SEVENTY-SIXTH REPORT
PUBLIC ACCOUNTS COMMITTEE
(1981-82)

(SEVENTH LOK SABHA)

DEVELOPMENT OF A HELICOPTER

MINISTRY OF DEFENCE

Presented in Lok Sabha on _____

Laid in Rajya Sabha on _____

LOK SABHA SECRETARIAT
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3-3-1982

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INTRODUCTION

I, the Chairman of the Public Accounts Committee, as authorised by the Committee do present on their behalf this Seventy-sixth Report on Paragraph 6 of the Report of the Comptroller and Auditor General of India for the year 1979-80, Union Government (Defence Services) on Development of a Helicopter.

2. The Report of the Comptroller and Auditor General of India for the year 1979-80, Union Government (Defence Services) was laid on the Table of the House on 28-4-1981.

3. The Committee have observed that due to the delay of 5-1/2 years in sanctioning the project, the cost of setting up the design facilities and for development has escalated from Rs. 31.84 crores in 1972 to Rs. 41.05 crore in 1976. The development cost has gone up from Rs. 23.04 crores in 1972 to Rs. 37.50 crores in 1979 and may eventually turn out to be still higher.

4. Referring to the further delay caused by the decision to change over from single engine to twin engine configuration, the Committee have stated that it was unfortunate that a technological gap was allowed to develop and the Ministry of Defence failed to incorporate the advanced technology already available. Deprecating this lacuna in defence planning with reference to vital projects of this nature, the Committee have suggested that active steps should now be taken to overcome this deficiency.

5. The Committee have observed that an account of the uncertainties to which the project was subjected over the years, the facilities/services made available to the country under the 10-year collaboration agreement with a French firm could not be utilised to the extent of 54.5% and the payment of Rs. 54.59 lakhs made to the firm was rendered infructuous to a large extent. The Committee's examination has disclosed that the search for a modern helicopter initiated in 1970 to meet the requirements of 1980s is not likely to fructify before 1990.

6. The Committee (1981-82) examined paragraph 6 at their sitting held on 9 September, 1981. The Committee considered and finalised the Report at their sitting held on 3 March, 1982. Minutes of the sittings form PART II* of the Report.

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

7. For facility of reference and convenience, 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 to the Report.

8. The Committee would like to express their thanks to the Officers of the Ministry of Defence (Department of Defence Production) for the cooperation extended by them in giving information to the Committee.

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

SATISH AGARWAL
Chairman
Public Accounts Committee.

NEW DELHI :
March 8, *1982*
Phalguna 17, *1903* (*S*)

REPORT

DEVELOPMENT OF A HELICOPTER

Audit Paragraph

1.1 In September 1970, Government concluded a 10-year collaboration agreement wih a foreign firm 'A' for the design, development and production of a helicopter to meet the requirements of the eighties and assigned it to a public sector undertaking (hereafter referred to as undertaking) for implementation. The agreement envisaged a payment to firm 'A' of US $ 750,000 (Rs. 54.59 lakhs) in 10 annual instalments.

1.2 **Design and development of the helicopter.**—Based on a feasibility study conducted by firm 'A' and the undertaking the Air Staff Requirements (ASR) were issued by the Air Headquarters in May 1971.

1.3 In April 1972, the undertaking sought Government approval to a project report and cost estimates for setting up of the required development facilities. The ASR of May 1971 was modified in July 1974 on the basis of the report of an Inter Services Team (March 1974). Mention was made in paragraph 8 of the Audit Report (Defence Services) for 1974-75 about the delay in sanctioning the project and non-utilisation of the 10-year collaboration agreement with firm 'A'. The project was finally sanctioned by Government in February 1976 at a cost increased from Rs. 23.04 crores (1972) to Rs. 27.36 crores for development and from Rs. 8.80 crores to Rs. 13.69 crores for establishing the design facilities. The Ministry of Defence had attributed (January 1976) the del y in sanctioning the project to budgetary constraints. Due to delay in the sanction of the project, the first prototype was expected (1975) to be flown by 1981-82 and production was to commence in 1984-85, i.e. 4 years beyond the period of the collaboration agreement, expiring in September 1980.

1.4 **Changes in the concept of the project.**—In April 1977, the Air Head quarters proposed the substitution of a single-engne (as per ASR) by a twin-engine configuration. The proposal, reiterated in August 1977, was stated to be based on the experience gained in 1971, operations and by other countries in 1973. A revised ASR (draft) was issued by the Air Headquarters in Februarv 1978 providing for a twin-engine configuration. The undertaking, to which the development of the helicopter was entrusted, however, stated (April 1978) that this would cause a set-back of 15—18 months in the development schedule and that the first flight testing of the prototype and production would be possible by 1984 and 1987 respectively. It added further that continued assistance of the foreign firm 'A' would be required for this purpose.

1.5 A technical group constituted in May 1978 recommended two alternative engines manufactured by foreign firms 'C' and 'D'. It was also then assessed that the change to twin-engine configuration would result in a redundancy of stores etc. of Rs. 54 lakhs, further increase in the cost of development by Rs. 6 crores and a delay of 15—18 months in the final induction of the helicopter. A proposal for a change in the scope of the project at a revised cost of Rs. 35.97—Rs. 37.50 crores (increase of Rs. 8.61 to Rs. 10.14 crores) was submitted to Government in October 1978. The proposal also envisaged negotiations with the foreign firm 'A' for extension of the 10-year collaboration agreement (which had meanwhile expired in September 1980) or with other firms. The proposal was approved by Government in January 1979.

1.6 The collaboration agreement with firm 'A' (September 1970) provided for its further extension (for a maximum period of 2 years) on payment of US $ 20,000 per year. Though approval of Government was obtained (January 1979) to negotiate with firm 'A' for the extension of the existing agreement and/or to negotiate with other firms for the development of the helicopter, neither has the collaboration agreement been extended nor has the engine been selected so far (October 1980). The Ministry of Defence stated (June 1980) that the undertaking was holding discussions with some firms in this regard

1.7 The undertaking had meanwhile incurred a capital expenditure of Rs. 3.84 crores on buildings, machinery and equipment and a development expenditure of Rs. 4.49 crores (June 1980) against which Government had reimbursed Rs. 4.01 crores up to June 1980.

1.8 The Ministry of Defence stated (November 1980) that :

—at the time of collaboration agreement in 1970, the concept of the role of the helicopter was still evolving and changes in the ASR had to be made to provide for the desirable capability in the context of changing operational environment;

—considerable expertise in the field of design and development of helicopter had been acquired and this should be utilised in future development work; and

—the final decision with regard to selection of the engine and entering into collaboration with a foreign manufacturer would be taken shortly and a modern technology helicopter would be successfully designed and developed in about 7 years time.

As mentioned above, negotiations for selection of the engine and entering into fresh collaboration agreement for development of the helicopter were in progress with foreign firms and indications were that the collaboration agreement would entail considerable additional expenditure.

1.9 While the project envisaged for developing a helicopter for the eighties was yet to get off the ground even 10 years after the collaboration agreement was signed, the cost estimates have escalated as indicated below :

	1972		1976		1979	
	Total	(FE)	Total	(FE)	Total	(FE)
					(Rupees in crores	
Design facilities .	8.80	(4.10)	13.69	(7.85)		
Development . .	23.04	(6.10)	27.36	(8.73)	35.97 to 37.50	(12.61 to 14.00)
Unit cost of manufacture . .	0.35		0.45		0.70 to 0.84	(0.35 to 0.42)

[Paragraph 6 of the Report of C&AG for the year 1979-80, Union Government Defence Services]

Collaboration agreement with SNIAS

1.10 Giving the background of the 10 years collaboration agreement (September 1970) with the French firm for the design, development and production of a helicopter to meet the requirements of eighties, the Secretary (Defence Production) stated in evidence :

> "The question of a decision for indigenous development of helicopter in India actually arose from the Aeronautics Committee's recommendations whose report was given in April/August 1969. That took account of certain thinking in the Government of India. At that stage, the Hindustan Aeronautics Ltd., Bangalore had been involved in the manufacture of Alouette-III (Chetak) helicopters, under licence agreement made in 1962 with a French firm and these helicopters had been in service in the Air Force for some years. This question of collaboration for indigenous development came in concurrently with a decision to go in for another successor to Alouette-III, *viz*. SA-315 or Chetak. It was in that context when we were going in for licence production of Chetak that it was decided that it would be desirable to set-up design and development facilities in India so that the next generation of helicopters would be of Indian origin.

Since we did not have design capabilities at that time it was considered necessary that we should enter into a collaboration agreement with the same people with whom we had been associated for well over 7-8 years."

1.11 Asked whether before entering into the collaboration agreement, the Government had finalised their requirements with regard to the type of helicopter required for meeting the challenges of the eighties, the Secretary (Defence Production) explained :

"Some of these aspects of the technical requirements of the Air Force and the Army were considered. In fact, most of the helicopter usages related to the Air Force and possibly to Navy. It had been duly considered in the Aeronautics Committee and the recommendations of the Aeronautics Committee do indicate the horizons of their consideration and then they came to the conclusion that it was necessary to set-up design and development facilities. The actual roles were to be considered alongwith the progress of design and development in collaboration with SNIAS.

The agreement was entered into on specific recommendations of the Aeronautics Committee. As soon as the agreement was entered into soon after a preliminary draft was spelt out."

1.12 The Committee further enquired whether before entering into the collaboration agreement, any ASR was issued. The Secretary, (Defence Production) stated :

"It would not have been possible to issue an ASR in this case. The agreement was for design and development of a product with general indication of the range—the specifics to be determined with reference to the actual needs.

We wanted to set up design facility in collaboration with this foreign company. Specific tasks have to be spelt out by both sides jointly taking into account what the users' requirement would be in the future. This is exactly what was done."

1.13 The witness further elaborated :—

"The broad scope of design and development had been clearly stated in the agreement itself. This was to be a successor to the helicopter we were going to produce.

In 1962 we went in for production of Alouette-III (Chetak) and in 1970 we went in for the successor helicopter SA-315, called Cheeta. The design and development for collaboration was with the same

people. The intention was to build up our own design capability and to develop our own helicopter, totally indigenous. This was the concept of the Aeronautics Committee and this was accepted and implemented by the Government."

1.14 The Committee desired to know the precise nature of enquiries made with regard to the proposed design collaboration agreement prior to concluding the agreement with SNIAS. The Ministry of Defence stated :

"The offer for collaboration in the design and development of the helicopters was available from the manufacturers of SA-315, viz., SNIAS of France. The Design Collaboration Agreement was negotiated and concluded concurrently with the Agreement for licenced manufacture of SA-315 helicopters. In fact the selection of SA-315 helicopter was subject to the condition that a satisfactory agreement for collaboration in the design and development of helicopter would be concluded. In the circumstances explained above, the question of enquiries from other prospective collaborators in 1970 did not arise."

The salient features of the Collaboration Agreement as offered by M/s SNIAS were as under :--

(1) SNIAS was to assist us in the creation and development of a helicopter design base in India capable of designing, constructing prototypes, developing and productionising helicopters of various ranges, meeting the Indian operational requirements; the first objective was to design, develop and productionise a helicopter in succession to SA 315/Allouette-III helicopter, incorporating design features and technology likely to be used in the 1980s.

(2) SNIAS was to provide assistance in the field of personnel training, both in their factories and other establishments in France and by sending their engineers, pilots, etc. to India.

(3) SNIAS was to position an Adviser in India for assisting in the implementation of the project and keeping liaison between the two parties.

(4) The training of Indian personnel was to cover the field of helicopter techniques both in the design field and testing and manufacturing fields and also assistance in incorporating specific techniques in the selected helicopter. The cost for 18 man years in France was included in the fee $ 750,000. Additional training in France was to be paid for.

(5) During the term of the Agreement, Government of India's technical personnel was to have access in SNIAS permises to all helicopter design, flight development, technical data as well as SNIAS know-how, patented or otherwise, for designing the first Indian helicopter programme.

(6) In respect of any specific work which should normally be performed by the Government under the Agreement, but which was entrusted to SNIAS, they were to be paid on cost plus basis.

(7) There was provision for undertaking design of advanced helicopters on terms to be agreed upon.

(8) SNIAS agreed to grant to Government a licence for the manufacture of Allouette-III with Artouste XIV Turbine engine without any charge. SNIAS also agreed to assist the Government of India in the selection of a suitable engine/engines for the helicopters to be designed under this Agreement.

(9) SNIAS was to have the right to manufacture in France, on an exclusive basis, the Indian helicopter but for sales outside France, a royalty of 2½% free of taxes will be payable to us.

(10) The Agreement was for a period of 10 years subject to extension for two years on a further payment of $ 20,000 per year.

As there were no other collaborators in the field, the question of comparison of terms and conditions offered by M/s. SNIAS does not arise."

1.15 During evidence the Committee referred to the following recommendation by the Aeronautics committee and desired to know the basis thereof :—

"The collaboration scheme proposed by Sub-Aviation is *prima facie* attractive; the terms would have to be further negotiated by Government. There is no alternative to collaboration with Sud-Aviation in the design of helicopters".

The Secretary (Defence Production) replied :

"One can only guess. Sud Aviation is previous or original name of SNIAS. The Committee were perhaps influenced by the fact that Allouette helicopter which was temporarily introduced in our country, was first introduced in France in 1959. In 1962 we signed a licence aggreement. In 1965 we were in production. And the Air Headquarters which were the main users of this helicopter were very happy with its performance. But at about the same time it was also decided to have a

licence for HF-315, which is a high altitude helicopter. It is possible, they might have taken into account the possibility of a package deal. It sometimes happens. That is all I can say at the moment."

1.16 The Committee enquired about the different alternatives available at the time when this agreement was entered into. The representative of HAL stated :—

"When SA 315 was being considered in 1969-70, there was another Hughes helicopter proposal, which was also evaluated. But the preponderant thinking was that (a) we should not bring in a helicopter for which we have to have more capital for a different type of technology and (b) it should be very good for the Indian conditions. So, in 1968-69 when the Aeronautics Committee was considering what type of helicopters should come into the country, it took the view that the new helicopter should be compatible with the production facility which was built up in the country and, secondly, the Company should be willing to the transfer of technical know-how. No other company, to my knowledge, even at that time was willing to give technological transfer. Even in this case, we had to twist their arms during the negotiations. We told them we can go for this particular programme provided the design collaboration agreement was agreed to at the same time".

1.17 Asked as to by whom the terms offered by the said firm were evaluated and at what level decision was taken to enter into an agreement with the firm, the Ministry of Defence stated that these were evaluated in the Ministry in consultation with the concerned authorities, namely Air-Headquarters, Ministry of Finance, HAL. etc. The decision for entering into the said Agreement was taken at the level of Defence Committee of the Cabinet

Air Staff Requirements

1.18 Based on a feasibility study conducted by the foreign firm and the HAL, the Air Staff Requirements (ASR) were issued by the Air Headquarters in May 1971. The ASR of May 1971 was modified in July 1974 on the basis of the report of an Inter Services Team of March 1974. The Committee enquired about the requirements envisaged in the ASR of 1971 and the reasons for which the revised ASR was issued in 1974. The Ministry of Defence* stated :—

"ASR 2/71 envisaged an advanced technology helicopter with an armed variant, and capable of operating in high mountanious regions as well as in the plains. M/s. Hindustan Aeronautics Ltd. were asked to carry out detailed feasibility studies of the helicopter based on ASR 2/71 which was to be finalised after receipt of HAL's feasiblity report. In the light of feasibility studies, further discussions were held between

*Not Vetted in Audit

Hindustan Aeronautics Ltd., Air Headquarters and Naval Headquarters and a revised ASR was issued in 1974. Such discussions and changes are not unusual in the process of finalising an ASR."

1.19 The Committee further enquired whether the Inter Services Team was associated at the time of finalising the collaboration Agreement and also while projecting the ASR of 1971 and if not, the reasons therefor. The Ministry of Defence* stated :

"The Inter Services Team was not associated at the time of finalising the design and development collaboration agreement with M/s. SNIAS, nor was it considered necessary to associate to the Inter Services Team. The required to technical assistance was provided by the Air Headquarters.

The ASR of 1971 was formulated after a joint meeting between the three Services. Thereafter, the ALH project was considered at a meeting of the Inter Services Equipment Policy Committee in February 1974 and it was decided to convence an Inter-Services Study Team with representatives from DRDO and HAL to examine in depth the future need of the country with regard to helicopter requirements. The Study Group under the Chairmanship of ACAS (OP) met in February 1974 and concluded that to meet the operational requirements of the three Services the concept of ALH should be pursued for the development of a suitable helicopter as per ASR 2/71 (issue 2)".

1.20 The Committee enquired why the requirements of the Air Force were not indicated before concluding the collaboration agreement with the foreign firm in September, 1970. The Secretary, (Defence Production) stated :

"This is not framed in a design and development and collaboration agreement. The ultimate requirement will be framed in mutual consultation later.

The Aeronautics Committee had a heavy representation of senior air force officials. They had taken a view that there was a test joint need to design and develop a helicopter for the needs of the services. A broad exercise was made taking into account the user's requirements which was subsequently examined for two or three years in consultation with each other for which design and know-how was being developed. And then it was finalised in July, 1974."

1.21 The Committee pointed out that the delay could have been avoided had the precise requirements of the Air Force been taken into consideration. The representative of the Air Headquarters stated :

"As I had explained earlier, when I mentioned the procedure for our ASRs. if we make it on our own, sometimes it may become un-

*Not Vetted in Audit

realistic. It may be too much which a manufacturer may not be able to give. Sometimes we may ask for too less we may land up with something which may not be compatible after 10 years. Therefore we keep our own requirements in general terms, first considering the parametres. After that we have a dialogue with the designer whosoever it is. Then, it is decided that so and so will collaborate. At that time we did not have the necessary know-how to design a helicopter on our own. If we want, we can go to HAL; at that time they did not have such expertise. We had to wait for the agreement which was signed. Immediately thereafter we started the dialogue."

1.22 The Secretary (Defence Production) further explained :

"It (ASR) is limited to known and available capability, in the sense that one has to go into production. After the user sees it, he may make some marginal changes to suit his requirement. The fact remains that the user's requirements have to be kept in mind. The skill in design and development had to be acquired from the foreign collaborators and then only the production could commence after some years. In the initial period of training and interaction the user had to be specifically kept in mind. Therefore, through various meetings and discussions between all the users, that is, Air Headquarters, Naval Headquarters and Army and the other users and HAL the design profile had to be formulated. If everything had gone on schedule then this three-year period would have been well spent because it was given to achieve the ultimate objective of meeting the user's requirements."

1.23 The Committee enquired whether right from the initial stages i.e. from 1970, the helicopter pilots were associated with the ASRs and with the changes therein at subsequent stages. The representative of Air Headquarters stated :—

"Our procedure is a very detailed one. Before we make ASR, we make out an internal paper which is distributed to various agencies who are involved in the operation of that system. For the instance, if I want to make an ASR for a helicopter we will make a position paper in the planning branch and later on it will be circulated to the operation branch. Then there is a meeting held and out of it comes the basic Air Staff target. After this, we consult them and make out a draft for framing our requirement right from the beginning. We also consult the user, the man who operates it."

Delay in sanctioning the Project

1.24 It is seen from the Audit Paragraph that in April, 1972, the Undertaking sought Government's approval to the project report and cost

estimate for setting up of the required development facilities. The project was finally sanctioned by Government in February, 1976 at a cost increased from Rs. 23.04 crores in 1972 to Rs. 27.36 crores for development and from Rs. 8.80 crores to Rs. 13.69 crores for establishing the design facilities.

1.25 The Committee desired to know the reasons for sanctioning the Project as late as in February 1976 since the collaboration agreement with the foreign firm was signed in September, 1970. The Ministry of Defence* stated :

> "The Design Collaboration Agreement was not in pursuance of any specific projection of demand but to prepare for a successor to SA 315 helicopter which would be required in due course. The project report was submitted by HAL in April, 1972. Among the questions which Government had to consider in dealing with this proposal was one of finding necessary resources for the project from the Defence Plan. It would be recalled that the country faced an unprecedented and unforeseen situation during 1971 leading finally to an armed conflict with Pakistan in 1971. This resulted in very severe financial contraints necessitating a mid term review of the requirements of defence services, in the context of changed priorities. After a detailed review of the Defence Plan in May 1973 in the context of the threat perceptions then obtaining, the relative priorities were redetermined, keeping in view the overall resources constraints. The ALH being a long gestation project, was accorded a low priority. Several important schemes including this Project could not be accommodated in the Defence Plan for want of resources.
>
> Efforts, however, continued in the Ministry of Defence to locate resources for this project from possible savings from other schemes in the Defence Plan. Separately, the proposal was also put to a detailed scrutiny to explore whether any alternative, even if less attractive was feasible. An inter Services Technical Team went into this question and came to the conclusion in February, 1974 that there was no viable alternative to the development of a new class of helicopters for meeting the future requirement of the Services. After a fresh review in June-July 1975 the project was included in the Defence Plan 1974-79. Accordingly the ALH project was approved in January, 1976 and Government sanction issued in February, 1976."

1.26 The Committee further desired to know the level at which the decision was taken to accord low priority to the project. The Committee

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* Not Vetted in Audit

also enquired whether apart from budgetary constraints, there were any other factors contributing to the delay of 5½ years. The Ministry of Defence stated :

> "Appex Group I, whose recommendations were accepted by the Cabinet, accorded low priority to this project. The delay of 5½ years was due only to budgetary constraints."

1.27 Elucidating the position further with regard to the constraint of financial resources for this Project, the Secretary (Defence Production) stated :

> ".....we moved heaven and earth in 1973-74 with the Government of India to the point of taking it to the Defence Minister twice. Everybody's hands were tied; because soon after the Bangladesh war there was a total review of the Defence Plan now because of a change in the situation. Even though this question was raised in 1971, it was only in 1975 that the Government could agree to it even though it was taken up at the highest level. The cost was not taken as Rs. 50 lakhs, the project cost was taken as something like Rs. 32 crores, and this kind of resources were not available in the sequence of priority which was considered important by the Government of India. An apex group at a very high level was set up to review the entire requirements of the three services. While some of the projects continued, some had to be dropped or postponed. Here it has only a question of postponing it by a few years."

1.28 He further added :

> "Such problems do recur and the situation in 1971-73 was critical. At the highest level, the Government of India took a decision to recast/all the priorities. The agreement was not held back. It was the project which was not sanctioned. In other words, the design and other activities were going on, but the facilities that would ultimately be required, were held back for a period of about 6 years. The agreement was signed in 1970, the estimates were submitted by HAL in 1972 after an initial feasibility report was submitted. From April, 1972, this matter was going round and round to find out whether any alternative resources could be found. The costs were something like Rs. 31 to 32 crores. It was not an easy decision to make. It was only in the slightly changed situation that a contract was made to run for 5 years and perhaps an audit report appeared in 1974-75 and finally the sanctioned could be issued in 1976. Only then the project could be taken up more purposefully."

1.29 The Committee desired to know the projections for funds for the entire project and the dates on which these projections were made. The Ministry of Defence stated :

"The estimated requirement of funds for meeting the capital cost for the establishment of helicopter development facility at HAL, Bangalore Complex. (At 1975-76 price level) were Rs. 1369 lakhs including foreign exhchange content of Rs. 785 lakhs. .....The requirements of funds towards development cost as estimated by HAL (excluding engine development) at 1975-76 price level were Rs. 2736 lakhs, including foreign exchange content of Rs. 873 lakhs. The development of cost of ALH was further revised from Rs. 27.36 crores (at 1975-76 price level) to Rs. 35.97 crores and to Rs. 37.50 crores (at 1978-79 price level) due to change from single to twin engine configuration."

1.30 The Committee further desired to have the following information :

(i) Actual requirement of funds from year to year

(ii) Amount actually sanctioned and utilised.

(iii) Short-falls in utilisation of funds and the reasons therefor.

In a note the Ministry stated :

"The phased requirements of expenditure towards the capital cost from 1975-76 to 1982-83 were as follows :

PHASING OF THE EXPENDITURE OF CAPITAL COST

(Rupees in lakhs)

	Total Expenditure	Foreign Exchange
1975-76	..	..
1976-77	91	43
1977-78	489	231
1978-79	413	243
1979-80	220	137
1980-81	18	11
1981-82	104	94
1982-83	34	26
Total	1369	785

Note: The actual commitment for the above expenditure would be made a year before in each year.

Phased requirements of funds on account of Revenue expenditure were as follows :

PHASING OF REVENUE EXPENDITURE AT 1975-76 PRICE LEVEL (EXCLUDING DEPRECIATION)

(Rs. in lakhs)

	Total Expenditure		Foreign Exchange	
Upto 1973-74	58		42	
1974-75	15		9	
1975-76	41	983	14	434
1976-77	175		70	
1977-78	323		144	
1978-79	371		155	
1979-80	374		155	
1980-81	281		77	
1981-82	250		61	
1982-83	233	1753	47	439
1983-84	229		46	
1984-85	211		37	
1985-86	175		16	
	2736		873	

The amount asked for and payments made to HAL by I.A.F. on ALH project from the year 1970-71 to 1980-81 are as follows :

MINISTRY'S BUDGET PROVISION FOR ALH PROJECT

(Rs. in lakhs)

Year	B.E. Amount		Payment to HAL by IAF	
1970-71	23.00		22.96	
1971-72	20.00		6.86	
1972-73	30.00			
1973-74	50.00		34.65	
1974-75	105.00			
1975-76	75.00		20.59	
1976-77	130.00		40.00	
1977-78	260.00		89.01	
1978-79	250.00	1039.07	81.54	413.65
1979-80	250.27		105.00	
1980-81	148.80		98.10	
	1342.07		498.71	

The total expenditure on the project upto May 81, was Rs. 529.43 lakhs.

The shortfall in utilisation of funds after 1976 is mainly because of :

(i) change over from single engine configuration to twin engine configuration in 1978; and

(ii) from 1978 onwards, because of non-finalisation of the configuration as also the collaborator."

1.31 The Committee pointed out that the Inter-Services team which had gone into the question had come to the conclusion that there was no viable alternative to the project. The Committee therefore enquired why budgetary allocations could not be made and why the project was allowed to get delayed resulting in cost escalation. The Secretary (Defence Production) replied :

> "Inter-Services Team was one in a series of steps that had been initiated by HAL in the Department of Defence Production with Government to review the resources allocation. The matter was taken to the level of Defence Minister twice. At that time it was decided as to what priority it should be given".

1.32 Further asked whether the Inter-Services Technical Team was associated at every stage, the witness explained:

> "This matter was referred to them and they submitted their recommendation to the three Chiefs of Staff. In the first instance in 1971 the consultations were with the Army and the Air Force. The revision was made in 1974 of the original and it was in full consultation with the three Services."

Change in the concept of the Project

1.33 It is seen from the Audit Paragraph that in April, 1977, the Air Headquarters proposed the substitution of a single-engine by a twin engine configuration. A revised ASR (draft) was issued by the Air-Headquarters in February, 1978 providing for twin-engine configuration. The Committee enquired since when the twin engine aircraft had been in use abroad and when exactly an assessment of their performances became available. The Ministry of Defence stated :

> "From published literature, it is seen that while some twin-engine helicopters were, designed and developed in the late 60s, an assessment of the relative merits specially with regard to survivability in combat roles, became available only from the mid-70s. It may be

added that even single engine helicopters had not been used in a combat role to any significant extent when the feasibility studies for the development of ALH were taken up".

1.34 The Committee further enquired as to why the desirability and necessity of having a twin engine helicopter could not be envisaged at the time of finalising the ASR of 1974. The Ministry of Defence stated :

".....when the feasibility studies for the development of ALH were made, the helicopters had not entered warfare in a combat role to any significant extent. Subsequent developments in warfare saw the helicopters in an effective role in the Vietnam war and the Arab-Israeli war in 1973. By 1975 some assessments of the lessons of Vietnam war appeared in Aviation journals which indicated the possibility of twin engines becoming a mandatory requirement for future combat helicopters. However, there were no authentic confirmatory reports to corroborate this thesis. These became available towards mid 1977 and these were critically re-examined and analysed.

As a result of the studies, further discussions were held between Air Head-quarters, and HAL and a proposal was made to the Steering Committee in September 1977 for a change to twin engine configuration."

1.35 Asked to explain the time gap of about 10 years in the designing and development of twin engine helicopters and in the assessment of their survivability in combt role, the Ministry of Defence stated :

"Both twin engine and single engine helicopters were designed in 1960s. Even the twin engined MI-8 that is in use with the IAF was designed in the 1960s. Employment of helicopters in the combat zone was, however, only limited to the experience of USA in the Vietnam War. But an analysis of the employment of the helicopters in the combat zone was carried out by the United States only in the later stages of the war. It was this analysis which established better chances of survivability of twin engine helicopters over the single engine helicopter. Thereafter, the world trend for armed helicopters has been for a twin engine configuration.

In September, 1970, the French firm had no experience in such deployment of helicopters and would, therefore, not have been in a position to indicate future trends in combat helicopters."

1.36 The Committee further desired to know as to how the Air Headquarters/Ministry of Defence keep themselves abreast of the latest developments in the field of aeronautics equipment, armaments etc. to ensure that outdated technology is not passed on to us by the developed countries. The Ministry of Defence stated :

> "At Air Hqrs. the Scientific Adviser to the Chief of Air Staff keeps in touch with latest developments. The Directorate of Air Staff Requirements is also entrusted with this task. Frequent contacts are also kept with manufacturers and Defence R&D. Visits to air shows abroad have this aspect as one of its major aims."

1.37 The Committee further enquired whether the present case did not indicate the inadequacy of the existing machinery in this sphere and if so, what action has been taken to overcome this lacuna in defence planning. the Ministry of Defence stated :

> "The signing of the 1970 agreement with SNIAS does not fall in the category of outdated technology. The use of helicopter in the combat zone was a new concept and it was still an innovation. No indepth study was available anywhere and no lessons had been drawn from past experiences. The case of the survivability of twin engine helicopters was only proved after the analysis had been made by the USA. Before this the whole concept was theoretical.
>
> The present system is, by and large satisfactory. However, additional measures are being taken, such as regular meetings, seminars on various aspects, R&D bulletins, feed back from air shows, etc."

1.38 The Committee enquired how the Air-Headquarters monitored the changing technological needs for incorporation in indigenous aircraft. The representative of Air Headquarters stated :

> "We have a Directorate of Air Staff Requirement. We try and get into that directorate from the operational side the most experienced people, from the technical side people who not only have field experience but also who are postgraduates, who have done advanced courses. Their main job is to keep in touch with modern development and the trends that set in. We have a scientific adviser to the CAS. These work together. There is also the continuous input that comes out of the seminars and conferences which are held frequently wherein new techniques are discussed by the operational staff. The inter-action between these three generally makes sure that you are monitoring the latest development. As soon as it becomes evident that we need a new product or derivative development, it is taken up

and put in the form of a position paper. Thereafter, we have a regular process. The paper is circulated to all the users who discuss it. Then it is discussed at the PSO's level and Chiefs' level whether such a requirement exists. Therefore, there is a continuous monitoring process to find out what is it that we need specifically."

Extent of Redundancy

1.39 It is seen from the Audit Paragraph that a technical group constituted in May 1978 recommended two alternative engines manufactured by foreign firms 'C' and 'D'. It was also then assessed that the change to twin-engine configuration would result in redundancy of stores etc. to the tune of Rs. 54 lakhs, further increase in the cost of development by Rs.6 crores and a delay of 15-18 months in the final induction of the helicopter. A proposal for a change in the scope of the project at a revised cost of Rs. 35.97-Rs. 37.50 crores (increase of Rs. 8.61 to Rs. 10.14 crores) was submitted in October, 1978.

1.40 The Committee desired to know the break-up of redundant expenditure of Rs. 54 lakhs due to change-over from single engine to twin engine aircraft.

The Ministry of Defence stated:

"Out of Rs. 54 lakhs termed as redundant expenditure the following expenditure was incurred on design work:

1. Helicopter design	Rs. 36.93 lakhs
2. Engine installation Design	5.33 lakhs
	Rs. 42.26 lakhs

This expenditure relates to design effort which has yielded valuable knowledge and experience in helicopter design and which was attempted for the first time. The design nucleus thus formed and the knowledge and experience gained would be helpful in the design and development of a twin engine helicopter. This expenditure should not therefore be treated as redundant.

The balance expenditure was incurred on the following items:

1. Test specimens	Rs. 3.11 lakhs
2. Mockup	Rs. 7.95 lakhs
3. Wind tunnel Models (two)	Rs. 0.98 lakhs
	Rs. 12.04 lakhs

1.41 Asked whether the redundant material had been put to any use, the Ministry of Defence stated:

"The three items listed above and accounting for an expenditure of Rs. 12.04 lakhs are specific to single engine configuration and could not therefore be put to any other use."

Utilisation of facilities available under the agreement with SNIAS.

1.42 The Committee further enquired whether the country had benefitted in any way out of the collaboration agreement involving an outgo of Rs. 54.59 lakhs. The Secretary (Defence Production) stated as follows:

"....Building up of design capacity is a continuing need. The need for designing and development of the helicopter is not extinguished. Now, within the time spent, when certain road blocks were there, we could not proceed further for the first 4-5 years in the absence of the project clearance and in the next 3-4 years for the reason of switch-over from single engine to twin engine configuration. So far as SNIAS is concerned, in the first place, HAL did utilise the training facilities for design and development, in the sense that while we did not reach the production stage, there was considerable inter-action with SNIAS with a view to set up a design facility at Bangalore complex, to the point of developing a mock up and two tunnel models which had been put to test. Besides considerable design work was done for capital and test facilities. This in the circumstances, was a considerable gain during that period."

1.43 Asked whether any experts from SNIAS were associated in the preparation of the first specification selected for the preliminary design in terms of para 3.2 of the agreement with SNIAS, the Ministry of Defence stated:

"After the conclusion of the Agreement and till final meeting held in January, 1974, specialists of HAL and SNIAS were fully associated in preparing the specifications selected for the preliminary design. This was finally discussed in January, 1974, in a joint meeting among SNIAS, Air Headquarters, Ministry of Defence Production and HAL."

1.44 The Committee further enquired whether SNIAS had nominated a Technical Adviser as stipulated in the Agreement and if so how his services were utilised. The Ministry of Defence stated:

"The services of Technical Adviser were utilised in:

(a) Coordination of design concept

(b) Training programme of HAL designers

(c) Preparation of joint feasibility studies and

(d) Preparation of detailed project report through specialists of SNIAS."

1.45 In a subsequent note, the Ministry have furnished the following details of facilities offered by SNIAS, the extent to which these facilities were utilised and with the reasons for their non/partial utilization:—

"Details of area of assistance and percentage utilization are as follows:

DETAILS OF UTILISATION OF SERVICES OFFERED BY M/S. SNIAS AS PER COLLABORATION AGREEMENT

Area of Assistance	Percentage of total assistance	Percentage actually utilised	Percentage shortfall in utilisation
1. Training of Indian Engineers	10	7.5	2.5
2. Assistance in work carried out on Indian Aircraft by Government Team	40	17	23
3. Assistance in establishment of Plant test facilities including:			
—Ground test facilities and in the actual testing of assemblies and endurence testing . . .	15	3	12
—Assistance in the establishment of flight test facilities etc.	10	3	7
—Assistance in productionising the developed aircraft including setting up of service Department	10	..	10
—Other facilities	15	15	..
	100	45.5	54.5

NOTE: In the absence of break-down of services and monetary value thereof in the collaboration agreement it is difficult to indicate the period and value of services actually utilised. Hence, the shortfall in significant areas of training/assistanc provided under the agreement is broadly assessed in terms of percentages as given above.

As regards the reasons for not fully utilising the assistance available in the Agreement, it may be stated that this was largely due to late sanction of the project on account of financial constraints, change in configuration from single engine to twin engines in the light of the experience of use of helicopters in combat role by other countries and consequential modifications in the staff requirements requiring fresh sanction of the project".

1.46. Asked as to how many technical personnel were sent by SNIAS to India and at what cost, the Ministry of Defence stated:

"Thirteen persons were sent by M/s. SNIAS to India during 1972 to 1978 at a cost of Rs. 9.47 lakhs. The following is the yearwise breakdown:—

Year	No. of Personnel	Period in weeks
1972	1	1
1974	2	1
1976	1	2
1977	4	3
1978	3	1

The Managing Director and Technical Director also visited HAL in 1978."

1.47 The Committee asked for the information on the following points:

(i) Number of foreign tours undertaken by the concerned authorities in the Ministry of Defence/Army/Air Headquarters HAL in connection with the project;

(ii) The expenditure incurred on each tour;

(iii) The personnel of each team:

(iv) Places visited; and

(v) Duration of each tour.

1.48. The Ministry of Defence have furnished the following information*:

A. Business Trips undertaken in connection with ALH Project (HBL only)

(i) No. of officials sent/trips undertaken . . . —22

(ii) Total expenditure (Expenditure in foreign exchange Rs. 2.20 lakhs). Rs. 5.27 lakhs

B. Training expenditure for 176 man months . . . . Rs. 12.25 lakhs
(Expenditure in foreign exchange Rs. 9.16 lakhs).
No. of persons sent 29

C. Grand total . . . . . Rs. 17.52 lakhs
(Rs. 5.27+Rs. 12.25 lakhs)
(Expenditure in foreign exchange= Rs. 2.20+Rs. 9.16 lakhs = Rs. 11.36 lakhs).

* Not Vetted in Audit.

1.49. Referring to a clause in the agreement that the pilots will be given 60 hours free flying without charge, the Committee enquired whether the facility was fully utilised. Chairman (HAL) stated:

> "Helicopter test pilots are specifically trained and we at that point of time possessed only one qualified helicopter test pilot. And he was deputed three times for flying not only one type of helicopter but a variety of helicopters in France so that his inputs with reference to such experience could be of use to the Design Bureau."

1.50 Asked whether this pilot had free flying for 60 hours, the Chairman (HAL) stated:

> "If I recall correctly, it was for almost 40 hours....approximately 20 hours, was not utilised."

1.51 The Committee pointed out that transfer of technical data and know-how was an important part of the agreement. The committee, therefore, enquired as to what extent the data and know-how furnished by the foreign firm as per the agreement would be useful in the changed situation. The Secretary, Defence Production replied:—

> "The basic point is, whether all the work that has been done with reference to the requirements of a single-engine concept would still be available for the twin-engine concept. We never got on to the point of creating a prototype. We went on to the stage of preproduction of a wind tunnel model and a mock up. All that has been gained may be useful. But we have not gained all that we could have gained under the collaboration agreement."

1.52 Para 10.2 of the September 1970 Agreement with SNIAS reads as follows:

> "If the Government at any time during the currency of this Agreement desires to suspend the development of the Indian Helicopter and undertake the development of another Helicopter, further payments as laid down in this Agreement shall be stopped and the fees for the new helicopter will be determined after taking into account the payments already received by SNIAS under this Agreement and keeping in view the scope of assistance required for the new helicopter."

1.53 Referring to the aforesaid provision in the Agreement, the Committee enquired why in view of the non-availability of finances the agreement was not suspended and further payment stopped. The Secretary (Defence Production) stated:

> "I may give you an analogy. In about 1974, the Government of India decided that all Civil works in the country shall be held over/

abandoned for the time being. The cost paid for abandoning the works because of financial emergency is incalculable. To abandon a project half-way when the intention was not to abandon it altogether, in my opinion in retrospect also, would have been a total waste....There are two specific stages. One was when the project estimate was made in 1972. It was not turned down for the simple reason that exercises were going on till 1975 to see if alternative resources could be found. Nobody in the Government of India, including the Services, would have agreed to abandon the project which was, if I may say so, a very reasonably purchased know-how. When we go into the next collaboration agreement, it will save time".

1.54. A technical group constituted in May, 1978 recommended two alternative engines manufactured by foreign firms 'C' and 'D' . A revised proposal for a change in the scope of the project, submitted to Government in October, 1978, also envisaged negotiations with the foreign firm 'A' for extension of the 10 year collaboration agreement.

1.55. The Committee desired to know as to why the collaboration agreement was not extended even though there was a provision for its extension for 2 years particularly when HAL had stated in April, 1978 that continued assistance of the foreign firm 'A' would be required even after the conclusion of the collaboration agreement in 1980. The Committee also enquired about the steps taken to ensure that the assistance of the foreign firm 'A' would be available after conclusion of the agreement. The Ministry of Defence stated:

"In accordance with the recommendations of IIIrd and IVth Steering Committee Meetings, while it was agreed in principle to extend the collaboration agreement, the Steering Committee also recommended exploring other consultancies which were favourably disposed to new developments and closer to the futuristic trends. The terms of the agreement for extension by 2 years were such that no new design information would be furnished by SNIAS during this extended period. This would not have helped since HAL had not progressed sufficiently. In view of this, no steps were taken to seek the extension."

Selection of Engine

1.56. The Committee desired to know in what respects the engines manufactured by foreign firm 'C' and 'D' were considered to be better than the existing engine. The Ministry of Defence stated:

"The engines under consideration represent advanced technology and are better from the point of view of size, power rating, weight, fuel consumtion etc."

1.57. Asked about the reasons for delay in selection of the engine and finalization of the agreement, the Ministry of Defence stated:

"Discussions had to be held with prospective reputed manufacturers of suitable engines like Rolls Roye (UK), Pratt & Whitney (Canada) and Turbomeca (France), to obtain design and performance characteristics as well as cost and time schedules. The choice was also dependent on the airframe configuration which in turn would depend on the prospective airframe collaborator like SNIAS, MBB etc. Study Groups constituted for the purpose held discussions and examined the alternative proposals under the overall direction of the ALH Steering Committee. The recommendations of the HAL Committee of Directors on Collaborator for airframe were made in October, 1980, followed by a report on engine evaluation in January, 1981. The collaboration and consultancy proposals are currently being examined by a high level team comprising the Scientific Adviser, Secretary, Department of Defence Production, Financial Adviser to the Defence Services, Vice-Chief of Air-Staff and Chairman, HAL. This team visited France and Germany in May, 1981, and based on their discussions, M/s. Aerospatial of France and MBB of West Germany have submitted detailed proposals in June/July, 1981 which are being examined."

1.58. Asked how long it would take to design and develop a modern technology helicopter and whether the inordinate delay in developing and manufacturing such a helicopter has affected the efficiency of the Defence forces, the Ministry stated:

"The time to develop a modern technology helicopter is dependent on the exact specifications of the customer, design base, technology and the facilities available with the organisation, type of collaboration assistance, etc. With expert collaboration it should be possible to develop modern technology helicopter in about 9 years. The delay in the development and manufacture of ALH has delayed the availability of the weapon system".

1.59. Asked about the state of the project at present the Secretary (Defence Production) stated:

".....In retrospect, it seems that the decision was a good one and something has been gained fortuitously or otherwise and there is a pay off from this involvement—whether it is extension of agreement or it is a new agreement. Rs. 60 lakhs was the total amount spent till last year on the training and know-how. If you were to look at certain exercises to be done today, the cost of such an agreement would be much more. After 1976 uptil now, Rs. 7 to 8 crores have been committed for

capital facilities and you know the price escalation and so on. Added to this, a fresh review today of available facilities in HAL with reference to the current requirement of Air Force for helicopter manufacture etc. may result in some possible savings in the capital cost for HAL which again is fortuitous because to take up 20 year projects for the purpose of meeting the changing requirements is very very difficult."

1.60. Asked whether the Ministry were going ahead with the Project and placing orders with the HAL or the project was being given up for going in for imports, Secretary (Defence Production) stated:

"As far as I could make out the present situation is that the highest level of assessment has two alternative proposals been made and these are now to be considered by Government for a final decision. Pendingl decision of the Government, it seems very unlikely that the Project wil be closed because it is a very vital Project, even in future as of today."

1.61 Asked how long it would take for the first prototype of the helicopter to be flown, the Ministry of Defence stated that the first flight could be expected in about 5 years from 'Go-ahead'.

1.62 In reply to a further question as to when regular production of the holicopter was expected to commence, the Ministry of Defence stated:

"Depending upon the collaboration and the extent of assistance from collaborators both in design, development and production, this could be of the order of 9 to 10 years."

1.63 The Committee enquired whether Government had gone into the detailed reasons for the long delay in developing the helicopter. The Ministry of Defence stated:

"The Government is already seized of the problem. The delays in the design and development of the holicopter were for unavoidable reasons."

1.64 Asked whether the Government could ensure that mistakes of this nature would not be repeated in future, the Secretary (Defence Production) stated:

"With your indulgence, subject to force majeure, you have my assurance. Government is very much concerned about some of these ....."

Achievements of HAL in the field of helicopter technology

1.65 the Committee enquired about the work done by HAL till July 1974 when the ASR was revised. The Chairman, HAL stated:

"Basically, the agreement speaks of a number of actions we had to take in setting up a design and development organisation from scratch. It necessarily calls for recruitment and training of people, setting up test facilities, setting up facilities for prototype manufacture, setting up facilities for material testing etc. We designed and set them up in consultation with and deal with firm SNIAS. The next step performed was essentially to establish what sort of helicopter would eventually be possible. Having done that, we simultaneously recruited people both in India and abroad, trained them and brought them back. So, in the first four years of this period, a lot of work in the nature of setting up of infra-structure went on, leading to the development of wing tunnel models and mock-up. The mock-up itself, though it was in wood, represents the design concepts of structure also.

If today we set out to make a prognostication of what technologies will be needed ten years from now, it can at best be in the nature of goals; it may not be proper to freeze them and treat them as sacrosanct. In the course of the development period, it is not unusual for technologies to develop more rapidly in some areas and less rapidly in others leading to some technology goals being exceeded and some not being met. So, the mid course adjustment and reviews are not very unusual it is done the world over. I don't believe that the change between 1971 and 1974 was anything much more than introducing an additional role and taking stock of what was likely to become available in technological terms, in terms of equipment etc. For this period of three years or so, a lot of training, recruitment, planning for various facilities was done with the help of SNIAS. So, this period was effectively utilized for the sort of work evisaged."

1.66 In reply to a further question regarding progress made till 1978-79 when some major changes were decided upon, Chairman HAL, explained:

"India, in fact, did not have any helicopter design and development capability. The conscious decision to set up such capability means educating people, training them, finding them from abroad also and getting a team of very highly skilled and competent engineers together. In this period of 5-6 years, we did grow from zero to a strength of about 68 trained competent engineers who were ready for a take off. So, this period of four or five years till the project got sanctioned in 1976 was used as a period of creating broad based infrastructural facilities. Once the project sanction was received, then we

proceeded to spend money on setting up of facilities like constructing necessary civil works, services and also developing the concept. So, the paper study was converted into physical hardwares and putting them through wind tunnel tests to verify our concept and also to develop a mock up. But before you can do the foregoing, you have got to ensure that drawing work is done, your estimates of weight, shape and equipment standards is right. The point is that we did not cut metal to make helicopter but were close to being ready to do so."

1.67 The Committee pointed out that HAL were supposed to design, develop and manufacture the helicopter within a period of 10 years to meet the challenges of 1980s. The Committee therefore, desired to know the impediments that came in the way which prevented the HAL from completing the work within the prescribed time limit. The Chairman HAL stated:

"So far as HAL is concerned, the agreement had been signed in September. It had a 10-year tenure, Air Force issued the ASR in May 1971. This was intended as 'draft' for purposes of planning and feasibility, HAL obtained a feasibility report in November, 1971 and the project report/estimates in April 1972. Thus while all the preliminaries were settled in about 18 months, there was a suspense thereafter which lasted until September, 1975 when the project was reinstated in the Defence Plan and sanction issued in February 1976. This period of suspense was however utilised to build up a nodal design organisation, including design work for capital and test facilities, know-how and technical inter-action with the collaborators and updating of the ASR in July, 1974.

1.68 Elucidating the position further, the Secretary Defence Production stated :

"By the time the final clearance was given for twin engine helicopter, HAL had attained the basic expertise. So far as infructuous effort is concerned, it is minimal taking into account the expertise that has been acquired by HAL. This expertise would be equally applicable and useable for a twin engine helicopter. But what we are doing now is that we are not developing the engine. We are developing an airframe. So wherever basic expertise has been gained by HAL under the collaboration would be put to full use in this. Besides, considerable progress had been made in setting up the capital facilities for the project. First of all, it is a question of allocation of resources available. In fact, Rs. 60 lakhs is a very small part of the total cost of development. The total cost of the project was around Rs. 41 crores. I should have mentioned in the beginning that this collaboration agreement was a

rather cheap and very reasonable arrangement for design collaboration. So far as the question of continuing with the single engine helicopter rather than switching on to twin-engine, or continuing both, is concerned the alternative is beyond the capacity of HAL. They could not have two projects of the same magnitude at the same time. The single engine helicopter was in production and it was meeting the requirements of the air force and the navy."

1.69 The Committee desired to know the nature and extent of liaison maintained between the Ministry of Defence, Air Headquarters and the HAL in regard to this project, the representative of Air Headquarters stated :

"Except to monitor the projects which are under development and from the maintenance side, the projects which are under production, we have not direct liaison as such. But the liaison is established as soon as we have a need. For example, if tomorrow we need a combat aircraft, we will get in touch with the HAL designing staff. The first thing we make is a very tentative document air staff target. Unfortunately this system had not been brought in 1969-70 when this project started. Today it is there. This target is discussed with all possible agencies within the country, technical and expert agencies. HAL is very much there in the picture. In fact, many times we consult them and ask them to give us some kind of basic paper on which to build our requirement."

1.70 Elaborating the position further, Secretary (Defence Production) stated :

"Besides each major project of HAL is monitored by a standing steering committee appointed by the Government. The important steering committees are chaired by the Defence Secretary or Production Secretary or the Chief of the Air Staff and senior level representation is there from Air headquarters or any other user that may be involved. The steering committee meets quite frequently."

1.71 Asked whether there was continuous inter-action in this case the representative of Air Headquarters stated :

"Whenever the HAL feel that they have something new, they write to us about that. In fact, the twin engine concept was started by HAL. That kind of dialogue is always there. When we are looking for a new system, we have a direct liaison with the Defence R&D and through them, such a liaison exists with HAL. When HAL meetings take place, the minutes get transmitted to us. But at the conceptual stage we do not have any direct dialogue with HAL."

Design and Development in HAL

1.72 Asked whether HAL had any design and development, bureau, the Chairman, HAL, stated :

"We have a very large aircraft design bureau at Bangalore. We have a helicopter design bureau. We have a very strong deisgn bureau or deisgn department at Hyderabad dealing with the avionics. We have once at Lucknow dealing with other equipments which go into aircrafts. We have a very small product improvements cell at Nasik. We have also accepted very recently a project for developing a small gas-bine engine. We have sanctioned a project for this."

1.73 On an enquiry whether the Chairman, HAL was satisfied with the design and development capabilities in HAL, the Chairman (HAL), stated :

"I am certainly very satisfied with the progress of development at Hyderabad. The effect of this is that every piece of avionic equipment which is going into the Mig 21, Jaguar AN 32 etc. is the result of the development and design unit there. At Lucknow, we have set up a team, it has a very young team but a strong enough team to be able to cope up with the programmes that come our way in the future. We are also using that very team to develop other products for diverse application in other areas such as tanks, tractors etc. The helicopter design bureau has great potentialities in these days but has not uptill now had the opportunity to see that a poduct designed by it is realised. There is a tremendous scope in its further development, its further strengthening and its further use. We have a large body, a strong body of designers. But again because of the lack of continuing projects, the design group has languished. Neither has it had project following a project as it should. It languishes if a project which we start upon, does not get realised. To that extent there is an element of discontinuity in the aircraft design. People who really were design leaders in the times of the Marut and Kiran, in the interregnum have by and large the faded away. We have a very good and strong group of young people who have yet to be blooded if I may use the word, be really taking on a meaningful project. What we are suffering from in the design field is that we could do with more projects of progressively increasing complexity. With that not only would this team be able to give of its best, but would also grow in its strength and overcome its weaknesses. So, to sum up, I would only say that there is need of two or three projects of increasing complexity so that what we learn from one is utilised in the more complex one and succeeding more complex ones. If you will recall, when I was talking on audit para on the Ajit last year, I had made the point that one of the biggest weaknesses in our total system is that though we are working in an area of a knowledge and cost explosion, we are not making the

investments necessary to keep technology current. If today we import technology but do not make the investments that we are needed to develop from this foundation forward, then we are going to be in a sterile situation of repeated imports of technology. I believe that unless we make a beginning in this direction we will for ever remain where we are. It will of necessity have to be a humble beginning but with a commitment to expanding efforts in the field of aeronautics. Such technology development is very very expensive as it virtually has to cover every discipline and to extend knowledge frontiers. To illustrate the point, North Rop—a firm in the United States has been awarded a contract to develop a full wing made out of carbon fibre re-inforced plastic at a value of $ 85 million. This is an investment that the Government of the United States is making in a forward looking technology superimposed upon much larger investments over the past 20 years. Now this is the sort of investment that we have to talk about if we are really talking in terms of developing a design capability which will be able to stand on its own. A new aircraft development has been estimated to cost a thousand crore in the U.K."

1.74 Asked whether any study had been made with regard to the functioning of the Design and Development—Wing in HAL during the last few years, the Chairman, HAL stated :

"An in-depth study is in the process of being done. We have drawn up a perspective plan to give us a forward, 10-year or 15-year look as to the technological and design objectives."

1.75 The Committee further asked whether any indepth study had been carried out as far as the technological capabilities, slippage in the projects undertaken, morale, management and other aspects of the Design and Development Bureau were concerned. The Chairman, HAL stated :

"This is a continual review situation. We have a design policy and a design monitoring committee engaged in this. As I said, it is an every day and a continuing process. We are now engaged as a 7-man committee of directors in considering how best we can re-organize the design operation and strengthen it. We also did this 2 or 3 years ago. The design monitoring committee which consists of five Directors of HAL meets on a month-to-month basis and comes forward with its recommendations to the Board of Directors."

1.76 In reply to a further question regarding the proposals for strengthening the Design Bureau, the Chairman, HAL stated :

"Some preliminary studies were already made. They are now being followed up and they are presently considering how best to apply

our total available resources to new projects. In this connection they are looking at how best to restructure or improve the coordination between the various wings of the Management. For example, the Rajadhyaksha Committee suggested an organisation based on the Russain model of design management which we followed. In the Russian design model, the Design Bureau has totally self-contained facilities. In the context of HAL this is not so. So, while that has been done in the interregnum between 1977 and now there have been modification to this model which was recommended by the Rajadhyaksha Committee.

Presently, as of now, in fact, we have held 3 or 4 meetings of how best to make a hybrid model which will take the best out of the Russian model and the best out of Indian model. We are presently doing this. We are presently having meetings of the committee of Directors. There are six of us who are applying ourselves to this. The results of these deliberations will be implemented as soon as it is completed."

1.77. A 10-year collaboration agreement was entered into in September, 1970 with a foreign firm 'SNIAS' of France for the design, development and production of a helicopter to meet the requirements of the 1980s. The agreement envisaged a payment of US $ 750,000 (Rs. 54.59 lakhs) to the firm in 10 equal instalments. This agreement was assigned to Hindustan. Aeronautics Ltd., a public sector undertaking, for implementation. One of the important factors in entering into agreement with this foreign firm was that in 1962 HAL had commenced production of Alouette III helicopters under licence agreement with the same firm.

1.78. The Committee find that the project could not be accorded sanction for 5-1/2 years after the signing of the agreement on account of constraint of funds. It has been argued that events leading to the armed conflict with Pakistan in 1971 and subsequent developments, resulted in very servere financial constraints necessitating changes in the priorities. Since the Armed Light Helicopter (ALH) project was a long gestation project, involving an expenditure of Rs. 31.84 crores [Rs. 8.80 crores for setting up design facilities and Rs.23.04 crores for development], it was accorded low priority.

1.79. The Committee find that it was only after the delay was highlighted by Audit that the project was finally approved in January, 1976 and sanction issued in February, 1976 by which time the cost had escalated to Rs. 41.05 crores.

1.80. The Committee observe that the final decision to undertake the project was based on the recommendations of the Aeronautics Committee, 1969, headed by Shri C. Subramaniam. The Inter-Services Team only reiterated 5 years later the findings of the Aeronautics Committee. The Committee,

therefore, consider that having already been convinced of the imperative need for an Armed Light helicopter and after having entered into an agreement with a foreign firm for the purpose, the decision to keep the project in abeyance was not quite warranted. The Committee believe that the resources for such a critical project could surely be found through re-appropriation of funds or by effecting savings elsewhere. The Committee deprecate that the project was allowed to languish for 5-1/2 years resulting in huge escalation in costs later. The Committee expect that such instances woull not be allowed to recur.

1.81 The Committee find that the Air Staff Requirements (ASR) 1971 were modified in July 1974 on the basis of the Report of the Inter-services Team. About three years later i.e., in April, 1977 the Air Headquarters proposed the substitution of a single engine by a twin engine configuration. A revised ASR was, therefore, issued in February, 1978 which had the result of a complete change in the project perception. The Committee have been informed that both twin engine and single engine helicopters were designed in 1960s and had been in use. An assessment of the relative merits of the two helicopters particularly with regard to their survivability in combat role had become available as early as in mid 1970s. Subsequent developments in warfare saw the helicopters in effective role in the Vietnam war and the Arab-Israeli war in 1973. Authentic confirmatory reports with regard to the survivability of the twin engine helicopters in combat role became available only towards the middle of 1977 through published literature. It was at this stage that the changeover to twin engine configuration was decided upon.

1.82 Since twin engine helicopters were designed and developed in 1960s, the Committee fail to appreciate on what considerations the Ministry/Air Headquarters opted for single engine helicopters in September 1970—a decision which they were obliged to reverse later. The Committee are therefore led to believe that the Ministry and the Air Headquarters have not been keeping themselves abreast concurrently of the latest developments in the field of helicopter technology in other countries. The Committee consider it unfortunate that a technological gap was allowed to develop and the Ministry of Defence failed to incorporate the advanced technology already available. The Committee deprecate this lacuna in Defence planning with reference to vital projects of this nature. The Committee would suggest that active steps should now be taken to overcome this deficiency.

1.83. The Committee regret to note that while the work on the development project could not be commenced for want of sanction till 1976, there have been heavy shortfalls *vis-a-vis* the yearly allocations even thereafter. Against the budgetary provision of Rs.1039 lakhs for the ALH project during the years 1976-77 to 1980-81 the actual utilisation was only to the tune of Rs. 413.65 lakhs. This is due in the first instance to change over from single

engine to twin engine configuration in 1978 and thereafter because of the continuing search for a suitable engine and a collaborator, for manufacturing the air frame. The Committee thus observe that the project which was initially expected to fructify in the early 1980s is still at the drawing board stage.

1.84 The Committee regret to observe that due to the uncertainties to which the project was subjected over the years, the facilities/services made available to the country under the 10 year collaboration agreement with the French firm could not be utilised to the extent of 54.5%. Thus, the payment of Rs.54.59 lakhs made to the firm was rendered infructuous to a large extent. (Besides, an expenditure of Rs.5.27 lakhs was incurred on business trips undertaken by various officials in connection with the ALH Project). The Committee find that there was an option available to Government to suspend the agreement but the same was not exercised for the reason that the decision was only to suspend the project and not abandon it altogether and also because it was "a very reasonably purchased know-how." The argument is somewhat specious since the Ministry themselves were neither sure about their priorities nor about the precise role which they wanted the helicopter to play. Even the free flying facility which would have provided training to the test pilots was not utilised to the extent of 33%. The explanation given during evidence wa not convincing. The Committee expect that full case will be taken in future for utilising all possible benefits available to Government under any collaboration agreement.

1.85 The Technical Group constituted in May 1978 assessed the redundancy of stores etc. to be of the order of Rs. 54 lakhs as a result of change-over to twin engine configuration Further increase in the cost of development by Rs. 6 crores and a delay of 15-18 months in the induction of helicopter, was also anticipated. However, according to the Ministry, an expenditure of Rs. 42.26 lakhs which relates to desing efforts cannot be considered as infructuous since the design nucleus thus formed and the knowledge and experience gained, would be helpful in the design and development of a twin engine helicopter. In the circumstances of the case the explanation does not appeal to reason. The Committee strongly feel that scarce resources should be put to maximum use and not allowed to be frittered away.

1.86 So far as the cost of development is concerued, the Committee find that it has escalated from Rs.23.04 crores in 1972 to Rs. 27.36 crores in 1976 and still further to Rs.37.50 crores in 1979. The Committee apprehend that the ultimate cost may turn out to be still higher.

1.87 The Committee understand that proposals submitted by two foreign firms for collaboration in regard to the air-frame are still under consideration and a decision in the matter is expected shortly. The Ministry of Defence

expect that the first prototype flight of the proposed twin engine helicopter would be possible in about 5 years from 'go-ahead' and depending upon the collaboration and the extent of assistance available both in design, development and production, regular production of the helicopter would commence within the next 9-10 years. The Committee thus find that the search for a modern helicopter initiated in 1970 to meet the requirements of the 1980s is, according to the present anticipations, not likely to fructify before 1990. The Committee expect that the Ministry would draw suitable lesson from the unfortunate experience in this case and ensure that the new project does not get bogged down the way the present one has been. The Committee have noted the assurance given to them by Secretary, Defence Production that "subject to force majeure, you have my assurance. Government is very much concerned about some of these. The Committee would like to be apprised of the precise steps taken to avoid such costly lapses and delays.

1.88 So far as HAL is concerned, the Committee cannot but emphasise that discontinuity of efforts initiated in a particular area, is bound to effect the morale of the designers and may also be found to be of little help in the changed situation, as in the present case. Such situations must be avoided.

1.89 The Committee understand that indepth studies are being made to evolve ways and means for further improving the Design and Developmot Wing in the HAL and also to find out how far it needs to be strengthened, so as to meet the requirements of 1990s. The Committee cannot emphasise too strongly the need for fuller and sustained utilisation of the capabilities and expertise built up in HAL. To that end, Government must ensure continuity in the execution of projects assigned to HAL which alone can enable it to take on more and more challenging tasks. The Committee would, like to be apprised of the results of efforts made in this direction.

NEW DELHI:
March 8, 1982
Phalguna 17, 1903(S)

SATISH AGARWAL
Chairman
Public Accounts Committee.

APPENDIX

Conclusions and Recommendations

Sl. No.	Para No.	Ministry/ Department concerned	Conclusion/Recommendation
1	2	3	4
1	1.77	Defence (Department of Defence Production)	A 10-year collaboration agreement was entered into in September 1970 with a foreign firm 'SNIAS' of France for the design, development and poduction of a helicopter to meet the requirements of the 1980s. The agreement envisaged a payment of US $ 750,000 (Rs. 54.59 lakhs) to the firm in 10 equal instalments. This agreement was assigned to Hindustan Aeronautics Ltd., a public sector undertaking, for implementation. One of the important factors in entering into agreement with this foreign firm was that in 1962 HAL had commenced production of Alouette III helicopters under licence agreement with the same firm.
2	1.78	-do-	The Committee find that the project could not be accorded sanction for 5¼ years after the signing of the agreement on account of constraint of funds. It has been argued that events leading to the armed conflict with Pakistan in 1971 and subsequent developments, resulted in very severe financial constraints necessitating changes in the priorities. Since the Armed Light Helicopter (ALH) project was a long gestation project, involving an expenditure of Rs. 31.84 crores [Rs. 8.80 crores for setting up design facilities and Rs. 23.04 crores for development], it was accorded low priority.
3	1.79	-do-	The Committee find that it was only after the delay was highlighted by Audit that the project was finally approved in January 1976 and sanction issued in February 1976 by which time the cost had escalated to Rs. 41.05 crores.

1	2	3	4
4	1.80	Defence (Department of Defence Production)	The Committee observe that the final decision to undertake the project was based on the recommendations of the Aeronautics Committee, 1969 headed by Shri C. Subramaniam. The Inter-services Team only reiterated 5 years later the findings of the Aeronautics Committee. The Committee, therefore, consider that having already been convinced of the imperative need for an Armed Light helicopter and after having entered into an agreement with a foreign firm for the purpose, the decision to keep the project in abeyance was not quite warranted. The Committee believe that the resources for such a critical project could surely be found through re-appropriation of funds or by effecting savings elsewhere. The Committee deprecate that the project was allowed to languish for 5½ years resulting in huge escalation in costs later. The Committee expect that such instances would not be allowed to recur.
5	1.81	-do-	The Committee find that the Air Staff Requirements (ASR) 1971 were modified in July 1974 on the basis of the Report of the Inter-services Team. About three years later i.e. in April 1977 the Air Headquarters proposed the substitution of a single engine by a twin engine configuration. A revised ASR was, therefore, issued in February, 1978 which had the result of a complete change in the project perception. The Committee have been informed that both twin engine and single engine helicopters were designed in 1960s and had been in use. An assessment of the relative merits of the two helicopters particularly with regard to their survivability in combat role had become available as early as in mid 1970s. Subsequent developments in warfare saw the helicopters in effective role in the Vietnam war and the Arab-Israeli war in 1973. Authentic confirmatory reports with regard to the surviva-

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			bility of the twin engine helicopters in combat role became available only towards the middle of 1977 through published literature. It was at this stage that the changeover to twin engine configuration was decided upon.
6	1.82	Defence (Department of Defence Production)	Since twin engine helicopters were designed and developed in 1960s, the Committee fail to appreciate on what considerations the Ministry/ Air Headquarters opted for single engine helicopters in September 1970—a decision which they were obliged to reverse later. The Committee are therefore led to believe that the Ministry and the Air Headquarters have not been keeping themselves abreast concurrently of the latest developments in the field of helicopter technology in other countries. The Committee consider it unfortunate that a technological gap was allowed to develop and the Ministry of Defence failed to incorporate the advanced technology already available. The Committee deprecate this lacuna in Defence planning with reference to vital projects of this nature. The Committee would suggest that active steps should now be taken to overcome this deficiency.
7	1.83	-do-	The Committee regret to note that while the work on the development project could not be commenced for want of sanction till 1976, there have been heavy shortfalls *vis-a-vis* the yearly allocations even thereafter. Against the budgetary provision of Rs. 1039 lakhs for the ALH project during the years 1976-77 to 1980-81 the actual utilisation was only to the tune of Rs. 413.65 lakhs. This is due in the first instance to change over from single engine to twin engine configuration in 1978 and thereafter because of the continuing search for a suitable engine and a collaborator, for manufacturing the air frame. The Committee thus observe that the project which was initially expected to fructify in the early 1980s is still at the drawing board stage.

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8	1.84	Defence (Department of Defence Production)	The Committee regret to observe that due to the uncertainties to which the project was subjected over the years, the facilities/services made available to the country under the 10 year collaboration agreement with the French firm could not be utilised to the extent of 54.5%. Thus, the payment of Rs. 54.59 lakhs made to the firm was rendered infructuous to a large extent. (Besides, an expenditure of Rs. 5.27 lakhs was incurred on business trips undertaken by various officials in connection with the ALH Project). The Committee find that there was an option avilable to Government to suspend the agreement but the same was not exercised for the reason that the decision was only to suspend the project and not abandon it altogether and also because it was "a very reasonably purchased know-how." The argument is somewhat specious since the Ministry themselves were neither sure about their priorities nor about the precise role which they wanted the helicopter to play. Even the free flying facility which would have provided training to the test pilots was not utilised to the extent of 33%. The explanation given during evidence was not convincing. The Committee expect that full care will be taken in future for utilising all possible benefits available to Government under any collaboration agreement.
9	1.85	-do-	The Technical Group constituted in May 1978 assessed the redundancy of stores etc. to be of the order of Rs. 54 lakhs as a result of change-over to twin engine corfiguration. Further increase in the cost of development by Rs. 6 crores and a delay of 15-18 months in the induction of helicopter, was also anticipated. However, according to the Ministry, an expenditure of Rs. 42.26 lakhs which relates to design efforts cannot be considered as infructuous since the design nucleus thus formed and the know-

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			ledge and experience gained, would be helpful in the design and development of a twin engine helicopter. In the circumstances of the case the explanation does not appeal to reason. The Committee strongly feel that scare resources should be put to maximum use and not allowed to be frittered away.
10	1.86	Defence (Department of Defence Production)	So far as the cost of development is concerned, the Committee find that it has escalated from Rs. 23.04 crores in 1972 to Rs. 27.36 crores in 1976 and still further to Rs. 37.50 crores in 1979. The Committee apprehend that the ultimate cost may turn out to be still higher.
11	1.87	-do-	The Committee understand that proposals submitted by two foreign firms for collaboration in regard to the air-frame are still under consideration and a decision in the matter is expected shortly. The Ministry of Defence expect that the first protctype flight of the proposed twin engine helicopter would be possible in about 5 years from 'go-ahead' and depending upon the collaboration and the extent of assistance available both in design, development and production, regular production of the helicopter would commence within the next 9-10 years. The Committee thus find that the search for a modern helicopter initiated in 1970 to meet the requirements of the 1980s is, according to the present anticipations, not likely to fructify before 1990. The Committee expect that the Ministry would draw suitable lesson from the unfortunate experience in this case and ensure that the new project does not get bogged down the way the present one has been. The Committee have noted the assurance given to them by Secretary, Defence Production that "subject to force majeure, you have my assurance. Government is very much concerned about some of these." The Committee would like to be appri-

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			sed of the precise steps taken to avoid such costly lapses and delays.
12	1.88	Defence (Department of Defence Production)	So far as HAL is concerned, the Committee cannot but emphasise that discontinuity of efforts initiated in a particular area, is bound to affect the morale of the designers and may also be found to be of little help in the changed situation, as in the present case. Such situations must be avoided.
13	1.89	-do-	The Committee understand that indepth studies are being made to evolve ways and means for further improving the Design and Development Wing in the HAL and also to find out how far it needs to be strengthened, so as to meet the requirements of 1990s. The Committee cannot emphasise too strongly the need for fuller and sustained utilisation of the capabilities and expertise built up in HAL. To that end, Government must ensure continuity in the execution of projects assigned to HAL which alone can enable it to take on more and more challenging tasks. The Committee would, like to be apprised of the results of efforts made 2in this direction.

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22. The English Book Store,
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23. Bahree Brothers,
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29. M/s. Ashoka Book Agency,
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