

FIFTH REPORT
STANDING COMMITTEE ON
DEFENCE
(1995-96)

(TENTH LOK SABHA)

MINISTRY OF DEFENCE
DEFENCE RESEARCH AND
DEVELOPMENT—MAJOR PROJECTS

Presented to Lok Sabha on 24 AUG 1995
Laid in Rajya Sabha on _____



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COMPOSITION OF THE STANDING COMMITTEE ON DEFENCE
(1995-96)

Shri Indrajit Gupta — *Chairman*

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- * 45. Shri R. Mangabandu

SECRETARIAT

- | | | |
|--------------------------|---|-----------------------------|
| 1. Dr. A.K. Pandey | — | <i>Additional Secretary</i> |
| 2. Shri. G.R. Patwardhan | — | <i>Joint Secretary</i> |
| 3. Shri K.L. Narang | — | <i>Deputy Secretary</i> |
| 4. Shri A.K. Singh | — | <i>Under Secretary</i> |

* Ceased to be a Member of the Committee on his retirement from Rajya Sabha w.e.f. 24.7.95.

INTRODUCTION

1. The Chairman, Standing Committee on Defence having been authorised by the Committee to submit the Report on their behalf, present this Fifth Report on 'Defence Research and Development—Major Projects'.

2. The subject was taken up for examination by the Committee on Defence (1993-94) which also considered replies to a detailed questionnaire on the subject as furnished by the Ministry of Defence. Thereafter, the Committee took evidence of the representatives of the Ministry of Defence (Department of Defence Research and Development) on 17 and 27 January, 1994.

3. The Committee wish to express their thanks to the officers of the Ministry of Defence (Department of Defence Research and Development) for placing before them the material and information as desired by the Committee and sharing with the Committee their frank views, perceptions and constraints concerning the matters which came up for discussion during evidence.

4. The Committee also express their thanks to the following experts/organisations for placing before them requisite written material and for giving evidence thus rendering assistance to the Committee in connection with detailed examination of the subject :

- (i) Shri Jasjit Singh, Director, Institute for Defence Studies and Analyses, New Delhi.
- (ii) Shri K. Subrahmanyam, Ex-Secretary, Department of Defence Production, Ministry of Defence, Former Director Institute for Defence Studies and Analyses and Consulting Editor The Economic Times.
- (iii) Shri P.R. Chari, Research Professor, Centre for Policy Research, New Delhi.

5. The Committee would also like to place on record their appreciation for the work done by the Standing Committee on Defence (1993-94) especially the then Chairman, Shri Buta Singh for his right direction and able guidance to the Committee in obtaining information and taking evidence for indepth examination of the subject. The Composition of the Committee 1993-94 is given at Appendix to this Report.

6. The Committee considered and adopted the report at their sitting held on 21st July, 1995.

7. The Report is divided into four Chapters — each is devoted to specific aspects. The Committee have *inter-alia* made the following important recommendations in the Report:

- (i) Establishments under D.R.D.O. should be further strengthened and their capabilities and expertise toned and geared up to enable them to enhance self-reliance level in meeting the requirements of our Armed Forces.
- (ii) DRDO should concentrate on major projects.
- (iii) Procedure laid down for the sanctioning of the Projects may be made further stringent and all such proposals be subjected to rigorous examination.
- (iv) India has no option but to continue to develop and upgrade its missile capabilities for deterrence and not for aggression on national security consideration.
- (v) Adequate budgetary allocation be made so that the prestigious project like L.C.A. is completed within specified time schedule.
- (vi) The tremendous delay and cost escalation in the design and development and finally the production of M.B.T. Arjun Tank does not appear justified. Competence attainment and technological insight should be made pre-requisite for taking up any major project.

8. For reference facility and convenience, the observations/recommendations of the Committee have been printed in thick type in the body of the report.

NEW DELHI;
9. August 1995

18, Srivastava 1917 (Saka)

INDRAJIT GUPTA,
Chairman,
Standing Committee on Defence.

CHAPTER I

DEPARTMENT OF DEFENCE RESEARCH AND DEVELOPMENT— OBJECTIVES AND MANAGEMENT

1.1 The Department of Defence Research and Development, established in 1958, is engaged in the task of developing new systems and technologies in the field of defence in order to enhance self-reliance in weapons and equipment.

1.2 The Department of Defence Research and Development operates through a network of establishments under the Defence Research and Development Organisation (D.R.D.O.) and also through the Aeronautical Development Agency (A.D.A.) a society for the development of Light Combat Aircraft. There are 50 establishments under D.R.D.O. The Department also functions in close partnership with 70 academic institutions and 50 national science and technology centres. About 150 public/private industries have supported the efforts of the Department in meeting the stringent needs of the Services.

1.3 The Research & Development activities at D.R.D.O. establishments cover a wide spectrum of disciplines namely aeronautics, armaments explosives, electronics & instrumentation, combat vehicles, engineering equipment, Naval systems, materials, rockets & missiles, computers & simulation, high altitude agriculture and life sciences, nuclear medicines, food technology, terrain research work, etc.

1.4 The Department has about Rs. 3,000 crores worth of Research & Development base. It has over 6,000 scientists, including engineers & managers supported by about 25,000 other personnel including administration and stores work force. An organised work culture has evolved. The organisation has a Mission Mode Organisational structure which is ideally suited for the present situation. Major R & D programmes are executed in partnership with multiple organisations including academic institutions and the industry.

1.5 As technology denial is forcibly applied by the technologically advanced countries, the same is being countered by forming consortia of industries, laboratories and academics for executing of major programmes including missiles. This has helped Government to pool the technological resources of the nation for the programmes.

1.6 DRDO has since introduced a concurrent engineering approach which facilitates 'Real Time Technology Absorption' by the production agency. This approach provides for overlapping of development and transfer, demonstration and absorption of the developed technology, leading to early production. This approach saves 4-5 years in the realisation of the system as compared to the conventional practice. The Defence Production unit and the R & D jointly work out the scheme. The technology transfer starts from the day the designing starts.

1.7 DRDO is guided by the R & D Council, under the Chairmanship of Raksha Mantri, Secretary, Department of Science and Technology, Secretary, Deptt. of Atomic Energy, Secretary, Deptt. of Electronics, DG CSIR, Distinguished scientists from academic institutions and other scientific departments are members of the Council. The DRDO undertakes R & D programmes taking into account the national R & D strength.

1.8 A number of D.R.D.O. developed systems have entered production. The Army has accepted systems like M.B.T. Arjun, Tracked Mortar carrier, etc. during 1993. Assistance has also been rendered to the Army in many areas like Avalanche forecast and tests for recruitment, studies on life-extension of system, Force potential evaluation etc. Army personnel have also been trained by D.R.D.O. in specialist areas at various institutions. Research has been carried out on the type of food to be supplied to personnel posted in cold regions.

1.9 A number of systems have also been accepted for induction by the Airforce. They are the Air Borne Surveillance System, the Pilotless Target Aircraft and the Radar Warning Receiver.

1.10 Navy has also accepted a number of items during 1993. D.R.D.O. has provided service to the para-military and police forces. They have been given T.V. jammers, intruder alarms, night vision devices, Bullet-Proof-Jackets and Jeeps etc. These were spin-offs from military programmes.

1.11 The goals specified for the near future are the L.C.A. roll out in 1995 and first flight during later half of 1996, productionisation of Trishul, completion of development phase of Akash and Nag. The Electronic Warfare system, one of the very important programmes which includes work on limited series production is being progressed on high priority. The 'Indra' Low Level Radar will also go into production.

Certain derivative systems are also being developed. The derivative system possibilities for the M.B.T. are the S.P. Gun, the Arjun Armoured Recovery Vehicle and the bridge layer tank, etc.

1.12 D.R.D.O. has evolved a profile for feasible induction of indigenous systems for Army, Navy and Airforce upto 2005. All the Services have plans for the missile systems. M.B.T. Arjun will be the major system for the Army. Navy will induct a number of underwater sonars and weapons.

1.13 The Committee note that the Department of Defence Research and Development is involved in developing new systems and technologies in the field of Defence in order to enable the country to enhance self-reliance in weapons and defence preparedness.

The Committee also note that the Department of Defence Research and Development operates through a network of 50 establishments under the Defence Research and Development Organisation (DRDO) and also through Aeronautical Development Agency, etc. The Department also functions in close partnership with 70 academic institutions, 50 national science and technology centres and about 150 public/private industries. The Department has about Rs. 3,000 crores worth of R & D base, over 6,000 scientists, engineers & managers supported by about 25,000 other personnel including administration and stores work force.

1.14 The Committee has also been informed that DRDO is guided by the R & D Council, under the Chairmanship of Raksha Mantri having Secretaries, Department of Science and Technology, Department of Atomic Energy, Department of Electronics, DG CSIR, Distinguished Scientists from academic institutions and other scientific departments as Members.

1.15 The Committee are appreciative of the efforts and achievements of the Department of Defence Research and Development and Defence Research and Development Organisation towards achieving the desired objective of self-reliance in critical defence technologies for national security.

1.16. The Committee, however, desire that establishments under DRDO should be further strengthened and their capabilities and expertise toned and geared up to enable them to enhance self-reliance level in meeting the requirements of our Armed Forces in the present day world when vital technologies are forcibly and unjustifiably being denied to India by technologically advanced countries under Missile Technology Control Regime (MTCR), Nuclear Non-Proliferation Treaty (NPT) and Coordinating Committee on Multilateral Export Control (COCOM).

CHAPTER II

BUDGETARY ALLOCATION

2.1 Allocation of budgetary resources to Defence R & D depends upon overall availability of funds, affordability, prioritised needs of User and criticality of development. In spite of severe resource crunch faced by the Nation, the budgetary resources for Defence R & D share has been marginally enhanced from 4.5% of the total Defence Expenditure for the last year to 5% during the current year.

2.2 The Budgetary Allocation on Defence Research and Development during 60's was about 1 percent of the total Defence Budget. It rose to about 2 percent in early eighties. The expenditure showed an increase from 2.6 percent in 1983-84 to 4.6 percent in 1987-88. Thereafter, it fluctuated between 4.2 and 4.5 percent. The R & D funding in real terms has seen a decline during 1987 to 1992. This has happened due to the over all resource crunch and the priorities of the National Defence. According to the Ministry, it is not possible to predict possible financial outlays in Defence R & D for long future periods.

2.3 In regard to the budgetary provisions for the Defence Research and Development during the years 1993-94 and 1994-95, the Secretary, (DR&D) of the Ministry of Defence informed during evidence as follows :

"In 1993-94 our budget estimate was Rs. 960 crores and the revised estimate was Rs. 994 crores. In 1994-95 we have asked for Rs. 1185 crores. Additional requirement of Rs. 191 crores over the year 1993-94 allocation is linked to the following programme goals

'The targetted roll out of LCA in 1995 and the first flight in 1996 are being given certain priority. We are aiming at production/ induction of Prithvi and Trishul to commence by 1994-95. We are also planning our SONAR system for ship control.'

This is our budget related goals position."

2.4 As regards fund requirement the representative of the Ministry of Defence informed as follows :

“Arjun has to go into production by 1997-98. The total fund needed till 1999 would be Rs. 1200 crores. The average requirement per year is Rs. 250 crores. The average fund requirement for Prithvi and Trishul works out to be Rs. 250 crores per year. The total requirement is of Rs. 500 crores per year to introduce MBT Arjun, Prithvi and Trishul into three Services.”

2.5 Allocation for DRDO has been increased to 5.3 per cent of total defence expenditure in the proposals for financial year 1995-96 from 5 per cent of the total defence expenditure in the Revised Estimates for the year 1994-95.

2.6 DRDO prepared a 15 year perspective plan upto year 2000. This was linked to the three Services 15 year perspective plan. The plan was prepared by top scientists of DRDO, collectively, and projected the futuristic technology growth and Services need.

These projections were considered by a Committee, headed by Distinguished Scientist Shri Venkatesan, who recommended 6%, 13% and 13% allocation for VII, VIII and IX plan periods respectively. These figures were later revised to 6%, 8% and 8%.

Shri Arun Singh's Committee, considering an overall scenario, recommended 6% share of the Defence Budget to DRDO for the VIII plan period.

2.7 The Government has worked out a 10 year plan for self-reliance. One of the objectives is investment of certain amount for critical technologies. DRDO is working on the development of some of the systems which may become the subject matter of denial regime by other countries.

2.8 The thrust for self-reliance also includes support to existing systems through indigenisation of spares. There is also a plan to upgrade some of the existing systems to stretch their life and capability. The indigenous systems would be progressively inducted and the import of major systems minimised.

2.9 Explaining as to how to overcome the defence technology gap, the Secretary (DRD) of the Ministry of Defence stated as follows :

“We shall recommend to the Government as to how to reduce the gap between the global and the national technology levels through suitable ‘mother-technology’ development programmes which we

of Defence stated as follows :

"Of course, there is the financial constraint. In 1989, we formed a team with one of the Chief Controllers. That team visited every laboratory and reviewed the total number of projects."

Explaining in greater details, the Director of Planning and Resource Management stated as follows :

"In total we had 989 projects in 1989 when we faced severe resource crunch. Out of these due to a rigorous review conducted over a period of four months, we closed down 618 projects of various cost dimensions as they had fulfilled the possible level of achievement. They included small, medium and high value projects. That brought the project load to just around 371 projects which we pursued in a more vigorous fashion to ensure that they were provided with adequate resources and passed on to production agencies for productionisation wherever required. The prioritisation was done on the basis of user requirement which was assigned the first priority. The second priority was to support technology for the users needs and the third priority was for the exploratory research which could be required on long term basis. Such reviews continued over a period of time every year. At no stage was any dead-wood project allowed to continue in the DRDO books.

Regarding question at what level the decision is taken to close down the projects, based on the recommendation of the R & D Panel which is chaired by the Deputy or Vice Chief of Staff, the decision is taken. On their recommendations only, the projects are closed. If they say that any project has to be continued which they consider necessary, the project will not be closed down at any stage."

3.7 Asked to clarify whether the projects were closed down on permanent or temporary basis, the representative of the Ministry informed that 600 projects were closed down on permanent basis in consultation with the Services because they were not going to bring any further cost effective gain.

3.8 On being pointed out that very fact as many a 618 projects could be dropped showed that they were taken up in a rather indiscriminate fashion notwithstanding the rigorous controls., the Secretary, (DRD) of the Ministry of Defence stated:

"Our job is to make the growth of technology. It is true that we pumped in a number of small projects. When we were doing

these, there were 30 projects running in a laboratory, which had achieved varied degree of successes."

3.9 On the undesirability of burdening DRDO with too many low-end projects and not concentrating on certain major projects in a focussed manner, SA to RM informed:

"I agree with what has been said about concentrating on few major programmes. For the last 3-4 years, DRDO has been concentrating on four major projects like MBT, combat aircraft, missile and electronic warfare system. Initially, I had to support various small programmes and the outcome may be unique from such programmes and it has increased the technology level. I would take your message that in view of constraint, money should be directed to major goals and fortunately, for DRDO, major goals are very clear".

3.10 On being asked the reasons for closure of various projects, the Ministry replied that DRDO took up development of weapon systems based on then prevailing threat perception and users requirements. Due to continued changes therein and induction of new weapon system in neighbouring countries new projects were to be undertaken for meeting Services needs. The maturity acquired from the experience gained from missile and EW programmes are being applied in other on-going schemes.

3.11 The Committee note that DRDO takes up projects of development of weapon systems based on the current threat perceptions and users requirements. However, considering the very fact that as many as 618 out of 989 projects were closed down following the review undertaken in 1989, the Committee cannot but infer that Services requirements were not judiciously projected and assessed, that rigorous controls as laid down for sanction of projects, when they were selected, were not exercised properly, and that when such a large number of projects were being taken up, they were taken up in a rather indiscriminate manner.

3.12 The Committee feel that Defence R & D had unjustifiably burdened itself with too many low-end projects and did not concentrate on certain major projects in a focussed manner. The Committee, therefore, recommend that the project proposals be rigorously examined and feasibility studies carried out on the basis of the latest threat perception and the Services need of the times,

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"Of course, there is the financial constraint. In 1989, we formed a team with one of the Chief Controllers. That team visited every laboratory and reviewed the total number of projects."

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"In total we had 989 projects in 1989 when we faced severe resource crunch. Out of these due to a rigorous review conducted over a period of four months, we closed down 618 projects of various cost dimensions as they had fulfilled the possible level of achievement. They included small, medium and high value projects. That brought the project load to just around 371 projects which we pursued in a more vigorous fashion to ensure that they were provided with adequate resources and passed on to production agencies for productionisation wherever required. The prioritisation was done on the basis of user requirement which was assigned the first priority. The second priority was to support technology for the users needs and the third priority was for the exploratory research which could be required on long term basis. Such reviews continued over a period of time every year. At no stage was any dead-wood project allowed to continue in the DRDO books.

Regarding question at what level the decision is taken to close down the projects, based on the recommendation of the R & D Panel which is chaired by the Deputy or Vice Chief of Staff, the decision is taken. On their recommendations only, the projects are closed. If they say that any project has to be continued which they consider necessary, the project will not be closed down at any stage."

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"Our job is to make the growth of technology. It is true that we pumped in a number of small projects. When we were doing

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3.9 On the undesirability of burdening DRDO with too many low-end projects and not concentrating on certain major projects in a focussed manner, SA to RM informed:

"I agree with what has been said about concentrating on few major programmes. For the last 3-4 years, DRDO has been concentrating on four major projects like MBT, combat aircraft, missile and electronic warfare system. Initially, I had to support various small programmes and the outcome may be unique from such programmes and it has increased the technology level. I would take your message that in view of constraint, money should be directed to major goals and fortunately, for DRDO, major goals are very clear".

3.10 On being asked the reasons for closure of various projects, the Ministry replied that DRDO took up development of weapon systems based on then prevailing threat perception and users requirements. Due to continued changes therein and induction of new weapon system in neighbouring countries new projects were to be undertaken for meeting Services needs. The maturity acquired from the experience gained from missile and EW programmes are being applied in other on-going schemes.

3.11 The Committee note that DRDO takes up projects of development of weapon systems based on the current threat perceptions and users requirements. However, considering the very fact that as many as 618 out of 989 projects were closed down following the review undertaken in 1989, the Committee cannot but infer that Services requirements were not judiciously projected and assessed, that rigorous controls as laid down for sanction of projects, when they were selected, were not exercised properly, and that when such a large number of projects were being taken up, they were taken up in a rather indiscriminate manner.

3.12 The Committee feel that Defence R & D had unjustifiably burdened itself with too many low-end projects and did not concentrate on certain major projects in a focussed manner. The Committee, therefore, recommend that the project proposals be rigorously examined and feasibility studies carried out on the basis of the latest threat perception and the Services need of the times,

before sanctioning the projects. They also recommend that DRDO should concentrate on major projects rather than allow their resources to be diffused and to be scattered thinly as the requirements of Defence Forces will always remain time critical and any mismatch could result in heavy infructuous investment of scarce resources and adverse effect on operational capability.

3.13 The Committee further desire that the procedure laid down for the sanctioning of the projects may be made further stringent and all such proposals be subjected to rigorous examination.

3.14 The Committee wonder how DRDO had in the first place allowed itself to be saddled with 989 projects. The Committee desire that procedures specified by the Ministry of Defence in relation to sanctioning and closing down of DRDO projects may be revamped in the light of maturity acquired from their experience, as to obviate dead wood projects involving infructuous expenditure and to evolve a goal-oriented approach.

3.15 Procedures should also be amended to make it obligatory to conduct periodic review of the projects with a view to scrutinising the need for their continuity.

CHAPTER IV

MAJOR R & D PROJECTS

4.1 Given below is the data on the Major R & D Projects as supplied by Ministry of Defence.

Table (i) shows the general data on the original and final cost of the projects, import content and likely date of completion.

Table (ii) shows the details on some of the major projects.

TABLE (I)

Name of Project	Original Cost (Rs. in Crores)	Revised Cost (Rs. in Crores)	Import Content (Rs. in Crores)	Likely time of completion
1. Integrated Guided Missile Development Programme (IGMDP)	388.83	784.66	291.14	Prithvi & Trishul ready for induction in 1994. Akash & Nag-1996.
2. Light Combat Aircraft (LCA)	560.00	2188.00	873.00	June, 1996
3. Main Battle Tank Arjun (MBT)	15.50	(i) 56.55 (ii) 280.80	102.32	Project completed

Table (iii)

Name of Project	Original Cost (Rs. in crore)	F.E. Component (Rs. in crore)	Projected Time of completion	1st Revision Date & Amount (Rs. in crore)	F.E. Component (Rs. in crore)	Projected Time of completion	Further review in any	Reasons for revision
1.	2.	3.	4.	5.	6.	7.	8.	9.
ICMFP	July '83 388.83	154.07	June '95	Sept '90 784.06	291.17	June '95	-	Inflation Exchange Ravariation, changes in user's requirements, Technological problems.
LCA	Aug '83 560.00	-	8-10 yrs. time	June '93 2188.00	873	First flight June '96 completion of phase I June '98	-	Change in scope, development strategy, fresh visions for engineering change orders, inflation, Exchange rate variation
MBT	March '74 19.50	3.70	Commencement of bulk production in 10 years from date of sanction	Oct '80 56.55	12.96	One proto-type to be ready by Dec '83 12 proto-type to be developed, one in every six months	IInd Revision : change in Q.R., requirement of additional proto-types, more realistic assessment of technical user trials and inflation.	Ist revision: Increase in gun caliber, indigenous engine & transmission inflation. IInd Revision : change in Q.R., requirement of additional proto-types, more realistic assessment of technical user trials and inflation.

Some of the Projects have been dealt with as under :

4.2 Integrated Guided Missile Development Programme (IGMDP)

The aim of the programme was to design, develop and finally lead to the production of four missile systems and to demonstrate the re-entry technology through the fifth project. The original cost of the programme as sanctioned in July'83 was Rs. 388.83 crores which was revised to Rs. 784.06 crores. It also has foreign exchange provision of Rs. 291.17 crores. 78 labs/academic institutions/public/private institutions are associated with the design and development of the missile systems. They are Prithvi, Trishul, Akash, Nag and Agni dealt with in the succeeding paragraphs.

4.3 Prithvi is designed for tactical application in the battle field. It is fully mobile and mounted on a vehicle. It carries a conventional war head. Fourteen flight trials have been conducted—first on 25.2.1988 and last on 6th June, 1994. 'PRITHVI' missile has also been successfully flown to achieve an extended range. The missile has entered into user's trial phase during March, 1994. Delivery to Services is expected to take place after user's trials. The last user trial was successfully carried out from Interim Test Range (ITR) Balasore on 6th June, 1994 and the missile is nearly ready for induction into the Armed Forces. The missile has also been tested on a land target when it was launched first time, fired from on-shore site against a land target on an island. This launch has achieved all the mission objectives set for it.

4.4 Trishul is designed to counter a low level attack with a very quick reaction time and has an all weather capability. It is getting ready for user trials in the coming year. So far 26 developmental flight trials have been conducted, first on 16th September, 1985 and last on 8th June, 1993 (more tests commenced from 1st August, 1994). The missile has also been flight tested twice in sea-skimming role and against moving targets. User's trial for Trishul missile system are expected to be completed during 1995-96 and after that the missile will be inducted into Army.

4.5 Akash has a multi-target handling capability. It employs command guidance system. There is a provision for terminal guidance also. Five flight trials have been conducted, first on 14th August, 1990 and last on 3rd February, 1994 proving various sub-systems. Akash self propelled launcher (ASPL) and Phased Array Radar have also

been developed. Its technical trials are expected to be completed by 1995-96 and thereafter missile will enter into the User's trial/production/induction phase.

4.6 Nag is a third generation anti-tank missile, having an all weather capability. It is capable of defeating futuristic armour. It uses Imaging Infra-Red (IIR) guidance having a day and night capability. 18 flight trials have been conducted, first on 7th February, 1990 and last on 29th January 1994, from ITR Chandipore in Orissa proving various sub-systems. Missile carrier (MICA) has also been developed. The Last four trials were conducted using Missile Carrier Vehicle. Developmental trials are expected to be completed by 1995-96 and after that it will enter into the User's trial/production/induction phase.

4.7. Development work on 'Prithvi' and 'AGNI' have since been completed. After user trials, Prithvi has now entered the induction phase. 'Trishul', 'Akash' and 'Nag' development trials are expected to be completed in 1995-96 after which these missiles are likely to enter the User's trials, production and induction phase.

4.8 Agni System is known as the technological demonstrator due to its technological status. 'Agni' is a technology project to develop re-entry test vehicle. The first launch of 'Agni' was successfully conducted on 22.5.89 from ITR, Balasore.

The Agni-03 vehicle was configured for longer range and was tested successfully on 19 February, 1994 from ITR, Balasore achieving all the mission objectives set for it like re-entry, manoeuver longer range, control, guidance, 2-stage propulsion and stage separation.

With the successful launch of AGNI-03 re-entry vehicle, 'AGNI' project comes to an end. The total expenditure incurred so far is of the order of Rs. 55.00 crores. Government is examining the situation consequent to the successful flights of Agni with respect to its future plans.

It has been stated that the objective of the test flight of Agni, carried out on 19th February, 1994 was to prove the re-entry and related technologies. When asked about the purpose of the demonstration, the Defence Secretary stated that it was a technology demonstration and depending on the strategic environment the Government may or may not decide to productionise it.

4.9 The missile programme is not adversely affected by M.T.C.R. (Missile Technology Control Regime). Restrictions were anticipated at the time of sanction of the programme in 1983 itself and steps taken to offset the effects. Action was taken to design sub-systems based on maximum indigenous items. M.T.C.R. was imposed in 1987 imposing further controls. Multiple Task Teams are indigenously developing/fabricating critical components and required facilities were being set up, where essential. On the overall, the challenge of M.T.C.R. has provided a good opportunity for promoting self-reliance and quality.

4.10 Annual Report (1994-95) of the Ministry of Defence *inter alia* mentions as follows :

“China has also been rapidly modernising its armed forces and equipping them with sophisticated aircraft, air defence weapons and enhancing its blue-water capabilities, China also continues to carry out nuclear tests.”

“Pakistan continues to maintain close ties with China. The latter is major source of weapons, particularly of combat aircraft, missiles and tanks. The sale to Pakistan of M-11 missiles and allied technology by China is a cause of concern.”

4.11 China is also reported to be developing three medium and long-range ballistic missile systems. Their initial operational status are planned to be realised for the mid and late 1990s.

4.12 The Ministry of Defence, in the light of the above, have stated that :

“It is relevant for India to undertake technology demonstrator project ‘AGNI’, so as to acquire a technology for future need, if required.”

4.13 The Committee appreciate the remarkable progress achieved by our scientists and engineers in the Integrated Guided Missile Development Programme (IGMDP) and expect them to achieve pinnacle of success in the missile programme area.

4.14 The Committee note that the project involved foreign exchange component of the order of Rs. 154.07 crores in the original cost of Rs. 388.83 crores in 1983 which rose to Rs. 291.17 crores in the total amount of Rs. 784.06 crores. The Committee desire that adequate measures should be taken to reduce the foreign exchange

component to the barest minimum in a phased manner without compromising efficiency of the system.

4.15 China has developed as a major nuclear and missile power. China also continues to be the main source of major weapons including missiles and allied technology to Pakistan, a very hostile neighbour, causing disquiet to India. Despite warming relations with China, China is and is likely to remain, the primary security challenge to India in the medium and long terms. Its enhancement of missile capabilities and its immense help to Pakistan in the missile programme are serious security concerns to India. The Committee feel that India has no option but to continue to develop and upgrade its missile capabilities for deterrence and not for aggression on national security consideration.

LIGHT COMBAT AIRCRAFT (L.C.A.)

4.16 L.C.A. is a multirole aircraft meant to provide air superiority in Air Defence. It is a single engine fighter aircraft with tailless, compound delta platform. It is smaller and lighter than other contemporary combat aircraft of its class. It integrates modern design concepts and state-of-the-art technologies such as relaxed static stability, fly-by-wire control system, advanced avionics, high strength composite materials and multimode radar.

In addition, short take-off and landing, high manoeuvrability with excellent maintainability and a wide range of weapon fit are some of its salient features. Primarily designed as an air superiority fighter, it has an excellent offensive air support and interdiction capability. L.C.A. is likely to be the future aircraft of the Airforce and is to replace MIG series of aircrafts. However it cannot do deep penetration strike role. The naval version of the L.C.A. is also on the drawing board.

4.17 Initially Hindustan Aeronautics Limited (which has a design bureau) was given the overall design responsibility for this new aircraft but later on the responsibility was shifted to DRDO. A separate society was registered under the title Aeronautical Development Agency (A.D.A) for the management of the project which was funding the L.C.A. project out of its resources provided by the Ministry of Defence.

4.18 LCA project has three-tier Programme Management Structure (General Body, Governing Council and Technical Committee) having

representations from DRDO, Airforce and the Production Agency at appropriate levels. In the LCA Technical Committee DG, ADA is the Chairman. Chairman HAL is the Co-Chairman, Deputy Chief of the Air Staff is a member, apart from other technical experts who are responsible for implementing the decisions and executing the programmes. Thus it may be observed from the above structure that the programme is a collaborative national venture.

4.19 The L.C.A. was sanctioned with an original cost of Rs. 560 crores. The revised cost of the project has been estimated at Rs. 2188 crores. It has a foreign exchange component of Rs 873 crores. Two prototypes of the aircraft will be ready by June 1996. The first aircraft is planned to undergo flight testing from June 1996 onwards and the second aircraft will start its flight trials from March 97 onwards.

4.20 The Committee observed that cost escalation gap between the original estimate and the final estimate was four times more and enquired whether it was grossly under-estimated or under invoiced or a genuine mistake. Explaining the position, the Secretary (DRD) of the Ministry of Defence stated as follows :

“LCA was first sanctioned in 1983 and the first major milestone was completed in 1989 and the expenditure upto this stage was Rs. 400 crores. The second phase like the full scale engineering development could not commence immediately due to the severe financial crisis faced during 1989-92. This has been the major cause of slippage. The projected cost of about Rs. 500 crores was based on 1982 price level and the fact that we have to develop that technology. After technology upgradation, we went for full estimation and now we can estimate the overall cost better than previously.”

4.21 In response to a query, the Secretary (DR &D) added:

“In some of our projects our estimate of time schedule and costs had escalated. I had explained in one of our slides, integrated design experience gained in 90s will lead to better cost estimate and schedule control.”

4.22 In a subsequent post-evidence note, the Ministry has stated as follows :

“LCA was first sanctioned in the year 1983. First major milestone was Feasibility Study followed by Project Definition. This was

completed in 1989. Expenditure upto this phase was around Rs. 400 crores.

The phase II of the Project Full Scale Engineering Development, could not commence immediately due to resource constraints during 1989-92. This has been the cause of slippage in this phase.

The first flight trial of Full Scale engineering version aircraft will be in 1996. The aircraft is expected to be inducted into IAF in 2003.

Production aircraft is expected to roll out in 2000.

To compress the time gap between design freeze and production, concurrent engineering is being pursued by ADA and HAL."

4.23 It has further been informed that the revised cost is approximately four times for original cost and the LCA has not even made its first flight. The organisation attributes the four fold escalation in the cost of the project to various factors and have given a list of components which constitute the present development cost.

	Rs. in Crores
(a) The 1983 sanction	560
(b) Escalation in rupee costs	301
(c) Escalation in FE costs	145
(d) Changes in FE rate	529
(e) Additional provision for Engineering change order	144
(f) Profit to HAL	55
(g) Change in scope & development strategy (more indigenisation)	230
(h) Underestimation	224
	2188

4.24 On being asked whether the Ministry had not included certain components initially which has since been covered under the new estimates, the Secretary (DR&D) informed:

"At that time, technology level had not gauged properly. When we went in for Rs. 560 crores, they said that given all the technology development does not mean that it has to lead to flight trials".

4.25 It was pointed out that the LCA Project engine was imported. The multimode radar came from the US, the avionic electronics came from France, the fly by wire system came from US. In regard to the above the Committee enquired how DRDO had assessed it to be an indigenised effort. Secretary (DR&D) replied that only selective inputs are being obtained from abroad so as to reduce project cost and time frame.

4.26 The Secretary (DR&D) of the Ministry of Defence explained taking examples of LCA engine as follows :

"Initially, at the development stage of the engine roughly about 40% of the components are imported. But when it goes into production, it will come down to 14 per cent only. That can also be indigenised. But the point is that it is not cost effective. There is no full sub-system that comes from abroad."

4.27 Another representative of the Ministry of Defence explained, with the permission of the Chairman, that the Kaveri engine of LCA was being designed and within six months it would be tested. After extended trials in 1998 it would be cleared for production by 2002 sufficient number of engines would be produced by HAL. However, for the initial flight trials, the G.E. 404 engines had been imported for the reason that if there was any malfunctioning in the aircraft it could not be attributed to the engine. But it was mentioned that the imported engine does not fully meet the LCA requirements and therefore the KAVERI engine was being designed and developed.

4.28 As regards the steps being taken to make LCA fully indigenised, the Secretary (DR &D) informed the Committee:

"If we are 100% indigenised, our aircraft will not be cost effective. I can compare the cost effectiveness if I put in indigenous efforts. There is a book called 'Japan says No' which, consider US which has Japan as a major single source. Their aircrafts will not fly without 15-30 per cent of Japanese parts."

Another representative of the Ministry added:

"Finally, you will see that LCA is the most indigenised aircraft ever made."

4.29 On being asked about the other comparable combat aircrafts presently operating, the Secretary (DR&D) of the Ministry informed:

"We can compare LCA only with three other aircrafts. One is Rafale of French make. It costs \$ 48 millions. There is another aircraft of EFA, British which costs \$ 37 millions. F-22 of USA costs \$ 59 millions. Grippen aircraft costs \$ 25 millions. Our LCA will cost 21 million dollars. The development cost is low; production cost is low. If we get international partnership, we can bring down the cost."

4.30 In reply to another question regarding the need to ensure that LCA did not become obsolete by the time it came into production, the Ministry stated in written reply that development strategy of LCA was geared to produce the state-of-the-art offensive role aircraft with the sophisticated contemporary technologies in avionics, materials, power plants etc.

4.31 The Committee note that LCA is a multi-role fighter aircraft being designed primarily for offensive role. It integrates modern design concepts and state-of-the-art technologies. LCA is likely to be future new generation aircraft of the Indian Air Force which will replace MiG series of the aircrafts.

4.32 The Committee note that LCA was first sanctioned in the year 1983 with an original cost of Rs. 560 crores. The Committee have, however, observed that there has been wide cost escalation between the original estimates and the final estimates. The final cost is estimated to be four times the original cost.

The Committee are not able to understand this big gap in the estimates. The Committee expect that DRDO authorities on the basis of their experience gained in the 90s on design development will project realistic estimates for their projects in future.

4.33 The Committee are unhappy to find that initially Hindustan Aeronautics Limited (HAL) was given overall design responsibility for this new aircraft but later on responsibility was assigned to DRDO and whereafter for which a separate society was registered

under the title ADA. The Committee are not aware of level of competence built up in DRDO before it embarked on this ambitious project. The project was taken up without the proper ground work and expertise and competence building, though DRDO had undertaken aircraft development since early 60s. The Committee feel that the LCA project which was monumental effort to develop a state-of-the art combat aircraft should have been undertaken with proper ground work and attainment of requisite technology level.

The Committee are informed that the first major milestone was feasibility study followed by Project Definition which was completed in 1989 though taking six long years and that expenditure upto this phase was around Rs. 400 crores. The Committee also find that the second phase of the Project Full Scale Engineering Development, could not commence immediately due to resource constraints during 1989-1992. The Committee are also unhappy to find that there was no or very little progress during the period 1989-92 and that in the second phase of the project, Full Scale Engineering Development there was delay for over three years. The project has already suffered tremendous slippages both in time schedule and cost estimates. The Committee, therefore, desire that in future adequate budgetary allocation be made so that the prestigious project like LCA is completed within specified time schedule.

The Committee also desire that after completion of prototype trials, the LCA project should be reviewed.

ARJUN M.B.T.

4.34 The Arjun M.B.T. Project, was started in 1974 at a cost of Rs. 15.50 crores and a foreign exchange content of Rs. 3.70 crores. The bulk production was to commence in 10 years time. The cost was first revised to Rs. 56.55 crores in October, 1980 and First prototype was to be ready by December, 1983. Also a total of 12 prototypes were to be developed, one in every six months. The project was again reviewed in May 1987 and the amount sanctioned for the project was 280.80 crores. At present the technology transfer to DGOF (Avadi) is under progress and the prototypes are being tested. The foreign exchange component from the first revision to the second revision had gone from Rs. 12.96 crores to 102.32 crores.

4.35 The participating R&D Establishments are the Combat Vehicle R&D Establishment (CVRDE), along with 12 DRDO labs/establishments and academic institutions. Tank factory at Avadi is the nodal agency involved in the project.

4.36 The reasons explained by the Ministry for the delay are the changes in the G.S.Q.R. specifications according to the change in threat perception from the 70s to 90s, the increase in the number of preproduction series tanks from 12 to 42, inflation and escalation in F.E. rate. The Secretary also explained during evidence that it was for the first time that such a tank was being built and therefore time was taken for competence building.

4.37 It was stated that due to changing threat perception and new development & in armoured fighting vehicle technologies, the Army revised twice the G.S.Q.R. for M.B.T. The new G.S.Q.R. issued in 1985 demanded a state-of-the-art tank, designed to take care of threats of 2000 and beyond. This involved change in scope of the project, all round protection against contemporary tank ammunition, higher power to weight ratio, increased hit probability including from moving tank to moving tank and F.S.A.P.D.S. round to defeat all tanks likely to appear by the year 2000.

4.38 In response to a query, the Secretary, (DRD) of the Ministry of Defence stated as follows:—

“When a specification is generated, it is never static. It is threat perception which matters. It is changing every time. Naturally, we have to re-design and so the cost will change.

The fire power demand in the 70s was different from that of 80s. In the 90s both mobility and fire power are important. Armoury protection power is dictating. I want to conform to change in the specification, change in the technological design. The inflation is at the rate of 12% or 13%. So, to that extent, cost escalation will also be there. Rs. 280 crores also include the cost of ‘X’ number of tanks that I have to give to the user.”

4.39 The Committee are unhappy to note that there have been seventeen-fold escalation in the project cost of MBT having original sanction of Rs. 15.50 crores in March, 1974 increasing to Rs. 56.55 crores after first revision in October 1980 and finally rising to Rs. 280 crores in May 1987, for a state-of-the art tank designed to take care of threat of 2000 and beyond. The Ministry have explained the cost escalation on the grounds of change in scope of the project, increase in number of prototypes from 12 to 42, inflation and escalation in FE rates.

4.40 The project was sanctioned in the year 1974 and the production/induction of the tank is expected to commence

in the Ninth Plan period. There has been tremendous escalation both in time and cost of the project. DRDO is the premier organisation of the country for Defence R&D engaged in design and development of major weapon systems since 1958. The Committee are conscious of the patience and hard work that is required in Defence R&D and that success in such Defence R&D projects is very slow and difficult. However, the delay of about 24 years in the design and development and finally the production of M.B.T. Arjun Tank does not appear justified. Such delays as have been in the past, are the bane of defence research and production.

4.41 The Committee are not convinced by the justification advanced by the Ministry for change in GSQR specifications revised twice in less than 5 years after being specified in 1972. The Committee feel that DRDO embarked on the project of this magnitude, undertaken for the first time in the country, without any reasonable idea of the cost, and the scope of the project and hence necessitating quick changes in GSQR which resulted in considerable amount of re-work, *ab-initio* development and import of additional sub-systems/components. The Committee feel that there has been enormous and inexplicable time escalation which necessitate self-introspection in the Ministry as to bring to the light the reasons for the failure either on the part of DRDO or users who failed to foresee prudently threat perception and to project their requirements beyond 6 years in 1974 and just 5 years ahead in 1980.

4.42 The Committee find that competence building in DRDO on a project commenced after a project was taken in hand. The Committee suggest that the DRDO should evolve an approach of competence building with coordination and consultation with other agencies in the country and abroad. The Committee would therefore, like to stress that competence attainment and technological insight should be made pre-requisite for taking up any major project.

4.43 Despite sincere and dedicated efforts made by our scientists/engineers, such abysmal long delays create an impression that such projects were dealt with in the lackadaisical manner in the past. The Committee desire that the Ministry henceforth should call for progress report especially of those on-going projects which are running behind schedule and review their position. This exercise should be undertaken with all seriousness by giving necessary directions to the implementing agencies. Such review made by

Government on major projects lagging far behind schedule and the direction given to make up the lost time should also be reflected in the Annual Report of the Ministry.

TRIALS OF M.B.T. ARJUN

4.44 When the Committee pointed out that the engine being imported for M.B.T. Arjun heated up in the desert conditions and that some of the equipments were so sensitive that they were not working properly, the Secretary (DR&D) stated, 'we cannot produce a proven engine and so, we have decided to take the technology transfer and take this engine. This engine is specially designed for us'. The Deptt. of Research and Development informed in a written note that the M.T.U. engine (838) fitted in M.B.T. Arjun is specifically designed for Indian Desert conditions based on Indian specifications. After trials, over past 5 years, its fan, rotor blades, filter and fuel injection system were perfected to work in the heavy, dust-laden atmosphere of the desert, the engine has special feature of "Power derating" at temperature higher than 42° C to 49°C ambient. Even in derated conditions, it provides speed of 22-25 km./hr. over cross-country terrain; and it can negotiate sand dunes of about 35° gradient. It has also been stated that the prototypes and 2 preproduction series tanks were extensively tried and cleared by the M.B.T. Cell of the Army. 6 preproduction tanks were handed over to the Army, these were under trial by an armoured brigade. They were to complete the final phase of trial by June 1994.

4.45 The Ministry in a subsequent note, however, informed that the modifications required to further improve the design are being carried out by the designing agency, namely DRDO and the next user trials would be held in the summer of 1995 and that plans for its series production are being formulated. The Ministry also informed that it is proposed to induct two regiments of M.B.T. Arjun initially during the Ninth Plan period.

4.46 It was also explained to the Committee during evidence that the M.B.T. tank was a world class tank. Asked to state whether the Army had certified this tank to be one of the best tanks in the world, the Secretary (DR&D) stated that the best judge to decide it were the users. The user has used it to the extent of 20,000 kms. in all kinds of terrain.

4.47 The Study Group of the Committee visited Rajasthan to observe the 1995 summer trials of the M.B.T. Arjun Tank.

It was informed that M.B.T. Arjun was first subjected to technical trials in 1988. Since then, a number of trials have been conducted to check and evaluate the various systems as also check its efficacy as an integrated fighting machine.

4.48 In the course of user trials of M.B.T. Arjun in the desert area and in the riverine areas of Punjab and J&K during 1993 and 1994, more than 18,000 kms. have been covered on the pre-production series tanks and about 2500 rounds of ammunition fired.

4.49 On the basis of users trials of summer 1994, Army Headquarters in consultation with DRDO laid down "Ten Basic Imperatives" as under:—

- (a) Improved accuracy of the gun at battle ranges.
- (b) Accuracy in the dynamic mode has to be established to acceptable levels.
- (c) Overall mission reliability has to be enhanced.
- (d) Fielding of NBC and Medium Fording Capability.
- (e) Configuration of ammunition bin with blow-off panel.
- (f) Ergonomics needs substantial attention.
- (g) Cruising range to be enhanced.
- (h) Firing in the rear arc at zero degrees is a must.
- (i) An emergency power traverse and APU should be provided.
- (j) An all electric power traverse if provided, will obviate the problem of leaks that occur in the present system in our environmental conditions.

DRDO have carried out most of the modifications/improvements accordingly which are expected to get validated during the trials of summer 1995.

4.50 It was brought to the notice of the Study Group during the on-the-spot study visit that 30 deficiencies were pointed out by the users during the previous tank trials. Out of these 75% have already been taken care of and modifications to the effect have already been made.

4.51 During the course of their on-the-spot study visit, the Study Group observed that certain deficiencies in automotive system, weapon system and ergonometry still remain to be effectively removed.

4.52 The Committee note that MBT Arjun was first subjected to technical trials in 1988 and since then a number of trials have been conducted to check and evaluate the various systems as also its efficacy as an integrated fighting machine.

4.53 The Committee have been informed that on the basis of users trials of summer 1994, Army Headquarters in consultation with DRDO had laid down certain basic Imperatives. The DRDO has since carried out modifications/improvements accordingly which are expected to get validated during summer trials of 1995.

4.54 The Study Group of the Committee during the course of their on-the-spot study visit have been informed that 30 deficiencies were pointed out by the users during the previous tank trials, out of which 75% have been taken care of. However, certain deficiencies in automotive system, weapon system and ergonometry still remains to be effectively overcome.

4.55 The Committee regret that despite the prolonged technical trials since 1988 and the user trials since 1993, the development process is yet to be completed. The Committee hope that the DRDO would chalk out a time bound plan for the removal of the deficiencies pointed out earlier by the users as also the new shortcomings which might have come to their notice during the summer trials of 1995 so as to ensure the formal induction of MBT Arjun with world class automotive system, weapon system and working environment for crew, during the Ninth Plan.

ELECTRONIC WARFARE PROGRAMME — SAMYUKTA

4.56 It has been stated that the Defence Research & Development Organisation (DRDO) have developed a number of electronic warfare systems for the three services namely Army, Air Force and Navy during last three decades. The objective of developing these systems has been to exploit adversary's radar, radio or other electronic emissions so as to deny access to vital intelligence while at the same time securing own communication and non-communication channels, thus achieving a force-multiplier effect. Based on the expertise already developed and the confidence gained in the EW field, an Integrated

Electronic Warfare Programme has been undertaken by DRDO jointly in close interaction with the Army to meet the requirements of Army for the year 2000 onwards. The programme was accorded Cabinet approval on 06 April, 1994.

4.57 The programme was sanctioned by the Government on 3rd May, 1995. The total cost of the Programme will be shared by the Army and DRDO. The Project is scheduled to be completed in 66 months from date of the sanction.

4.58 The programme envisages delivery of electronic warfare entities, comprising communication and non-communication type systems to Army. This will considerably enhance the capabilities of the Army in the electronic warfare field. The programme is managed by a 3-tier management structure of Management Boards. Consortium approach is envisaged for development which will ensure participation of competent public and private sector companies in the programme. This will enable development of indigenous industrial base for such defence systems. Concurrent engineering practices will be followed aimed at reducing the time for development and delivery to the Army.

4.59 Regarding the latest status of the project it has been stated that :

- (i) Design has been finalised;
- (ii) Procurement action of critical imported items required for core system demonstration for demonstrating feasibility has been completed;
- (iii) Work packages have been formulated; and
- (iv) Some of the hardware and software modules are getting ready.

4.60 The Committee note that the Defence Research and Development Organisation (DRDO) has undertaken an integrated Electronic Warfare Programme jointly with the Army to meet the requirements of Defence Services for the year 2000 onwards. The Committee further note that the project sanctioned on 3rd May, 1995, envisages the delivery of Eelectronic Warfare entities comprising of communication and non-communication type system to the Army. The project is scheduled to be completed in about 66 months from the date of sanction.

4.61 The Committee, considering the past performance of the DRDO in regard to other major projects specially the time and cost overruns, desire that high priority be accorded to the project and the management structure and other monitoring mechanism be adequately strengthened and equipped to ensure completion of the project within laid down time frame. The Committee also hope that the DRDO would keep track of the related developments and advances in the EW field as to keep the system state-of-the-art. The Committee also desire that the participation of public and private sector companies in the programme be further increased as also other appropriate measures be taken to bring down the import content which is quite high. The Committee also recommend that E.W. Programmes for modernisation of the Air Force and Navy may also be considered for being taken up by DRDO jointly with the other Services.

NEW DELHI;

9, August 1995

18, Sravana 1917 (Saka)

INDRAJIT GUPTA

Chairman,

Standing Committee on Defence.

MINUTES OF THE NINTH SITTING OF THE STANDING
COMMITTEE ON DEFENCE

(1993-94)

The Committee sat on Wednesday, 14 July, 1993 from 1100 hrs
to 1400 hrs.

PRESENT

Shri Buta Singh — *Chairman*

LOK SABHA

2. Shri Ayub Khan
3. Shri Nurul Islam
4. Shri Bhupinder Singh Hooda
5. Shri Nandi Yellaiah
6. Shri Rajaram Shankarrao Mane
7. Shri Kamal Chaudhry
8. Shri Sharad Dighe
9. Shri Yoganand Saraswati
10. Shri Prakash Narain Tripathi
11. Shri Jagat Vir Singh Drona
12. Shri Gabhaji Mangaji Thakore
13. Shri Pratap Singh
14. Shri Mumtaz Ansari
15. Shri Chhedi Paswan
16. Shri Abhay Pratap Singh
17. Shri Chun Chun Prasad Yadav
18. Shri Amal Datta
19. Shri Hannan Mollah
20. Shri Indrajit Gupta
21. Maj. Gen. R.G. Williams

Rajya Sabha

22. Shri Prabhakar B. Kore
23. Shri S. Jaipal Reddy
24. Shri Satchidananda
25. Shri Sushilkumar Sambhajirao Shinde
26. Shri Gopalsinh G. Solanki

SECRETARIAT

Smt. P.K. Sandhu	— Deputy Secretary
Shri Ashok Sarin	— Assistant Director

EXPERTS

1. Shri Jasjit Singh, Director, Institute for Defence Studies and Analyses.
2. Shri K. Subrahmanyam, Ex-Secretary, Department of Defence Production, Ministry of Defence, Former Director Institute for Defence Studies and Analyses and Consulting Editor, The Economic Times.

2. At the outset, the Chairman welcomed the Members of the Standing Committee on Defence. The Committee invited Shri Jasjit Singh, Director, Institute for Defence Studies and Analyses to share with the Members his expert views on the subject 'Defence Research and Development - Major Projects'.

3. The Committee thereafter invited Shri K. Subrahmanyam, a leading Journalist to give his expert opinion on the subject.

4. A verbatim record of the proceedings was kept.

5. The Chairman thanked the experts for giving their frank view on the subject and rendering service to the Committee.

The Committee then adjourned

MINUTES OF THE TENTH SITTING OF THE STANDING
COMMITTEE ON DEFENCE

(1993-94)

The Committee sat on Thursday, 9 September, 1993 from 1500 hrs. to 1700 hrs.

PRESENT

Shri Buta Singh — *Chairman*

MEMBERS

Lok Sabha

2. Shri Nurul Islam
3. Shri Bhupinder Singh Hooda
4. Sqn. Ldr. Kamal Chaudhry
5. Shri Vijay Naval Patil
6. Shri Umrao Singh
7. Shri Sharad Dighe
8. Shri Yoganand Saraswati
9. Shri Prakash Narain Tripathi
10. Shri Jagat Vir Singh Drona
11. Shri Pandurang Pundlik Fundkar
12. Shri Pratap Singh
13. Shri Mumtaz Ansari
14. Shri Indrajit Gupta

Rajya Sabha

15. Shri Misa R. Ganesan
16. Shri Hiphei
17. Shri Satchidananda
18. Shri Digvijay Singh
19. Shri Gopalsinh G. Solanki

SECRETARIAT

1. Smt. P.K. Sandhu — *Deputy Secretary*
2. Shri Ashok Sarin — *Assistant Director*

EXPERT

1. Shri P.R. Chari, Research Professor, Centre for Policy Research, New Delhi.

2. At the outset, the Chairman welcomed the Members of the Standing Committee on Defence. The Committee invited Shri P.R. Chari, Research Professor, Centre for Policy Research to share with the Members *inter alia* information and his expert views on the subject 'Defence Research and Development - Major Projects'.

3. A verbatim record of the proceedings was kept.

4. The Chairman thanked Shri P.R. Chari for his expert opinion on the subject.

The Committee then adjourned.

MINUTES OF THE THIRTEENTH SITTING OF THE STANDING
COMMITTEE ON DEFENCE
(1993-94)

The Committee sat on Monday, 17 January, 1994 from 1500 hrs to 1720 hrs.

PRESENT

Shri Buta Singh - *Chairman*

MEMBERS

Lok Sabha

2. Shri Bhupinder Singh Hooda
3. Sqn. Ldr. Kamal Chaudhry
4. Shri Sharad Dighe
5. Maj. D.D. Khanoria
6. Shri Yoganand Saraswati
7. Shri Jagat Vir Singh Drona
8. Shri Gabhaji Mangaji Thakore
9. Shri Chun Chun Prasad Yadav
10. Shri Hannan Mollah
11. Maj. Gen. R.G. Williams

Rajya Sabha

12. Shri Misa R. Ganesan
13. Shri Prabhakar B. Kore
14. Shri A. Nallasivan
15. Shri S. Jaipal Reddy
16. Shri Satchidananda
17. Shri Sushil Kumar Sambhajirao Shinde
18. Shri Digvijay Singh

SECRETARIAT

1. Shri V.N. Gaur — *Director*
 2. Shri T.R. Sharma — *Under Secretary*

REPRESENTATIVES OF THE MINISTRY OF DEFENCE

1. Dr. A.P.J. Abdul Kalam, Scientific Adviser to Raksha Mantri and Secretary, (DR&D)
2. Shri K. Santhanam, Chief Adviser (Tech)
3. Shri B.G. Joshi, F.A.D.S.
4. Shri K.N. Singh, CCR&D(S)
5. Dr. V.K. Aatre, CCR&D(A)
6. Vice Admiral R. Kohli, VSM, CCR&D (NS)

2. At the outset, the Chairman, welcomed the Members of the Standing Committee on Defence and the Secretary (DR&D) and his colleagues to the sitting of the Committee and invited their attention to the provisions contained in directions 55 and 58 of the Directions by the Speaker.

3. The Committee recorded evidence of the representatives of the Department of Defence Research and Development on the points arising out of examination of the subject 'Defence Research and Development - Major Projects'. The evidence was not concluded.

4. A verbatim record of the evidence was kept.

5. The Committee decided to take further evidence of the representatives of the Ministry of Defence (Department of Defence Research and Development) on the subject 'Defence Research and Development -Major Projects' on 27 January, 1994.

(The witnesses then withdrew.)

The Committee then adjourned.

MINUTES OF THE FOURTEENTH SITTING OF THE STANDING
COMMITTEE ON DEFENCE
(1993-94)

The Committee sat on Thursday, 27 January, 1994 from
1100 hrs. to 1330 hrs.

PRESENT

Shri Buta Singh — *Chairman*

MEMBERS

Lok Sabha

2. Shri Nandi Yellaiah
3. Shri Manikrao Hodalya Gavit
4. Sqn. Ldr. Kamal Chaudhry
5. Shri Vijay Naval Patil
6. Shri Ram Niwas Mirdha
7. Shri Umrao Singh
8. Shri Sharad Dighe
9. Maj. D.D. Khanoria
10. Shri Yoganand Saraswati
11. Shri Prakash Narain Tripathi
12. Shri Jagat Vir Singh Drona
13. Shri Gabhaji Mangaji Thakore
14. Shri Mumtaz Ansari
15. Shri Abhay Pratap Singh
16. Shri Amal Datta
17. Shri Hannan Mollah
18. Maj. Gen. R.G. Williams

Rajya Sabha

19. Shri Misa R. Ganesan
20. Shri Hiphei

21. Shri S. Jaipal Reddy
22. Shri Sushil Kumar Sambhajirao Shinde
23. Shri Gopalsingh G. Solanki

SECRETARIAT

- | | | |
|---------------------|---|-----------------|
| 1. Shri V.N. Gaur | — | Director |
| 2. Shri T.R. Sharma | — | Under Secretary |

REPRESENTATIVES OF THE MINISTRY OF DEFENCE

1. Dr. A.P.J. Abdul Kalam, Scientific Adviser to Raksha Mantri and Secretary, (DR&D).
2. Shri K. Santhanam, Chief Adviser (Tech)
3. Shri K.N. Singh, CCR&D(S)
4. Dr. V.K. Aatre, CCR&D (A)
5. Vice Admiral R. Kohli, VSM, CCR&D (NS)

2. The Committee resumed oral examination of the representatives of the Department of Defence Research and Development on the remaining points on the subject 'Defence Research and Development — Major Projects'.

3. The representatives of the Department of Defence Research and Development also were asked to furnish written replies to the list of points on the subject.

4. The evidence was concluded.
5. A verbatim record of the evidence was kept.

(The witnesses then withdrew).

The Committee then adjourned.

MINUTES OF THE SIXTH SITTING OF THE STANDING
COMMITTEE ON DEFENCE
(1995-96)

The Committee sat on Friday, 21 July, 1995 from 1500 hrs. to 1630 hrs.

PRESENT

Shri Indrajit Gupta — *Chairman*

MEMBERS

Lok Sabha

2. Shri Ayub Khan
3. Shri Bhupinder Singh Hooda
4. Shri Nandi Yellaiah
5. Sqn. Ldr. Kamal Chaudhry
6. Shri Vijay Naval Patil
7. Shri Ram Niwas Mirdha
8. Shri Sharad Dighe
9. Shri Umrao Singh
10. Maj. D.D. Khanoria
11. Shri Yoganand Saraswati
12. Shri Prakash Narain Tripathi
13. Shri Jagat Vir Singh Drona
14. Shri Gabhaji Mangaji Thakore
15. Shri Hannan Mollah
16. Shri Chhedi Paswan
17. Maj. Gen. R.G. Williams
18. Shri Kamaluddin Ahmed

Rajya Sabha

19. Shri B.B. Dutta
20. Shri Suresh Kalmadi
21. Shri K.R. Malkani

22. Shri A. Nallasivan
23. Shri S. Jaipal Reddy
24. Shri Satchidananda
25. Shri Sushil Kumar Sambhajirao Shinde

SECRETARIAT

1. Shri G.R. Patwardhan — *Joint Secretary*
2. Shri K.L. Narang — *Deputy Secretary*

2. The Committee considered their Draft Report on the subject 'Defence Research and Development — Major Projects' and adopted it with the following amendment:

Add at the end of Para 4.33 :

"The Committee also desired that after completion of prototype trials, the LCA Project should be reviewed ."

3. The Committee authorised the Chairman to finalise the Report in the light of factual verification and vetting from security aspect received from the Ministry as also of verbal and consequential changes and present the same to the Parliament.

The Committee then adjourned.

APPENDIX

COMPOSITION OF THE STANDING COMMITTEE ON DEFENCE (1993-94)

CHAIRMAN

Shri Buta Singh

MEMBERS

2. Shri Ayub Khan
3. Shri Nurul Islam
4. Shri Bhupinder Singh Hooda
5. Shri Nandi Yellaiah
6. Shri Rajaram Shankarrao Mane
7. Shri Manikrao Hodalya Gavit
8. Shri Kamal Chaudhry
9. Shri Vijay Naval Patil
10. Shri Ram Niwas Mirdha
11. Shri Umrao Singh
12. Shri Sharad Dighe
13. Prof. Ashokrao Anandrao Deshmukh
14. Maj. D.D. Khanoria
15. Shri Yoganand Saraswati
16. Shri Prakash Narain Tripathi
17. Shri B.L. Sharma Prem
18. Shri Jagat Vir Singh Drona
19. Shri. Gabhaji Mangaji Thakore
20. Shri Pandurang Pundlik Fundkar
21. Shri Pratap Singh
22. Shri Mumtaz Ansari
23. Shri Chhedi Paswan
24. Shri Abhay Pratap Singh

25. Shri Chun Chun Prasad Yadav
26. Shri Amal Datta
27. Shri Hannan Mollah
28. Shri Indrajit Gupta
29. Shri C. Sreenivaasan
30. Maj. Gen. R.G. Williams
31. Shri Misa R. Ganesan
32. Shri Hiphei
33. Shri Suresh Kalmadi
34. Shri R.K. Karanjia
35. Shri Prabhakar B. Kore
36. Shri A. Nallasivan
37. Shri S. Jaipal Reddy
38. Shri Satchidananda
39. Shri Sushil Kumar Sambhajirao Shinde
40. Shri Digvijay Singh
41. Shri Gopalsinh G. Solanki
- **42. Shri K.R. Malkari
- **43. Shri B.B. Dutta

* Nominated w.e.f 26.8.93 Vice Shri Sunil Dutt resigned from the Committee.

** Nominated w.e.f. 24.3.94