

# **HUNDRED AND FOURTEENTH REPORT**

## **PUBLIC ACCOUNTS COMMITTEE (1987-88)**

**(EIGHTH LOK SABHA)**

### **EXTRA EXPENDITURE DUE TO DELAY IN DEVELOPMENT OF AN EQUIPMENT**

**MINISTRY OF DEFENCE  
(DEPARTMENT OF DEFENCE RESEARCH AND DEVELOPMENT)**



*Presented to Lok Sabha on 29.3.1988*

*Laid in Rajya Sabha on 29.3.1988*

**LOK SABHA SECRETARIAT  
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CORRIGENDA TO 114TH REPORT OF PUBLIC ACCOUNTS  
COMMITTEE (8TH LOK SABHA)

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### PART-II\*

Minutes of sittings of the Committee held on  
22.9.1987  
9.3.1988

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\*Not printed (one cyclostyled copy laid on the Table of the House and five copies placed in Parliament Library).

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(1987-88)

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## INTRODUCTION

1. the Chairman of the Public Accounts Committee, do present on their behalf this Hundred and Fourteenth Report on Paragraph 24 of the Report of the Comptroller and Auditor General of India for the year 1985-86, Union Government (Defence Services) relating to extra expenditure due to delay in development of an equipment.

2. The Report of the Comptroller and Auditor General of India for the year 1985-86, Union Government (Defence Services) was laid on the Table of the House on 8th May, 1987.

3. The Committee have expressed deep concern over the inordinate delay in the development of equipment 'B'. According to the original estimates this equipment was to be made available for user trials by mid 1975 and there-after for series production by mid 1977. The Committee have found that more than 15 years have already elapsed since the sanction of the project in August 1972 but there is still no specific indication about the time by which this equipment of great importance would be actually made available for use by the Army. The Committee have strongly recommended that atleast now serious co-ordinated and time bound efforts should be made to ensure that the equipment is made available to the Army urgently.

4. The Committee have been led to believe that the scientists of R&D Establishment had taken up a challenge which they have not been able to quite cope with. The scientists, perhaps, carried away by their enthusiasm, over-estimated the scientific capability and infrastructure available in the country. It does not appear wise on the part of the R&D Establishment to take up this particular challenge by estimating the cost and time frames of Rs. 53 lakhs and 3 years for completing the development of equipment 'B' because both these estimates have been very wide off the mark. The Committee agree that it may not be possible to precisely estimate the cost and time frames for the completion of the research and development projects. But the estimates should be correct within certain limits and there should not be extraordinary escalations as have been in this case. Any scientific improvement has to be a part of continuous upgradation. In this case the concerned agencies were obviously seeking to accomplish a quantum jump without having the necessary competence to do so. The Committee have an inescapable impression that serious efforts have not been made to give this equipment to the Army within a reasonable time frame. The Committee

have emphasized that the concerned efforts of all concerned should be directed to ensure that the Army is equipped effectively all the time and is not made to suffer for the delay in the completion of Research and Development projects.

5. Due to the inordinate delay in the development and consequently of production of equipment 'B' the Ministry had to accord sanction in April, 1982 for the import/licence manufacture of some number of equipment 'C' at a cost of Rs. 28.10 crores. The Committee have deprecated that this extra expenditure had to be incurred to meet urgent operational requirements despite the fact that this made fell short of Army specifications.

6. The Committee have found that inordinate delay in development of equipment 'B' has led to huge escalation in development cost from Rs. 53 lakhs to Rs. 265.92 lakhs. The equipment is still under trials and the trials so far held have indicated that some more steps are required to be taken by the R&D Establishment to improve its functioning which would naturally involve some additional expenditure. Further, the estimated cost of the hybrid version of equipment 'B' and indigenous production cost of equipment 'C' would be Rs. 126 lakhs and Rs. 140 lakhs respectively in 1989-90 as against the initially estimated cost of Rs. 20 lakhs for productionised version of equipment 'B'. According to the Committee the disproportionate escalation in costs is indicative of the fact that the authorities concerned did not have a clear conception of the amount of development efforts required at the time of initial estimation.

7. With a view to achieving the aims of any research and development project of this nature within any practicable time-frame, it is imperative that the research projects are not only properly formulated at the initial stage but their progress is also effectively monitored till final completion. On analysis of the different stages in the execution of the project, the Committee have felt that none of these aspects have been adequately taken care of. The Committee have recommended that the Department should make an in-depth study of the problems faced by them in the implementation of this project and evolve detailed methodologies for ensuring comprehensive and periodic review and appraisal of all research project proposals in terms of detailed planning, coordination, progression and monitoring not only to reduce incidence of cost and time over run but also to make the country self-reliant in the field of modern technology.

8. The Committee (1987-88) examined Audit paragraph 24 at their sitting held on 22 September, 1987. The Committee considered and finalised

the Report at their sitting held on 9 March, 1988. Minutes of the sitting form \*Part II of the Report.

9. For facility of reference and conveniences, the observations and recommendations of the Committee have been printed in thick type in the body of the Report and have also been reproduced in a consolidated form in Appendix III to the Report.

10. The Committee would like to express their thanks to the officers of the Ministry of Defence (Deptt. of Defence Research and Development) for the cooperation extended to them in giving information to the Committee.

11. The Committee place on record their appreciation of the assistance rendered to them in the matter by the office of Comptroller and Auditor General of India.

NEW DELHI ;

*March 11 1988*

*Phalgun 21, 1909 (S)*

AMAL DATTA

*Chairman,*

*Public Accounts Committee.*

## **REPORT**

The Report is based on paragraph 24 of the Report on the Comptroller and Auditor General of India for the year 1985-86, Union Government (Defence Services) which is at Appendix I.

2. The audit paragraph under examination highlights inordinate delay and enormous increase in expenditure incurred in the development of equipment 'A' for use by the army. The facts of the case as brought out in the audit paragraph and revealed as a result of examination by the Committee are recounted in the succeeding paragraphs.

### **Background**

#### *Development of equipment 'A'*

3. Based on the sanction accorded by the Ministry of Defence in 1962, a Research and Development Establishment had developed equipment 'A' which was productionised by a Public Sector Undertaking (PSU). According to the Ministry of Defence (Deptt. of Defence Research and Development), the development of equipment 'A' was totally indigenous in concept and design. However, certain components and sub-assemblies under use in PSU at that time were made use of for its design and development. A number of this equipment were produced between November 1969 and September 1973 by the Public Sector Undertaking and supplied to the Army. The total development cost of this equipment was Rs. 22.10 lakhs and production value per unit was approximately Rs. 13.83 lakhs.

4. Equipment 'A' was approved by the Army as an interim measure. It suffered from a number of limitations. The major limitation of this equipment was that it was heavy, which somewhat restricted its mobility. Moreover, it could detect only one shell at a time. It used an analog computer and also it did not have a silent generating set. The Secretary, Deptt. of Defence Research and Development explained during evidence that an analog computer has many dis-advantages. It could not do the calculations and measure at the same time. According to him the uselessness of the analog computer was realised in 1972 when they started the programme. They wanted to start with digital computer. There was a problem in semi-conductor, medium scale integrated circuits and large scale integrated circuits. They had medium scale integrated circuits. The large scale integrated circuits came in the western countries somewhere in 1976-77 and it was available in this country in 1978-79,

5. It was not possible to remove these limitations in the equipment at that time, as they were arising mostly out of the limitations of the technology available in the country at the time. For this reason, a new Qualitative Requirement was projected by the Army Head Quarters and a new R&D project was proposed to overcome these limitations.

*Sanction for development of Equipment 'B'*

6. In the above circumstances a General Staff Qualitative Requirement (GSQR) for equipment 'B' was drawn up by the Army Headquarters in April 1970 which was approved by the General Staff Equipment Policy Committee on 8 August 1972. The R & D Establishment stated in March 1972 that the estimated cost of somewhat similar foreign equipment 'C' but with far lower performance was about Rs. 15 lakhs and that the cost of productionised version of equipment 'B' was expected to be Rs. 20 lakhs approximately. The Ministry accorded sanction in August 1972 for indigenous development on *high priority* of 2 models of equipment 'B' at a cost not exceeding Rs. 53 lakhs. Equipment 'B' was to be made available for user trials by mid 1975 and thereafter series production was to start by mid 1977.

7. All GSQRs prepared by the Army are primarily based on the Operational Requirement in the foreseeable future. This, coupled with the indigenous R&D capability and the state-of-the-art, go in making a GSQR. According to the Department of Defence Research and Development GSQR for equipment 'B' is more or less akin to the performance parameters of equipment 'C' with an additional facility of multi-target locating capability which was one of the parameters of an advanced equipment a system which was being developed by another foreign country, at that point of time.

8. On an enquiry by the committee as to what efforts were made to update the requirements from time to time, the Committee were informed that the need to update GSQR did not arise as considerable deliberations had gone into it during the conceptual stage and the parameters listed therein were based on the operational requirements as foreseen for the future. However, decision was taken as late as in 1982 for incorporating some of the good features of equipment 'C' in the development of hybrid version of equipment 'B'.

9. The reasons advanced by the department for taking 2 years in approving the qualitative requirement (QR) for equipment 'B' approved in August 1972 when it was drawn up by the Army Headquarters in April 1970, although the equipment was stated to be urgently required, are at Appendix II.

10. The very fact that the Government took more than two years to accord approval in August 1972 to this QR goes to prove the lackadaisical approach of the Government from the initial stage itself in meeting the urgent requirement

of the Army. The Committee desire that such delays must be eliminated in future in the interest of the country's defence preparedness and recommend that appropriate changes should be made in the decision making procedure to achieve this end.

*Delay in development of equipment 'B'*

11. The model of equipment 'B' was to be developed and made available for user trials by mid-1975. The R&D Establishment was able to produce a model only in November 1977 and it was subjected to user trials during 1978-81 and was found to fall short of the required range.

12. The Department have explained that the time estimated was over-optimistic and they had not foreseen many technological hurdles which they apparently discovered later. There was under-estimation of efforts needed to fill the voids in the grey areas involved at that point of time as according to the Ministry nowhere in the world equipment with a multi-target capability existed at that time. The lack of availability of state-of-the-art components for use in military grade equipment was also one of the reasons for the delay. The development model should have been ready by August 1975. According to the Department, actually the laboratory model of the equipment got ready by September 1976, and this was tried out in the field for technical evaluation in October 1976.

13. As a result of the above evaluation, it was found that certain design changes, were necessary. After incorporating these changes, the model was offered for user trials in March 1978. Since the percentage of detection and accuracies obtained were not acceptable to the users, the equipment was taken back to the R&D Establishment reworked, and was offered for retrials in January 1980, and further user trials were conducted in December 1980-January 1981. According to the Department, the major features of multi-target capability was demonstrated satisfactorily. However, the maximum range of detection in all aspect angles, percentage detection, percentage accuracy of location, and the somewhat higher weight were not acceptable to the users.

14. The whole project was broken up into seven work packages as indicated at <sup>2</sup>Appendix II.

Five reviews of the project for development of equipment 'B' were conducted between July 1975 and October 1978, and on each review the date of completion of the project had to be shifted due to slippages, postponing the final date of completion to February 1979. Consequently, there were Five revisions in the PERT Chart during the currency of the project which are at <sup>2</sup>Appendix II.

15. Since the model of equipment 'B' as finally developed by R&D Establishment fell short of the required range, the Ministry accorded sanction to a revised project in December 1982, which was further amended in August 1984, for further development of the equipment based on the design of equipment 'B' as then developed by R&D Establishment by further incorporating some of the good features of equipment 'C' at a total cost of Rs. 240.13 lakhs (including Rs. 53 lakhs sanctioned earlier in August 1972).

16. According to the Department the features of equipment, 'C' were known to them while formulating a QR for equipment 'B' and the QR is more or less akin to the performance parameters of equipment 'C' with the additional facility of multi-target locating capability, a feature extracted from an advanced equipment of a foreign country.

17. After the issue of sanction of December 1982, the R&D Establishment took 4 years for the development of hybrid version of equipment 'B' which was handed over for user trials in December 1986. According to the Department, production of hybrid version of the equipment can be undertaken by PSU on receipt of bulk production clearance from the Technical Coordination Authority.

18. The Department also intimated that it would take some more time before these trials are completed at various locations in different type of terrains. The production of the equipment is now planned for 1989-90 (against the originally projected time mid-1977), provided the bulk production clearance is given by Technical Coordination Authority immediately after the current trials and before end 1987. The clearance has not been given upto 7.3.1988.

19. In an attempt to justify the period of 14 years already taken for the development of equipment 'B', which has still not been accepted by the user the Department have stated that during these 14 years, continuous activities have taken place in the development of this equipment with active cooperation between the designer, user and the production agency. The main phases of the project activities according to the Department are as under :

- (a) August 72 to March 78—'A' model development and technical/user trials.
- (b) April 78 to January 81—Developmental modifications arising out of trials.
- (c) February 81 to November 86—Study of Equipment 'C' leading to a fresh approach for undertaking development of a hybrid version of Equipment 'B' incorporating basic features of Equipment 'B' and 'C'. Sanction of additional funds, association of production agencies,

contract finalisation with PSU. Development of engineering model of the hybrid version user trials and carrying out modifications arising out of the user trials.

20. The Secretary of the Department finally conceded during evidence that they had failed badly in time and money.....According to him, this was an area where they were trying to catch up with high technology. They were not able to supply the equipment in time. They were extremely disappointed that they were not able to meet their time frame and within the cost. He further stated as follows :

“We made a mistake in anticipating completely the relevant requirement. We were getting into the technological difficulty.”

21. The Department has also conceded that the non-availability of equipment 'B' has affected the operational preparedness to the extent that a number of Army units remained equipped with the out-dated equipment 'A', but the requirements of the Army were partially met by supplementing equipment 'A' by the induction of equipment 'C'.

22. The Committee are deeply concerned to note the inordinate delay in the development of equipment 'B'. According to the original estimates this equipment was to be made available for user trials by mid-1975 and thereafter for series production by mid-1977. More than 15 years have already elapsed since the sanction of the project in August, 1972 there is no specific indication about the time by which this equipment of great importance would be actually made available for use with the Army. The Committee are not convinced with the contention of the Department that in such cases involving front-line technologies and where assistance cannot be sought from other countries, it is difficult to precisely estimate the time frame for fully developing such a sophisticated item to meet the stringent requirements of the Army. The stringent requirements projected by the users in 1970 and approved in 1972 were fully known to the R & D Establishment—when the commitment was made in 1972 that the development would require a period of 3 years from the date of sanction.

23. The Committee believe that the ultimate aim of all Defence Research and Development efforts is to attain production capability within reasonable time span so that the country becomes self-reliant in vital defence equipment. The hard fact remains that even today after 15 years of Research and Development effort the Army has not been provided with this equipment and it is still not certain as to when the Army will be able to use indigenously developed and produced equipment. The non-availability of equipment 'B' has affected the operational preparedness to such an extent that a number of Army units had to remain equipped with the out-dated and cumbersome equipment 'A' and others had to be equipped with imported equipment 'C'. The Committee strongly

recommend that atleast now serious co-ordinated and time bound efforts should be made to ensure that the equipment is made available to the Army urgently.

24. The Committee are led to believe that the scientists of the R and D Establishment had taken up a challenge which they have not been able to quite cope with. The scientists, perhaps, carried away by their enthusiasm, over-estimated the scientific capability and infrastructure available in the country. It does not appear wise on the part of the R and D Establishment to take up this particular challenge by estimating the cost and time frames of Rs. 53 lakhs and 3 years for completing the development of equipment 'B' because both these estimates have been very wide off the mark. The Committee agree that it may not be possible to precisely estimate the cost and time frames for the completion of the research and development projects. But the estimate should be correct within certain limits and there should not be extra ordinary escalations as have been in this case. Any scientific improvement has to be a part of continuous upgradation. In this case the concerned agencies were obviously seeking to accomplish a quantum jump without having the necessary competence to do so. The Committee have an inescapable impression that serious efforts have not been made to give this equipment to the Army within a reasonable time frame. The Committee have no doubt that the concerted efforts of all concerned should be directed to ensure that the Army is equipped effectively all the time and is not made to suffer for the delay in the implementation of Research and Development Projects.

25. The Committee are of the opinion that the rational way of assessing completion of a project would be to break down the objective into a number of small comprehensive activities/work packages and then estimate the time and cost requirement of each of these constituted activities based on past experience of similar activities. Only then it would be possible to correctly frame the time schedule and costing of Research Projects. The Committee hope that the Government will draw a lesson from the past experience and take adequate precautions in preparing time frame and cost estimates for Defence Research Projects so that there is no serious dislocation in defence preparedness due to delay in successful completion of these projects.

#### *Availability of Equipment 'C'*

26. According to the Department of Defence Research and Development, equipment 'C' was not available with them in 1972 though some information about it was known but the same was not adequate for any meaningful planning. It became available only in 1980, when it was brought to the country for user's evaluation. After adequate technical information of this equipment became available as a result of user evaluation and subsequent studies in 1981, the R&D

Establishment suggested a plan of action for taking up development of hybrid version by incorporation of some of the features of equipment 'C' and this could only be done in 1982.

27. To a question whether equipment 'C' was available in 1972, the Secretary, D. ppt. of Defence Research and Development stated that the existence of equipment 'C' was known to them in 1972.

28. In this connection a distinguished scientist informed the Committee during evidence that equipment 'C' might have existed at that time but the details of what exactly it constituted that was not available. The further explanations given by him are at Appendix-II.

29. According to the Department of Defence Research and Development, as per information gathered from the Army there was no reason to ascertain the availability of equipment 'C' between 1970 and 1979, since they had already placed the development orders for equipment 'B' on the basis of GSQR No. 329/79. This order was more or less akin to that of equipment 'C' with additional features. Due to delay in development and anticipated resultant delay in production it was felt that the Army's deficiencies cannot be met with equipment 'B' even if it proves successful when offered for trials at the beginning of 1980. It had earlier been trial evaluated in 1978 but did not meet user's requirements. Hence the then Chief of Army Staff in March 1980 approved the proposal for inviting equipment 'C' for trial evaluation in India.

30. To an enquiry as to why efforts were not made initially to make necessary enquiries from the manufacturer of equipment 'C' and to incorporate its useful features in the proposed equipment 'B', the Department of Defence Research and Development have stated that equipment 'C' become available only in 1980, when it was brought to the country for user evaluation. According to the Department no military hardware would be permitted by any country for study and adaptation unless specific agreements are executed. Information gathered on this equipment through technical literature or by Military attache was not adequate enough for this purpose. According to the Department it could not be possible to plan a development effort for modifying equipment 'B', based on the sketchy and general information that was available before 1982.

31. It is seen from JANE's WEAPON SYSTEM, 1976 that equipment 'C' was then available. According to the book this equipment was developed as a lighter, more mobile...".

32. A disquieting feature distinctly noticed by the Committee is that no serious efforts appear to have been made either by the Army

or the R & D Establishment to keep themselves abreast of the position relating to development and availability of equipment 'C' even though the original GSQR for equipment 'B' was more or less akin to equipment 'C'. Had this been done the proposal approved in March 1980 for importing equipment 'C' for trial would have been initiated much earlier and a lot of delay in the development of equipment 'B' could have been avoided. The decision taken in 1982 for incorporating some of the good features of equipment 'C' in the development of hybrid version of equipment 'B' could have been taken much earlier as the original GSQR for equipment 'B' was claimed to be akin to equipment 'C'. The Committee are of the opinion that there is no real coordination between the various agencies and there was complete lack of planning in the R & D establishment. The Committee would urge the Government to take steps to ensure that research programmes are drawn up realistically having regard to the available technological competence, domestic industrial infrastructure, availability of foreign know how, components etc., a time bound packages with well defined objectives and responsibilities. The Committee also desire that effective monitoring of all such research programmes be made routinely and at frequent intervals.

*Important and Indigenous manufacture of equipment 'C'.*

33. Due to delay in the development 'B' and as equipment 'A' already in service was being phased out, it was decided by the Army in February 1981 to import/licence manufacture some number of equipment 'C'; in spite of the fact that the performance of this equipment fell short of Army specifications, to meet immediate operational requirements.

34. The Department of Defence Research and Development intimated the Committee that equipment 'A' already in service was not only ageing but was unable to meet the operational requirements of early eighties, let alone the future. Besides, the indigenous development of equipment 'B' was lagging behind. Hence, the Army decided to import/licence manufacture equipment 'C'.

35. The decision to import/licence manufacture some number of equipment 'C' was taken in February 1981 but sanction therefore was accorded by the Government in April, 1982.

11 number of equipment 'C' including 1 for DRDO were directly imported.

36. The remaining numbers have been indigenously produced by a PSU, albeit under license from a foreign firm. According to the Department the

total price paid to the PSU was Rs. 28.10 crores. Regarding the estimated cost of Rs. 3.90 crores in 1972, i.e. cost of Rs. 15 lakhs per piece of equipment 'C' mentioned in the audit paragraph, the Department has stated that this was not based on any quotation or cost estimate from the foreign firm. The figure of Rs. 15 lakhs was estimated by a Scientis in 1972 when the detailed features of equipment 'C' were not available to them. According to the Department this cannot, therefore, be taken for any meaningful comparison with the actual prices paid now.

37. The Department has also confirmed that indigenous production of equipment 'C' for planned quantity has been completed and deliveries effected.

38. According to the users, the performance of indigenous produced equipment 'C' is inferior to that imported from abroad. The Department have intimated the Committee that detailed investigations on the performance of the indigenous produced equipment 'C' as compared to the imported units are in progress.

39. Due to the inordinate delay in the development and consequently of production of equipment 'B' the Ministry had to accord sanction in April 1982 for the import/licence manufacture of some number of equipment 'C' at a cost of Rs. 28.10 crores. The Committee deprecate that this extra expenditure had perforce to be incurred to meet urgent operational requirements despite the fact that this made fell short of Army specifications.

40. It is also regrettable that the performance of indigenously produced equipment 'C' is inferior to that imported from abroad. The authorities have not yet been able to locate the reasons for this and the matter is reported to be under investigation.

41. The Committee are of the opinion that the deficiencies in the indigenous manufacture of equipment should be not only investigated but the reason there of critically analysed, so that the causes of deficiency are identified and removed with due promptitude and measures taken to avoid such deficiencies/lapses in future. The Committee would like to be apprised of the results of such investigation and analysis.

*Cost of development and production of equipment 'B'*

42. Revised sanction was accorded in December 1982 (which was further amended in August, 1984) for development of equipment 'B' by further incorporating some of the good features of equipment 'C' at a total cost of Rs. 240.13 lakhs (including Rs. 53 lakhs originally sanctioned in August 1972). The final cost of development of equipment 'B' was estimated to be Rs. 265.92 lakhs.

According to the Department of Defence Research and Development, the estimated production cost of hybrid version of equipment 'B' as intimated by Public Sector Undertaking would be Rs. 126 lakhs in 1989-90. the cost of production of equipment 'C' during the same time frame will be Rs. 140 lakhs.

43. The general break up of expenditure incurred for development of equipment 'B' by the R&D Establishment after the increase in allocation is at <sup>a</sup>Appendix II.

44. **The inordinate delay in development of equipment 'B' led to huge escalation in development cost from Rs. 53 lakhs to Rs. 265.92 lakhs. The equipment is still under trials and the trials so far held have indicated that some more steps are required to be taken by R&D Establishment to improve its functioning which would naturally involve some additional expenditure. Further, the estimated cost of the hybrid version of equipment 'B' and indigenous production cost of equipment 'C' would be Rs. 126 lakhs and Rs. 140 lakhs respectively in 1989-90, as against the initially estimated cost of Rs. 20 lakhs for productionised version of equipment 'B'. The disproportionate escalation in costs is indicative of the fact that the authorities concerned did not have clear conception of the amount of development efforts required at the time of initial estimation.**

#### *Capability of the hybrid version*

45. The main features of light weight, silent generator and mobility of equipment 'C' are stated to have been incorporated in the equipment 'B' hybrid version. It has, however, not been possible to obtain maximum range capability of equipment 'C'. However, the range that would be obtained by the hybrid version would meet the primary requirement of the GSQR in so far as mortars are concerned.

46. According to the Department the last users trials were carried out during November-December 1986 and the performance of the equipment was satisfactory. However, the performance of the equipment with regard to the target acquisition range, accuracy of location and ability to locate weapons at critical aspect angles was not satisfactory. Only with repeated trials it is possible to evaluate and improve the performance if there are any shortcomings.

47. The Department have further stated that except for a shortfall of about 10-15% in range, when viewed through unfavourable aspect angles, equipment 'B' meets the objective of detection of multishells. However, even this equipment does not overcome the problem of low angle detection of guns. For these reasons, a QR for a new Weapon-finder equipment has been initiated, [which is presently under study at R&D Establishment.

48. **The Committee conclude from the above facts that the state of development of the latest model of the hybrid version of equipment 'B' which the R&D Establishment have produced after huge time and cost overrun still suffers from numerous limitations. It is not certain as to within what time span these limitations would finally be removed to meet the user's requirements: The Committee also take note of the fact that even the hybrid version of equipment 'B' doesnot overcome the problem of low angle detection of guns. For these reasons proposal for a new Weapon-finder equipment has been initiated, which is presently under study at the R&D Establishment. The Committee hope that the Government would closely monitor the implementation of this project and take appropriate steps to prevent the slippages/deficiencies.**

*Execution of Research and development projects in an estimated time-frame*

49. According to the Department of Defence Research and Development, in cases involving front-line technologies and where assistance cannot be sought from other countries, it is difficult to precisely estimate the time-frame for fully developing a sophisticated item to meet the stringent requirement of the users.

50. With a view to cutting down such delays the Department is stated to have laid appropriate emphasis in its Five Year Plan 1985-90, as well as in the Perspective Plan 1985-2000, on programmes concerning the development of materials, devices, processes and design techniques over a wide front of scientific and technological disciplines, comprising all activities from systems development to upstream research. In several instances the Department claims to have introduced the concept of Technological Demonstration Programmes that will be precursors to system development programmes.

51. **With a view to achieving the aims of any research and development project of this nature within any practicable time-frame, it is imperative that the research projects are not only properly formulated at the initial stage but their progress is also effectively monitored till final completion. On analysis of the different stages in the execution of the project, it is felt that none of these aspects have been adequately taken care of. The Committee would recommend that the department should make an indepth study of the problems faced by them in the implementation of this project and evolve detailed methodologies for ensuring comprehensive and periodic review and appraisal of all research project proposals in terms of detailed planning, coordination, progression and monitoring not only to reduce incidence of cost and time over run but also to make the country self-reliant in the field of modern technology.**

52. It is seen from the Annual Report of the Department of Defence Research and Development for the year 1986-87 that the research and development in DRDO has resulted in the production of defence items worth Rs. 1385 crores. The Committee are of the opinion that this figure is not encouraging for a big country like ours. The Committee recommend that foremost concern of the Research Department should be to achieve production capabilities based on our own research efforts in the shortest possible time and on a much larger scale with appropriate budgetary support so as to reduce our foreign dependence as far as possible.

53. It is also learnt that the Department has drawn its Perspective Plan for 1986-2000. The Committee hope that the implementation of this Perspective Plan is properly monitored so that time-frame and cost estimates are not subject to enormous variation, as had sadly happened in the instant case. These plans should also be reviewed every year in the light of performance and demand projections. It is imperative that serious efforts are made with a view to ensuring self reliance in defence requirements indigenously as far as possible.

NEW DELHI ;  
March 11, 1988  
Phalguna 21, 1909 (S)

AMAL DATTA,  
Chairman,  
Public Accounts Committee.

## APPENDIX I

(Vide para 1)

### *Paragraph 24 of the Report of Comptroller and Auditor General of India for the year 1985-86, Union Government (Defence Services)*

#### *Extra expenditure due to delay in development of an equipment*

Based on the sanction accorded by the Ministry of Defence (Ministry) in 1962, a Research and Development (R&D) Establishment developed equipment 'A' which was productionised by a Public Sector Undertaking (PSU) and introduced in the early 1970s for use as field artillery radar. Due to certain limitations, this equipment could not meet the requirements of the Army fully. A General Staff Qualitative Requirement was therefore drawn up by the Army Headquarters in April 1970 for equipment 'B' which was approved by the General Staff Equipment Policy Committee on 8th August 1972. The R&D Establishment stated in March 1972 that the estimated cost of a somewhat similar foreign equipment 'C' with far lower performance was about Rs. 15 lakhs and that the cost of productionised version of equipment 'B' was expected to be Rs. 20 lakhs approximately. The Ministry accorded sanction in August 1972 for indigenous development on high priority of 2 models of equipment 'B' at a cost not exceeding Rs. 53 lakhs. Equipment 'B' was to be made available for user trials by mid 1975 and thereafter for series production by mid 1977.

The model developed by the R&D Establishment in November 1977 was subjected to user trials during 1978-81 and was found to fall short of the required range. The users, therefore, wanted retrial after necessary improvements. Meanwhile, as equipment 'A' already in service was being phased out, it was decided by the Army in February 1981 to import/licence manufacture 25 Nos. of equipment 'C' (even though this make fell short of Army specifications) to meet the immediate short term operational requirement. The required balance quantity of 38 Nos. was proposed to be left for indigenous development production. Accordingly, the Ministry accorded sanction on 1st April 1982, for import-cum-licence manufacture of 26 Nos. of equipment 'C' (including one for R&D Establishment to facilitate further development) at a cost of Rs. 28.10 crores; the estimated cost of 26 Nos. in 1972 was Rs. 3.90 crores only. 10 numbers of equipment 'C' ex-import were received during 1982-83 and the balance quantity is being produced under licence by the PSU.

The total expenditure incurred on the development project of equipment 'B' upto December 1982 was Rs. 51.56 lakhs against Rs. 53 lakhs sanctioned in August 1972. Since the model of equipment 'B' as developed by R&D Establishment fell short of the required range the Ministry accorded revised sanction in December 1982 (as further amended in August 1984) for development of field artillery radar based on the design of equipment 'B' developed by R&D Establishment by further incorporating some of the good features of equipment 'C' at a total cost of Rs. 240.13 lakhs (including Rs. 53 lakhs sanctioned earlier in August 1972). Thus, the development of equipment 'B' sanctioned in August 1972 and planned to be completed in 1977 had not been completed till October 1986.

The Ministry stated (October 1986) that :

The improved version of equipment 'B' is under users' trials.

The final cost of development of equipment 'B' was estimated to be Rs. 265.92 lakhs.

The non-availability of equipment 'B' is having an adverse effect on defence preparedness.

The case reveals that :

On account of the inordinate delay in development and production of equipment 'B', the Ministry had to accord sanction in April 1982 for the import/licence manufacture of 26 numbers of equipment 'C' at a total cost of Rs. 28.10 crores, even though equipment 'C' fell short of Army requirements in many respects.

Ministry's sanction of August 1972 envisaged development of equipment 'B' at a cost not exceeding Rs. 53 lakhs against which Rs. 51.56 lakhs had been spent upto December 1982 when the sanctioned amount was enhanced/revised. The cost of development of equipment 'B' has now gone up from Rs. 53 lakhs to Rs. 265.92 lakhs and the equipment which was initially expected to be available by 1977 is still (October 1986) stated to be under user's trials.

The non-availability of equipment 'B' is having an adverse effect on the defence preparedness.

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## APPENDIX II

### *Relevant excerpts from Proceedings and Written Information.*

#### 1. (Vide para 9)

Based on the operational requirements prepared by the Director General of Military Operations and the state of art, the Artillery Directorate formulated the draft GSQR in April 1970. This was discussed with the DRDO laboratory, and a revised draft issued in January 1971 for examination by concerned agencies. Based on comments received from the various agencies, a final draft GSQR was issued in March 1972 and placed before GSEPC (General Staff Equipment Policy Sub-Committee) in April 1972 and GSEPC (General Staff Equipment Policy Committee) in August 1972 for approval.

#### 2. (Vide para 14)

Seven work packages in which the project was broken:

| <i>Work package</i>                            | <i>PDC</i>          | <i>Cost (Rs.)</i> |
|--|---------------------|-------------------|
| (i) Antenna, RF and Transmitter                | 24 months           | 12 lakhs          |
| (ii) Signal processing                         | 24 months           | 10 lakhs          |
| (iii) Digital Computer, Software and Simulator | 24 months           | 10 lakhs          |
| (iv) Display                                   | 14 months           | 9 lakhs           |
| (v) Mechanical Engineering                     | As & when projected | 2 lakhs           |
| (vi) Silent Generator and Carriage             | 24 months           | 5 lakhs           |
| (vii) System Interface                         | 6 months            | 5 lakhs           |

The PDC is to be taken from the date of sanction of project viz., August 1972, for work packages (i) to (v) and for (vi) PDC to be taken from May 1976, the date of forming out task to R and D Engineers. The 2 ton trailer was received in September 1976 for mounting System Interface (vii) to start from August 1974.

### 3. (Vide para 14)

#### Revisions in the PERT Chart :

- (i) The first revision in July 1975 indicated that many work packages contained more grey areas and needed more input from data bank and all of them took a longer time than 24 months forecasted. The review indicated that all of them now take additional 12 months time. Therefore, probable date of completion was shifted to June 1976.
- (ii) A detailed review carried out in April 1976 indicated delays in development in software area as a major set-back and the delay anticipated was by 8 more months ; taking the possible completions to January 1977. A review again in June 1976 to overcome the slippage indicated a possibility of completing the effort by September 1976. The technical evaluation was conducted in October 1976. However, due to design changes, the development activities could be only completed by March 1978, and was offered for user trials. Based on the outcome of the trials, further redesign effort was initiated.
- (iii) The review in April 1978 indicated further gaps in grey areas, such as system stability, software need for a moving target indicator etc. The time frame worked out and the PERT Chart drawn indicated that equipment 'B' will be ready by December 1978. A further review in October 1978 showed a slippage of another 2 months, taking the date of completion to February 1979. Technical trial at ranges were conducted from January-November 1979.

### 4. (Vide para 28)

Equipment 'C' in an earlier version was a different kind of system and it was produced in small number because it had lesser mobility. To that extent the information was available with us. But that was of no use for actual design. The multi-target capability was something very new. It was a challenge to us with technical sense ; something which has not been done by other countries. We could have taken the easier option and said that nobody has developed it and we also cannot develop it. But we were enthusiastic to go about it. We have people in this country who can take this kind of challenge, to meet the user requirement. In spite of the difficulty and trauma we have gone successfully through this development. It was not easy because when we are in difficulty, no journal or technical paper could help us. We had to strike our head against heavy odds especially as it would appear to work away in the analytical plane but in actual practice it would function differently.....

Somewhere we had to make a beginning in this vital area because the resources that we have are never adequate to start at any point of time. We could not have awaited till we got adequate resources and start development. So, we thought that we would take a risk because the gain at the end would be tremendous for the country. This is how we started.

At that time, our appreciation was that since that single target code was already in the field, the multitarget capability would be of greater importance to the user than reducing the weight. When you have limited manpower you have to optimise your efforts and hence we could not have both aspects. Then we ran into technical difficulties which we could not anticipate at that time because we were confident with our success of early 70s. This is a genuine appreciation of what happened in the course of development of multi-target capability. We were carried away by our enthusiasm that we have already achieved the earlier version and we were fully hopeful that we could achieve this multi-target capability also.

5. (Vide Para 43)

*Break up of expenditure incurred on development of equipment 'B'.*

| Item  | Expenditure<br>from Dec. 82<br>to July 84<br>(Rs. in lakhs) | Expenditure<br>from Aug. 84<br>to Aug. 1987<br>(Rs. in lakhs) | Remarks   |
|---|---|---|---|
| 1   | 2   | 3   | 4   |
| 1. Estimated cost of equipment 'C' including escalation | Cost of one imported equipment 'C'                          | —   | Adjustment bill still awaited from Army. A sum of Rs. 86.90 lakhs provided for in the sanction towards the estimated cost of one imported equipment 'C' |
| 2. Cost of Engineering effort of BEL                    | 18.90   | 77.82   | —   |
| 3. Cost of T. E. Devices and portable generator.        | 3.10  | 7.36  | —   |

| 1.  | 2 | 3    | 4   |
|---|---|------|---|
| 4. Cost of mini bus and modifications to this for housing-electronics equipment | — | 1.49 | —   |
| 5. Cost of the diesel jeep  | — | —    | Order placed for Rs. 1.783 lakhs. Item not received |
| 6. Technical trials including cost of ammunition                                | — | —    | —   |
| 7. Hiring of transport for the project direction                                | — | —    | —   |

### APPENDIX III

#### *Conclusions and Recommendations*

| <i>Sl. No.</i> | <i>Para. No.</i> | <i>Ministry/Department Concerned</i>                 | <i>Conclusion/Recommendation</i>  |
|----------------|------------------|--|---|
| (1)            | (2)              | (3)  | (4)   |
| 1              | 10               | Defence (Deptt. of Defence Research and Development) | <p>The very fact that the Government took more than two years to accord approval in August 1972 to this QR goes to prove the lackadaisical approach of the Government from the initial stage itself in meeting the urgent requirement of the Army. The Committee desire that such delays must be eliminated in future in the interest of the country's defence preparedness and recommend that appropriate changes should be made in the decision making procedure to achieve this end.</p>   |
| 2              | 22               | Defence (Deptt. of Defence Research and Development) | <p>The Committee are deeply concerned to note the inordinate delay in the development of equipment 'B'. According to the original estimates this equipment was to be made available for user trials by mid 1975 and thereafter for series production by mid 1977. More than 15 years have already elapsed since the sanction of the project in August, 1972, there is no specific indication about the time by which this equipment of great importance would be actually made available for use with the Army. The Committee are not convinced with the contention of the Department that in such cases involving front-line technologies and where assistance cannot be sought from other countries it is difficult to precisely estimate the time frame for fully developing such a sophisticated item to meet the stringent</p> |

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(1)

(2)

(3)

(4)

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requirements of the Army. The stringent requirements projected by the user in 1970 and approved in 1972 were fully known to the R & D Establishment when the commitment was made in 1972 that the development would require a period of 3 years from the date of sanction.

3 23

Defence (Deptt. of Defence  
Research and Development)

The Committee believe that the ultimate aim of all Defence Research and Development efforts is to attain production capability within a reasonable time span so that the country becomes self-reliant in vital defence equipment. The hard fact remains that even today after 15 years of Research and Development effort the Army has not been provided with this equipment and it is still not certain as to when the Army will be able to use indigenously developed and produced equipment. The non-availability of equipment 'B' has affected the operational preparedness to such an extent that a number of Army units had to remain equipped with the out-dated and cumbersome equipment 'A' and others had to be equipped with imported equipment 'C'. The Committee strongly recommend that at least now serious co-ordinated and time bound efforts should be made to ensure that the equipment is made available to the Army urgently.

4 24

Defence (Deptt. of Defence  
Research and Development)

The Committee are led to believe that the scientists of the R and D Establishment had taken up a challenge which they have not been able to quite cope with. The scientists, perhaps, carried away by their enthusiasm, over-estimated the scientific capability and infrastructure available in the country. It does not appear wise on the part of the R & D Establish-

ment to take up this particular challenge by estimating the cost and time frames of Rs. 53 lakhs and 3 years for completing the development of equipment 'B' because both the estimates have been very wide off the mark. The Committee agree that it may not be possible to precisely estimate the cost and time frames for the completion of the research and development projects. But the estimate should be correct within certain limits and there should not be extraordinary escalations as have been in this case. Any scientific improvement has to be a part of continuous upgradation. In this case the concerned agencies were obviously seeking to accomplish a quantum jump without having the necessary competence to do so. The Committee have an inescapable impression that serious efforts have not been made to give this equipment to the Army within a reasonable time frame. The Committee have no doubt that the concerted efforts of all concerned should be directed to ensure that the Army is equipped effectively all the time and is not made to suffer for the delay in the implementation of Research and Development Projects.

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5 25

Defence (Deptt. of Defence  
Research and Development)

The Committee are of the opinion that the rational way of assessing completion of a project would be to break down the objective into a number of small comprehensive activities/work packages and then estimate the time and cost requirement of each of these constituted activities based on past experience of similar activities. Only then it would be possible to correctly frame the time schedule and costing of Research Projects. The Committee hope that the Government will draw a lesson from the past experience and take adequate precautions in preparing time

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| (1) | (2) | (3)  | (4)  |
|-----|-----|--|--|
| 6   | 32  | Defence (Deptt. of Defence Research and Development) | <p>frame and cost estimates for Defence Research Projects so that there is no serious dislocation in defence preparedness due to delay in successful completion of these projects.</p> <p>A disquieting feature distinctly noticed by the Committee is that no serious efforts appear to have been made either by the Army or the R &amp; D Establishment to keep themselves abreast of the position relating to development and availability of equipment 'C' even though the original GSQR for equipment 'B' was more or less akin to equipment 'C'. Had this been done the proposal approved in March 1980 for importing equipment 'C' for trial would have been initiated much earlier and a lot of delay in the development of equipment 'B' could have been avoided. The decision taken in 1982 for incorporating some of the good features of equipment 'C' in the development of hybrid version of equipment 'B' could have been taken much earlier as the original GSQR for equipment 'B' was claimed to be akin to equipment 'C'. The Committee are of the opinion that there is no real coordination between the various agencies and there was complete lack of planning in the R &amp; D establishment. The Committee would urge the Government to take steps to ensure that research programmes are drawn up realistically having regard to the available technological competence, domestic industrial infrastructure, availability of foreign know how, compents etc., a time bound packages with well defined objectives and responsibilities. The Committee also desire that effective monitoring of all such research programmes be made routinely and at frequent intervals.</p> |

|    |    |  |  |
|----|----|--|--|
| 7  | 39 | Defence (Deptt. of Defence Research and Development) | <p>Due to the inordinate delay in the development and consequently of production of equipment 'B' the Ministry had to accord sanction in April 1982 for the import/licence manufacture of some number of equipment 'C' at a cost of Rs. 28.10 crores. The Committee deprecate that this extra expenditure had perforce to be incurred to meet urgent operational requirements despite the fact that this make fell short of Army specifications.</p> |
| 8  | 40 | Defence (Deptt. of Defence Research and Development) | <p>It is also regrettable that the performance of indigenously produced equipment 'C' is inferior to that imported from abroad. The authorities have not yet been able to locate the reasons for this and the matter is reported to be under investigation.</p>  |
| 9  | 41 | Defence (Deptt. of Defence Research and Development) | <p>The Committee are of the opinion that the deficiencies in the indigenous manufacture of equipment should be not only investigated but the reason thereof critically analysed, so that the causes of deficiency are identified and removed with due promptitude and measures taken to avoid such deficiencies/lapses in future. The Committee would like to be apprised of the results of such investigation and analysis.</p>                     |
| 10 | 44 | Defence (Deptt. of Defence Research and Development) | <p>The inordinate delay in development of equipment 'B' led to huge escalation in development cost from Rs. 53 lakhs to Rs. 265.92 lakhs. The equipment is still under trials and the trials so far held have indicated that some more steps are required to be taken by R &amp; D Establishment to improve its functioning which would naturally involve some additional expenditure. Further, the estimated cost of the hybrid version of</p>      |

| (1) | (2) | (3)  | (4)  |
|-----|-----|--|--|
|     |     |  | <p>equipment 'B' and indigenous production cost of equipment 'C' would be Rs. 126 lakhs and Rs. 140 lakhs respectively in 1989-90, as against the initially estimated cost of Rs. 20 lakhs for productionised version of equipment 'B'. The disproportionate escalation in costs is indicative of the fact that the authorities concerned did not have a clear conception of the amount of development efforts required at the time of initial estimation.</p>   |
| 11  | 48  | Defence (Deptt. of Defence Research and Development) | <p>The Committee conclude from the above facts that the state of development of the latest model of the hybrid version of equipment 'B' which the R &amp; D Establishment have produced after huge time and cost overrun still suffers from numerous limitations. It is not certain as to within what time span these limitations would finally be removed to meet the user's requirements. The Committee also take note of the fact that even the hybrid version of equipment 'B' does not overcome the problem of low angle detection of guns. For those reasons proposal for a new Weapon-finder equipment has been initiated, which is presently under study at the R &amp; D establishment. The Committee hope that the Government would closely monitor the implementation of this project and take appropriate steps to prevent the slippages/deficiencies.</p> |
| 12  | 51  | Defence (Deptt. of Defence Research and Development) | <p>With a view to achieving the aims of any research and development project of this nature within any practicable time-frame, it is imperative that the research projects are not only properly formulated at the initial stage but their progress is also effectively monitored till final completion. On analysis of the different stages in the execution of the project, it is</p>  |

felt that none of these aspects have been adequately taken care of. The Committee would recommend that the Department should make an in-depth study of the problems faced by them in the implementation of this project and evolve detailed methodologies for ensuring comprehensive and periodic review and appraisal of all research project proposals in terms of detailed planning, coordination, progression and monitoring not only to reduce incidence of cost and time over run but also to make the country self-reliant in the field of modern technology.

13 52 Defence (Deptt. of Defence Research and Development)

It is seen from the Annual Report of the Department of Defence Research and Development for the year 1986-87 that the research and development in DRDO has resulted in the production of defence items worth Rs. 1385 crores. The Committee are of the opinion that this figure is not encouraging for a big country like ours. The Committee recommend that foremost concern of the Research Department should be to achieve production capabilities based on our own research efforts in the shortest possible time and on a much larger scale with appropriate budgetary support so as to reduce our foreign dependence as far as possible.

14 53 Defence (Deptt. of Defence Research and Development)

It is also learnt that the Department has drawn its Perspective Plan for 1985-2000. The Committee hope that the implementation of this Perspective Plan is properly monitored so that time-frame and cost estimates are not subject to enormous variation, as had sadly happened in the instant case. These plans should also be reviewed every year in the light of performance and demand projections. It is imperative that serious efforts are made with a view to ensuring self reliance in Defence requirements indiginously as far as possible.

