of Defence Services complete units had to be purchased from Collaborators and supplied. The position of sales of equipments effected during the last 3 years and the estimated value of sales for the year 1969-70 is as below:—

(i) 1966-67	Rs. 10·44 crores
(ii) 1967-68 .	. Rs. 15·92 crores
(iii) 1968-69 .	. Rs. 21·81 crores includes equipments purchased for re-sale—Rs. 531 lakhs
(iv) 1969-70 . .	. Rs. 18·82 crores—includes equipments purchased for re-sale—Rs. 48 lakhs.

(b) *Components*

These items falling under this category are as below:—

(i) Germanium and Silicon Semi-Conductors.
(ii) Receiving Valves
(iii) Piezo-electric crystals
(iv) Ceramic & Mica Capacitors
(v) Transmitting Tubes
(vi) X-ray and Cathode-ray Tubes
(vii) TV Picture Tubes
(viii) Microwave Tubes

(The setting up of facilities for production of items at Sl. Nos. (vi) to (viii) are under various stages of progress and production is yet to commence).

8.24. Marketing arrangements for items under (i) and (ii) above are made as below:—

(1) direct sales to large scale set manufacturers.

(2) to the small scale set makers and the retail market through a number of distributors including the National Small Industries Corporation.

In addition to the above, direct sales by BEL through their Regional Sales Depot at important centres was also being considered. A beginning is said to have been made with the establishment of a Regional Sales Depot in New Delhi. With regard to the other component items (iii) to (viii) above sales are effected directly by BEL against orders received from customers.

8.25. Orders are placed on BEL against commercial quotations given by BEL. A system of discount for quantities ordered operates and the pricing is constantly reviewed taking into account the order position, competition from the other established manufacturers etc. 100 per cent payment through Bank negotiated documents against despatches is generally stipulated. For certain large scale set manufacturers, certain credit facilities are allowed.

8.26. The sales position for the components for the last 3 years and the esimated sales for the current year *viz.* 1969-70 is as follows:—

(i) 1966-67 . . .	Rs. 3·28 crores
(ii) 1967-68 . . .	Rs 3·63 crores
(iii) 1968-69 . . .	Rs. 5·19 crores*
(iv) 1969-70 . . .	Rs. 5·83 crores (inclusive of Excise duty element Rs. 107 lakhs.

8.27. The estimates of sales for the current year shown above, taken into account the production plans for the year. For the subsequent year, the production plans would be dependent to a large extent on the finalisation of equipment requirements for the Fourth Five Year Plan by the various Government departments and in particular the Defence Services. BEL is already separately working out preliminary plans for the next 3 to 4 years taking into account certain indications of requirements available from the concerned departments. It is anticipated that if the present trend of requirements continue, orders materialise as per indications, BEL can look forward to sales of equipments alone to a value of about Rs. 22 to Rs. 24 crores per annum for the next 3 to 4 years.

8.28. As far as the components were concerned it has been stated that in view of the trend in the receiver industry, the demand for receiving valves was expected to decline. However, on an overall

* Inclusive of excise duty element of Rs. 1.52 crores levied for the first time with effect from 1-3-1968.

basis components sales of the order of Rs. 6 crores to Rs. 7 crores per year for the next 2 to 3 years could be predicted, which figure was expected to increase as soon as production of the other component items now in planning stage was progressively taken up.

8.29. The Committee are concerned to note that demand for Receiving Valves was expected to decline in the next 3 to 4 years. The Committee recommend that BEL should make aggressive sales efforts and if necessary, by reorganisation of its sales Departments, with a view to secure advance orders and should determine the future pattern of production in BEL after a realistic demand survey.

(D) Sunday Debtors

8.30. The book debts of the Company as on 31st March, 1968 amounted to Rs. 394.25 lakhs out of which Rs. 8.04 lakhs relate to sales yet (March, 1968) to be billed for. Out of Rs. 8.04 lakhs a sum of Rs. 4.20 lakhs has remained unbilled for more than three years.

(b) The following table indicates the details of the debts outstanding for more than one year as on 31st March, 1968:—

(Rupees in lakh)

	Government Departments	Government Companies/ Corporation	Private customers
Debts outstanding for more than one year but less than 2 years	22·06	3·79	0·11
Debts outstanding for 2 years and more but less than 3 years	18·78	0·63	0·01
Debts outstanding for 3 years and more	29·34	1·35	0·09
	70·18	5·77	0·21

8.31. The Ministry have stated (November, 1968) that according to the Management "the bulk of the outstanding is from Government Department/Customers. Bharat Electronics Ltd. had experienced occasional difficulties in prompt billing/realisation of dues against such supplies due to one or the other of the following reasons:

(i) Supplies made during emergencies by airlift etc., based on urgent oral instructions.

(ii) Failure of the Consignee in properly verifying and sending inspection notes in respect of sales by import directly consigned to them in respect of material procured under credit arrangement.

(iii) Non-receipt of and delay in receipt of intimaton of consignment in regard to receipt of goods consigned in good conditions.

(iv) Transit damages and shortages in transit resulting in considerable work all round and delays.

(v) Necessity to provide and complete every small items covered by the order before the question of extension of delivery and amendment of acceptance of tender, waiver of liquidated damages, etc., could be taken up.

(vi) Diversion of material by customer from one project to another project, resulting in delays in assessment of specific shortages and rendering of inspection notes, etc. Loss or misplacement of documents either in post or due to movement of units/offices or reorganisation of customer establishments."

8.32. In a detailed note submitted after the evidence B.E.L. has stated as follows:—

"Bulk of the difficulties enumerated in the para is being taken up with the concerned Government Department. In respect of Ministry of Defence, the position is very much improved and we have already taken up with the indentors to convey their price acceptance, so as to enable us to take prompt billing action for supplies effected. For majority of the items, bills could not be raised for want of price acceptance.

8.33. It may be mentioned in this connection that out of the total amount of Rs. 394.24 lakhs outstanding as on 31-3-68, the amounts outstanding on date is only of the order of Rs. 72 lakhs. Action has been taken to send bills to the tune of Rs. 5 lakhs out of this and payment is expected shortly. In respect of another big item to the value of Rs. 10 lakhs price acceptance has since been cleared and action taken to obtain duplicate copies of 2 and 5 inspection notes from the concerned parties and send it to the C.O.D. Agra for countersignature, so as to enable us to prefer the bill.

8.34. In respect of a sum of Rs. 1 lakh outstanding from the Civil Aviation Department, certain repairs have to be carried out, which has since been done and final inspection note from the party is awaited, in order to enable us to raise bill. Similar action is being taken in respect of other cases also."

8.35. In another written reply about the debts outstanding on 31-3-1968 to the extent of Rs. 75.95 lakhs due from Government and Government. Companies/Corporation the B.E.L. have stated as follows:—

"Out of a sum of Rs. 75.95 lakhs outstanding as on 31-3-1968 the following sums amounting to Rs. 49.79 lakhs are still due. These items represent both billed and unbilled items upto the end of August, 1970. The details are as follows:

(Rupees in lakhs)

	Over one year old as on 31-3-68	Position as on 31-8-1970	Out of amount shown in Col. 3 Unbilled as on 31-8-1970
Government Departments (Non-Defence)	55·96	30·85	2 .39
Government Departments (Defence)	14·22	14·22	12·55
Government Companies	5·77	4·72	
	75·95	49·79	33·94

The help of the Ministry of Defence production is always taken to a settle matters relating to prices."

8.36. In a written reply about the measures taken by B.E.L. in the light of Experience to raise the bills promptly and to effect settlement of outstanding accounts, B.E.L. have stated as follows:—

"Our sales cover a wide range of equipments, accessories and spares and we quote fixed prices. There are also changes in the list of accessories/spares projected initially and some of the accessories projected require development,

matters connected with speeding up of quotations and acceptance of prices (after discussion where necessary) are already under discussion with Ministry of Defence.

8.37. BEL has also taken action in following directions to improve the position:

(i) Where various items are involved, individual prices are given and provision is made for part delivery and part payment.

(ii) To the extent possible revision to delivery dates quoted earlier are obtained before effecting the deliveries to avoid hold up of bills.

(iii) To attend to transit damages, technical team is sent to the customers' places for effecting speedy repairs on the spot."

8.38. The Committee cannot but view with concern the outstandings of BEL. The Committee hope that the question of acceptance of prices in advance on the basis of quotations would be sorted out soon with the Ministry of Defence so as to facilitate settlement of future bills. The Committee would like BEL to systematically follow up the question of recovery of amount for equipment already supplied to Government departments so as to recover all the outstanding amounts due.

(E) Important Irregularities

Irregularities in the sale of canteen coupons

8.39. In September/October, 1966 the management conducted a review of the sale of the canteen coupons for the period from April, 1964 to May, 1966. As a result of the review it was noticed that coupons of the value of Rs. 15,461 had been redeemed in excess of those sold and accounted for by the canteen. Consequently, the Management carried out an investigation of the sale of canteen coupons for the period from June, 1966 to August, 1967 and noticed that the canteen had redeemed coupons of the value of Rs. 69,482 in excess of those sold in the said period.

8.40. According to the Management the alleged fraud was perhaps made possible by the printing of spurious coupons and the mixing of them with the genuine ones.

8.41. Had a proper procedure for the linking of used coupons with those issued and custody of the used coupons been laid down the alleged fraud could have been avoided.

8.42. The Management have stated (November, 1967) as follows:—

> "All precautionary measures have been taken and supervision in the canteen has been strengthened. The question of restricting the validity of the coupons has also been considered but due to administrative reasons it was not possible to implement this so far. However, this is under examination. Arrangements have now been made for daily verification and destroyal of the coupons.....A full time supervisor for the canteen has been posted to tighten the supervision."

8.43. The Management have further stated (August, 1968) that "the case is under investigation by the Police and all the files and records in this regard are with them, and the persons are under suspension."

8.44. The Ministry have stated (November 1968) that "the case against alleged culprits is now *sub-judice*".

8.45. In a written note the management of BEL has stated that the canteen has been in existence from 1957. In early stages the accounts of the canteen were reviewed from an overall angle and at the end of the year the value of coupons sold and value of coupons surrendered, reconciled and value of coupons outstanding was assessed, and reflected in the balance sheet. While doing this exercise for 1964-65, it was noticed that the value of coupons surrendered exceeded the value of coupons sold and that led to the present investigation. As this could have been occasioned by used coupons being recirculated as a first step, action was taken to deface the used coupons in a clearer manner. A vigilance was also simultaneously kept. The total loss as reported may be taken as the final figure.

8.46. The loss might not be considered as abnormal or quite significant, from the following angle:

> "The Company started this as a welfare measure and in the early stages working force contemplated was five thousand workers for an annual turn-over of Rs. 4 crores. Due to subsequent developments, the factory had to expand far beyond that strength. So there was heavy pressure on the facilities in the Canteen. Large strength had to be

catered with very brief intervals in between. Number of coupons—practically all of small denominations—surrendered per day varied around 20,000."

8.47. The company had taken reasonable steps to ensure proper accounting check having regard to the nature of the transactions. This has been a fraud perpetrated by employees.

8.48. The *modus operandi* of the canteen Supervisor in perpetrating this fraud was studied. From the evidences deposed during the hearing of the case before the Additional Sessions Judge and other information collected, it was seen that the Supervisor,—in conspiracy with one of the canteen boys, who was entrusted with the task of selling the canteen coupons and another Clerk in the Transport section—got spurious coupons with similar denominations identical to the genuine coupons printed from a private press and then brought them stealthily to the factory and allowed circulation. As the Canteen Boy was also entrusted with the task of selling the regular coupons, the Canteen Supervisor had an ample opportunity to effect circulation of the spurious coupons either through the Canteen boy or through other persons. Further, he himself was drawing the coupons from Welfare section and issuing them for sale at the counter, thus mixing them up with genuine coupons at his level was rendered easy.

8.49. Even though restriction of validity of coupons as such was not enforced in the past, colours of coupons as well as number have been changed periodically more or less to achieve the same result and the system has been subsequently found working satisfactorily.

8.50. The persons involved are Canteen Supervisor, a Canteen boy and a Clerk in the Transport department. The employees have been dismissed from the company pending formal approval of the Industrial Tribunal as required under the law.

8.51. The Sessions Court has convicted three of the employees. All the three employees have been convicted for rigorous imprisonment. They have gone to the High Court on appeal.

8.52. This was a clever fraud perpetrated by two or three persons and there was no laxity on the part of the supervisory officials in relation to the procedure then obtained. The procedure has since been tightened and supervision strengthened. In this connection

an extract of the judgment of the Additional Sessions Judge who had heard the case is furnished below:—

> "However, we may say very generally that in view of the evidence of these witnesses it is clear that a definite procedure was followed by the BEL in distributing the coupons for sale and that they were properly held without giving scope for mischief and that yet this mischief occured and it was occured not on account of any defect in the system of holding the stock and distributing them by the Department of the B.E.L. but on account of the fact that accused Nos. 1 to 3 entered into a conspiracy and got the coupons printed and put them into circulation through accused No. 2 which was possible only because accused No. 1 happened to be the Assistant Supervisor of the B.E.L. in charge of the Canteen."

[Extract Judgment CR No. 1959/27.12.69 of Additional Sessions Judge in case No. 39 of 1968].

8.53. The Committee regret to note about the fraud perpetrated by the employees of BEL in the sale of Canteen coupons and recommend that the management of BEL should strengthen the existing measures to prevent the recurrence of such events and may adopt further measures in this regard, if necessary.

IX

CONCLUSION

(A) Introduction

Objects and purpose

9.1. In 1948, the Government of India had set up a Committee to consider the question of wireless and electronic industry in India with a view to attain self-sufficiency in this vital equipment or strategic importance. In June, 1952, the Government approved the setting up of the industry in collaboration with a French firm named Compagnie Generale De Telegraphie Sans Fil (C.S.F.). The work of the project was initially being dealt with by the Ministry of Defence. The Bharat Electronics Limited was incorporated on 21st April, 1954 to take over the work of the project. The main objects of the Company are—

(a) to design, develop and progressively manufacture electronic equipment such as transmitters, transreceivers, oscilators, amplifiers, X-ray tubes, surgical, medical and other appliances and instruments intended for electro and other therapy treatment; and

(b) to undertake the manufacture of specialised and electronic components including values.

Capital

9.2. The authorised capital of the company was Rs. 10 crores. The paid up capital of the Company was Rs. 5.21 crores as on 31st March, 1970 and was entirely subscribed by the Government. The Company also obtained from the Government of India a loan amounting to Rs. 5. 24 crores as on 31st March, 1970. The loan equity ratio is 1:1. Long term loan amounting to Rs. 94.81 lakhs was obtained from foreign banks by the undertaking to finance the projects for certain plants and equipments. Besides, the Company had purchased certain equipments and components from foreign countries on deferred credit. The amount outstanding against deferred credit as on 31st March, 1970 was Rs. 2.77 crores.

Collaboration Agreements

9.3. The undertaking entered into 40 collaboration agreements with the following 20 collaborators;

1. CSF, Paris, France.
2. Pye Telecommunications Ltd. England.
3. NV Philips' Gloeilampenfabriken, Holland.
4. Marconi's Wireless Telegraph Co., Ltd. U.K..
5. NRDC, New Delhi.
6. NEC Ltd., Japan.
7. Bendix Corporation, USA.
8. Contraves AG, Switzerland.
9. S & HAG, West Germany.
10. A.E.I. Ltd., England.
11. AT&E (Dridgnorth) Ltd., UK.
12. Redifon Ltd., England.
13. Mullard Equipments Ltd., England.
14. Plessey Co., (UK) Ltd., England.
15. Racal Electronics Ltd., England.
16. RCA, USA.
17. Siemens, West Germany.
18. Dynamics Corporation of America, New York.
19. Fernseh, GmbH, West Germany.
20. Selenia Industries Electroniche Associate S-p.A, Roma, Italy.

9.4. Collaboration agreements were entered into to bridge the technological gap between the modern technology and the existing state of technology in India. Basic collaboration agreement was entered into with C.S.F. (France). Since B.E.L. had already derived substantial benefits in regard to technical and industrial assistance and production technique systems, from this basic agreement with C.S.F. it was possible for BEL to start production of non-CSF (France) equipment with limited assistance available under new licensing agreements mentioned above (which were distinct from comprehensive collaboration agreements).

(B) Important Findings of the Report

Production Performance

9.5. The company is producing about 70 types of electronic equipments besides number of components. On account of diversified

production requiring different types of operation on different machines, the undertaking represented that no assessment could be made of the rated capacity. The Company had planned production programme in advance taking into consideration the demands for the production, capacity of the various shops and availability of materials from foreign suppliers.

Prouct-Mix

9.6. The undertaking is producing mainly the following items:—

(a) Communication equipments including receivers, transreceivers, transmitters.

(b) Radars—including fire control Radar, Field Artillery Radar and Storm Warning Radar.

(c) Test and electronic instruments, clinical audiometer, valve voltmeter RF output meters.

(d) Electronic components like Receiving Valves, Germanium Semiconductors, Silicon Semi-conductors, Mica capacitors (in Blades) ceramic capacitors, crystals, transmitting tubes, magnetors, X-Ray Tubes, T.V. Picture Tubes and Cathode Ray Tubes.

These components are generally for radio receiving industry and equipments are mainly for Defence services. The requirements of civil departments such as A.I.R., Meteorological Department, Police, Border Security Force, Railways, Overseas Communication Service and Port Trust etc. are also met.

Value of production

9.7. The Committee have noted with satisfaction that the value of production has increased to 160 per cent in 5 years from 1965-66 to 1969-70. They hope that this record of achievement will be maintained by the undertaking with a view to attain self-sufficiency in the electronic industry.

Rated Capacity

9.8. During the examination, the Committee find that it has not been possible for BEL to actually assess the rated capacity of the plants. The undertaking consist of 2 main divisions, namely, Equipment Division and the Components Division. The undertaking has represented to the Committee that it is possible for them to assess the rated capacity of the shops engaged in the manufacture of components. As regards the Equipment Division, BEL has represented

that it may not be possible for the undertaking to do the same owing to the fact that the product-mix is dependent upon the customers' demand and a large number of equipments were produced in relatively smaller batches. It has, however, been stated that the overall utilisation in the Equipment Division had been 72 per cent of the available capacity. The Committee have recommended that the rated capacity of the plant should be fixed in terms of physical output for each unit. If the rated capacity of the plant was not indicated to the company by the supplier of the plant or the collaborator, the Company should undertake an assessment of the ultimate and rated capacity on their own and keep a watch over the progress made to achieve that capacity.

9.9. The Committee also find that the actual production and planned production in almost all the cases of components, referred to in the statement at para 4:6 of this Report, was far below the installed capacity and they view with concern the wide gap between the installed capacity and the actual production. The low production not only means loss to the Undertaking but also results in high cost of production. The Committee could get no proper explanation for low production of these items. They desire that the Company should keep a constant watch over the production and sustained efforts should be made to achieve the installed capacity."

Research and Development

9.10. There are four public undertakings manufacturing electronic equipments under three different Ministries till recently. There are:—

1. Electronics Corporation of India.
2. Indian Tlephones Industry.
3. Hindustan Aeronautics Ltd., and
4. Bharat Electronics Ltd.

9.11. The B.E.L., the Committee find, maintains a Research Unit. The Committee find that research and development department has been able to design and develop over 80 different minor items successfully. Some of the items of equipments indigenously designed, and developed were various types of air borne trans receivers, rescue equipments, fully transistorised manpack VHF sets, simpler version of the Radio Telegraph Adaptor, Transistorised Fish Finder equipment etc. The major equipment development programmes to meet the requiremnts of Indian Air Force had been entrusted to BEL and have successfully progressed.

9.12. BEL has spent about Rs. 17 lakhs on research and development in 1965-66, Rs. 33 lakhs in 1966-67, Rs. 58.00 lakhs in 1967-68, Rs. 67 lakhs in 1968-69 and Rs. 69 lakhs in 1969-70. As a result of indigenous design and development work in BEL, the undertaking has been able to produce equipment costing about Rs. 3.60 crores of the total production of about Rs. 24.00 crores.

9.13. The Committee find that there has been an increase in the research and development activities of the undertaking. They agree that rise in expenditure is inevitable in research activities but they hope that the increase in expenditure should be commensurate with the development of production of new items|products produced as a result of research and developmental activities.

Indigenisation programme and Foreign Exchange Savings

9.14. The Committee has been informed that by effecting import substitution for the manufacture of equipments and components produced under licence and with the introduction of indigenously designed equipments and components, the undertaking achieved saving of Rs. 1530 lakhs in Foreign exchange in 1969-70. The total foreign exchange savings from 1955-56 to 1969-70 has amounted to Rs. 63.23 crores. According to the undertaking the saving in foreign exchange has been worked out with reference to the selling price or C.I.F. cost whichever is lower as reduced by foreign exchange Content of the imported items. The Committee, however notice from the Annual Report of the Company for the years 1964-65 and 1965-66 that the value of production including the work-in progress has been assessed on the basis of the selling prices. As the value of production so arrived at has been reduced to exclude the value of work-in-progress at cost, the resultant value of completed production represents the selling prices. On the basis of the data furnished to the Committee at Paras 8.10 and 8.11 of this Report it is noticed that the landed cost inclusive of Customs duty is lower than the selling prices of the Company.

In view of the above, the Committee are unable to express any opinion of the quantum of Foreign Exchange claimed to have been saved by the undertaking. The Committee would, therefore, recommend that the Foreign Exchange savings worked out with reference to the C.I.F. costs may be furnished to them duly vetted by Audit.

9.15. The Committee find that the percentage of foreign exchange content of completed production has been on the rising side. Compared to 29.98 per cent in 1966-67, foreign exchange content has

risen to 35.56 per cent in 1969-69. The Committee were unable to discover the exact reasons for such continuous increase in foreign exchange content in the products of the BEL although it should be other way about. The Committee note that in 1969-70, the percenttage content of foreign exchange in completed production has shown slight improvement but as compared to 1966-67 it is still on the high side. The Committee recommend that the BEL should study this aspect of their performance and take effective remedial measures to reduce their dependence on imported components in this vital industry.

Pricing policy

9.16. The Committee find that the cost of production of components manufactured in BEL has increased in 1969-70 as compared to the cost of production in the year 1966-67. The rise in cost has been more than 25 per cent during that period. The cost of production of BEL on certain items like 100 BEL transmitting tubes has increased by about 101 per cent from 1967-68 to 1968-69. The Committee has recommended that the reasons for this abnormal increase in the cost of production may be gone into and remedial steps be taken.

9.17. Apart from this, it has come to the notice of the Committee that BELs selling prices effective from 1st March, 1969 in respect of certain items as for example germanium, semi-conductors, silicone semi conductors and certain types of transmitting valves are higher that the landed cost of these types of equipments imported from abroad. Justifying this increase, the undertaking has argued that it may not be correct to make the comparison of BELs selling prices with landed cost of foreign transistors since foreign manufacturers have not only been in the field for many years earlier but the market as well as quantity of production was many times more than the capacity of the plant of BEL. The Committee agree that these factors influence the selling price of products but urge that BEL should not relent in their efforts to reduce their cost of production. Selling price of BEL should as far as possible be at a level lower than the landed cost of components imported from abroad.

Demand Survey

9.18. The Committee have recommended proper demand survey in a realistic manner and have suggested the stepping up of the sales activities so that the demand of its products is sustained. At present, BEL is dependent on the suggestions of Government Departments|user departments for assessment of the demand of its pro-

ducts. The Committee have recommended that the undertaking should, instead of depending mainly on the assessment made by the user departments, evolve its own machinery for making demand survey, bearing in mind the likely developments in the electronic field in the future.

Financial Matters

9.19. The Committee note with satisfaction that this undertaking has been making profits during the last five years. In the year 1965-66 it has recorded a profit of Rs. 144 lakhs in 1966-67 Rs. 256 lakhs, in 1967-68 Rs. 381 lakhs, in 1968-69 Rs. 434 lakhs and in 1969-70 Rs. 427 lakhs.

9.20. he Committee note that in spite of the profit, there is a decline in the percentage of profits as compared with the volume of sales in the year 1967-68 and 1968-69. The Committee recommend that if profitability of BEL goes down in spite of growing volume of sales, such a development should be viewed with concern and the reasons for such set back be investigated. The Committee also recommend that BEL should arrest such disturbing trend and hope that the undertaking would be able to offer still better return on investment in future.

Achievement of objective

9.21. The main objectives of the Company as reiterated earlier is to design, develop, and to manufacture specialised electronic equipments and components. The Committee find that over 80 types of electronic equipments were designed, developed by the undertaking. In the manufacture of electronic equipments etc. also BEL had made substantial progress. The value of production for instance has increased by 160 per cent from 1965-66 to 1969-70.

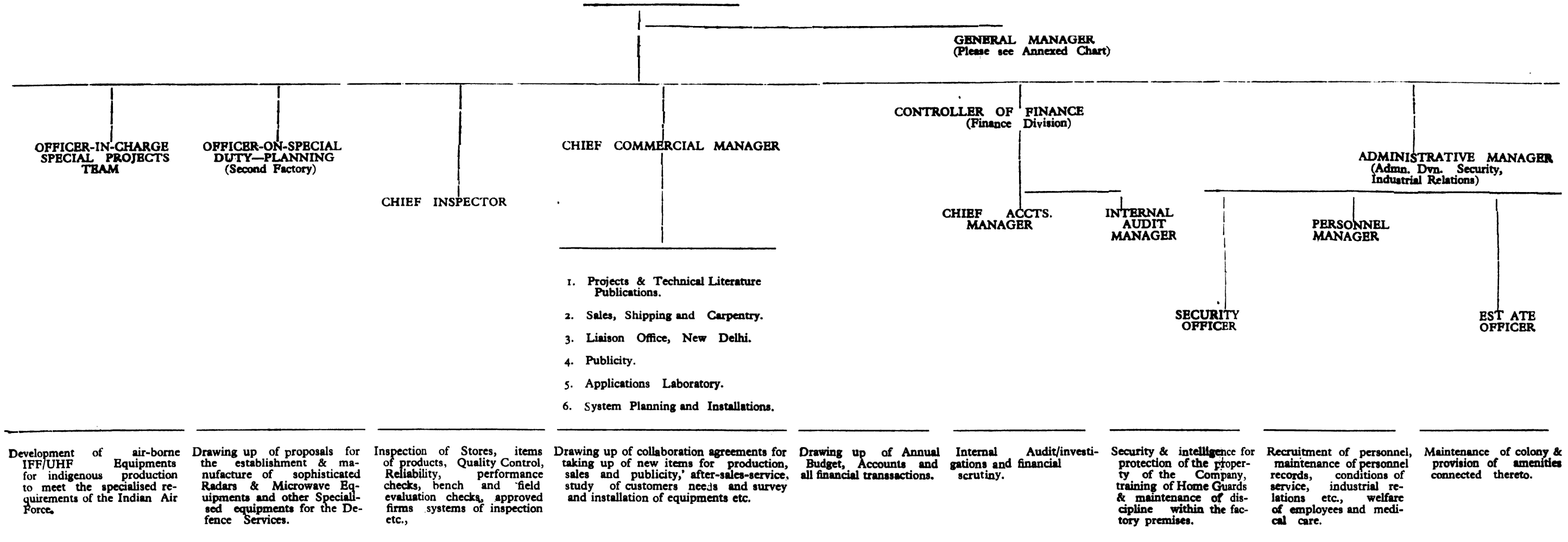
Development of Electronics

9.22. The Committee are happy to note that the Government have recognised the urgent need for development of Electronics Industry in this country and have set up the Electronics Commission. The Electronics Commission has been asked to "review the entire field of Electronics with regard to research, development and industrial operations with full authority to formulate policy in this field and to direct implementation on sound technical and economic principles of all measures, both promotional and regulatory, that are necessary for the country to attain self-reliance in the shortest possible time and in the best possible manner".

APPENDIX I

(*Vide* para 3·1)

ORGANISATIONAL CHART OF BHARAT ELECTRONICS LTD., BANGALORE-13.



ORGANISATIONAL CHART OF PRODUCTION DIVISIONS OF BHARAT ELECTRONICS LIMITED

GENERAL MANAGER

MANAGER, PURCHASE	MANAGER, STORES	DY. GEN. MANAGER LOW POWER COMMUNICATION EQPTS.	DY. GEN. MANAGER HIGH POWER COMMUNICATION EQPTS.	DY. GEN. MANAGER RADAR	DY. GEN. MANAGER PLANNING	DY. GEN. MANAGER ELECTRON TUBES	DY. GEN. MANAGER SEMICONDUCTORS	MANAGER PASSIVE COMPTS.	MANAGER COIL WINDING	CHIEF ENGR.
PURCHASE & MARKET RESEARCH		Production Control Fabrication Assembly and Testing Services	Production Control Fabrication Assembly and Testing Services	Production Control Fabrication Assembly and Testing Services	Engineering & Standards Technical Trg. Centre Research & Development	Technical Library Magnetron Tubes Transmitting Tubes TV Picture Tubes X-Ray Tubes Receiving Valves	Germanium Semiconductors Silicon Semiconductors Development Laboratory	Crystals Capacitors		
Procurement of Stores for production and Maintenance etc.	Receipts & issue of stores and accounting thereon, Customs, clearance etc.	Manufacture of various low frequency wireless/electronics equipments & Allied Apparatus.	Manufacture of various High frequency wireless/electronic Equipments & Allied Apparatus.	Manufacture of various types of Radars viz., Fire Control Radars, Storm Warning Radars, Surveillan Radars, Fish Finders, Computers etc.	Engineering and Development of Equipments for production, preceservation of know-how etc. standardisation of materials, indigenisation etc. and training of men to suit the needs of the industry and maintenance of a Technical Library.	Manufacture of Magnetrons, transmitting tubes, X-Ray Tubes, Radio Receiving Valves, TV Picture Tubes, and development of other types of Electron Tubes.	Manufacture of Germanium and Silicon Transistors & Diodes and development work on various other types of transistors and recovery of germanium.	Manufacture of various types of Crystals & Capacitors.	Manufacture of dif. types of Coils and Transformers to cater the entire requirements of the dif. Prodn. Divisions.	Construction of bldgs., installation of machines etc. & providing of Services & maintenance thereon.

APPENDIX II

(*Vide* para 3.9)

Powers for Board of Management Bharat Electronics Limited

The President having constituted a Board of Management of Bharat Electronics Limited, the Board of Directors delegate the following powers to this Board under Article 74(1) of the Articles, of Association of Bharat Electronics Limited.

1.	The Managing Director will preside over all meetings of the Board of Management.	Chairman
2.	The Board of Management will meet to advise the Managing Director in despatch of the current business of the Company not less than once every fortnight.	Meetings
3.	The quorum shall be two members including the Chairman and the Controller of Finance	Quorum
4.	All matters shall be decided by a simple majority of votes, the Chairman having a casting vote in case of an equality of votes.	Votes
5.	The Managing Director and the Controller of Finance shall have the right of individually to require any resolution passed at a meeting of the Board of Management to be kept in abeyance pending a reference to the Board of Directors and their decision thereon.	Right of reference
6.	All questions affecting finance and accounts will be decided after consultation with the Controller of Finance	Finance and Accounts
7.	A Resolution in writing signed by all the members shall be as valid and effectual as if passed at a duly called and constituted meeting.	
8.	Members shall be present in person at every meeting, and no representative or proxy shall be entitled to be present and vote as a member.	Proxy
9.	The Secretary to Board of Management will keep proper record of the minutes of every meeting.	
10.	The Board of Management will in particular advise the Managing Director about the exercise of the following powers without prejudice to the general powers conferred by Articles 74(1) of the Articles of Association :—	
	1) Making and giving receipts, releases and other discharges of money payable to the company and for the claims and demands of the company.	
	2) Determining subject to the provisions of Articles 76 of the Articles of Association, who shall be entitled to sign on behalf of the Company, bills, notes, receipts, acceptances, endorsements, cheques, releases, contracts and documents.	

3) Opening banking accounts in the name of the Company with banks approved for this purpose by the Board of Directors and to operate thereon for and on behalf of the Company.

4) Appointing, removing, suspending of replacing officers, clerks, agents, workmen at rates to be approved by the Board of Directors except for work charged establishments; provided that these powers will only be exercised in full in respect of all employees the maximum salary of whose posts does not exceed Rs. 860/- in regard to the others the previous sanction of the Board of Directors will be necessary for appointment, fixation of salaries, remoluments and removal. The Managing Director will have the power to suspend any employee of the Company. Any general revision of the wages and salaries or conditions of service of the employees will require the approval of the Board of Directors.

5) Purchasing raw materials, articles and other things required in connection with the operations of the company within the limits of the annual appropriation therefor assanctioned by the Board of Directors.

6) Incurring capital expenditure not exceeding Rs. 50,000/- per quarters if the total capital appropriation for the year as sanctioned by the Board of Directors is not exceeded.

7) Selling the capital assets of the Company or writing off where necessary upto a limit of Rs. 10,000/- a year. But a quarterly report of all transactions in excess of Rs. 1,000/- under clauses, 6, 7 and 8 should be submitted to the Board of Directors.

8) Instituting, conducting, defending, compounding or abandoning any legal proceedings by or against the Company and also compoundings and allowing time for payment or satisfaction of any claims or demands by or against the company provided the amount of consideration involved does not exceed Rs. 10,000/-.

9) To enter into such negotiations and contracts and rescinding or varying such contracts, and executing and doing such acts, deeds and things in the names and on behalf of the company as may be necessary in accordance with the delegation of the Authority above or in regard to such delegations as may be hereafter made by the Board of Directors.

10) Sub-delegating to the extent that may be considered necessary the powers, authorities and discretions for the time being vested in him subject, however, the ultimate control and authority being retained by him.

11) To sanction the posts of Executives whose salary does not exceed Rs. 860/-.

12) To decide on sponsoring of the candidates for training abroad under various scholarships. Minutes 16 and 17 of 76th Meeting.

APPENDIX III

Summary of Conclusions/Recommendations of the Committee on Public Undertakings contained in the Report

Sl. No.	Reference to Para No. in the Report	Summary of Conclusions/Recommendations.
1	2	3
1	1.16	The Committee note that at the National Conference on Electronics held in Bombay in March, 1970 some of the leading authorities on Electronics including the ex-Chairman of the Electronics Committee and leading scientist, who was formerly a Member of the Planning Commission and is now Scientific Advisor to Defence Minister were frankly critical of the excessive reliance placed on foreign collaboration and observe that the achievements in the field of attaining self-reliance in defence and tele-communications electronics throughout the sixties were disappointing. The Committee feel that the perspective plan for electronics industry having been prepared under the eminent chairmanship of late Dr. Bhabha, there was not adequate follow-up action with the result that even in 1970-71 the value of equipment produces with indigenous know-how in B.E.L. was no more than Rs. 6 crores, out of a total production of Rs. 21.40 crores. The Committee would like Government to give the highest priority to the intensification of research and development programme in Electronics in the country so that we are able to attain self-reliance in this crucial industry. In particular, the Committee would commend the suggestions made at the Conference that requests for foreign inputs for electronics industry should be most critically

1	2	3
		examined with a view to develop self-reliance and do away with, as far as possible, foreign collaboration. The Committee in particular suggest that the methods followed by Japan in achieving a break-through in electronics, by purchasing outright know-how (where necessary) intensifying research and development in close collaboration with industry and production of quality goods at most competitive prices, should be closely examined by Electronics Commission and adopted as necessary in the interest of stepping up our production of electronics to meet the demands of home market and avail of its export potential.
2	1.17	The Electronics Commission should draw up a perspective plan for the electronics industry in the light of all relevant developments since the Bhabha Committee Report was submitted and have a system of continuously reviewing the trends in demand and production so as to extend in concrete terms every help to the development of electronics industry within the country. A yearly report on the achievements in the electronics industry should be presented in time. to Parliament so that the matter receives continuous attention at the highest level.
3	2.7	Realistic assessment of the demand of Products, in the opinion of the Committee, is vital for every undertaking. In the case of BEL, which bases its demand survey on the anticipated demands of the user departments 'as advised by them (those departments) in their agreements', assessment of demand of products may not prove to be completely realistic. Rapid development is taking place in the electronic industry. Actual requirements of the user departments may undergo a change in the future. The Committee therefore, recommend that the undertaking should exercise utmost caution in

1	2	3
		making their demand survey of products and instead of depending exclusively on the assessment made by the user departments, should evolve its own machinery for making demand survey, bearing in mind the likely developments in the electronic field in the future.
4	2.8	The Committee note that no individual manufacturer abroad is capable of manufacturing and supplying the entire range of electronic equipments with facilities to user departments in India. In this background, the undertaking/ Government had provided in the CSF agreement that the Government should have the liberty to collaborate with other firms. They recommend that BEL should take steps to obviate such a contingency in India in regard to the production of electronic equipments. BEL should, ~~the Committee feel~~, equip itself in such a way that its products are not restricted in their manufacture to limited type of equipments as in foreign countries. They hope that in this connection, the undertaking will make full use of the 'liberty to collaborate' with other foreign firms. They note that the BEL has entered into non-CSF collaboration agreements, which is a step in the right direction.
5	2.19 & 2.20	The Committee note that the BEL entered into 40 agreements with 20 collaborators. In some of the agreements extension of time had been granted by the undertaking. It is not quite clear from the note furnished by the Ministry the number of cases where deviations have taken place from the guidelines laid down by the Ministry of Finance/Economic Affairs for entering into collaboration agreements. The Committee recommend that : (i) reliance on foreign collaboration agreements for import of technical know-how

1	2	3
		for the production of various equipments and components should be brought to the minimum and the BEL and other undertakings should strive to attain self reliance;
		(ii) extension of tenure of agreements with foreign collaborators should be granted on very rare occasions and deviation from the norms/guidelines laid down by the Ministry of Finance/Economic Affairs should be avoided;
		(iii) all undertakings in Public sector should endeavour without any further loss of time to attain indigenisation in the technical know-how, and in the production of equipments and components and should in no case approach a foreign agency unless a clear certificate is given by the concerned Ministry about their inability to meet their requirements from indigenous sources.
6	2.24 & 2.25	According to the undertaking the saving in Foreign Exchange has been worked out with reference to the selling price of C.I.F. cost whichever is lower as reduced by foreign exchange Content of the imported items. The Committee, however, notice from the Annual Report of the Company for the years 1964-65 and 1965-66 that the value of production including the work-in-progress has been assessed on the basis of the selling prices. As the value of production so arrived at has been reduced to exclude the value of work-in-progress at cost, the resultant value of completed production represents the selling prices. On the basis of the data furnished to the Committee at Paras 8.10 and 8.11 of this Report it is noticed that the landed cost in-

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		clusive of Customs duty is lower than the selling prices of the Company. In view of the above, the Committee are unable to express any opinion of the quantum of Foreign Exchange claimed to have been saved by the undertaking. The Committee would, therefore, recommend that the Foreign Exchange savings worked out with reference to the C.I.F. costs may be furnished to them duty vetted by Audit.
7	2.26	The Committee find that percentage of foreign exchange content of completed production has been on the rising side. Compared to 29.98 per cent in 1966-67, it has risen to 35.56 per cent in 1968-69. The Committee are unable to locate the exact reasons for such progressive increase in foreign exchange content in their products instead of their reduction. However, the Committee note that in 1969-70, the percentage content of foreign exchange in completed production has shown slight improvement (fall by 3 per cent) but compared to 1966-67 foreign exchange content still remains high. Stressing the need for attaining self reliance as soon as practicable, the Committee urge on the BEL to study this aspect of their performance and take effective remedial measures to reduce their dependence on imported components in this vital industry.
8	2.28	The Committee note that with the introdution of indigenously designed equipment and components, the undertaking has made progressive efforts towards saving of foreign exchange. However, as pointed out in the Report elsewhere, a lack of rapport was visible between BEL and NPL resulting in limited utilisation of know-how developed by N.P.L. for Ceremic

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		Capacitors, etc. The Committee would urge that there is need for close coordination and co-operation between national laboratories (National Physical Laboratory and Central Electronics and Engineering Institute etc.) under CSIR and BEL in the matter of research and development of knowhow in specified fields so that the country is able to attain self reliance at the earliest and thereby conserve foreign exchange. The BEL has a vital role to play in building up the electronic industry in our country to meet the internal demand and capture an increasing share in export market.
9	3.16	The Committee recommend that organisational set up of Bharat Electronics Ltd. should be kept under constant review so that improvements can be effected. It will indeed be a useful exercise if the organisational set up of enterprises engaged in electroninc industry in leading foreign countries e.g. Japan, U.S.A. etc. are studied to keep abreast of latest developments in the electronics industry and the organisational efficiency with a view to their adaption in the undertaking.
10	3.17	The Committee are of the view that progress in the electronics field depends upon how far various agencies engaged in design, development or research in electronics field are able to pool their resources and forge a common integrated programme of work. But this is possible only if a close coordination between three public sector undertakings viz. Bharat Electronics Ltd., Hindustan Aeronautics Ltd. and Electronics Corporation of India on the one hand and various Research organisations, universities etc. working in the direction of development of Electronics Industry in the country on the other is maintained.

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11	3.18	The Committee note that needs of Atomic Energy Commission and public undertakings on the Defence side vary considerably. The Commission needs highly sophisticated Electronic control instruments required for research and atomic power Stations. Similarly Public Undertakings on Defence side manufacture equipment which primarily serves the needs of Defence and may have no direct connection with what the Atomic Energy Commission on the Civil side might stand in need of. In view of the above reasons, it does not appear to be advisable to bring these organisations under one umbrella. The Committee, however, suggest to wait for the report of the Electronics Commission but in the meantime survey should be conducted to see what simple items of equipment can be co-ordinated and manufactured at one place with a view to standardisation and to economise cost of large scale production.
12	4.7	It will be seen from the statement at para 4.6 of this Report that the actual production and planned production in almost all the cases was for below the installed capacity. The Committee view with concern the wide gap between the installed capacity and the actual production. The low production not only means loss to the Undertaking but also results in high cost of production. The Committee could get no proper explanation for low production of these items. They desire that the Company should keep a constant watch over the production and sustained efforts should be made to achieve the installed capacity.
13	4.12 & 4.13	The Committee note the view point of the management that the plant was working to its full capacity but BEL may try to bring in full capacity of its Equipments Division also. As mentioned in para 4.10, overall utilisation of

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		productive machines in the equipment division, had been 72 per cent of the available capacity in 1969-70 on the basis of two eight from shifts. It is, therefore, evident that all the units of the plant were not working to their rated capacity.
		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 the 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 capactity.
14	5.10	The Committee note that the first coordinated efforts to assess the country's requirements in respect of electronics equipments and components was made by the Bhabha Committee. But they note with regret that it would have been better if a systematic effort would have been made to see how far the projections of demand made by that Committee have stood the test of time and proved realistic. The present system whereby each undertaking conducted a review of demand of its own items of manufactured products is perhaps not the correct way to give an overall assessment. As electronics industry is a highly sophisticated and specialised branch of engineering, the Committee feel that there is need to subject the long term projection to a periodical review by a standing Expert Committee. Such a Committee would naturally consist of renowned Electronic Engineers, eminent Economists and representatives of trade, industry etc. so that reviews submitted to Government

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		were realistic and could be reliable basis for advance planning.
15	5.18	The Committee have noted with satisfaction the fact that value of production in BEL has increased from year to year and from Rs. 926.74 lakhs in 1965-66 to Rs. 2,411.26 lakhs in 1969-70, an increase of 160 per cent in a period of 5 years. The Committee, however, hope that this record of achievement will be maintained and improved in future so as to attain self reliance and self sufficiency at an early date in the crucial field of electronics for Defence and Industry.
16	5.28 to 5.33	The Committee find that the BEL had entered into an agreement with CSF (French Collaborator) in 1952 which also covered *inter alia* manufacture of ceramic capacitors. On 1st April 1960, BEL entered into another agreement with NRDC/NPL for a period of 14 years for the manufacture of ceramic capacitors in their factory. Subsequently, BEL curtailed this agreement with NRDC from 14 years to 10 years. The Committee note that the undertaking changed the process of manufacture of disc type of capacitors which they were following on the NRDC/NPL know-how as that process was found by the undertaking (BEL) to be expensive and labour intensive. Moreover, the technical know-how for the manufacture of not only disc type of capacitors but also of plaquettes, tubulars, and trimmers types of capacitors prompted the undertaking to seek the assistance of its collaborators CSF, (French Firm). The Committee note that in 1965, the BEL decided to go in for foreign collaboration for manufacture of tubulars and trimmers and started their actual production in February 1966

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whereas according to the National Physical Laboratory, the Laboratory was able to develop by end of 1965 "trimmer bases which were acceptable to the industry."

The lack of understanding and rapport between BEL and National Physical Laboratory would be clear from the statement of National Physical Laboratory to the Committee that "Since BEL had made preliminary moves in getting into collaboration agreement with a foreign firm, NPL did not find it necessary to pass on the know-how for Trimmer bases to BEL", while the BEL have stated in the note to the Committee that "BEL understand that a few firms have been licensed to manufacture Ceramic Capacitors with the NPL know-how but do not however have information whether the parties so licensed have started production."

The Committee deprecate strongly this lack of coordination between National Physical Laboratory and BEL both of which are financed from Government funds. The Committee consider that National Physical Laboratory should have specifically brought to the notices of BEL the process for manufacture of trimmers and tubular capacitors as soon as they had developed it for commercial exploitation and that BEL should have on its own also kept track of the investigation and research being continued at National Physical Laboratory so as to avail of the indigenous know-how as soon as it came upto the mark, in preference to the foreign collaboration.

The Committee urge that there should be a very close cooperation between National Laboratories (National Physical Laboratory, Central Electronics and Engineering Institute etc.) under CSIR and BEL and similar undertakings in the matter of Research and Development. The Com-

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		mittee are of the view that the purpose should be to attain self-reliance at the earliest available opportunity and the import of technical know-how on items of technology where indigenous know-how and expertise is available should be avoided.
17	5.34	The Committee are also surprised at the way the production of tubulars was taken up by the undertaking. The Company produced 6,33,833 tubulars upto 1966-67 at a cost of Rs. 3,26,757. Out of these 6,27,980 tubulars had been sold for Rs. 0.50 lakhs and the balance 5853 numbers were utilised by the Company. B.E.L. thus incurred a loss of Rs. 2.75 lakhs on this venture. The B.E.L. characterised the entire expenditure as developmental in nature, a view point which the Committee is not in a position to accept. This is not all. When BEL changed the process of disc types of capacitors for mass production, items like Plant and Machinery, tools, raw materials etc. of the value of Rs. 1.47 lakhs became surplus. This amount had to be written off. The Committee are not able to appreciate why the research on tubular capacitors was not continued in a coordinated manner by NPL/BEL so as to achieve a break-through at the earliest and also reduce developmental expenditure. The Committee hope that B.E.L. would make a thorough analysis of demand and cost of production before undertaking manufacture of any new items to avoid recurrence of such losses in future.
18	5.37	The Committee recommend that the present product mix of Bharat Electronics Ltd. should be kept under constant watch and changes made as and when variations of demand and consumers preferences arise or are likely to arise. Special care should be taken by BEL to meet the requirements of components of small scale manufactures of electronic equipments meant for entertain-

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		ment purposes. BEL should also develop capacity and keep pace with expanding requirements of components for T.V., computers etc.
19	5.39	Consultation with users can go a long way to undertaking perspective long term planning. Every effort should be made by BEL to obtain from users firm orders on a long-term basis to avoid the possibility of unplanned and uneconomic production. The Committee, therefore, recommend that Bharat Electronics Ltd. should develop closer liaison with users. BEL should also arrange to carry out demand survey from time to time so as to gear up their manufacturing programme to meet anticipated requirements.
20	5.41	The Committee note with concern that the cost of production of most of the components manufactured at BEL has increased considerably in 1969-70 as compared to their cost of production in 1966-67. The cost of production has risen by more than 25 per cent during the aforementioned period, *e.g.* the cost of production of receiving valves EZ 80 has increased by 25.4 per cent, EBC 81 by 20.96 per cent, UF 89, by 32.57 per cent, UCH 81 by 29.7 per cent, EL 84 by 38.46 per cent and ECL 82 by 31.23 per cent. Even the cost of production of BEL 100 type transmitting tubes has increased from Rs. 257.42 per piece in 1967-68 to Rs. 519.17 per piece in 1968-69, *i.e.* by 101.68 per cent. The Committee recommend that the reasons for this increase in the cost of production may be gone into and the remedial steps be taken to arrest this trend.
21	6.6	The Committee regret that percentage of rejection of Germanium Semi-Conductors is on the increase. For example percentage of rejection of OA 79|72 has increased from 16.17 per cent in 1968-69 to 23.84 per cent in 1969-70, that of OA 85|81 Diode from 16.03 per cent in

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		1968-69 to 32.58 per cent in 1969-70. Similarly, percentage rejection of AC 127, AC 132 and AC 187, Transistors has gone up from 22.83, 19.61 and 19.02 in 1968-69 to 38.59, 30.99 and 36.27 respectively in 1969-70. Though Bharat Electronics Ltd. claim that these percentage rejections are "within the limits normally encountered by manufacturers abroad", they have not given precise details of such limits. It is however, evident that the percentage of rejections in 1969-70 has shown a rising trend. The Committee recommed that Management of Bharat Electronics Ltd., should make concerted efforts to arrest this disturbing trend by putting the present arrangements for quality control in their enterprises on a sound footing.
22	7.14 and 7.15	Research and Development is an activity which is vital for healthy growth of Electronics Industry in India. The Committee are of the view that success of any research project does not depned on how much expenditure is incurred on it but the performance of specific tasks related to production and solution of practical problems posed by the industry. The Committee therefore, recommend that there should be close coordination between the production and research wings of the industry so that problems of crucial importance are tackled in a concerted manner. The Committee wish to stress that Research and Development of B.E.L. should work in close coordination with C.S.I.R. and other related research laboratories in the country so that a coordinated approach can hasten the achievement of self reliance in technology, obviate unwitting duplication of research effort, reduce cost of production and above all lay a sound

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		technological base for the electronic industry in India.
23	7.17	The Committee understand that an Electronics Commission has recently been created by the Government. The Committee feel that in an industry like electronics, where the pace of obsolescence is faster than the pace for acceptance, time is the essence of the matter. With the creation of the Electronics Commission by the Government, the Committee hope that a well coordinated and integrated programme for research and development would be evolved and implemented. The Committee would suggest that a perspective plan for research and development be drawn up for next 10-15 years. This plan should be reviewed every year in the light of performance and demand projection. 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.
24	8.6	The Committee note that decline in percentage of profit as compared with the volume of sales for the year 1967-68 and 1968-69 was not due to increase in cost of production only. If profitability of BEL goes down inspite of growing volume of sales, it is a development which has to be viewed with concern, whatever be the reasons for such a development. The Committee hope that BEL would be able to arrest this disturbing trend soon by giving a better return on the investment made.
25	8.13	The Committee regret to note that BEL's selling prices (including excise duty) effective

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		from 1st March, 1969 in respect of Germanium Semi-Conductors (OA 70, 73, 79, 81, 85, 91 & 95) range from Rs. 1.30 to Rs. 2.00 as against total landed cost of Rs. 1.07. The position in respect of silicon Semiconductors was no better. For example, as against the total landed cost of Type, BY 100 and BY 114 as Rs. 3.82 and 3.50 BEL's wholsale prices were Rs. 5.50 and Rs. 5.00 respectively. The position of some types of transmitting valves was still worse. For example, the selling price per unit of B.E.L. 3000 and 5000 types was Rs. 3000 and Rs. 4,400 respectively as against the highest landed cost per unit of these types which were Rs. 2,481 and Rs. 3,995. BEL had argued that "it might not be correct or fair to make comparison of BEL's selling prices with landed cost of foreign transistors, as foreign manufacturers have not only been in the field many years earlier but their market as well as quantities of production was many times the capacity of the plant of BEL". The Committee agree that these factors do influence the selling price of a product but wish to stress that BEL should not relent in their efforts to reduce their cost of production so that it might be possible to bring their selling prices at par with the landed cost of Germanium Semi Conductors, Silicon Semi-Conductors and Transmitting valves etc. etc.
26	8.18 and 8.29	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.
27	8.28 and 8.29	As far as the components were concerned it has been stated that in view of the trend in the receiver industry, the demand for receiving

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		valves was expected to decline. However, on an overall basis components sales of the order of Rs. 6 crores to Rs. 7 crores per year for the next 2 to 3 years could be predicted, which figure was expected to increase as soon as production of the other component items now in planning stage was progressively taken up.
		The Committee are concerned to note that demand for Receiving Valves was expected to decline in the next 3 to 4 years. The Committee recommend that BEL should take aggressive sales efforts and if necessary, by reorganisation of its sales Departments, with a view to secure advance orders and should determine the future pattern of production in BEL after a realistic demand survey.
28	8.38	The Committee cannot but view with concern the outstandings of BEL. The Committee hope that the question of acceptance of prices in advance on the basis of quotations would be sorted out soon with the Ministry of Defence so as to facilitate settlement of future bills. The Committee would like BEL to systematically follow up the question of recovery of amount for equipment already supplied to Government departments so as to recover all the outstanding amounts due.
29	8.53	The Committee regret to note about the fraud perpetrated by the employees of BEL in the sale of Canteen coupons and recommend that the management of BEL should strengthen the existing measures to prevent the recurrence of such events and may adopt further measures in this regard, if necessary.
30 and	9.22 9.23	The Committee are happy to note that the Government have recognised the urgent need for development of Electronics Industry in this country and have set up the Electronics Commission. The Electronics Commission has been

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		asked to "review the entire field of Electronics with regard to research, development and industrial operations with full authority to formulate policy in this field and to direct implementation on sound technical and economic principles of all measures, both promotional and regulatory, that are necessary for the country to attain self-reliance in the shortest possible time and in the best possible manner."
		As pointed out earlier in this report there is need for making intensified efforts for achieving self-reliance in Electronics. The Committee have no doubt that the Electronics Commission would take special note of the recommendations made at the National Conference on Electronics held in Bombay in March, 1970 and would take concerted measures to promote self-reliance in the industry, in order to meet not only the requirements of all strategic sections within the country but also to develop export potential in this promising area. The Committee also suggest that the Electronics Commission should draw up a perspective plan for the Electronics Industry in the light of all relevant developments since the Bhabha Committee Report was submitted and have a system of continuously reviewing the trends in demand and production so as to extend in concrete terms every help to the development of Electronics Industry within the country. A yearly report on the achievements in the Electronics Industry should be presented in time to Parliament so that the matter receives continuous attention at the highest level.

GMGIPND—LS II—2129 (Aii) LS—30-11-71—1340.