

# **EIGHTY-SEVENTH REPORT**

## **PUBLIC ACCOUNTS COMMITTEE (1981-82)**

(SEVENTH LOK SABHA)

### **REPLACEMENT OF A BASIC TRAINER AIRCRAFT**

MINISTRY OF DEFENCE



*Presented in Lok Saba on.....*

*Laid in Rajya Sabha on.....*

**LOK SABHA SECRETARIAT**

**NEW DELHI ..**

*March, 1982/Chaitra, 1904 (S.A.K.A.)*

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### PART II\*

Minutes of sittings of the Committee held on:

10-9-1981

23-3-1982

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

## PUBLIC ACCOUNTS COMMITTEE

(1981-82)

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[iv]

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1. Shri H. G. Paranjpe—*Joint Secretary*
2. Shri D. C. Pande—*Chief Financial Committee Officer*
3. Shri K. C. Rastogi—*Senior Financial Committee Officer*

## INTRODUCTION

1, the Chairman of the Public Accounts Committee as authorised by the Committee do present on their behalf this Eighty-seventh Report on Paragraph 7 of the Report of Comptroller and Auditor General of India for the year 1979-80, Union Government (Defence Services) on Replacement of a basic trainer aircraft.

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's examination has disclosed that five and a half precious years were lost in the search for a common trainer aircraft to serve the needs both of the Air Force and civilian users. The Committee have pointed out that lack of adequate coordination and interaction between the Department of Defence Production, the Air Headquarters, the DGCA and HAL has been responsible for the abnormal delay to which the project has been subjected. Meanwhile, there has been a steep escalation in costs. While the developmental cost which was estimated at Rs. 168 lakhs in April, 1975 has gone upto Rs. 537.40 lakhs at 1980 price level, the unit cost of manufacture has gone up from Rs. 6.40 lakhs to Rs. 19.25 lakhs during this period. A more disturbing aspect of the inordinate delay is the demoralising effect on the training of pilots on an ageing, unreliable, and diminishing fleet of aircraft.

4. The Committee have called upon the Ministry of Defence to undertake a comprehensive review of major developmental projects initiated during the last 15 years with a view to ascertaining the reasons for delay in their execution. This review should attempt to correlate the effect of the delays on the morale and combat-worthiness of Defence personnel and the steps that may be necessary to obviate them. This study may also identify the projects which were abandoned half way and the reasons therefor.

5. The Committee (1981-82) examined paragraph 7 at their sitting held on 10 September, 1981. The Committee considered and finalised the Report at their sitting held on 23 March, 1982. Minutes of the sitting 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 Librarys

6. 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.

7. The Committee would like to express their thanks to the Officers of the Ministries of Defence (Department of Defence Production) and Tourism and Civil Aviation for the cooperation extended by them in giving information to the Committee.

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

NEW DELHI;

March 26, 1982.

Chaitra 5, 1904(S).

SATISH AGARWAL

*Chairman*

*Public Accounts Committee.*

## REPORT

### *Replacement of a basic trainer aircraft*

#### *Audit Paragraph*

1.1 Aircraft 'A', built indigenously around an imported engine, was inducted in service in the Air Force in April, 1953 as a basic trainer for imparting *ab initio* training to pilots. In November, 1965, the Air Headquarters (Air HQ) proposed the replacement of aircraft 'A' by 1970 by a more modern one and suggested that a feasibility study be carried out by a public sector undertaking (hereafter 'undertaking'). The Air HQ issued (May, 1968) the Operational Requirement for the aircraft to be developed to replace aircraft 'A'. The feasibility report submitted by the undertaking in February, 1969 envisaged development of an improved version of the existing aircraft 'A' with a more powerful engine. The cost of each aircraft to be developed was then estimated at Rs. 2.30 lakhs and development was expected to take 4 years. The undertaking made certain changes in its feasibility report in May, 1969.

1.2 Meanwhile, the Aeronautics Committee, while observing that the prospects of designing a single piston engine basic trainer aircraft to meet civil and Air Force requirements were not bright, recommended (April, 1969) that the matter deserved a careful study before the undertaking could be allowed to go ahead to develop a new aircraft to replace aircraft 'A'. Thus, the undertaking's proposal was temporarily set aside and the matter of having a common basic trainer aircraft was taken up by the Ministry of Defence with the Ministry of Civil Aviation. The Director General, Civil Aviation (DGCA) who had already designed an aircraft 'A' for civil use requested the Air HQ to give their specification for the *ab initio* trainer. After updating their Air Staff Requirement (ASR) of 1968 to accommodate contemporary changes in the pattern of pilots' training, the Air HQ projected to the DGCA their revised ASR in May, 1971. No joint feasibility study by the Air HQ, the DGCA and the undertaking was, however, taken up at this time.

1.3 In October, 1971, the undertaking intimated the Air HQ that with a view to avoiding duplication in design effort, it would undertake a feasibility study only if the results of evaluation on aircraft 'B' were not acceptable to the Air Force. In November, 1971, a feasibility study of modifying aircraft 'B' (under development) to meet the Air Force requirements was

entrusted to the DGCA. The DGCA informed (December, 1971) the Air HQ that after providing for certain characteristics desired by the Air HQ, aircraft 'B' had been designed to meet more demanding requirements.

1.4 During February—September, 1972, an Air Force aircraft systems testing establishment evaluated 'B' and found that the aircraft fell short of the ASR and required some major modifications to improve its performance. The DGCA intimated (December, 1972) that incorporation of all modifications and improvements could be carried out in about 2 years. However, later in November, 1973, the DGCA suggested that the Air Force should consider inducting aircraft 'B' in its existing form as it met most of the Air Force requirements except cockpit lay-out and its cruise and climb performance. In December, 1973, the DGCA indicated that they had no plans to incorporate the major modifications desired by the Air Force.

1.5 In the evaluation carried out (July, 1974) by the Air Force in association with the DGCA representatives etc., it was found that the performance of aircraft 'B' in its current stage of development fell short of the ASR of 1971 in several respects. The DGCA, however, felt that aircraft 'B' had the basic flying and performance qualities for *ab initio* training both for service and civil requirements and its subsequent prototype to be developed could be fitted with any suitable instrumentation and cockpit layout for the requirement of the Air Force once a decision was taken that basically aircraft 'B' was acceptable for Air Force use.

1.6 Thereafter, no coordinated effort was made for further development of aircraft 'B' to achieve the objective desired by the Aeronautics Committee. Finally in October, 1974, the Air HQ recommended dropping of the proposal for adoption of aircraft 'B' for the use of the Air Force as it did not appear likely that the DGCA would be able to improve significantly aircraft 'B' which was not suitable for Air Force use.

1.7 The DGCA stated (May, 1980) that had aircraft 'B' been accepted in principle as a suitable trainer, the country then would have had an indigenous trainer aircraft to meet the civil and service requirements with the essential modifications needed for a trainer and that this would have saved a lot of unnecessary expenditure in obtaining a trainer from abroad. The DGCA added (January, 1981) that aircraft 'B' had been developed for civil use at a material cost of Rs. 0.55 lakh (labour cost being not separately available) and one prototype produced was given airworthiness certificate, but that regular production of it had not yet been taken up. Thus, even after nine years, the objective of replacement of aircraft 'A' had not been achieved.

**1.8 Design and development of a suitable basic piston trainer aircraft by the undertaking—**

Meanwhile, in March, 1973, the undertaking had informed the Ministry of Defence that supply of spares fabricated by it for aircraft 'A' would continue only up to 1976-77 after which retooling would be necessary and progressive import of different items, raw materials, and rotables would become problematic. In September, 1974, the undertaking was asked to examine the feasibility of designing, developing and manufacture of a basic piston trainer aircraft (aircraft 'C') as per ASR of 1971 to be inducted in service from 1977-78 so that pilot training might not be disturbed in late 1970s. According to the feasibility study carried out (April, 1975) by the undertaking, the design and development cost was estimated at Rs. 168 lakhs (foreign exchange; Rs. 12 lakhs) cost per aircraft was estimated at Rs. 6.40 lakhs (exclusive of profit) at 1974-75 price level. After updating the ASR of 1971 by incorporating further improvements, the Air HQ issued (February, 1976) a revised ASR to the undertaking. Sanction to the development of aircraft 'C' by the undertaking at an estimated cost of Rs. 168 lakhs was accorded by the Ministry of Defence in February, 1976. The first aircraft was planned to be produced and delivered in the fifth year after the 'go-ahead' sanction of February, 1976. The undertaking stated (March, 1978) that deliveries would commence in 1981 provided a production order was immediately placed. By May, 1979, two prototypes had been flown. The third prototype, being built involving complete redesigning, was scheduled to be flown in December, 1980. Besides, one more airframe was also being built to the third prototype standard for carrying out strength stiffness tests once again in view of change in design.

1.9 While reviewing the progress on the development of aircraft 'C', the Air HQ had indicated (May, 1978) that if the development was not accelerated, the only alternative would be to replace aircraft 'A' (being maintained at high costs and accident risks with attendant problems on maintenance) through import. In view of the planned phasing out of aircraft 'A' from 1982 the Air HQ had further stressed (March, 1979) upon the Ministry of Defence the need for induction of aircraft 'C' by 1981-82 so that pilots' training might not be disrupted. The Air HQ added that in the absence of guaranteed performance of this aircraft, production orders on the undertaking could not be placed. The development work was still (October, 1980) in progress. The production order on the undertaking had not yet (October, 1980) been placed by the Air HQ.

1.10 *Cost estimates.*—The project for development of aircraft 'C' originally (April 1975) estimated to cost Rs. 168 lakhs was expected to

cost Rs. 377 lakhs on completion (including an expenditure of Rs. 16.86 lakhs on preliminary design studies and certain additional features incurred by the undertaking from its own funds). This did not include the element of profit payable to the undertaking. Against an expenditure exceeding Rs. 298 lakhs incurred by the undertaking on the project up to end of 1979, reimbursements including provisional payments, aggregating Rs. 283, lakhs were authorised by Government to the undertaking up to January, 1980.

1.11 The increase in development cost was attributed (November, 1979) by the Ministry to the increase in wages, overheads, inadequacy of the provision for escalation and increased development work on first two prototypes to improve the performance and handling. In March, 1978, the undertaking indicated the revised cost of production of aircraft 'C' as around Rs. 8.5—9.00 lakhs (at 1977 price level).

1.12 The search for a suitable basic trainer aircraft to replace trainer aircraft 'A', which commenced in 1965, was yet to materialise (October, 1980) even after a passage of 15 years. In the meantime, the requirement had been met with the existing aircraft which was maintained at a very high cost and which also involved high accident rate. The Ministry of Defence stated (November, 1979) that the time taken in search of a suitable basic trainer aircraft to replace aircraft 'A' was attributable to the following factors:

- the undertaking's proposal (1969) to design and develop a basic trainer aircraft for the Air Force was temporarily set aside till 1974 in view of the recommendation of the Aeronautics Committee (1969) to explore the possibility of having a single trainer aircraft to serve the needs of both the Air Force and the Civil Aviation;
- final rejection of aircraft 'B' by the Air Force was due to failure of the DGCA to modify aircraft 'B' to meet the Air Force requirements despite the earlier assurance that the aircraft would be duly improved; and
- the design and development of aircraft 'C' was entrusted to the undertaking after updating the ASR in February, 1976 in view of the enhanced performance required for 1980s.

Delays at various stages in the development of aircraft 'C', the production of which was yet (October, 1980) to commence, have led to the following:

- estimated cost of the development of aircraft 'C' increased by Rs. 209 lakhs from Rs. 168 lakhs (1975) to Rs. 377 lakhs

(1975) and increased in estimated production cost per aircraft from Rs. 2.30 lakhs (1968) to Rs. 9.00 lakhs (1977);

- necessity of maintaining an ageing aircraft 'A' at high costs and risk due to high accident rate; and
- consequential effect on pilots' training on account of dwindling assets of aircraft 'A' and also delay in availability of a suitable substitute aircraft.

1.13 Production order for aircraft 'C' was yet (October, 1980) to be placed on the undertaking; this would result in slippages in its planned deliveries and possibility of import of a trainer aircraft could not be ruled out. Although the search for a basic trainer aircraft in replacement of existing aircraft 'A' started as early as 1965, the Air Force was still (October, 1980) without a suitable aircraft.

[Paragraph 7 of the Report of C&AG for the year 1979-80, Union Government (Defence Services)]

*Induction of improved version of the basic trainer aircraft*

1.14 The Committee desired to know the life span of aircraft 'A' and the year by which these aircraft were expected to be phased out. Secretary (Defence Production) stated:—

“It had a life of 5,300 hours. The question of phasing out had not arisen at all. The HAL had produced 170 aircraft until 1964 and thereafter the production was practically shut down because all the requirements had been met. There are overhaul cycles both for air-frame and the engine. The Aeronautics Committee said that the existing resources would last for another ten years. The Air Hqs. had thought of a future requirement for which they initiated a dialogue in November, 1965. A letter was written to HAL to say, “We are thinking of a successor to HT-2 in course of time.” That is how the ball started rolling. This aircraft even on present indications, as has been mentioned in the reply to the questionnaire, would last without any major problems for the next three or four years until the new aircraft is in production.”

1.15 Asked to indicate the considerations which prompted Air Headquarters to propose replacement of the aircraft in November, 1965, the Ministry of Defence stated:—

“The objective was to replace Aircraft 'A' if a more modern basic trainer with a powerful engine and better maintenance and

construction characteristics could be developed and inducted into the Air Force.”

1.16 In another note, the Ministry of Defence further stated:—

“With the induction of the indigenously developed and produced jet trainer aircraft HJT-16 (Kiran), it became possible to delete the obsolete intermediate trainer (T-6G) thus sending the cadets directly from the basic trainer to the jet trainer. To make the transaction smooth, it was necessary to update the basic trainer. It was with this in mind that Air HQs. suggested the development of another *ab initio* to replace the aircraft ‘A’.”

1.17 The Committee desired to know whether any studies were carried out and enquiries made from foreign sources regarding the availability of an improved version of basic trainer aircraft and if not, how the broad parameters of the development effort required for the purpose were determined in the first instance. The Ministry of Defence stated:—

“No discussions were held with foreign sources regarding the availability of an improved version of basic trainer aircraft. The *ab initio* aircraft is not a high technology item and the broad parameters could be determined from the expertise already available in the IAF.”

1.18 Asked whether any discussions were held with the DGCA and the HAL prior to mooting the proposal in November, 1965, the Ministry of Defence stated:—

“The proposal of November, 1965 was mooted by Air HQ. so that discussions with HAL could be started. This was just the first step.”

1.19 The Committee desired to know the reasons for the delay of about 2½ years i.e. from November, 1965 to May, 1968 in identifying the changes required in the aircraft and in finalising the operational requirement. The Ministry of Defence stated:—

“In November, 1965, Air HQs. suggested that HAL should undertake a feasibility study for developing a more modern *ab initio* trainer. The aim of this exercise was to induct by 1970 a more modern basic trainer with a powerful engine and better maintenance and construction characteristics if this could be developed. Certain general parameters required are indicated by Air HQs. for conducting such a feasibility study. This communication from Air HQs. was conveyed by the Ministry of Defence to HAL. In response, MD(HAL) suggested in

January, 1966 that it should be feasible to improve the performance of Aircraft 'A' by re-engining it with a new engine and a new propeller. This proposal did not envisage the development of a more modern new piston trainer, but was limited essentially to a re-engining exercise on aircraft 'A'. Some of the improvements desired by Air HQrs. in more modern *ab initio* trainer could not have been achieved with the modification proposed by HAL.

From a perusal of records, it appears that this matter was not specifically pursued further. Later in consultation with HAL, Air HQrs. finalised their operational requirement 1/68 for a successor aircraft to Aircraft 'A'. This OR was issued on 3rd May, 1968. HAL submitted their feasibility report with reference to this OR on 8th February, 1969. The initial projection of Air HQrs. had envisaged "a sturdy under carriage" HAL had proposed a tail wheel in their feasibility study of February, 1969. After examination of this proposal, Air HQrs. *vide* their letter of 15th March, 1969 suggested that it would be appropriate to have a tri-cycle under-carriage for the new aircraft instead of the one proposed by HAL. This was agreed to by HAL on 6th May, 1969.

In other words, the O.R. of May, 1968 was further refined after the receipt of the feasibility study from HAL in February, 1969. The time taken for revising from February, to May 1969 is not unusual in development projects of this nature."

1.20 Elucidating the position further, the Secretary (Defence Production) stated:—

"We covered a part of this when a specific written question was asked earlier. In reply to that question it was stated that the matter was not pursued further. This is not quite correct. The fact is that there was continuous inter-action. It was sometime in November, 1965 HAL was asked. In January, 1966, HAL expressed the possibility and suggested some modifications to the aircraft. In May, 1966, the matter was referred to the Training Command in Bangalore for a detailed evaluation of the feasibility report. A number of suggestions were made by HAL which were discussed. The main question of tri-cycle under carriage was however not resolved until 1968. Ultimately, a decision was taken in May, 1969. Then there was a continuous interaction. November 1965 was a preliminary stage of a dialogue which was timely and worthwhile even though HT-2 was continued to be manufactured until 1963-64."

1.21 Asked about the changes made by the Air Headquarters in the O.R. in May, 1969, the Ministry of Defence stated:—

“The main changes made by the Air Headquarters in the O.R. in May, 1969 was the introduction of fixed tri-cycle (Nose wheel) under-carriage in place of the ‘tail wheel’ type under-carriage proposed in the feasibility report.”

1.22 The Committee further enquired as to why the aforesaid modifications could not be incorporated in the original O.R. The Ministry of Defence stated:—

“The initial projection of Air-HQrs. simply desired a “sturdy under carriage”. After HAL proposed ‘tail wheel’ under carriage as in the case of aircraft ‘A’ Air Hqrs. considered these proposals and suggested a change to ‘nose wheel’ configuration in keeping with the state of art for such trainer aircraft. Such discussions and changes in the process of finalising the ASR are not unusual.”

*Search for a common trainer aircraft for the Air Force and Civil Aviation.*

1.23 During evidence, the Committee invited the comments of the representative of the Ministry, to the following observations made by the Aeronautics Committee in regard to the development of an *ab initio* trainer aircraft for the Air Force:—

“We are sceptical of the prospects of successfully combining the requirements of the Air Force and Civil Aviation for an *ab initio* piston engined trainer aircraft. The Air Force requires a fully aerobatic aircraft which can only be met by acceptable to civilian users. The proposition of designing an aircraft to fulfil both roles, while not impossible will require a compromise specification between the Air Force and the civilian requirements. We would advise a careful study before HAL launches on the project.”

This is what really started the movement. The possibility of DGCA aircraft which was then being developed for their own requirements was examined to see whether something could be done to meet the Air Force requirements as well as the requirements of the Civilians.

1.24 The Secretary (Defence Production) stated:—

“...in retrospect there is certain amount of ambivalence in the Report of the Committee itself. In terms of specifications, roles

and requirements of civil training in a flying club and the training required by a pilot in Air Force are totally different . . . . . The flying clubs have constraints of resources and cater to hobby flying. . . . . The pilots have to get extensive training before they got into the lowest levels of aircraft for civil aviation. . . . . Certain things may have motivated that Committee, after expressing their grave doubts, the Aeronautics Committee said never mind, take a look. I think this was perhaps a lot of time to come to the conclusion that this was not the answer. To be very honest, this seems to be the case."

1.25 Asked why a revised ASR was issued in May 1971 despite the views of the Aeronautics Committee in the matter, the Secretary (Defence Production) stated:—

"The revision was mainly in the nature of liberalisation and relaxation. . . . . It was the intention of the Air H.Q. to see to what extent requirements could be met by scaling down specification to some extent. The indications are that these were aimed at making aircraft acceptance."

1.26 The Committee desired to know whether the pattern of pilot training for the Air Force differed from the training given for pilots on the civil aviation side, the Ministry of Defence stated:—

"Pilot training in the Air Force starts with the basic piston engine trainer. The pupil then moves on the advanced stage on the . . . . . jet trainer. After obtaining the 'Wings' the pupils are sent for their applied training of transport, helicopter, or fighters as required. In Civil Aviation *ab initio* flying training is imparted by the flying clubs. These clubs impart training for PPL (Private Pilots Licence), CYL (Commercial Pilots Licence) and FIR (Flight Instructor's Rating)."

1.27 Asked about the commonality between the two types of training the Ministry of Defence stated:—

"Except for the very basic training when the pupil is introduced to flying, there is very little commonality between the Air Force and Civil flying organisations. While one trains its pilots to use the aircraft as a weapon platform or for operational employment, the other is largely offered to normal commercial type of route flying."

1.28 The Committee desired to know whether there was any country in the world which used a common aircraft for training of civilians as well as defence personnel. The representative of Air Headquarters stated:—

“In the past there had been aircraft like the Chipmunk. In the olden days we used to have Tiger Moth. These aircraft were common on the civilian as well as on the Air Force side. But the training pattern was different. Normally no country has done the training for the civilian pilots as well as the Air Force pilots. The Air Force training is always separate. In those days these aircraft met the requirements of both. In the modern days, by and large, the aircraft developed are separately for Air Force because they have to fly the fighter aircraft also.”

1.29 The Director General (Civil Aviation) stated:—

“But the type of aircraft for *ab initio* flying would be common for civil and Air Force (Military). But thereafter IAF switch over to a far-superior sophisticated aircraft for training. Air Force requirements are totally different. First thirty hours training may be common but thereafter Air Force gets on to a different type of flying. The basics are common but the training becomes different later on.”

1.30 The Committee desired to know whether there was a common training programme for the defence and civilian personnel in any of the advanced countries like U.S., U.K., France, Germany and USSR. The Department of Civil Aviation stated:—

“So far as known to this Department, there is no common established training programme for the civilian as well as Air Force personnel in any of these countries. However as it has happened in India a few times, the possibility of Air Force/Naval Air trainees etc. being sent to Civil Flying Training establishments in other countries for *ab initio* flying cannot be ruled out. Presently Naval Air cadets are being imparted initial flying in 2 Civil Flying Clubs in India viz. Hyderabad and Madras.”

1.31 The Committee were informed in evidence that in the late sixties or early seventies it was decided that the intermediate stage of training should be done away with and the *ab initio* trainer should be compatible with the jet trainer then being manufactured. The Committee desired to know the precise reasons for changing the pattern of training and its implications particularly with regard to the proposal for having a common *ab initio* trainer. The Committee also enquired why in view of this decision, the proposal for a common trainer was pursued at all. The Ministry of Defence stated:

"Fill the early seventies, flying training was imparted on Aircraft 'A' (basic stage), Harvard/T6G (intermediate stage) and Vampire (Advanced stage). Both Intermediate and Advanced trainer aircraft were old, needed replacement. HJT-16, indigenously developed by HAL, was available as replacement. Keeping in view the future AF pilot requirements and economy, it was decided to dispense with the intermediate piston aircraft. The exercises covered in the intermediate stage are now carried out on Kiran aircraft and this stage is named the "Advanced Stage." The exercises covered on Vampire advanced stage are covered on Kiran aircraft and stage renamed as "Applied Stage." It will be seen that only the intermediate/piston trainer aircraft was dispensed with and not the intermediate stage of training. The stage was only re-named as Advanced Stage with same flying syllabus of 80 hours in 22 weeks on Kiran aircraft, instead of the T-6G piston engine aircraft. With the deletion of the intermediate piston trainer aircraft, it was necessary for the basic piston engine trainer to have better performance so that the transition to the jet trainer would be smooth. A requirement for an improved *ab initio* trainer was, therefore, felt. Such a trainer could also have been used for civil flying training, and it is for that reason that the recommendations of the Aeronautics Committee were followed up."

1.32 The Committee further enquired as to how far the revised pattern of training accorded with the pattern followed in other countries. The Ministry of Defence stated:—

"The pattern of training is fairly akin to the pattern being followed in most of the other countries, in that the training imparted at the *ab initio* weeding out stage is on a basic piston or simple jet engine aircraft (the USSR uses the L-29), followed by subsequent training on a jet trainer and further specialised training on the same type or a more advanced type of trainer. The only exception is in case of UK where the Direct Entry trainees (who do not have any previous flying experience) are trained on a jet provost (similar to our HTJ16) from the beginning itself. The other minor differences in the training pattern are mainly in respect of the quantum of flying hours at different stages of

training duration of each stage and the stage at which the trainees are awarded wings/commission."

1.33 In May/June, 1969 the Department of Defence Production requested the concerned authorities viz. the HAL, the Air Headquarters, Ministry of Tourism and Civil Aviation etc. to furnish their comments on the suggestion given by the Aeronautics Committee with regard to a common basic trainer aircraft. Comments received from these authorities are reproduced below:—

(i) *Department of Defence*

"From the Deptt. of Defence, we would agree that if a single *ab initio* piston engined trainer aircraft would meet civil and Air Force requirements, it should be attempted. Air Force operational requirements of the *ab initio* single engined trainer aircraft have been communicated to the Department of Defence Production and HAL. It is for HAL to examine the proposition whether a single *ab initio* piston engined trainer aircraft could be designed to meet both the Air Force and civil requirements."

(ii) *Ministry of Tourism & Civil Aviation*

"The view of the Civil Aviation Department is that though the Revathi will meet the civil requirements as a trainer aircraft, it will not meet the requirements of the Air Force since it does not fall within the aeronautics category."

(iii) *Air Headquarters*

"It would be desirable if a single *ab initio* piston engine trainer could meet civil as well as Air Force requirement. From this point of view REVATHI MK-II aircraft, designed by the Technical Centre of DGCA is being examined by the Air Force.

## (iv) HAL:

"In case REVATHI MK. II is accepted by IAF, HAL can undertake its manufacture. In case it is not accepted by IAF, a joint OR to meet the needs of IAF and Civil Aviation be issued together with anticipated recruitment for feasibility study by HAL."

1.34 The Committee desired to know whether any joint meeting was held to discuss the implications of the recommendations of the Aeronautics Committee before or after formally writing to the concerned authorities to offer their comments on its recommendations and if not, why it was not considered necessary to do so. The Secretary (Defence Production) stated:

"The sequence of events is like this. After the Aeronautics Committee report and after the ASR of 1971, when DGCA was contacted a suggestion was made in September 1971 that Ravathi MK-II could meet the requirements of both the Civil Aviation and Air Force and was expected to meet the requirements of ASR 4/71. The aircraft was offered for evaluation in October, 1971, HAL said that Air Force should first evaluate Ravathi II with or without modifications, to save time and to avoid duplication of efforts. There was an area of uncertainty. The production agency cannot take for granted any major deviation from the ASRs. In the inter-action, with the prototype available if for example, the need was urgent, it is possible that they might have said, "we do not need the tri-cycle undercarriage." In that context, the exercise went on. November 1971, DGCA was asked by AIR Headquarters for feasibility about two major modifications *i.e.* tri-cycle undercarriage and acrobatic capability, and it was stated that HAL will assist in the modifications to be made. In December, 1971 the DGCA confirmed regarding the possibility of an existing plan for a tri-cycle undercarriage and capability for aerobatic manoeuvres. This kind of thing went on for 21/2 years with the idea perhaps possibly the two sides might ultimately come to compromise solutions."

1.35 Asked whether any technical expert from the Air Force was associated with development work so as to fulfil the requirements, the Secretary (Defence Production) stated:—

"Modifications to Revathi II would have meant a totally new design. If I may say so, as early as May, 1972 while the first series of flight evaluation trials were going on it became clear to the Air Headquarters that this aircraft would not, without

very major modification, be able to meet their requirements. The process of evaluation and re-evaluation and cost estimates of modifications went on for another year and a half. But there is evidence, in May 1972 the Air Headquarters hinted while the evaluation trials were going on, "these are the major shortfalls, what do you propose to do." But, somehow, the consensus between the two sides could not be reached for rather a long period of time that this aircraft cannot be modified to meet the requirements."

1.36 Asked about the results of preliminary trails of Revathi Mark II, the Ministry of Defence stated that following shortfalls were noticed:—

- “(a) Shortfalls that would have required minor modifications—
- (i) It was not an all metal construction;
  - (ii) Seats and rudder pedals could not be adjusted;
  - (iii) Warning lights for systems were not provided;
  - (iv) Instrument panel lighting was not provided.
- (b) Shortfalls which required major redesign work—
- (i) Tri-cycle undercarriage not provided;
  - (ii) Inadequate climb, take off and landing performance requiring installation of a higher power engine.”

1.37 Referring to the observations of the D.G.C.A. (December, 71) that “they already had plans for incorporating a tri-cycle undercarriage and expressed confidence that Revathi Mark II was capable of aerobatic manoeuvres”, the Committee desired to know (i) whether the DGCA actually carried out the required modifications and (ii) how they came to the conclusion that Revathi Mark II was capable of aerobatic manoeuvres. The Department of Civil Aviation stated:—

“No. It was found on deeper consideration that the higher speeds and rates of climb called for in ASR 4/71 could be achieved only by redesigning the aircraft to take an engine of about 220—250 H.P. as against one of 145 H.P. fitted earlier. This would have resulted in increased structural weights, increased fuel consumption and consequential rise in operational and maintenance costs apart from higher initial cost of the engine and aircraft. Flying clubs and training institutions on the civil side could ill-afford to bear such increased expenditure. The modification was thus found to be unjustifiable, at least for civil requirements. This view was also reinforced by the rapid rises in fuel costs.”

*Evaluation by Air Craft and Armament Testing Unit*

1.38 During February—September, 1972, an Air Force aircraft systems testing establishment evaluated Revathi Mark II and found that the aircraft fell short of the ASR and required some major modifications to improve its performance. The DGCA intimated (December 1972) that incorporation of all modifications and improvements could be carried out in about 2 years.

1.39 In their Report of 23 October, 1972, the ASTE had *inter alia* concluded that the aircraft failed to meet the ASR in many respects. Its main drawback was the poor equipment standard and layout. In flight, the aircraft had inadequate aileron power for carrying out rolling manoeuvres, poor climb performance and inadequate stall warning.

1.40 The ASTE found the following drawbacks in the aircraft:

“The aircraft lacked adequate stall warning. Its cockpit layout was non-standard. Its performance in climb and cruise performance was poor. The aircraft had inadequate lateral control to carry out rolling manoeuvres. Loops were required to be done at or very near the maximum permissible speeds. Crew comfort was poor due to inability to adjust seats and rudder pedals and due to poor cockpit ventilation. No instrument panel lighting was provided. The aircraft was not provided with a nose wheel.”

1.41 The ASTE recommended that in the present form the aircraft should not be considered for induction in the Air Force and Technical Centre (DGCA) should be asked to implement the following minimum changes before the aircraft could be considered for service use:—

- (a) Provision of adjustable seats and rudder pedals.
- (b) Improved cockpit ventilation.
- (c) Provision of inter-com facility.
- (d) Enhancement of roll power.
- (e) Increase in structural strength to allow greater diving speeds.
- (f) Modification of pitot head so as to have an acceptable level of pressure error of the ASI.
- (g) Installation of equipment required by Air Force in standard service layout in consultation with ASTE.

1.42 Asked whether after the receipt of report from ASTE the matter was referred to HAL to ascertain whether they could carry out the necessary modifications, the representative of Air Headquarters stated:—

“At that stage, no. There has been a slight lack of communication on one aspect. The ASTE whose reports are referring to, had a dual job. There was a request from the DGCA as to whether the Ministry of Defence would make available the services of ASTE to DGCA, on their behalf, to have flight test for their own purpose. Right from the beginning when the decision was taken that we will have a look at it. . . . .”

1.43 Asked as to who took the decision, the witness stated:—

“It was decided by the Ministry of Defence. What we said at that time was that since the ASTE was in any case doing flight evaluation on behalf of the DGCA, on their own, concurrently, they could find out the feasibility of it for the Air Force. They have been using ASTE because they have no flight test facilities of their own.”

1.44 Elucidating the position further, the representative of Air Headquarters state:—

“What we are building up is for the requirements of the Defence Services. But our Government charter says that we will undertake flight test evaluation for the three Defence Services as well as any other agency which may be approved by the Ministry of Defence. The Ministry of Defence had approved the ASTE for helping DGCA. The ASTE was in the process of doing it. Even if the Air Force requirements had not come, the ASTE would have carried the flight test for DGCA for their own use.

These reports of 1972 that you see are reports which are double sided. One is for DGCA for their own development. When they do any trials, they submitted a report. They have first to give a report on the modification done for their own purpose. Then they would compare it again and again with ASR and finally say that it still does not meet the requirements.”

1.45 Asked to furnish his comments in this regard, the Secretary (Defence Production) stated:—

“I would like to re-stress just that point that when ASTE was doing the flight trials, the DGCA's requirements were simple whereas IAF's requirements were a little more. They wanted to make

people ready to jump into faster jet trainer. Therefore, saying that the aircraft is O.K. from flying point of view meant that DGCA's requirement was fulfilled. Commandant ASTE also said that for the Air Force requirement there was a short-fall. This line of differentiation had to be made and it was clarified right in the beginning by DGCA that the requirements of the two Departments were different. This point was perhaps not understood properly. Perhaps this point has been misunderstood and DGCA said "It is OK. Why don't you accept it?"

1.46 In a further note on the subject, the Ministry of Defence have stated:—

"At the time of the receipt of ASTE Report in October, 72 the aircraft 'B' was under development at the Technical Centre of the DGCA. Prior to receipt of ASTE's Reports, DGCA were informed by Air Hqrs. in July, 72 after preliminary assessment of the aircraft about the main design changes that would be required to the aircraft 'B'. DGCA were also informed that HAL had agreed to render assistance to the extent required by their Technical Centre. However, no reference was made to HAL after the receipt of ASTE's Report."

1.47 The Committee pointed out that DGCA had intimated in December, 1972 that all the modifications could be carried out within 2 years. The committee, therefore, desired to know the action taken in the light of above and also whether the matter thereafter was specifically referred to HAL for carrying out the improvements. The Secretary (Defence Production) stated:—

"DGCA had at the same time stated that the question of tri-cycle under-carriage should be considered. When these proposals came, they were considered in the Air Headquarters and they took a view in March 1973. In other words, they did not agree with the proposal. They also said that there was a need for a more powerful engine to improve the climb and roll performance of the aircraft, besides the tricycle under carriage and that is why the modifications could not be carried out. The proposal of December, 1972 of DGCA lists all the modifications that had arisen out of the evaluation results. There is a long list of items and it says finally a decision will have to be taken regarding the suitability of these aircraft for use by the Indian Air Force.

Once the major decision is taken, it would be necessary to assess this task for producing this in quantity...

This list of modifications is there in the feasibility report. Those are the modifications recommended in the Report of the Evaluation team. They also raised the point that the question of under carriage should be reconsidered. In other words, this major modification, which would have necessitated a total re-design of the aircraft was the question mark even at this stage. It was in that context that the Air Headquarters reacted with the view that all the modifications without changing the power of the engine, would not be acceptable and would not meet their requirements.....

As I mentioned, the problem that was hurting DGCA was also the problem hurting HAL. If we had to go through with the tri-cycle under-carriage, it would mean re-designing a new aircraft and not a mere modification. This is the crux of the problem. When we were asked "why not modify this or that"? It was a wishful thinking viz. that the Air Force would some how or the other, be persuaded to drop the basic requirement of the under-carriage. It must have been in that context. Otherwise in retrospect, it is obvious no amount of modification of Revathi-II or MK-II would have solved the problem".

#### *Revision of ASR*

1.48, 1.49 The Committee desired to know as to why DGCA could not indicate earlier than December 1973 that they had no plans to incorporate any major modifications desired by Air Force. The Ministry of Defence stated:—

"In this connection DGCA have stated that the international fuel crisis and steep escalation of fuel prices assumed serious proportions only during the end of 1973. It was found on deeper consideration that the higher speed and rate of climb called for in ASR 4/71 could be achieved only by redesigning the aircraft around an engine of about 220-250 HP against one of 145 HP fitted earlier. This would have resulted in increased structural weight, increased fuel consumption and consequential rise in operational and maintenance costs, apart from high initial cost of the engine and aircraft. It was considered that flying clubs and training institutions on the civil side

could not afford to bear such increased costs. This view was further reinforced by the subsequent increase in fuel prices. It was in this context that DGCA decided in December 1973 not to incorporate any major modifications as desired by the Air Force."

1.50 The Committee further enquired why a joint evaluation by the Air Force, the HAL and the DGCA representatives etc. was carried out only in July 1974 i.e. 7 months after the DGCA had expressed their inability to incorporate the major modifications desired by the Air Force. The Ministry of Defence stated:—

"In November, 1973, DGCA indicated that it would not be able to incorporate the major modification as recommended in the ASTE's Report, as it would have made the aircraft uneconomic for civilian use. However, the acceptance of the aircraft 'B' was still kept under consideration in the larger interest of a common trainer. Air HQ were aware that DGCA was still carrying out certain modifications to the aircraft, including improvements in roll power, etc. In February, 74, they were therefore, asked to offer the aircraft for flight trials. The aircraft was made available only in July, 74."

1.51 In their reply, the Department of Civil Aviation stated:

"So far as the Civil Aviation Department is concerned, in November, 1973 the DGCA had proposed to Air Headquarters that a Committee be constituted to look into the whole question and sort out the problems. Subsequently, a few important improvements/modifications like design and fabrication of all metal flaps and ailerons, etc. were carried out. Thereafter, procedural requirements like getting the aircraft ready for inspection arrangements for securing availability of the test pilots etc. had also to be made".

1.52 The Committee desired to know as to why no coordinated efforts were made even after July 1974 to develop aircraft 'B' further to achieve the desired objective. The Ministry of Defence stated:

"The evaluation brought out that the aircraft 'B' still did not meet the requirements in several important areas; most of the performance figures were short, the roll power, though slightly improved remained inadequate and rolling manoeuvres were difficult to execute. No improvements had been made in the cockpit layout and controls design since the last assessment. The slight improvement in roll power unmasked the fact that

the rudder response was also poor. It was, therefore, felt that not useful purpose would be served by further consideration of the aircraft 'B' and that it would be necessary to terminate the efforts and look elsewhere for requirements of the Air Force."

1.53 In their reply, the Department of Civil Aviation stated:

"DGCA made an offer *vide* their letter No. 5/3/61-RD dated the 26th August, 1974 to the Ministry of Defence that any modifications required could be incorporated in the pre-production models once a decision is taken that the aircraft 'B' is basically acceptable. However, following the submission of the report of the ASTE in September, 1974, presumably Air Headquarters came to the conclusion that Aircraft 'B' was unlikely to be improved significantly and decided to approach HAL for a new sign."

1.54 The Committee desired to know whether DGCA had gone in for production of Revathi II to meet their own requirements Secretary, Ministry of Tourism and Civil Aviation stated:

"The prototype which was designed was found to be satisfactory from the point of view of civilian requirement, that is for the flying clubs. At one stage, the DGCA felt that this could also be utilised by the Defence Ministry. But that fell through between 1971 and 1973. The requirements of civilian aircraft for civilian training purpose is estimated to be of the order of 100. Once we manufacture these 100, presuming that we went in for a production of 100, we will be at the dead-end because the rate of attrition, the rate of loss, the rate of replacement, would be two per annum. Therefore, HAL will be producing at the rate of 25 per year for four years and then there would be a sudden drop in the production programme. Therefore, we do not want to go into production unless, as we hoped, the Defence Ministry and ourselves could jointly go in for productionisation in which case their substantial demands for replacements, their replacements being faster, and our demand which was much less, could have conjointly helped HAL to produce on an even keel. We on our own would not have found it economical to go ahead.

Secondly, the cost of an aircraft which would be acceptable to the Defence Ministry and ourselves would be much beyond the capacity of the flying clubs to buy. Ultimately, as you know, the purchasing power for these flying clubs is provided by us. They are taking subventions from the Ministry. If an aircraft,

as is estimated, would cost Rs. 20 lakhs, nobody would ever buy it which is another reason why we have not been able to go in for productionisation."

1.55 According to the Audit Paragraph the DGCA had stated in May 1980 that had aircraft 'B' been accepted in principle as a suitable trainer, the country then would have had an indigenous trainers aircraft to meet the civil and service requirements with the essential modifications needed for a trainer and that this would have saved a lot of unnecessary expenditure in obtaining a trainer from abroad. The DGCA added in January, 1981 that aircraft 'B' had been developed for civilians at a material cost of Rs. 0.55 lakhs (labour cost being separately available) and one prototype produced was given airworthiness certificate.

1.56 The Committee enquired from the DGCA whether Revathi II could have been used by the Air Force with slight modifications as claimed by them. The DGCA state:—

"The Aircraft which was recommended to the Air Force had its own specifications and the Air Force had its own specifications and there were shortfalls in the aircraft which was presented to the Defence Department to evaluate the aircraft and to see if it meets their requirements. They could point out the shortcomings. It is difficult for me to answer whether they could have used it or not. Their requirements are different than ours. But whatever is available with us, we supplied, but there are certain shortcomings. The Defence Department came to the conclusion that those shortcomings would create certain problems. The aircraft 'B' has a Tail wheel instead of Nose wheel. Whether they could use this aircraft or not, is entirely for the Defence Department to say. But, obviously they could not use it, otherwise they would have accepted it."

*Designing, development and manufacture of aircraft 'C'*

1.57 The Committee enquired why HAL was asked only a September, 1974, to examine the feasibility of designing developing and manufacture of a basic piston trainer aircraft as per ASR of 1971, the Secretary, Defence Production stated:—

"HAL was duly associated at all stage upto September 1974 in view of the possibility of Air Headquarters coming to accept some compromise terms in which case HAL would have taken on the modifications enquired for the development of a new aircraft. As I said the problem was tricycle under carriage, which would have meant redesigning: the other modifications

were not a major consideration because these were analogous to HAL's own projected modifications."

1.58 The Committee further enquired whether at any time before September 1974, HAL had been asked to design the trainer aircraft. The Secretary (Defence Production) stated:

"No. In September 1974, Air Headquarters had finally made up their mind that they would not use Revathi-II. So, HAL was asked to take up feasibility study and indicate the time frame against the revised ASR which was to be issued but without any major modifications. In November 1974, a draft of ASR was conveyed to HAL. In April 1975, the HAL Board took upon itself to sanction some money (Rs. 10 lakhs for the project pending Government sanction)."

1.59 The Committee desired to know the salient features of the ORs/ASRs of 1968, 1971 and 1976. The Ministry of Defence stated:

"The salient feature of the OR of 1968 and ARSs of 1971 and 1976 are listed below:—

	OR 1/68	ASR 4/71	ASR 10/75
(i) Construction	All metal	All metal	All metal
(ii) Take off to clear 15 mat. Max. AUW	230 m	250 m	250m
(iii) Landing to clear 15 m	250m	250m	300m
(iv) Max level speed	250 kmph	250 kmph	250 kmph
(v) Stalling speed	65 kmph	80 kmph	85 kmph
(vi) Initial Rate of climb	300 m/mm.	300 m/mm.	300 m/mm.
(vii) Time to climb to 3500 m	20 min	20 min	15 min.
(viii) Spinning	Recovery within one turn with in 100 m vertical height	Recovery within 1½ turns and with 300 m loss of height	Recovery within one and half turns and within 300 m loss of height.
(ix) Undercarriage	Fixed & sturdy	Tricycle	Tricycle."

1.60 Asked about the major changes in these ASRs, the Ministry of Defence stated:

"Except for the change regarding the under carriage, there was no major change in the ASRs except for marginal relaxations in performance parameters."

1.61 Elucidating the Position further, the representatives of Air Headquarters stated:

"I would like to state that no Air Force in the world can state or foresee requirements with such firmness. We have to go back and forth. There is always a bottle of wits with regard to requirements between the designer and the user. The user can ask for the sky. We have also been blamed for asking too much. What we normally lay down is a general requirement which is later on solidified in consultation with the designer. But it has happened in the case of HAL, and not only with DGCA or Civil Aviation. When we start consulting, we come to feel: "we can withdraw up to a certain stage and make our ASR lenient to some extent; and beyond that, we cannot go." In this case, if you see the ASR table, you will find that we have been more and more lenient. The landing distances are increasing. It means it is more lenient. So, although it appears many a time that we keep on changing the ASR, these changes are made invariably to accommodate the designer to the extent possible."

1.62 Asked why the stalling speed was raised successively from 65 kmph as per OR/68 to 80 kmph in ASR 4/71 and 85 kmph in 10/75 and also the reasons for reducing the time to climb to 3500 m from 20 min in OR 1/68 and ASR 4/71 to 15 min in ASR 10/75, the Ministry of Defence stated:

"The formulation of an ASR does not end with the issue of a document. The process is a continuous evolution where discussions are held with the manufacturers and R&D and certain requirements, which would have been pitched too high or too low, are changed. In the early seventies, when ASRs were first formulated, the stage of the draft ASR on the basis of which discussions are conducted, was not properly annotated. This has created the impression that there have been continuous changes without any justification. Changes to the performance parameters were the result of discussions with industry so that what was feasible could be asked for. These are based on feasibility studies that the manufacturer carries out, and in no way delay the development of the aircraft. The changes in the stalling speed and time to climb should be viewed in this perspective."

*Development of Air-craft 'C'*

1.63 The Committee desired to know the precise progress made with regard to the development of the trainer aircraft 'C'. The Ministry of Defence stated:

"The first prototype was completed by January 1977 and the second by March 1979. Most of the development problems have been resolved and efforts have been made to effect further improvements in regard to performance (rate of climb and time to climb) and spin characteristics. Significant weight reduction has been achieved in the third prototype resulting in improved performance which is being evaluated. The flight development of aircraft 'C' is expected to be completed by May 1982."

1.64. Asked as to when the aircraft 'C' was likely to be inducted in service for training, the Ministry of Defence stated:

"Assuming that the third prototype would meet the essential operational requirements of Air HQRs, the aircraft would be inducted in IAF in 1985-86."

1.65 The Committee enquired why despite having built up a good infra-structure, it had taken such a long time for HAL to develop a simple trainer aircraft. The Chairman, HAL replied:

"There was delay of three months in the first prototype. In the second prototype short-comings relating to spinning characteristic and control performance were removed. Then a static test was done and we realised that the strength available was too large and, therefore, the structure was amenable to reduction in weight. Therefore, third prototype was developed around a reduced weight by about 120 kg and that third prototype did its first flight when the Study Group of the hon. Members was in Bangalore. I am happy to say since then it has flown nine times. From preliminary results of performance it would appear that it now meets the Air Force requirements almost completely. We still are trying for further improvements in the spinning characteristics. This aircraft recovers from a spin very easily. The two characteristics are opposed to one another. If you have a violent spin it recovers much more easily. If it stabilises at a spin then it loses more height. After various experiments, an acceptable aircraft has emerged. We have received the first order from Air Force. . . . They kept the word they would have this aircraft and not import it."

*Cost of Development and Production*

1.66 According to the Audit Paragraph, the estimated cost per aircraft in 1968 was Rs. 2.3 lakhs and it went upto Rs. 9 lakhs in 1977. Asked about the latest estimate of the cost of production of aircraft 'C', the Ministry of Defence have stated:

“The latest budgetary estimate of the production cost at 1980 price level based on a production run of 161 aircraft is Rs. 19.25 lakhs (Excluding profit).”

1.67 Elucidating the position, the Secretary (Defence Production) stated in evidence:

“There is one correction. The figure of Rs. 2.5 lakhs is a mistake. It is not in the cost frame we are talking about. It is a different product based on a modified aircraft. It has no connection with the subsequent cost. The subsequent cost estimates are related to a new design. But rest of increases have taken place because of the level of price escalations. Earlier estimate was at 1977 price level and the latest estimate is at 1980 price level.”

1.68 In a further note, the Ministry have stated that the development cost has gone up from Rs. 168 lakhs (April 1975) to Rs. 537 lakhs (revised estimate were under consideration of Government). The increase in development cost has been essentially due to:—

- “(i) the additional effort and time required to overcome the problems encountered during design and development of the aircraft which were not envisaged earlier.
- (ii) Necessity to build third prototype as against the plan for constructing only 2 prototypes.
- (iii) Construction of the third prototype to lower all up weight involving additional tooling expenditure.
- (iv) Several modifications had to be introduced to improve the characteristics of the aircraft with a view to meeting the Air Staff Requirement to the extent possible.
- (v) Increase in the manhour rate of Rs. 18/- assumed in the project estimates consequent on wage revision, increased overhead and extension of time to a cumulative average of approximately Rs. 28.00 per manhours.

- (vi) The cost of all drawings involved upto type certification now forms part of the development cost which was not included in the original development estimate.

The increase in production cost of aircraft 'C' is mainly due to:—

- (i) increase in manhour rates over the years;
- (ii) escalation in cost of engine and other material, and
- (iii) Increase in amortisation of Deferred Revenue Expenditure. Besides, precise production estimates could not be furnished until the development had been substantially completed. Even though the present estimates cost is higher than the estimated cost given earlier, it may be mentioned that the present estimated cost compares favourably with the landed cost of similar contemporary aircraft produced abroad such as SIAI Marchetti, SF 260MX (Italy) and Volment L-70 (Finland) apart from savings in FE (Foreign exchange)."

1.69 The Committee desired to know the expenditure incurred by HAL and reimbursed by government towards development of this project so far.

The Ministry of Defence stated:

"An expenditure of Rs. 415 lakhs was incurred on the project by HAL upto 30th June, 1981, against which the Government has reimbursed Rs. 358 lakhs."

1.70 The Committee desired to know the measures proposed to be taken to obviate the delays in the execution of such projects. The Secretary (Defence Production) stated:

"In 1974-75 I did, as DADS, a review of certain defence projects. Because of my knowledge of Air Force and of HAL, we undertook reviews of certain major projects with a life span of 15 or 20 years. . . . . This particular case got carried away in the context of the Aeronautics Committee's report. Here, you cannot entirely remedy the situation. I, as DADS had called on the present C&AG when he was Defence Secretary and I had then pointed to the need for very close and continuous co-ordination between the Defence, Defence Production and R&D C&AG would bear me out. Again in the context of what was mentioned yesterday, cognisance has also been taken at the Government level of the fact, that there is need for a longer perspective plan which should take into account the lead times for indigenous development and production to meet the user's requirements in a most cost effective manner."

*Re-engining and Maintenance of the existing trainer aircraft.*

1.71 The Committee desired to know whether the existing number of trainer aircraft available with the Air Force was adequate for training purposes. The Secretary (Defence Production) stated:

“The authorised establishment is at two locations for training purposes, and the holdings are around . . . . . These are expected to meet the requirements. It is true that HAL had, at one stage, told the Air HQs, that it would be impossible to maintain the aircraft beyond a certain point of time. This was perhaps intended at least partly to get the basic decision expedited. Some interim solution has been found for the HT-2 engine which is the major problem and not the air-frame. A few engines may have to be changed. But otherwise the aircraft is capable of being used till 1983-84 when new production would be established.”

1.72 Asked about the extent of reduction in the total quantum of flying because of introduction of the revised training pattern, the Ministry of Defence stated:—

“The details in respect of original, present and the proposed future training pattern for the period 1982—86,, as an interim measure, are appended below. However, this Interim Plan would revert to the present training pattern after 1986 or when sufficient assets of aircraft ‘C’ are available and additional flying training units are established.

	Original pattern	Present pattern	Proposed (Interim pattern) 1982-86	
			1982-86	
Basic	Aircraft ‘A’ 40 h	Aircraft ‘A’ 30 h	Aircraft ‘A’ 30 h	For Army Navy Trainees only.
Intermediate	Harvard/T6G 80 h			
Advanced	Vempire 75 h	kiran 80 h	Kiran 39h Kiran 67 h	100 h
Applied		Kiran 100 h	Kiran 100 h	
Total	195 h	210 h	200 h.”	

1.73 Asked about the precise implications of the revised training pattern *vis-a-vis* the requirements of *ab initio* trainer aircraft, the Ministry of Defence have stated:

“During the interim proposed LTTP(P) from 1982—86, basic training has been eliminated due to unreliability of aircraft ‘A’ and slippages in Aircraft ‘C’ delivery schedule. However, in order to utilise the available aircraft ‘A’ Army and those Navy pilots who are being trained to fly only helicopters will continue to be trained on aircraft ‘A’. About 12 aircraft will be required to meet these pilot’s training requirements. Adequate assets of aircraft ‘C’ would be necessary to implement the post 1986 training plan.”

1.74 In March 1973, HAL had informed the Ministry of Defence that supply of spares fabricated by it for aircraft ‘A’ would continue only upto 1976-77 after which retooling would be necessary and progressive import of different items, raw materials and rotables would become problematic. The Committee pointed out that Members of Study Group II of the Committee during the course of their visit to the Air Force Training Institute, Bangalore were informed that solo flying on aircraft ‘A’ had been stopped, which the Committee felt affected efficiency and training programme. Clarifying the position, the representative of Air Headquarters stated as follows:—

“The problem is lack of spares of certain types. But it could happen even in the case of a brand new car. This particular aspect which we are facing now was not envisaged. But it was a failure because of the certain components in the engine; and that is an imported item which is not available.”

1.75. Asked why the requirement of spares was not envisaged in time—the witness stated:

“The type of harmed spares which are required were known. But if a particular component starts giving some trouble, then we have problems.”

1.76 In January 1966, HAL had suggested that it should be feasible to improve the performance of aircraft ‘A’ by re-engining it with a new engine and a new propeller. This matter was not specifically pursued further. The Committee were informed that HAL had re-engined the aircraft ‘A’ and if the trials were successful some of the aircraft would be modified to

meet the training requirements. Asked as to why the HAL's proposal of 1966 was not pursued further at that time, the Secretary (Defence Production) stated:

“...they had indicated in very general terms that they needed a more powerful and sturdier aircraft with a sturdy under-carriage, HAL made a proposal for an upgraded higher power engine with some amount of strengthening here and there... the use of more powerful engine it was considered later would not by itself solve the problem.”

1.77 Explaining the position further, the Chairman (HAL) stated:

“1966 proposal was related to general updating of aeroplane to meet much later requirements. The present re-engining was a minimum change one. The institute's problem was non-availability of engine cylinder heads. Therefore engine overhaul and repair became rather difficult. We wanted to carry out minimum changes to cope up with maintenance part and liability.”

1.78 Elucidating the position further, the Ministry of Defence stated:

“HAL's proposal to re-engine the aircraft 'A' was not pursued further in 1966, as the aircraft would not have given the overall enhanced performance that was required of a new *ab initio* trainer in view of the changed flying training programme.”

1.79 Asked about the reasons for reviving the proposal, the Ministry of Defence stated:

“The aircraft 'A' engine, because of ageing, has become unreliable and there have been repeated incidents of engine failures. The pupils solo flying has also been stopped because of this unreliability. In spite of various measures, these recurring snags have not been overcome. As a remedial measure aircraft 'A' is proposed to be re-engined.”

1.80 Asked as to when the trials on the re-engined aircraft were expected to be completed, the Ministry of Defence stated:—

“Trials by HAL were completed during September, 1981. Assessment of the performance of re-engined aircraft 'A' by HAL indicates performance of the re-engined aircraft 'A' as similar to that of the pre-mod aircraft.”

1.81 The Committee desired to know also how the aircraft 'A' re-designed by HAL for interim use would meet the requirements of the Air Force. The Ministry of Defence stated:

"Modified aircraft 'A' will enable solo flying by the trainee pilots to be recommended. It would be possible to restore the flying syllabus to 40 hrs. against the present 30 hrs. and to cover the full spectrum of basic stage exercises. It will act as a substitute till aircraft 'C' are available in adequate numbers."

1.82 Asked as to how many of the aircraft 'A' were proposed to be re-designed and at what cost, the Ministry of Defence stated:

"12 aircraft 'A' are proposed to be re-engined at an approximate cost of Rs. 4.84 lakhs for each aircraft exclusively of profits as chargeable by HAL."

*Accident/Incidents on Aircraft 'A'*

1.83 Asked about the rate of accidents/incidents on aircraft 'A' during the last 15 years, the Secretary (Defence Production) stated:

"...I would say that both in absolute terms and in terms of hours flown, the rate of accidents is coming down."

1.84. Elucidating the position further the representative of Air Headquarters stated:

"We cannot explain the rate of accidents in absolute terms. If we do not fly at all, there would be no accident. The more we fly, the more is the risk. Therefore, the accident rate has to be judged on the basis of number of hours an aircraft has actually flown. According to the international standard, it is judged on the basis of 10,000 hours flown by aircraft. In pure terms of number of accidents on the basis of the aircraft being flown more, they may appear to be more. But, when we talk in terms of the flying done, the rate may go down. As I said earlier, in HT-2 the rate has gone down. But the incident rate showed an increase because of the engine failures that we had. It is because of the cylinder-head giving way which causes this. It did affect. We had to change our training pattern. When the pilot force-lands the aircraft, we do not lose the aircraft. We make sure to see that for safety the instructor is there."

1.85. Asked about the effect of not allowing solo flying on the training programme, the witness stated:

“Although they do the dual flying, the instructors do not interfere.

We have adopted a different approach. The instructor is always there. In case of emergency, he takes the authority. That means extra load on the instructor. Your point was whether it could have affect on the flying. The man once gets on to the flying of the Kiran type of aircraft, he gets over that shortfall. We have not had any effect on our input or our output. This we refer to as our Interim plan as an interim measure. When HPT-32 comes up as anticipated there would be no difficulty in putting that in our Air Force training plan.”

1.86 The Committee desired to know the rate of accidents/incidents in which aircraft 'A' have been involved during each of the last 15 years, in terms of hours flown. The information furnished to the Committee shows that the rate of accidents varied from 7.10 (per 10,000 flying hours) in 1966-67 to 0.78 in 1978-79. The rate of incidents is however much higher. It was as high as 70.97 in 1966-67 while the minimum recorded was 16.96 in 1976-77. The rate of accidents/incidents during the years 1977-78 to 1980-81 has been as follows:—

	Rate of	
	Accidents/	Incidents (Per 10000 flying hrs.)
1977-78	3.02	33.20
1978-79	0.78	43.09
1979-80	2.09	22.31
1980-81	1.75	21.03

1.87. The Committee enquired whether the reasons for the high rate of accidents/incidents had been examined in depth and if so, what the findings were. The Ministry of Defence stated:

“Various problems had been encountered with the airframe and aero-engine. These problems had been studied in depth and necessary preventive measures were initiated, or modifications introduced, as and when these problems arose. These problems were even discussed at various levels including the Flight Clearance Committee meetings where members from all concerned agencies, like Air HQrs, HAL, D. Aero, and

DTD&P (Air) were present. After detailed discussions, preventive measures were introduced on priority to overcome the failures.

Various problems in respect of airframe were pertaining to under-carriage, centre section rear spar failure, tail wheel attachment point failure, canopy flying off in air, control pilot static failure etc. In respect of engines, the main problems are engine vibrations/cuts, cylinder head cracks, looseness of studs/nuts, /gas leaks, propeller/crank shaft failures and engine mount failures etc. The airframe problems and some of the engine problems like propeller/crank shaft failure, engine mount failure etc., have largely been overcome after introduction of various checks/STIS and modifications. However, in spite of various preventive measures taken in the past, some of the engine problems like gas leak, cylinder head failure, engine vibrations/cuts still persist.

The persistence of some of the problems is due to the fact that the manufacture of Cirrus major engines ceased about 20 years ago. No development work was being done by the manufacturers on these engines and the spares for them were not available from the prime manufacturers i.e. Rolls Royce or their subsidiaries. However, all efforts are being made to ensure that the engines give trouble free service. Teams of specialists from HAL have also been positioned at the units to carry out necessary checks/preventive measures which are beyond the scope of the unit personnel. In addition to these teams, various other measures taken to overcome the persistent engine problems are as follows:—

- (a) *Cylinder Heads*:—Total technical life of the engines and their components was not laid down earlier. As such, it was decided to replace these cylinder heads with the new ones. Pending receipt of new cylinder heads, the old ones are being subjected to improved method of inspection and servicing overhaul at HAL.
- (b) *Gas Leaks*:—
  - (i) Whenever cylinder heads are removed for checks or replaced due to failures, gaskets are to be replaced mandatorily. These gaskets are not available from the prime manufacturers but are being obtained through other stockists.

Some of them were not upto the mark. HAL have proposed to manufacture these gaskets locally.

(ii) Gas leaks are also due to improper seating of cylinder heads. Bluing check has been introduced to ensure proper seating of cylinder heads.

(c) *Engine Cuts*—Modi/HT-2/162 has been introduced. This mod-calls for introduction of back up fuel pumps collector tank and filter to improve fuel system and ensure positive supply of fuel. Mod/HT-2/166 which calls for better cooling of the engine to avoid overheating of cylinders has also been introduced.

Though some of the engine problems continue, all efforts are being made to overcome these persisting problems. Trials have been carried out on the re-engined aircraft with a new Lycoming engine. The final report of flight test is awaited.”

1.88 The Committee were informed that the reason for the failure of engines of aircraft ‘A’ was the non-availability of certain components which were required to be imported. The Committee desired to know since when the difficulties in obtaining the required components had been persisting. The Ministry of Defence stated:

“Difficulties are being experienced since 1975-76 in overhaul of Cirrus Major engines due to lack of critical spares, such as cylinder head, crank-shafts, etc.”

1.89. The Committee desired to know whether the matter had been examined with a view to fixing responsibility for not envisaging the requirements and arranging for sufficient replacements well in time. The Ministry of Defence stated:

“The matter was discussed in meeting held by the Chief of Air Staff with Secretary (DP) on 25th June, 1980, to overcome the overhaul problem of Cirrus Major engines. Keeping in view the difficulty in obtaining spares throughout the UE period as planned now, HAL launched a project in 1980 for re-engining the Aircraft ‘A’ with a Lycoming engine.”

1.90 Asked about the number of aircraft presently grounded for want of components, the Ministry of Defence stated:

“At present only 3 Aircraft ‘A’ are grounded at FIS, Tambaram, for want of engines.”

1.91 The Committee desired to know the details of major overhauling or repairs to aircraft 'A' required to continue them in service upto 1985-86. The Ministry of Defence stated:

"The present aircraft 'A' cannot be maintained for the following reasons:—

- (i) Ageing.
- (ii) Non-availability of spares.
- (iii) Outdated signals equipment fitted.
- (iv) Unreliability of the Cirrus Major engines presently fitted. The life of type UE of these aircraft has been issued upto 1984."

1.92 The Committee observe that the search to replace HT 2 basic trainer aircraft which had been inducted in service in the Air Force in April 1953 was started as far back as in November 1965 when it was felt that the aircraft needed to be replaced by a more modern one with a powerful engine and better maintenance and construction characteristics. The anticipation at that stage was that it would be possible to replace the aircraft by 1970. With this end in view, the HAL were asked to undertake a feasibility study. The Committee, however find that it took 2-1/2 years merely to identify the changes required and to finalise the operational requirements (OR) for the proposed aircraft and the same was issued on 3 May 1968. It is surprising that it should have taken so long to specify the requirements, considering that this aircraft is stated to be not a high technology item and the expertise was already available in the IAF since the existing aircraft had been built indigenously around an imported engine. The Committee find that further modifications became necessary when instead of "a sturdy undercarriage" initially projected by the Air HQs and a tail-wheel type under-carriage proposed by HAL in the feasibility report of February, 1969 it was decided to have a fixed tri-cycle (Nose wheel) under-carriage. However, development of the basic train aircraft was temporarily set aside in view of the observations made by the Aeronautics Committee (1969) to the effect that the feasibility of having a common basic trainer aircraft to meet the requirements of the Air Force as well as Civil Aviation authorities should be carefully examined. The Committee find that the Aeronautics Committee had pre-faced their recommendation with the remark that they were 'sceptical' of the prospects of successfully combining the requirements of the Air Force and the Civil Aviation since the former required a fully aerobatic aircraft which could only be met by a machine in a price range unlikely to be acceptable to the civilian users.

1.93 The Committee find that it took about 5-1/2 years for the Air Headquarters/Department of Defence Production to come to the conclusion that 'Revathi Mark II' being then developed by the Directorate General of Civil Aviation would not be able to meet the requirements of the Air Force. It is clear from the records made available to the Committee that even initially when the recommendations of the Aeronautics Committee were referred to them for comments, the Ministry of Tourism and Civil Aviation had clearly stated that 'though the Revathi will meet the civilian requirements as a trainer aircraft, it will not meet the requirements of the Air Force since it does not fall within the aeronautics category'. HAL on their part suggested that in case Revathi Mark II was accepted by IAF, HAL could undertake its manufacture. In case it was not accepted by IAF, a joint OR to meet the needs of IAF and Civil Aviation be issued together with the anticipated requirements for feasibility study by HAL. Conceding that the recommendations of the Aeronautics Committee needed in depth examination, the Committee regret to note that the question of finalising a joint OR to meet the requirements of the Air Force and the Civil Aviation for a common trainer aircraft was allowed to get bogged down in routine inter-departmental references and no effort was made to set up a joint machinery to study the feasibility of the proposal about which doubts had already been expressed both by the Aeronautics Committee as well as by the DGCA as to its acceptability to the Air Force. The Secretary, Department of Defence Production deposed that it could be said in retrospect that there was a certain amount of 'ambivalence' in the Report of the Aeronautics Committee and that 'in terms of specifications, roles and requirements of civil training in a flying club and the training required by a pilot in Air Force are totally different.' The Department of Defence Production have further informed the Committee that 'except for the very basic training when the pilot is introduced to flying, there is very little commonality between the Air Force and civil flying organisations. While one trains its pilots to use the aircraft as a weapon platform or for operational employment, the other is largely offered to normal commercial type of route flying.'

1.94 The Committee further note that while the Air Force authorities had decided in May 1969 itself to go in for a trainer aircraft with a tri-cycle undercarriage, it was only in November 1971 that the DGCA were asked to examine the feasibility of two major modifications viz tri-cycle under-carriage and aerobatic capability which in effect would have meant a totally new design. The DGCA on their part confirmed that they already had plans for incorporating a tri-cycle under-carriage and expressed confidence that Revathi Mark II was capable of aerobatic manoeuvres. No efforts in this direction were however made since it was later found on deeper consideration that this would have resulted in increased structural weights, increased fuel consumption and consequential rise in operational

**and maintenance costs apart from higher initial cost of the engine and aircraft which the flying clubs and training institutions on the civil side could ill afford.**

**1.95 The Air Force authorities found in the preliminary trials carried out in May 1972 that Revathi Mark II suffered from several short-falls and would not meet their requirements without major modifications. The proposal of the DGCA made in November 1973 to set up a Committee to sort out the problems, made in the context of their inability to incorporate the desired modifications, appears to have been ignored and the process of evaluation, re-evaluation and estimating the cost of modifications went on for another year without any tangible results. The proposal was finally abandoned in October, 1974.**

**1.96 The Committee would like to express their unhappiness over the fact that five and a half precious years were lost in the search for the elusive common trainer aircraft. The feasibility report prepared by HAL in February 1969 remained in cold storage till September 1974 and the HAL was "Kept waiting" for Government's decision in the matter.**

**1.97 The Committee regret to observe that the authorities failed to take note of the position so plainly stated not only in the Report of the Aeronautics Committee but also by the Ministry of Tourism and Civil Aviation. It is really unfortunate that matters were allowed to drift for such a long time. Secretary, Defence Production stated in evidence that the recommendations of the Aeronautics Committee were taken a little too seriously . . . . We spent a lot of time to come to the conclusion that this was not the answer." The Committee note with dismay the total absence of any sense of urgency in the Department of Defence Production/Air Headquarters even in the fact of a badly felt need. The DGCA are also partly to blame for their failure to examine the cost and feasibility aspect of the proposed modifications at the time the matter was referred to them in November, 1971. Having first given the impression that they had plans to provide the tri-cycle under-carriage, they took two years to inform the Air Force authorities that they had no plans to incorporate the major modifications desired by them.**

**1.98 The Committee are thus led to the conclusion that lack of adequate coordination and inter-action between the Department of Defence Production, the Air Headquarters, the DGCA and HAL has been responsible for the abnormal delay to which the project has been subjected.**

**1.99 Consequent upon the failure to develop a trainer aircraft common to both the civil aviation and Air Force, the HAL were asked in September 1974 to examine the feasibility of designing, developing and manufacturing a basic piston trainer aircraft 'C' (HPT-32) as per ASR 4**

of 1971. Certain changes in the performance parameters based on feasibility studies were incorporated in ASR 10/75 and the new basic trainer aircraft was required to be inducted in the Air Force by 1977-78. The Committee have been given to understand that three proto-types of the new aircraft were developed, the third proto-type did its first demonstration flight on 31 July, 1981 when study Group of the Committee visited HAL, Bangalore. According to latest anticipation the aircraft is expected to be inducted in service only in 1985-86. Meanwhile, the life of the HT-2 aircraft has been extended upto 1984 despite the fact that it has become difficult to maintain these aircraft due to ageing, non-availability of spares, outdated signal equipment and unreliable Cirrus major engines.

1.100 The Committee find that due to inordinate delay in the development of a new piston engine trainer aircraft, there has been a steep escalation in the developmental cost as well as in the unit cost. While the developmental cost which was estimated at Rs. 168 lakhs in April 1975 has gone upto Rs. 537.40 lakhs at 1980 price level, the unit cost of manufacture has gone up from Rs. 6.40 lakhs (1974-75) to Rs. 9 lakhs (1977) and further to Rs. 19.25 lakhs at 1980 price level. According to the Ministry of Defence the present estimated cost compares favourably with the landed cost of similar contemporary aircraft produced abroad apart from the savings in foreign exchange. While this may be so, the fact remains that substantial economies would have accrued had the Ministry taken timely decision in the matter and allowed HAL to go ahead with the development work.

1.101 Apart from the huge escalation in cost that has occurred in this case, a more disturbing aspect of the inordinate delay is the demoralising effect on the training of pilots on an ageing, unreliable and diminishing fleet of aircraft. The Committee understand that the HT-2 aircraft have been involved in a large number of accidents/incidents particularly due to engine failures. Consequently, solo flying by the trainees has had to be stopped. As an interim arrangement, the flying duration at the basic stage has been reduced from 40 to 30 hours. The Committee understand that it would be possible to revert to the normal training pattern only after 1986 when sufficient assets of HPT-32 aircraft are available and additional flying training units are established. The Committee thus that the interim pattern of training does not allow full spectrum of basic stage exercises. This is indeed unfortunate.

1.102 The Committee note that the number of incidents in which HT-2 aircraft has been involved has been quite severe—the rate being as high as 43.09 per 10,000 flying hours in 1978-79. The Committee understand that difficulties are being experienced since 1975-76 in overhaul of Cirrus Major Engines fitted in this aircraft due to lack of critical spares

such as cylinder heads, crank shafts etc. It was with a view to getting over these difficulties that HAL had proposed as early as in January 1966 that it should be possible to improve the performance of aircraft 'A' by re-engining it with a new engine and a new propeller. The matter was however not pursued at that stage since it was felt that an upgraded engine would not by itself solve the problem. The Committee understand that the proposal has since been revived. Trials carried out by HAL in September 1981 to assess the performance of re-engined aircraft showed that its performance was similar to that of the pre-modified aircraft, and it may be possible to allow the trainee pilots to follow the normal flying syllabus of 40 hours of basic stage exercises in solo flying. It is proposed to re-engine 12 aircraft at an approx. cost of Rs. 4.84 lakhs per aircraft exclusive of profits chargeable by HAL. The Committee regret that the proposal mooted as early as in 1966 was not pursued till matters came to a head.

1.103 The Committee expect that this work would be completed without any further hitch so as to ensure that the existing trainer aircraft are put to the optimum use and the training of pilots which had been affected adversely over the last few years is resumed on the normal pattern.

1.104 The Committee would like to point out in conclusion that the present case highlights the need for very close and continuous coordination between the Ministry of Defence/Department of Defence Production, the Defence Research and Development Organisation and the HAL. The Committee have been assured that cognizance has been taken at the government level of the need for long term perspective plan which would take into account the lead time for indigenous development and production to meet the requirements of the users in a manner that would be cost effective. The Committee expect that concrete steps in this direction would be taken without further loss of time.

1.105 In some of their earlier Reports\*, the Committee have dealt with similar cases of undue delays in the execution of developmental projects entrusted to HAL, consequent escalation in costs and infructuous expenditure on procurement of stores/equipment. The Committee desire that the Ministry of Defence should undertake a comprehensive review of major developmental projects initiated during the last 15 years with a view to ascertaining the reasons for delay in their execution (including the delays caused by frequent changes in ORs/ASRs). This review should attempt to correlate the effect of the delays on the morale

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\*33rd Report (7 LS)  
76th Report (7 LS)

and combat-worthiness Defence personnel and the steps that may be necessary to obviate them. This study may also identify the projects which were abandoned half way and the reasons therefor. The Committee would like this study to be entrusted to a high level team consisting of eminent scientists in the field of Defence research as well as high ranking representatives of the three Services and HAL. The Team may be asked to furnish its findings within a year and the same should be reported to the Committee as soon as available.

NEW DELHI;

March 26, 1982.

Chaitra 5, 1904(S)

SATISH AGARWAL  
*Chairman*  
*Public Accounts Committee*

## APPENDIX

### CONCLUSIONS AND RECOMMENDATIONS

S.No.	Para No.	Ministry/Deptt. concerned	Conclusion/Recommendation
1	2	3	4
1	1.92	Defence (Department of Defence Production).	<p>The Committee observe that the search to replace HT 2 basic trainer aircraft which had been inducted in service in the Air Force in April 1953 was started as far back as in November 1965 when it was felt that the aircraft needed to be replaced by a more modern one with a powerful engine and better maintenance and construction characteristics. The anticipation at that stage was that it would be possible to replace the aircraft by 1970. With this end in view, the HAL were asked to undertake a feasibility study. The Committee, however find that it took 2-1/2 years merely to identify the changes required and to finalise the operation requirements (OR) for the proposed aircraft and the same was issued on 3 May 1968. It is surprising that it should have taken so long to specify the requirements, considering that this aircraft is stated to be not a high technology item and the expertise was already available in the IAF since the existing aircraft had been built indigenously around an imported engine. The Committee find that further modifications became necessary when instead of "a sturdy undercarriage" initially projected by the Air HQs and a tail-wheel type under-carriage proposed by HAL in the feasi-</p>

bility report of February, 1969 it was decided to have a fixed tri-cycle (Nose Wheel) under-carriage. However, development of the basic trainer aircraft was temporarily set aside in view of the observations made by the Aeronautics Committee (1969) to the effect that the feasibility of having a common basic trainer aircraft to meet the requirements of the Air Force as well as Civil Aviation authorities should be carefully examined. The Committee find that the Aeronautics Committee had prefaced their recommendation with the remark that they were 'sceptical' of the prospects of successfully combining the requirements of the Air Force and the Civil Aviation since the former required a fully aerobatic aircraft which could only be met by a machine in a price range unlikely to be acceptable to the civilian users.

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Defence (Department  
of Defence production)

The Committee find that it took about 5-1½ years for the Air Headquarters/Department of Defence Production to come to the conclusion that 'Revathi Mark II' being then developed by the Directorate General of Civil Aviation would not be able to meet the requirements of the Air Force. It is clear from the records made available to the Committee that even initially when the recommendations of the Aeronautics Committee were referred to them for comments, the Ministry of Tourism and Civil Aviation had clearly stated that 'though the Revathi will meet the civilian requirements as a trainer aircraft, it will not meet the requirements of the Air Force since it does not fall within the aeronautics category'. HAL on their part suggested that in case 'Revathi Mark II' was accepted by IAF, HAL could undertake its manufacture. In case it was not accepted by IAF, a joint OR to meet the needs of IAF and Civil Aviation be issued

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together with the anticipated requirements for feasibility study by HAL. Conceding that the recommendations of the Aeronautics Committee needed in depth examination, the Committee regret to note that the question of finalising a joint OR to meet the requirements of the Air Force and the Civil Aviation for a common trainer aircraft was allowed to get bogged down in routine inter-departmental references and no effort was made to set up a joint machinery to study the feasibility of the proposal about which doubts had already been expressed both by the Aeronautics Committee as well as by the DGCA as to its acceptability to the Air Force. The Secretary, Department of Defence Production deposed that it could be said in retrospect that there was a certain amount of 'ambivalence' in the Report of the Aeronautics Committee and that 'in terms of specifications, roles and requirements of civil training in a flying club and the training required by a pilot in Air Force are totally different.' The Department of Defence Production have further informed the Committee that except for the very basic training when the pilot is introduced to flying, there is very little commonality between the Air Force and civil flying organisations. While one trains its pilots to use the aircraft as a weapon platform or for operational employment, the other is largely offered to normal commercial type of route flying."

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(Defence Department of  
Defence Production)/  
Tourism and Civil  
Aviation.

The Committee further note that while the Air Force authorities had decided in May 1969 itself to go in for a trainer aircraft with a tri-cycle undercarriage, it was only in November 1971 that the DGCA were asked to examine the feasibility of two major modifications viz. tri-cycle under-

carriage and aerobatic capability which in effect would have meant a totally new design. The DGCA on their part confirmed that they already had plans for incorporating a tri-cycle under-carriage and expressed confidence that Revathi Mark II was apable of aerobatic manoeuvres. No efforts in this direction were however made since it was later found on deeper consideration that this would have resulted in increased structural weights, increased fuel consumption and consequential rise in operational and maintenance costs apart from higher initial cost of the engine and aircraft which the flying clubs and training institutions on the civil side could ill afford.

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(Defence Department  
of Defence Production)

The Air Force authorities found in the preliminary trials carried out in May 1972 that Revathi Mark II suffered from several shortfalls and would not meet their requirements without major modifications. The proposal of the DGCA made in November 1973 to set up a Committee to sort out the problems, made in the context of their inability to incorporate the desired modifications, appears to have been ignored and the process of evaluaion, re-evaluation and estimating the cost of modifications went on for another year without any tangible results. The proposal was finally abandoned in October, 1974.

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The Committee would like to express their unhappiness over the fact that five and a half precious years were lost in the search for the elusive

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common trainer aircraft. The feasibility report prepared by HAL in February 1969 remained in cold storage till September 1974 and the HAL was "kept waiting" for Government's decision in the matter.

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Defence Department of  
(Defence Production)/  
Tourism and Civil  
Aviation.)

The Committee regret to observe that the authorities failed to take note of the position so plainly stated not only in the Report of the Aeronautics Committee but also by the Ministry of Tourism and Civil Aviation. It is really unfortunate that matters were allowed to drift for such a long time. Secretary, Defence Production stated in evidence that the recommendations of the Aeronautics Committee were taken a little too seriously. . . . We spent a lot of time to come to the conclusion that this was not the answer." The Committee note with dismay the total absence of any sense of urgency in the Department of Defence Production/Air Headquarters even in the face of a badly felt need. The DGCA are also partly to blame for their failure to examine the cost and feasibility aspect of the proposed modifications at the time the matter was referred to them in November, 1971. Having first given the impression that they had plans to provide the tri-cycle undercarriage, they took two years to inform the Air Force authorities that they had no plans to incorporate the major modifications desired by them.

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The Committee are thus led to the conclusion that lack of adequate coordination and inter-action between the Department of Defence Production, the Air Headquarters, the DGCA and HAL has been responsible for the abnormal delay to which the project has been subjected.

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Consequent upon the failure to develop a trainer aircraft common to both the civil aviation and Air Force, the HAL were asked in September 1974 to examine the feasibility of designing, developing and manufacturing a basic piston trainer aircraft 'C' (HPT-32) as per ASR 4 of 1971. Certain changes in the performance parameters based on feasibility studies were incorporated in ASR 10/75 and the new basic trainer aircraft was required to be inducted in the Air Force by 1977-78. The Committee have been given to understand the three prototypes of the new aircraft were developed, the third prototype did its first demonstration flight on 31 July, 1981 when study group of the Committee visited HAL, Banga'ore. According to latest anticipation the aircraft it expected to be inducted in service only in 1985-86. Meanwhile, the life of the HT-2 aircraft has been extended upto 1984 despite the fact that it has become difficult to maintain these aircraft due to ageing, non-availability of spares, outdated signal equipment and unreliable Cirrus major engines.

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The Committee find that due to inordinate delay in the development of a new piston engine trainer aircraft, there has been a steep escalation in the developmental cost as well as in the unit cost. While the developmental cost which was estimated at Rs. 168 lakhs in April 1975 has gone upto Rs. 537.40 lakhs at 1980 price level, the unit cost of manufacture gone up from Rs. 6.40 lakhs (1974-75) to Rs. 9 lakhs (1977) and further to Rs. 19.25 lakhs at 1980 price level. According to the Ministry of Defence the present estimated cost compares favourably with the landed cost

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of similar contemporary aircraft produced abroad apart from the saving in foreign exchange. While this may be so, the fact remains that substantial economics would have accrued had the Ministry taken timely decision in the matter and allowed HAL to go ahead with the developmental work.

10 I.101 Defence (Department of Defence Production)

Apart from the huge escalation in cost that has occurred in this case, a more disturbing aspect of the inordinate delay is the demoralising effect on the training of pilots on an ageing, unreliable and diminishing fleet of aircraft. The Committee understand that the HT-2 aircraft have been involved in a large number of accidents/incidents particularly due to engine failures. Consequently, solo flying by the trainees has had to be stopped. As an interim arrangement, the flying duration at the basic stage has been reduced from 40 to 30 hours. The Committee understand that it would be possible to revert to the normal training pattern only after 1986 when sufficient assets of HPT-32 aircraft are available and additional flying training units are established. The Committee thus find that the interim pattern of training does not allow full spectrum of basic stage exercises. This is indeed unfortunate.

11 I.102 -Do-

The Committee note that the number of incidents in which HT-2 aircraft have been involved has been quite severe—the rate being as high as 43.09 per 10,000 flying hours in 1978-79. The Committee understand that difficulties are being experienced since 1975-76 in overhaul of Cirrus Major Engines fitted in this aircraft due to lack of critical spares such as



the lead time for indigenous development and production to meet the requirements of the users in a manner that would be cost effective. The Committee expect that concrete steps in this direction would be taken without further loss of time.

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C. 105

Defence (Department of  
Defence Production)

In some of their earlier Reports\*, the Committee have dealt with similar cases of undue delays in the execution of developmental projects entrusted to HAL, consequent escalation in costs and infructuous expenditure on procurement of stores/equipment. The Committee desire that the Ministry of Defence should undertake a comprehensive review of major developmental projects initiated during the last 15 years with a view to ascertaining the reasons for delay in their execution (including the delays caused by frequent changes in ORs/ASRs). This review should attempt to correlate the effect of the delays on the morale and combat-worthiness of Defence personnel and the steps that may be necessary to obviate them. This study may also identify the projects which were abandoned half way and the reasons therefor. The Committee would like this study to be entrusted to a high level team consisting of eminent scientists in the field of Defence research as well as high ranking representatives of the three Services and HAL. The Team may be asked to furnish its findings within a year and the same should be reported to the Committee as soon as available.

\*33rd Report (7 L.S.)  
76th Report(7L.S).

20. Atma Ram & Sons,  
Kashmere Gate,  
Delhi-6.
21. J. M. Jaina & Brothers,  
Mori Gate, Delhi.
22. The English Book Store,  
7-L, Connaught Circus,  
New Delhi.
23. Bahree Brothers,  
188, Lajpatrai Market,  
Delhi-6.
24. Oxford Book & Stationery  
Company, Scindia House,  
Connaught Place,  
New Delhi-1.
25. Bookwell,  
4, Sant Narankari Colony,  
Kingsway Camp,  
Delhi-9.
26. The Central New? Agency,  
23/90, Connaught Place,  
New Delhi.
27. M/s. D. K. Book Organisations,  
74-D, Anand Nagar (Inder Lok),  
P.B. No. 2141,  
Delhi-110035.
28. M/s. Rajendra Book Agency,  
IV-D/50, Lajpat Nagar,  
Old Double Storey,  
Delhi-110024.
29. M/s. Ashoka Book Agency,  
2/27, Roop Nagar,  
Delhi.
30. Books India Corporation,  
B-967, Shastri Nagar,  
New Delhi.

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